

On (Not) Mattering in Connections: How Geofencing Reinscribes the Exclusions of Logistical Capitalism

**by
Prem Sylvester**

B. Tech. (Information Technology), College of Engineering, Guindy, 2018

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
School of Communication
Faculty of Communication, Art and Technology

© Prem Sylvester 2022
SIMON FRASER UNIVERSITY
Fall 2022

Copyright in this work is held by the author. Please ensure that any reproduction or re-use is done in accordance with the relevant national copyright legislation.

Declaration of Committee

Name: Prem Sylvester

Degree: Master of Arts (Communication)

Title: On (Not) Mattering in Connections: How Geofencing Reinscribes the Exclusions of Logistical Capitalism

Committee: **Chair: Stephanie Dick**
Assistant Professor, Communication

Wendy Chun
Supervisor
Professor, Communication

Alberto Toscano
Committee Member
Term Research Associate Professor, Communication

Armin Beverungen
Examiner
Junior Professor, Organisation in Digital Cultures
Leuphana University of Lüneburg

Abstract

This thesis proposes that the connections made between a networking apparatus and the objects it captures inscribe specific socio-spatially constituted relations that are always already exclusionary of certain other socio-spatialities. Specifically, the connections of logistical media reproduce the incomplete ordering of land, labour, and life that logistical capitalism demands. This thesis develops the concept of the logistical algorithm in order to map how geofencing apparatuses, in their (re)inscription of particular socio-spatial histories and relations, produce incomplete connections. This thesis therefore reads geofencing algorithms and their deployments in/as apparatuses across logistical geographies — namely, the Port of Vancouver, Metro Vancouver, and the Canada-US border. As logistical media, these apparatuses spatiotemporally measure and manage the movement of freight trucks. This thesis therefore asks: what goes into the making of a connection-as-relation, and what might have to be excluded from that making in order to make connections work for logistical capitalism?

Keywords: connection, geofencing, logistical media, trucking, logistical geographies, logistical capitalism

Dedication

To every encouraging voice, every quiet nudge, every loud celebration that may go unnamed

Acknowledgements

I would first like to acknowledge that I live and work on the unceded traditional lands of the Coast Salish peoples, including the səliłwətaʔt (Tseil-Waututh), kwikwəłəm (Kwikwetlem), Skwxwú7mesh Úxwumixw (Squamish) and xʷməθkʷəy̓əm (Musqueam) Nations. Much like the work presented in this thesis, my presence on these lands is tied up with histories and relations of settler-colonialism that cannot be rewritten without the return of stolen land to its traditional caretakers.

My deepest gratitude to my senior supervisor, Wendy Hui Kyong Chun, without whose intellectual and material support this thesis would simply not exist. Thank you for your constant encouragement, precise comments that frequently led me to epiphanies, and your patience with my tendencies to think and write chaotically. Thank you also to my supervisor Alberto Toscano for helping me find the frames and words for my disorganized ideas, and for passing on your sheer volume of knowledge in response to sudden emails and over coffees at Continental. My gratitude and admiration also goes out to the many scholars and faculty at the School of Communication and beyond — Enda Brophy, Svitlana Matviyenko, Kavita Philip, Nicholas Blomley, and Cristina Moretti, among others — who have helped me tremendously along this academic journey. I would also like to extend my thanks to Stephanie Dick and Armin Beverungen who have graciously agreed to be on my committee.

I would like to show my deep respect and admiration for everyone working at the Digital Democracies Institute, where I've found a community of some of the best working and future scholars who have also been wonderful friends and peers. I have learnt more than I can tell by simply being around the team.

I have a fuller life thanks to my people scattered across the world but never far away: friends in India who tether me to places and spaces I could never forget, friends in the US and Europe for whom we wrangle time zones and the annoyances of video calls, and friends I don't get nearly enough time for. My sincere gratitude to the kind and joyful people who have helped me make Vancouver a home this past year. A special thanks to Suranjan and Kevin, who have had my back for longer than I'd ever expected, to Amy, who (literally) opened her home to me, and to Ranjodh and Sahana, who patiently guided me through the strangeness of academia and without whom I would, quite simply, not be here.

To my parents, whose understandable confusion over my abandoning a degree in computer science to pursue the humanities has become encouragement and trust that I will make it in an unforgiving world, my apologies and all my love. To my uncle, whose kindness and support has been invaluable, thank you for believing in me.

Finally, to my love, my light, Shivani — thank you for your patience, your fierce trust in me, and for holding me up when I could've fallen so easily. Thank you for believing in me and my work when I don't, and for taking on the universe for and with me. I am inexpressibly excited to make my life with you.

Table of Contents

Declaration of Committee	ii
Abstract.....	iii
Dedication	iv
Acknowledgements.....	v
Table of Contents.....	vii
List of Figures	ix
Chapter 1. Introduction	1
1.1. What Do Geofencing Algorithms (Re)Inscribe?	2
1.2. Theory and Method.....	6
1.2.1. Literature Review	6
1.2.2. Theoretical Framework.....	13
1.2.3. Method	19
1.3. Parameters of Geofencing: Land and Labour in the Logistical Algorithm.....	24
1.3.1. The Making of Trucking as Logistical Labour.....	24
1.3.2. Land as Socio-Spatial Grounds: The Settler-Colonial Making of Canadian Territory	29
1.4. Thesis Outline	31
Chapter 2. Geofencing at the Port of Vancouver, or, Reinscribing the Exclusions of Truck Turn Time	35
2.1. The Logistical Function of the Port of Vancouver	37
2.2. Geofencing at the Port of Vancouver and the Calculation of Truck Turn Times... ..	44
2.3. How the Port of Vancouver Came to Be, or, How Geofences Got Their Borders. ..	50
2.3.1. Historical Regimes of Use and Improvement of Waterfront Land	51
2.3.2. Transportation Infrastructures and the Making of Urban Vancouver.....	58
2.3.3. Why Border the Port?	63
2.4. Logistical Labour at the Port of Vancouver	68
2.4.1. Dock Work and Trucker Relations, Now and Then	69
2.4.2. Racialization of Logistical Labour as Sociotechnical Control	72
2.4.3. Geofencing's Access to the Movement of Labour.....	75
2.5. Metrics, Improvement, Relations, and the Exclusions of Connection	78
Chapter 3. Truck Trip Planning in Metro Vancouver: What Gets Excluded in Connecting a Regional Logistical Geography?	81
3.1. The Regional Metro Vancouver Logistical Geography	83
3.1.1. Where Do the Trucks Go? Problems of Movement and Location in Metro Vancouver	93
3.2. Geofencing and Truck Routing: Modeling the Regional Logistical Network	94
3.3. How Land Use in Metro Vancouver Writes the Logistical Algorithm.....	103
3.3.1. The Making-Logistical of Metro Vancouver	106
3.3.2. Axes of Socio-Spatial Differentiation in Metro Vancouver.....	109
3.3.3. Geofencing and the Reinscription of Logistical Land Use.....	115

3.4.	The Logistical Labour of Circulation in Metro Vancouver	116
3.4.1.	Warehousing Labour in Metro Vancouver: Making the Regional Assembly Line.....	117
3.4.2.	Classed and Racialized Warehouse Labour in Neoliberal Logistical Capitalism: Flexibilization and Temp-ing as Writing the Logistical Algorithm	120
3.4.3.	The Relations Between Warehousing and Trucking Labour are Broken	124
3.5.	The Logistical Connection is Incomplete	126
Chapter 4. Geofencing at the Canada-US Border and the Dis/Connections of Delay		128
4.1.	Geofencing and the Spatialized Calculation of Time	131
4.1.1.	Delay and Wait Times	136
4.2.	Producing 'Secure Trade' Across the Border.....	140
4.2.1.	PoEs and Regional Logistical Geographies	142
4.2.2.	The Securitization of Border Crossing.....	143
4.3.	Making the Border, Made by the Border: Racialization and Settler-Colonialism in Canadian Border Security	145
4.3.1.	Supply Chains and Transportation Infrastructure Across the Border	145
4.3.2.	Differential Inclusion in the Making of Canadian Borders.....	146
4.3.3.	The Historical Securitization of the Canadian Border.....	148
4.4.	Crossing the Border, Crossed by the Border: The Logistical Writing of Border Security and Logistical Labour Relations	150
4.4.1.	Trucker-BSO Relations, or, the Making of a Border Crossing.....	151
4.4.2.	Racialized Immigrants as Logistical Labour: the Possibilities of Border Crossing	153
4.4.3.	Making Delay/Excluding Delay: Classed and Racialized Labour at the Border.....	157
4.5.	Making the Border (Crossing) Logistical: Geofencing and the Management of Delay	158
Chapter 5. Conclusion		161
5.1.	The Exclusions of (Making) Connections.....	163
5.2.	The Logistical Algorithm Elsewhere.....	165
5.3.	(A)Social Media as Logistical Media?	166
References		169

List of Figures

Figure 1. Port of Vancouver (n.d.) jurisdictional map	38
Figure 2 KPIs significant for the Port of Vancouver’s supply chain performance, as drawn from Ireland (2005, 93)	43
Figure 3. The marked geofences, from L-R, indicate the Centerm and Vanterm terminals, respectively. The yellow zones indicate the staging areas, while the longer green stretches indicate the truck routes leading upto the port. Reproduced from Port of Vancouver (2014)	44
Figure 4. Fraser Surrey Docks	45
Figure 5. Deltaport	45
Figure 6. Vanterm and Centerm geofences. Reproduced from The Tiago Group (2013)	46
Figure 7. Fraser Surrey Docks (L) and Deltaport (R) geofences. Reproduced from The Tiago Group (2013)	46
Figure 8. Reproduced from Stanger-Ross and Landscapes of Injustice Research Collective (2016)	53
Figure 9. Vancouver land use in 1970. Reproduced from Griggs (1970, 141)	55
Figure 10. Reproduced from East Vancouver Port Lands Working Group (2007) ..	57
Figure 11. Reproduced from Griggs (1970, 188)	74
Figure 12. Drayage and Transload Facilities in Metro Vancouver. Sourced from Friedman and Basilij (2020)	84
Figure 13. Sourced from Davies (2006)	88
Figure 14. Logistics sprawl in Metro Vancouver. Sourced from Woudsma and Jakubicek (2020)	88
Figure 15. Warehouse distribution outward from Vancouver. Sourced from Oliveira, Schorung, and Dablanc (2021)	89
Figure 16. The Major Road Network in the Lower Mainland. Sourced from TransLink (2018)	90
Figure 17. Truck traffic across the Lower Mainland. Sourced from TransLink (2017)	91
Figure 18. Route planning with TransLink’s Commercial Vehicle Route Planner app	98
Figure 19. Geofenced areas of significant container activity in the Metro Vancouver region. Note that these align with the presence of ports and airports, as well as warehouses across the region	99
Figure 20. Individual truck trip through geofenced areas of significant container activity in the Metro Vancouver region	99
Figure 21. Aggregated truck travel patterns across the Metro Vancouver region (the thickness of lines indicate the frequency of that trip)	100
Figure 22. The truck trip tool used to track all the carrier’s trucks’ positions and their status with respect to the completion of a trip, or a leg of the operation. Sourced from Payne and Payne (2014)	100

Figure 23. The truck trip tool used to track individual trucks' positions and their status with respect to the completion of a trip, or a leg of the operation. Sourced from Payne and Payne (2014)	101
Figure 24. Depiction of how geofencing is used to plan a truck route down to the finest detail — the circular areas marked on the interface are the geofences used to mark the exact route taken during the trip. Sourced from Payne and Payne (2014)	101
Figure 25. The Job Dispatch screen which describes the truck trip, its origin and destination, and assigns the trip to a particular trucker. Sourced from Payne and Payne (2014)	102
Figure 26. Immigrants' geographical distribution in Metro Vancouver as of 1971. Sourced from Hiebert (1999)	112
Figure 27. Immigrants' geographical distribution in Metro Vancouver as of 1971. Sourced from Hiebert (1999)	112
Figure 28. Immigrants' geographical distribution in Metro Vancouver as of 1986. Sourced from Hiebert (1999)	113
Figure 29. Immigrants' geographical distribution in Metro Vancouver as of 1986. Sourced from Hiebert (1999)	114
Figure 30. Indo-Canadian geographical distribution in Metro Vancouver as of 1991. Sourced from Walton-Roberts (1998)	114
Figure 31. Border crossings between British Columbia, Canada and Washington, USA. Sourced from Government of British Columbia (n.d.)	129
Figure 32. Major commercial border crossings between Ontario, Canada and Michigan, USA. Sourced from CBC News (2022)	130
Figure 33. Freight trucks' passage through a PoE. Reproduced from Haughton and Isotupa (2012)	132
Figure 34. Geofences at Ambassador Plaza. Reproduced from McCord, Brooks, and Banach (2016)	133
Figure 35. Geofences at Ambassador Plaza. Reproduced from McCord, Brooks, and Banach (2016)	134
Figure 36. Geofences at Blue Water Bridge. Reproduced from McCord, Brooks, and Banach (2016)	134
Figure 37. Geofences at Blue Water Bridge. Reproduced from McCord, Brooks, and Banach (2016)	135

Chapter 1. Introduction

There is no networking without a connection. As modes of sociotechnical relation, connections are seemingly ubiquitous. In the neoliberal image (and imagination) of the world, the network brings actors and agencies together through its connections. Such connection, however, is no simple 'thing' that draws a line between subject and object, tracking and tracked, power and the disempowered. A connection is more accurately the production of relations via a heterogeneous mix of socio -technical, -political, and -cultural data, devices, instruments, regimes, infrastructures, and processes that are assembled into what resembles a singular object (Chun 2016). However, in making these connections technically possible, these very conditions of possibility seem to disappear into the blank spaces of the network (Chun 2021). The productive forces that condition the matter of connection-as-relation are excluded from the connection itself.

This thesis investigates and analyzes precisely these apparently missing pieces of what makes a connection, these "constitutive exclusions" (Barad 2007). In particular, the connections made between a networking apparatus and the objects it captures inscribe specific socio-spatially constituted relations that are always already exclusionary of certain other socio-spatialities. Logistical media (Rossiter 2016) act as particularly useful analytical objects for this claim. The connections of such networked media apparatuses reproduce the spatiotemporal orientations and incomplete ordering of land, labour, and life that logistical capitalism demands (Harney and Moten 2021). In particular, this thesis examines geofencing apparatuses as logistical media that spatiotemporally measure and manage the movement of freight trucks across logistical geographies.

Geofencing remains an underappreciated deployment of location-based media technologies. By embedding a (static or dynamic) digital perimeter or 'fence' in a real-world geographical space (Namiot 2013), geofencing can be used to detect a mobile object's proximity to the geofenced area and determine that object's relation to that space. This functions as an algorithmic "semi-continuous monitoring" of space (continuous outside the geofenced space and discrete within it) (Oliveira et al. 2015). Geofencing is hence especially useful for tracking and tracing systems that enable the planning, organization, and control of logistical processes, such as fleet and freight movement through supply chains and their various constituent 'linkages' (van Dorp 2002). Deployed

as locative media, then, geofencing is among *the* “media of logistics” (Rossiter 2016, 8). The productive coordinates for geofencing apparatuses — where commodity movements come to matter for the actors who deploy logistical media — are those of the apparatuses’ dis/connection with the object of interest: when the truck crosses the geofence.

1.1. What Do Geofencing Algorithms (Re)Inscribe?

Geofencing describes the movement of an object with respect to delimited geographical areas, specifically, when that object crosses the geofence’s border — enters or exits the geofenced area. It is a proactive location-based technology that, through what is typically described as a Location Monitoring Unit (LMU) located within the geofencing apparatus, can record and (periodically) transmit spatiotemporal data to the actor that deploys the technology (Modica et al. 2018; Namiot 2013). It is deployed to track mobile objects through their spatiotemporal relation — position — to the borders of geographical areas via “hybrid positioning technologies, which use a combination of GPS, WiFi, and Cell-Id positioning” (Küpper, Bareth and Freese 2011), and to the systemic relation of that object to that geography. As such, geofencing apparatuses necessarily presume representational correspondence between that mobile object and a subject moving through space; they presume movement which is open to access when desired. The delimitation of space in which geofencing is deployed is furthermore marked by geometric or symbolic “addressing”, in which the borders of the geofence are described in terms of shape or, more typically, through reference to an assigned geographical address, or latitude-and-longitude-based position (Garzon and Deva 2014). Geofencing algorithms require “the representation, collection and indexing of geospatial geometric shapes” (Modica et al. 2018) which are based on the marking out of geographical space by social actors endowed with such power.

Simultaneously, the operation of geofencing translates the relations between space and subject to strictly technical connection between networking objects, i.e., the LMU and an on-board data unit (OBDU) situated on the tracked mobile object, or trackee (Greenwald et al. 2011; Reclus and Drouard 2009). Described as Machine-to-Machine (M2M) data processing systems (Modica et al. 2018), geofencing proceeds through background tracking (Garzon and Deva 2014), where the technical relationality — the connection — is active in the background of the social relations the apparatus sets up, while the social

context is not readable in the relations of tracking. Geofencing accords the actor that controls the geofenced space and that institutes the apparatus the power to define the set of relations between itself and the mobile object, grounded in the space of interest to that actor. The bordering of space which is fed into the geofencing algorithm also helps that actor define access to that space in terms of the mobile subject's access to it (Reclus and Drouard 2009), producing a relational differential inclusion of the subjects moving through geofences. That actor therefore assumes some regulatory interest in the space in which geofencing is deployed — either as property-owner, or otherwise interested in tracking and regulating movement through that space. A geofence therefore “*constitutes a spatiotemporal condition*” (Garzon and Deva 2014; emphasis added): it works through the definition of socio-spatial relations by the social actors invested in tracking the mobile subject via the space they move through.

Geofencing also works through the temporal aspect of motion. The position of the trackee is not only recorded in terms of the spatial coordinates of the geofence's segment which that object crosses, but with the timestamp of that crossing (Namiot 2013). Furthermore, the motion of the tracked object can be recorded across space through temporally linked geofences, so that what is of consequence is the duration of the object's presence within a geofence and its transition between those geofences — the direction of which indicates the “temporal order” of the tracked motion (Garzon and Deva 2014). The temporality of geofencing is therefore read as the duration of when a connection is active, when there is an open relation between the tracker and tracked, LMU and OBDU. This temporality is oriented towards the server, or the LMU, that functions as the central component of the tracking infrastructure while managing multiple mobile objects (Greenwald et al. 2011). Geofencing apparatuses mark time with reference to the spaces in which they are deployed to track movement.

The (capitalist and State) actors that set up geofences throughout the supply chain can organize commodity movement with respect to those spaces of tracking. They can plan the tender and dispatch of shipments in real time, respond to exceptional changes in routes, track delivery fulfillment, plan and schedule truck routes, and otherwise manage truck fleets. Route matching for example, which is the backbone of location-based logistical planning, relies on “the timestamps of the collected geographical points, or on the estimation of the collected geographical points, or on the estimation of the cruising

speed of the device” (Modica et al. 2018). The installation of M2M-supporting nodes — OBDOs in pallets, containers, and trucks at one end and LMUs by warehouse operators, port authorities, and supply chain business associations at the other — are intended to support the definition and management of socio-spatial relations at critical points all along the chain (Modica et al. 2018; Reclus and Drouard 2009). Geofencing, then, mediates these relations spatiotemporally to identify and target operational bottlenecks and deficiencies for improvement, especially through “time optimization”, “delivery optimization”, and “minimizing human mistakes” (Oliveira et al. 2015).

Technically, the centralized form of geofencing employed in logistics — a lightweight networking technology that is thin at the client-side — means it is heavily tilted towards optimizing for the resource constraints on the server-side (Garzon et al 2015; Oliveira et al. 2015). The setting and (often secret) recording of geofences, their access levels, their conditions of tracking, and the security and privacy of supply chain data (Modica et al. 2018) is wholly managed by capitalist and State actors (which include the software firms providing location-based services to logistics companies). The centralization and server-orientation of logistical geofencing is also adaptable to tracking any track outfitted with an OBDO without the need for heavy investment in spatially-constrained infrastructure (Reclus and Drouard 2009). This allows for integrated logistics management across “the physical flow, the chain custody, and the chain of ownership” (Oliveira et al. 2015) of commodities through Service-Level Agreements, or SLAs, which manage firm-level relations through spatial components such as the geofence’s geographical coverage, or temporal constraints such as of “timely delivery” (Greenwald et al. 2011). Technical features such as “disconnection support” for “shadow zones” where environmental or infrastructural deficiencies might affect the transmission of recorded data (Oliveira et al. 2015) and “safety zones” where movement is presumed to be guaranteed and therefore not tracked (Garzon and Deva 2014) support logistical management. Geofencing apparatuses can also be configured to manage (out) human interventions that are discursively presented as hard to ‘improve’. These “inconsistencies in the logistics flow” include “mistaken deliveries and pickups and cargo thefts” that presume a discourse of security and “travel management” that actively ensures the OBDO can communicate with the LMU without the truck driver’s intervention (Oliveira et al. 2015). These functions acknowledge that the apparently seamless tracking of supply chains is technically produced (Küpper, Bareth and Freese 2011). Geofencing therefore coordinates and

orders labouring subjects through technical mechanisms implemented by logistics companies.

Besides in the spatiotemporal and socio-spatial registers of geofencing, logistical capitalism's drive towards improvement, broadly defined, is also evident in its use as logistical media. Geofencing indexes its capacity for improving technical processes to itself (as with power efficiency for mobile devices' battery and network resource usage), as well as to its capacity for spatiotemporal description (such as quality of geospatial data and location accuracy) (Modica et al. 2018). It is also simultaneously about improving the financial outcomes of businesses (Oliveira et al. 2015) through the management of labour. Geofencing is therefore not only about efficiency or accuracy, but about a general capacity for improvement.

Geofencing apparatuses therefore configure relations between geofenced logistical facilities and commodity-carrying trucks via their connections. These connections are also relations between clients and servers, space and sociality, labouring subjects and capitalist actors. In these apparatuses, the making of a connection depends simply on a pair of ontological primitives: location and equipment (Oliveira et al. 2015). However, these connections refract the relations logistical capitalism deems important precisely because they presume a landscape of activity that can be known through and as commodity movement. The making-logistical of space and socius that is necessary for the deployment of geofencing apparatuses, therefore, cannot be read only through the latter's connections, but only through what those connections write out. These are the social and material histories of racial capitalism and settler colonialism that make space for the use of logistical media today; the imprints of logistical capitalism marks the connection even as it seeks to discard those historically produced relations. The deployments of geofencing apparatuses and the connections they generate are made possible through the inscriptive device that I refer to here as the logistical algorithm.

This thesis is particularly interested in geofencing apparatuses (and their reinscription of the logistical algorithm) that are deployed at the major logistical geographies of the Port of Vancouver, Metro Vancouver, and the Canada-US border. These spaces are made in accordance with logistical-capitalist imperatives, which are always racial-capitalist and settler-colonial. The discourses that materialize in and through the contemporary socio-

spatial text of these logistical geographies are heavy with those histories. Regimes of property and territoriality tend to be made and remade as land for logistical use. Making space also necessarily makes socialities — the writing of the socio-spatial text through the logistical algorithm — and those that live and labour in these geographies do so under the shaping power of logistics. In the Canadian territorial spaces studied here, the logistical labour of trucking and of dock work or warehousing is produced through longer histories of racialization and erosion of labouring subjects' collectivities. While geofencing apparatuses are directly connected to the former, the latter relate, but are not connected, to these apparatuses' operation. Furthermore, the social and spatial registers of these logistical geographies are shot through with the internal differentiation — and the accompanying classed and racial tensions — produced by logistical capitalism. These divisions and antagonisms — these borders — imprint themselves in the lives and relations of labouring subjects, their stasis and mobilities. Reading the socio-spatial texts of logistical geographies through and beyond the connections of the geofencing apparatuses reveal all that was discarded in imagi(ni)ng relations as free of the weight of history and sociality, in reading connections as simply the edges of a network.

Through reading the (incomplete) socio-spatial texts where geofencing is deployed in various spaces of logistical tracking and tracing, this work seeks to apprehend the productive forces that are immanent to connection(s). Simultaneously, this thesis emphasizes that the normative view of a connection excludes certain contextual absent-presences that still constitute the connection-as-relation in order to make it 'work'. The question that this thesis seeks to answer, then, is this: what are the socio-spatialities that actually go into the making of the connection-as-relation, and which socio-spatialities have to be excluded from such connections in order to make it work for logistical capitalism? What doesn't matter in the making of a connection?

1.2. Theory and Method

1.2.1. Literature Review

This thesis seeks to expand on and enrich a growing body of literature on the complex intersections of logistical capitalism, the materiality of the network form, and spatiality. This extant work spans media studies, literary studies, geography, political economy, computer

science, and business studies, and therefore is often inter- and transdisciplinary. It is also ambitious in scope, narrating the racialized history of logistics (Harney and Moten 2021), the making of “logistical geographies” (Hepworth 2014) and “logistical worlds” (Rossiter 2014) through Enterprise Resource Planning (ERP) software, the global geographies of supply chains (Tsing 2009, Cowen 2014) and the (mis)translation of social relations into network topologies (Terranova 2004, Chun 2016). This thesis seeks to match that ambition through much more modest means, by choosing a particular instantiation of logistical media (Rossiter 2016) — geofencing — through which to study the seemingly omnipresent modality of the network form: the connection (Munster 2013, Chun 2016). As a corollary, connections between the objects of tracking and tracing systems and their (algorithmic) infrastructures of geofencing allow one to examine these instruments — apparatuses — for the calibration and coordination of “labour and life, objects and atmospheres” (Rossiter 2016, 4) in logistics.

How the operational processes of logistics sociotechnically — materially — come to know and constrain the rhythms of labour, then, can tell us much about the political dimensions of life in what has been called supply chain (Tsing 2009) or logistical (Harney and Moten 2021) capitalism. The two may differ on their accent of emphasis: on the processes of capitalist management in case of the former and on the spaces of global commodity production and circulation in case of the latter. They are both concerned, however, with the social and subjective dimensions of capitalism, which are necessarily about labour (Marx 1877/1967). When placed in conversation with each other, they draw out the dialectical tension between the universalizing abstracting force of the production line — “total movement + total access” (Harney and Moten 2021, 38) — and the particularistic geographic-cultural differentiation and diversity of the places — “economic niches” (Tsing 2009) — of supply chains. These logics produce what Ned Rossiter (2016) calls logistical labour, while also producing liminal operative or managerial figures that diversify and deepen the exploitation of labour (Tsing 2009). Hence, through a settler-colonial moving of property through a presumed ‘empty world’, logistics reproduces whiteness and its racial logics of continuous, metricized self-improvement of logistical ‘flow’ (Harney and Moten 2021). Logistics, then, is businesswise a branch of operations management and operationally a science of loss (of property, of value, of labour time) — more specifically, of loss prevention.

Logistics has also historically been a war science. Much has been written about the close ties between logistics, its military history, and securitization (Cowen 2014). This thesis, however, will take up the more recent shift in attention to the civilianization of logistics, especially in capital's entanglements with the State: logistics as capitalist managerial science attending to commodity movement and labour flows, where security remains an important lynchpin of logistical power (Neilson 2012). Logistics has come to define and produce several spaces of capitalist production and circulation, from local spaces such as factories and warehouses, to territorial spaces such as States, cities, and borders, to transnational spaces of "extrastatecraft" (Easterling 2014) or "borderzones" (Mezzadra and Neilson 2013, 235) such as ports. Logistics has historically and geographically co-evolved, then, to become one of the defining capitalist 'operations', alongside extraction and finance, through "the production and heterogeneity of global space, as well as as its intertwining with techniques and technologies of power in the making of territory" (Mezzadra and Neilson 2019, 166). This literature therefore examines how logistics comes to matter (to borrow the pun from Karen Barad (2007)) in contemporary capitalism.

The literature registering the interface between computational and algorithmic systems, material infrastructures, legal and political regimes, various productive geographies, and labour is much more limited. The beginnings of such intersections, however, can be traced in the work of geographers who examine and emphasize the technologically-mediated production of space and place, and therefore also of their entanglements and co-production of social relations.

Software, as the popular narrative goes, operates through the execution of code on data to produce information. This executive position, however, is necessarily imbricated with the socio-spatial relations of its production, as well as its uses and effects. Data, code, and information are socially, spatially, and temporally co-constituting and mutually reinforcing. Contemporary geographies, in other words, "are produced through, by and of the digital" (Ash, Kitchin, and Leszczynski 2018). Space, across places, is today saturated with code that constantly transforms and remediates, i.e., transduces it (Kitchin and Dodge 2011). Through coded objects, infrastructures, processes, and assemblages, software produces "code/space" as well as "coded spaces", where the former spaces are mutually constituted with code, while the latter spaces may exist (differently) outside code. Code/spaces such as geofences, therefore, are "relational and emergent spaces in which

software frames the [differential and extensible] unfolding but does not determine it” (73). Information, too, has “always had geography” in its mediation of access, participation, and representation through networks, infrastructures, and technologies that could be physically and materially located (Graham, De Sabatta, and Zook 2015). Furthermore, the social relations that can be parsed through the heterogenous layers of digital information, or “data shadows” of these information geographies, are “spatially, temporally, and personally context-dependent” (Graham 2014). Therefore, the informationalization of these relations reflect the “digital divisions of labour” (Graham and Zook 2013): the highly unequal social geographies in which subjects live and labour and come to be digitally known. As such, digitally and algorithmically produced representations of space and place can reify and even exacerbate material inequalities in their production of “augmented realities” that include some information to the exclusion of others; exclusions that are shaped by the unequal nexus of power and knowledge.

The spatiality of code and information is especially pronounced in contemporary urban space, whose informatic geography can be traced back to pre-digital (Graham, De Sabatta, and Zook 2015) and premodern times (Mattern 2021, 59). Acting on this information is now an array of software, humming in the interstitial spaces of everyday life, embedded in the material infrastructures of the city. However, the attendant “automatic production of space” (Thrift and French 2002) made possible by urban software has significant (often deleterious) impacts on the governance of, and public participation in, such spaces. Software, in becoming “the practice of government” (Mitchell 1996), i.e., mediating new forms of “automated management” or governmentality (Kitchin and Dodge 2011; Ash, Kitchin, and Leszczynski 2018), produce particular power geometries of “splintering urbanism” (Graham and Marvin 2002) or “software-sorted geographies” (Graham 2005). Software therefore engenders particular conditions of access to private services and public goods, deepening inequalities between sections of the social fabric for whom these new technologies are beneficial and those whom they serve to further marginalize.

Such delineation or ‘sorting’ of space depends on the material calculability of space — its technological knowability (Kitchin and Dodge 2011, 47, 50). The production of “geographies of calculation” therefore depends on a repetitive spatiotemporal sequencing of movement, on the production of “spaces of anticipation that...depend upon the gradual

construction of complex ethologies of bodies and objects which are the repositories of the ‘correct’ positionings and juxtapositionings which allow things to arrive and become known” (Thrift 2004a). Software begets location (Leszczynski 2015), and coded location depends on the “maceration and purification” of sociocultural space by systems of address (Thrift 2004a). This ubiquity and sheer volume of calculation and calculative space turns up not just new forms of quantitative knowing, but a perception of qualitative judgment and working with ambiguity which Thrift (2004b) calls “qualculation.” There is no beginning or end to qualculation. These new generated — qualculated — qualities therefore “act as a space-time background...[which] would enable new forms of movement to occur”; human subjects today are therefore increasingly embedded and located in “movement-space which is relative rather than absolute — but which...relies on an absolute space for its existence” (ibid). Qualculation changes how human — social, intersubjective — relations proceed in and through space and time, mediated by software-based calculative regimes.

While locative or spatial media in its mediation of socius, space, and time (Leszczynski 2015) has, as seen above, received significant critical attention, its logistical dimensions are less pronounced in this literature. Geofencing in particular, despite its prevalence in the technical literature (especially in computer science and supply chain management), largely goes unremarked on in critical work (a notable exception is Özkul’s (2021) study of ‘algorithmic fixes’). However, there are valuable insights to be derived from related work on logistical geographies and the media of logistics.

Logistics spatializes cost-benefit analyses, therefore enacting logistical geographies of optimisation, rationalization and (geo-economic) securitization (Hepworth 2014, Cowen 2010). In other words, the calculative regimes of logistics are intimately tied to the “neoliberalization of space” (Cowen 2010). However, these logistical regimes are not enacted easily. At the geopolitical level, they must encounter territoriality; at the sociotechnical level, they must coordinate spatially and geographically disparate commodity chains (Thrift 2004a, Hepworth 2014); at the subjective level, they must flexibilize labour in order to minimize, if not disappear, attendant ‘frictions’ (Hepworth 2014). It is hence that logistical systems like track-and-trace models must assume a “standardization of space” (Thrift 2004a) and “search for the most efficient ways to use the space and time of each moment.” In a recursive turn, then, track-and-trace logistical systems produce the spaces of qualculation upon which they then come to rely.

Philip Agre's (1994) influential work on the capture model of data production includes underappreciated descriptions of tracking and tracing systems. Specifically, Agre describes how these systems "divide their computational labour between the moving entity, some stationary computer system, and various human and mechanical intermediaries" to establish a representational continuity between, say, truck drivers and the trucks' movements, i.e., the human and the nonhuman. Notable extensions of this work have come from geographical perspectives that note the equivocation of circuits of commodity circulation with the agency of workers themselves through mediating data. This work on logistical operations illuminates how capitalism remakes logistical geographies "through spatial calculation that articulates itself across geoeconomic, corporeal, and virtual scales" (Kanngieser 2013). Such "cartographic calculation" not only involves the capture of contextual events — such as detection of proximity to the geofence — but also "the proliferation of data into the world" (Hind 2020), such as on fleet and freight movement through 'real' geographic space.

Perhaps the most comprehensive intervention into the intersections of the software and physical infrastructures that govern the labour-power employed in logistical operations is Rossiter's (2016) conceptualization of logistical media. Through the translation of algorithmic and computational materiality into "soft infrastructures," logistical media "coordinate, capture and control the movement of people, [capital], and things" (4-5). Logistical media also work in conjunction with the ubiquity of computing environments, especially in urban spaces (Antenucci 2019) and logistical zones like warehouses (Beverungen 2021). Per Rossiter, they span territories and cross borders towards generating a data-abstractive force of biopolitical power over labour and its subjectivities, mobility, and cognitive capital.

What is now commonly referred to as the smart city, in many ways, registers the above mentioned intersections of digital media, (urban) space, and logistics. Digital media are heavily involved in the remaking of urban space and place, or their "re-placeing" to re-embed networked urban subjects "within meaningful spatial and temporal contexts" (Halegoua 2020, 6). They emphasize "dwelling and the rootedness of lived experience and human relations" (10). Digital media technologies, then, can produce relatively stable "places" — social spaces "where constantly evolving relationships, exchanges, and

disruptions call attention to the relations of power that construct and reconstruct these spaces over time” (12) — as well as space(s) understood ontogenetically (Kitchin and Dodge 2011). These “smart” interventions are often made in actually existing cities, often coextensively with practices of neoliberal technocratic governance and austerity measures. Understanding these modes of urban data-driven governance, then, are often more revealing of computational ways of urban knowing than greenfield smart cities (Shelton, Zook, and Wiig 2015). ‘Smart’ urbanism erases material and (more-than-)human ways of knowing cities in its emphasis on computational methodologies and epistemologies. It works over and ignores the material traces of urban histories and local (community-based and indigenous) knowledges (Mattern 2021). Smart cities and the associated urbanism, then, fits well with the informatic predilections of logistics. These urban designs bring in a distinctively logistical set of concerns and rationales to optimize and streamline the urban form for the movement of people and things (Shapiro 2020). The smart city is the urban form made logistical.

The networking media of logistics, therefore, continue to garner critical interest. However, the connections that constitute such networks remain relatively absent from the literature on logistical media. The modes of production of a connection, has, however, been deeply important to critical studies of the network form and its politics. The ‘thingness’ of the connection is reconceived instead as a sort of relational contact, a modality of networking (Munster 2013). What are depicted as network edges, as connections, indicate the presence of an active relation between nodes (at least at the time the diagram is captured) even as they distinguish actors from action (Galloway and Thacker 2007). Haythornthwaite (2005) posits connectivity itself as a qualitative measure of networked intersubjectivity. These connections can be depicted as clean, straight lines (without any of the interfering messiness of space and time between nodes that might qualitatively change these relations (Terranova 2004)) only by “condensing complex clouds of interactions into definite, traceable lines of connection (or connections imagined to be so) between individual nodes across disparate locales” (Chun 2016, 2). Network interaction, then, is borne of a flurry of active dis/connections. Connection is no simple thing.

The extant literature presents an expansive view of the media and materialities of logistics, but there is yet to be a granular examination of what makes such relations between network-, algorithmic-, locative-media and logistical circuits possible. This thesis aims to

articulate why that theoretical gap between the thinking and substance of networked logistics exists, and work towards filling it.

1.2.2. Theoretical Framework

Inspired by the wide-ranging and interdisciplinary approach of the extant literature, this thesis expands the field of view of what makes mediated logistics possible through the socio -technical, -spatial, -political, and -economic modalities of connection. Specifically, this thesis employs critical work on logistics as well as critical studies of the network form to understand the productive forces at play in socio-spatial relationality. I develop the concept of the “logistical algorithm” as that which (re)inscribes histories of space and socius (and the exclusions that field of relations generate) within the deployments of technological apparatuses today involved in logistics. The logistical algorithm is written according to the imperatives of logistical capitalism and is productive of the connections of those apparatuses of logistical media.

Logistical capitalism has historically been reproduced by putting the (self-)possessive imperative to the endless (economic, political, social, subjective) operation of improvement, necessarily producing a racialization originating in whiteness (Harney and Moten 2021, 29). Its imperatives of putting to use what it accesses have therefore always been tied up with settler colonialism’s production of racial difference and propertied regimes of ownership (Bhandar 2018): of social antagonisms. Logistical power “builds the networks within which relations unfold” (Neilson 2012), rearranging and reassembling heterogeneous global orders of capitalist power, negotiating the heterogeneity of global spacetime. Such an understanding of logistics underscores the “historical unfolding of this fixation on fixing, the murderous interplay of capture and improvement, [which] is given in and as self-improvement-in-self-accumulations’ violence towards whatever shores up the rendezvous of differentiation, incompleteness, and affection” (Harney and Moten 2021, 34). It is through this logistical science that capitalism expands the production and assembly line throughout the socius. Continuous improvement is the name of the violent, unending, metricized game, where the circulatory circuit, “the flow of the line mediates the relationship between worker and machine and determines, rather than is determined by, the proportions of variable and constant capital” (93-94). The symmetry of property and logistics is no coincidence. In fact, logistics is precisely a matter of “moving property

through the emptiness of making the world” (17). In its historical racial-capitalist form of moving speaking commodities — slave labour — logistical capitalism produced whiteness as the apex of racial difference and therefore the logistical power par excellence. It is capable of differentiation not only in what it accesses and puts to use for the improvement of property, social lives, the self, but also in the discard — the often violent exclusion — of what logistical capitalism cannot improve. Logistical capitalism remains invested in its contemporary (neoliberal) shape in making space and sociality amenable to the movement of commodities, be they things or labour(-power) — which is to say, in producing an asociality that cannot count non-logistical ways of being-together. What I call the logistical algorithm, then, acts through space and socius, producing them in the assembly-line shape of logistical capitalism.

The logistical algorithm therefore also excludes what is “more than what is adequate for it to do its thing, to choose, to decide” (da Silva 2021, 5). These exclusions are immanent to logistical capitalism’s production of difference, but go beyond pure difference to actively close out non-logistical modes of being-together: communities, collectivities, or multitudes. Connection is therefore a deciding tool of logistical control for which the logistical algorithm works as a “machine of self-improvement” (Harney and Moten 2021, 42) in which certain figures (and the value they carry) count “as null, nothing, no-thing, no-bodies” (da Silva 2021, 10); they *don’t count*. In the colonizing expansion of movement and access, which is to say of the logistical algorithm, “another connection must always be made” (Harney and Moten 2021, 57). Connections-as-relations are “virtualized as total communication, total connectivity [...through] capital’s algorithmic attempt to dematerialize, conceptualize, and regulate an essential and essentially sensual communism” (101). This is the making-logistical of space and socius; the making-assembly-line of life. However, the very presumptions this algorithm makes as to what comes to matter for logistical capitalism means that these connections are incomplete.

This thesis, then, is interested in the logistical algorithm’s (re)production of incomplete sociality and “the general incompleteness of process” (110). The incompleteness of logistics’ socio-spatialities materializes different relational texts for sociality generally speaking and for capitalist relations of exploitation. As the ur-text herein, the logistical algorithm names the conditions of possibility for the deployment of media technologies such as geofencing apparatuses.

Geofencing, as a locative technology of tracking and tracing systems emplotted and spread in place and space, is enrolled in a network dispositif or apparatus (Munster 2013) that brings together material and social infrastructures, instruments, forces, and techniques. The geofencing apparatus' making of connections is irreducible to these elements of the apparatus, since their relations are constituted by logistical-capitalist imperatives. To surface these relations, this thesis turns to an inquiry "into the material specificities of the apparatuses that help constitute objects and subjects" (Barad 2007, 27). These forces of relationality cannot materialize separately or 'individually', and therefore cannot be said to interact, but instead, are "intra-acting from within, and as part of" (88) the "entangled material agencies" (56) thus produced. It is through the active processes of networking (Munster 2013) that any connection is made. It becomes vital, then, to keep in view the field of relations that actually constitute connection; to study the material engagements with what makes the world legible.

The materiality of what goes into the making of connections also begs the question of what doesn't matter in connection. It asks what the constitutive exclusions are that produce a connection, and how these are essential to understanding how the world is materially made known. Connection, as many scholars argue, is constitutive of the network form (Chun 2016, Jagoda 2016). The connective tissue of network relationality takes precedence over its 'nodes'; it is "operative in the technicity of networking" (Munster 2013, 187). However, connections are a reduced, or incomplete, vector of relationality. The network apparatus "mediates relations between disconnected actors" (Feldman 2011) through abstract logics and/or agents. Here, connections are direct objectifications of relations discontinuous in space and time. Relations exceed connections (as contact), and therefore comprise of that which may be excluded from the connection but still constitute them. This is not to say that relationality necessarily exists without the connection, but that the connection instantiates a particular sort of regulated relationality through geofencing's networking apparatus. The geofencing apparatus hence produces a network of connections amongst the agents of tracking and tracing systems, but these connections "cut continuous space and time into slices of connectivity" (Chun 2016, 50). Connections turn matters of relational duration into matters of connective linearity (Terranova 2004) "by portraying polyvalent interactions as direct lines of contact" (Chun 2016, 50). They reinscribe the logistical algorithm.

The technical constitution of connection is itself made possible by the computational technologies that constitute the apparatus of geofencing, that ‘capture’ a data representation of human activity that is increasingly shorn of their agency (Agre 1994). Through aggregative “grammars of action” that materially shape agential activity even as they purport to represent them the correspondence between action and information is “interpreted or negotiated” through sociopolitical structures. They are written through *and* rewrite the logistical algorithm. Capture models such as those employed by the geofencing apparatus of tracking and tracing systems necessarily surface information that is productive for capitalist exploitation — such as movement of labour — while disregarding other socio-spatialities that do not figure in the logistical algorithm. This makes an understanding of capture models generative in how the connections of the geofencing apparatus telescope social difference and antagonisms.

The logistical algorithm that produces connections-as-relations, then, requires apparatuses that can help manage and put a range of relations to work. The logistical coordination of labour and life is today inseparable from its algorithmic and software infrastructures, its media (Rossiter 2016). The accelerated application of logistical logics to capitalist trade coincides with “the computerization of logistical systems and the orchestration of production and trade according to the workings of supply chains” (Neilson 2012). The network apparatuses of geofencing, therefore, “are activated as orientation systems in the instance of the arrangement between software, infrastructure, and labour” (Rossiter 2016, 141) along its connections, parametrically excluding that which does not matter for logistical capitalism. It is precisely this algorithmic inscription that generates the incompleteness of life enmeshed with logistics. The logistical algorithm intervenes in diverse ways of life to shape its sociality as logistical, as making-assembly-line.

Logistics governs the worlds that the “soft” infrastructures of transport, communication, labour, data, and algorithms make. Logistical media deepen this form of power over “the composition of labour and the production of subjectivity” (5), even as labour-power makes possible the networking of logistical circuits of capital. The technology of geofencing does not need to know labour in its subjectivities, but simply rewrites labour as a productive force. However, as the logistical algorithm already presumes and assigns differential capacities for value (and its extraction) from (classed and racialized) labouring subjects,

their lives and ways of being are conditioned by the racial-capitalist and colonial engines of logistics. The logistical algorithm is “the machine of self-improvement” (Harney and Moten 2021, 42). In other words, the databasing (Munster 2013) of lively relations dispenses with certain borders (such as between labour and life) and engenders new ones (of containment), generating particular modes of dis/connection. These form the constituent elements of Rossiter’s logistical media theory that emphasizes the materiality of communication, their enmeshing with sovereign and imperial power over labour and life, and their territory-making.

The logistical algorithm is also necessarily spatial, proceeding through an interpolative one-two beat of land and labour. The technologies of logistical territoriality and governance — logistical media — make it possible for capital to meld geographies of labour and geographies of logistics (Kanngieser 2013). Extended to computational algorithmic deployments via network apparatuses, those socio-spatialities already constrain the connections-as-relations that may be produced. The digital coding of space engenders the logistical city (Rossiter 2016, xiii) whose elastic spaces are modulated by the becoming-assembly-line of logistics, as well as the depoliticized logistical state, “whose territorial power is congruent with the operational capacity of infrastructure and the economy of supply chain capitalism” (156). This new territorial imaginary is not coincident with the State, but “is constituted through network topologies and infrastructures of exploitation” (173) that are often spatiotemporally disparate. Furthermore, these imaginaries straddle the State, spaces of private capital, as well as deformations and reconfigurations of both. This is not to say that the State is immaterial — it continues to maintain sovereign power over territorial space — but that the national-regional spaces examined in this thesis function as “zone(s) of instability” (Szeman 2004) through and against which various (political) discourses tussle to become textual. In these zones, which mark and subtend (supra)national spaces, the logistical algorithm stabilizes and materializes a particular set of readable discourses. It writes the socio-spatial texts through which the relations of logistical capitalism and their constitutive exclusions can be read.

Logistical media, then, map their logics of inclusion/exclusion (Cho and Yoon 2018) onto existing (socio-spatial) relations, but also expands territorial logics beyond these relations. With geofencing, these logics are no longer tied to the physical correspondence of space and property, i.e. territory, but the very production of space. To understand the production

of these new logistical geographies requires attention to their socially a(nta)gonistic production and the spatial composition of labour and class (Toscano 2004). Geofencing, then, multiplies borders — the definitive sign of territoriality (Newman and Paasi 1998) — in a world already riven by them, entangling them with the logistical state (Rossiter 2016) and city (Antenucci 2019). These borders hence “are not merely geographical margins or territorial edges [...but] complex social institutions marked by tensions between practices of border reinforcement and border crossing” (Mezzadra and Neilson 2013, 3). The logistical algorithm proceeds through the differentiation of space and sociality which manifests through geofencing apparatuses as borders.

Borders are the defining technology of geofencing. Even though the technical literature variously refers to the actual geofence as a perimeter, boundary, fence, or border, this thesis takes up borders as a productive site of dis/connection, positing that its spatiotemporal coordinates locate the incomplete relation of connection. Given the logistical distending of borders, their fluidity (Konrad 2015) enables them to criss-cross space, time, and social relations. Borders remain a dialectical site of contact as much as separation at various socio-spatial scales (Newman and Paasi 1998, functioning as “devices of inclusion that select and filter people and different forms of circulation in ways no less violent than those deployed in exclusionary measures” (Mezzadra and Neilson 2013, 7). The geofence-border hence produces a differential inclusion of subjects and objects in the geofenced area that cannot avoid reducing the effect of bordering to the simple production of insides or outsides. It is therefore vital to pay attention to “the patterns of connection and division that invest the relations between radically heterogenous borderscapes” (9). Studying the geofence-border requires surfacing the social, material, historical, and relational conditions of boundary constitution: of *bordering*.

Geofencing is therefore emblematic of logistical media’s spatiotemporal making-assembly-line of the social lives that pass through the geographies it inflects. As functioning within logistical capitalism, geofencing is oriented towards enabling the movement of commodities via total access to space and labouring subjects. The targets of improvement and targets of geofencing are structurally equivalent — labouring subjects — so that they are put to work driving the logistical formula of total movement + total access (Harney and Moten 2021) for logistical-capitalist actors. The use of geofencing as logistical media, in sum, is typical of the coordination and ordering of labouring subjects

through technical mechanisms that come inscribed with the relations of logistical power (Neilson 2012) — the logistical algorithm is always already inscribed in logistical media.

This thesis is therefore invested in how the connection(s) that pattern relations in and through geofencing's networking apparatus reinscribe the differential inclusion and exclusion of socio-spatial relations when said connections are made at the geofence's border. Connections produce reinscriptions of the logistical algorithm. As a logistical-capitalist schemata that aims to produce the continuous improvement of logistical flow, the logistical algorithm proceeds through the parameters of use, access, and movement that open space and socius to the deployment of geofencing apparatuses. The connections produced through these apparatuses are relations that are treated as simple lines of contact but carry histories and (re)make social lives. Connections elide relations of labouring subjects to each other, to the shaping of space, and to infrastructures and systems of power. Logistical media theory, and its attention to digital technologies and material infrastructures, meet theories of territoriality and borders through the makings of labour and life by capitalist actors. This framework, therefore, helps understand the (how, why, and where of) materializations of connection with and through labouring subjects, logistical geographies, and logistical media technologies. It also names the spatiotemporal coordinates where connection's inclusions and exclusions are made.

1.2.3. Method

The logistical algorithm takes as its deciding parameters the socio-spatialities of logistical capitalism which are inscribed in it and are reinscribed in logistical media technologies. The socio-spatial texts that logistical capitalism materializes can be read in the discourses that are produced by and reproduce the logistical algorithm. Geofencing as a contextual, event-based technology marks the spatiotemporal coordinates of the material-discursive reinscription of the logistical algorithm; what is of consequence to the materiality of geofencing apparatuses is what produces their context, their material conditions of tracking and tracing. Therefore, I employ a diffractive approach (Barad 2007) to analyze the material-discursive algorithms of geofencing and its parameters as useful "empirico-analytical device[s]" (Rossiter 2016, 143). In order to get at the connection's constitutive exclusions this thesis simultaneously puts into conversation the material-discursive matterings of logistical capitalism's software and infrastructure with labour, "the real not-

capital” (Marx 1939/2005, as cited in Terranova 2004, 73), as diffracted at and by the border. The historical reading of the land and labour that is inscribed in the logistical algorithm conditions the relations it can produce, while a symmetrical comparative reading of contemporary logistical geography and labour as entangled with logistical media surfaces the non-text of this algorithm. Through describing the conditions of possibility of the geofencing apparatus through (critical) discourse analysis and close readings, I name connection as a specific reading-writing of relationality.

This thesis contends instead that examining different contexts of the geofencing apparatus can surface the contingent resonances as well as differences across them, especially when situated in localities comparable across “situation, time and space” (Kitchin 2017). They offer lenses where connections materialize differently and relationally, but not separately. This becomes not just useful, but pertinent when applied to supply chains (Danyluk 2021; Tsing 2009). In particular, this thesis selects three interrelated contexts in North America where geofencing apparatuses are deployed: (transnational) border crossings of truck fleets at the Western Pacific Canada-USA border, trucks fleets traveling in and around Metro Vancouver, and leading up to the Port of Vancouver. Therefore, this thesis asks: what is comparable between these geofenced areas that make them useful for knowing the mattering of connections as operating through the logistical algorithm?

While direct access to the software systems in and through which geofencing operates is unfeasible for the scope of this research, algorithms employed in geofencing and its applications are widely explicated in the technical literature in computer science and areas of business studies such as operations and supply chain management. These algorithmic apparatuses can hence be “sampled” in their varying use-cases (Seaver 2014). Such examination of the pseudocode of algorithms involves “tracing out how the algorithm works to process data and calculate outcomes, and decoding the translation process undertaken to construct the algorithm” (Kitchin 2017). This literature hence offers an initial point of entry into studying the parameters of the logistical algorithm, of geofencing as logistical media.

However, it is not merely the algorithm as technical object that has material impacts. Firstly, algorithms do not follow a simple linear path from input to output, as they co-constitute outcomes through their relations with data and social relations. Furthermore,

social questions are bracketed in the early decisions about how to operationalize relational activities into a procedural model. Such assumptions therefore elide the mediating historical, political-economic, and cultural work required to translate these algorithmic features into computational models (Agre 1994). It is therefore the operant values, assumptions, procedures and systematizations that determine the (logistical) algorithm's construction, as well as the entangled relations of people, data, and code, that effect sociological difference. To pay attention to these larger forces at play requires a commitment to grasping algorithmic apparatuses across their scales and complexity (Gillespie 2016, Seaver 2014). It is therefore vital to understand how "algorithms act as part of a wider network of relations which mediate and refract their work" (Kitchin 2017). The surfacing of these processes is made possible through the geofence's network apparatus, which would guide methodological focus on the historical flux of processes and phenomena and their causal (but non-deterministic) materializing effects in socotechnical material-discursive apparatuses.

This thesis therefore draws on — beyond the technical literature — public documents and reports from institutions such as the Vancouver Fraser Port Authority, grey literature from companies that make use of geofencing in logistical management, journalistic reports, and research from industry bodies like the Canadian Transport Research Forum. It also pays attention to the ontologies, methodologies, and representational logics of 'smart' urban technologies such as dashboards that visualize geofenced areas (Mattern 2021, Rossiter 2016). Furthermore, this thesis reads histories of key logistical infrastructures and spaces, including warehouses, fleets and freight transportation, urban spaces, and borderzones that come to matter at the sites of investigation. These material-discursive histories bring out the political and ideological valences of the (im)materiality of the geofence; they emphasize how the logistical algorithms of geofencing "do work in the world" (Kitchin 2017).

To talk of logistics without labour(-power), however, is to miss on perhaps its most vital social relation — more specifically, logistics engenders socio-spatial relations of labour. To examine how these socio-spatial relations come to be most evident at or in proximity to the border of the geofence, this thesis employs border as method (Mezzadra and Neilson 2013) in logistical worlds (Rossiter 2014, Rossiter 2016). This thesis then is interested not so much in what happens 'inside' the geofenced area, but the cleavage in

real space the geofence's apparatus introduces, and hence how it dis/connects fields of relations. Bringing to bear an ethnographic lens on these moments of connection, border as method and the making of logistical worlds emphasizes the critical sociopolitical — which is to say, conflictual — position of labour in producing logistical spaces and subjectivities.

Border as method “emerges from a conflictual confrontation with the materiality of the tensions and conflicts that constitute the border as an institution and set of social relations,” (Mezzadra and Neilson 2013, 19) emphasizing “the tense and conflictual ways in which borders shape the lives and experiences of subjects who, due to the functioning of the border itself, are configured as bearers of labour power” (20). The apparatus of geofencing, then, not only works through territorial borders, and produces cultural and social borders, but “modulates inclusion and movement within logistical industries...to govern labour and supply chains in the informational economies” (Rossiter 2016, 66). The permeability of borders that are made visible through geofencing apparatuses makes logistical media a productive lens for understanding processes of territoriality. Border as method therefore reads ethnographic accounts of border crossings, negotiations, and reinforcements with particular attention to the material histories that produce the social relations of the border.

These borders are not just territorial or geographical. In fact, border as method emphasizes how sociotechnical apparatuses such as those of geofencing multiply borders in view of processes of capital accumulation through “the simultaneous emergence (and structural intertwining) of geographic and cognitive borders” (Mezzadra and Neilson 2013, 34). Border as method analyzes “the tense balance and dramatic unbalance between political borders [and] the frontiers of capital, traced not only by capital's expansionist drive but also by its need to organize space according to multiple hierarchical criteria” (66). Furthermore, the mobility of labour, i.e. the agential subjectivity enmeshed with logistical media, “plays a role in remaking and reconfiguring both the external and internal borders of contemporary world regions” (55). In tandem with mobility, then, borders also have a temporal dimension. Border as method, then, also pays attention to “experiences of passing through...borderscapes where the compression, elongation, and partitioning of time exerts effects of control, filtering, and selectivity” (132).

Border as method, therefore, asks how labour is heterogeneously produced when the global socius is riven with devices of differential inclusion. This *multiplication of labour* draws our attention to “how the mobility and proliferation of borders adds an unprecedented intensity and diffusion to the divisions and hierarchies that characterize the organization of labour under capitalism” (24). “Labour was multiplied” such that “[i]t was first intensified, in the sense that its tendency to colonize the entire life of labouring subjects became even more pronounced than before. Second, it was materially diversified....Third, it was heterogenized as far as legal and social regimes of its organization are concerned” (88). Capital and its disciplinary regimes of power produce individual subjectivities as well as “reconfigur[e] the material borders between classes, genders, and communities that mark these very bodies in their materializing subjectivities” (Barad 2007, 229). Paying attention to logistical power through the analytic device of the border, then, points to “the frictions, discords, and struggles that cross the field of labour and contribute to the production and reproduction of labour forces” (Mezzadra and Neilson 2013, 122). The labouring class, indeed, is an oppositional materialization of logistical capitalism’s reconfiguring of the world. It is through border as method, then, that we can follow the making of connections across demarcated spaces of social (non-)relation. And it is through the multiplication of labour at the borders of these logistically valuable spaces that the constitutive exclusions of logistical capitalism, which materialize as the incomplete relations of connection, can be read. This thesis therefore reads ethnographies and histories of the multiplication and differential inclusion of labour regimes that come to matter in border crossings, especially those involved in fleet and freight transportation, such as truckers and warehouse workers as symptomatic of the logistical algorithm and its exclusions.

In summary, this thesis follows the material-discursive texts of the geofencing network apparatus produced by and producing the logistical algorithm, and reads ethnographies and histories of its constitutive exclusions, as materialized in and as land and labour. The incomplete relations that materialize as connections are therefore illustrated, with particular attention to the socio-spatialities that set the material conditions of possibility for the technical — algorithmic — making of the connection.

1.3. Parameters of Geofencing: Land and Labour in the Logistical Algorithm

Geofencing apparatuses work through the logistical algorithm's reinscription of differentially inclusive socio-spatialities. It presumes space and socius being open to logistical use. This possibility of use is itself dependent on the making of logistical socio-spatialities, the writing of land and labour — the logistical algorithm — as facilitating commodity movement. The originary historical moments of such presumptions may be located in the earliest days of racial capitalism (Harney and Moten 2021), so that in the contemporary form of logistical capitalism recognized in this thesis, geofencing apparatuses rely on the differentiation of social relations through space — specifically, on the making of trucking as classed and racialized logistical labour and the settler-colonial making of Canadian sovereign space as property and territory. Specifically, these geofencing apparatuses are deployed to access truck movements where supply chains move through lands located in Canada. The logistical-capitalist logics that produce these material-discursive spaces (Szeman 2004) set the inscriptive conditions of possibility for the socio-spatial text that geofencing presumes.

1.3.1. The Making of Trucking as Logistical Labour

The geofencing apparatus does not produce its objects, but a particular linguistic model of them (Agre 1994), a textual representation of social subjects that writes the logistical algorithm and its structuring imperatives of total movement + total access (Harney and Moten 2021) into their relations. Logistical capitalism needs and expects tracked objects to keep moving, which means that labouring subjects are expected to be able through space with little to no interruption, without irruptions or interruptions that may make space for non-logistical relations to materialize. Trucking labour(-power) is put to work improving their productivity and efficiency. Truckers are vulnerable to such management owing to their classed and racialized situations; their working lives are made more precarious, their incomes reduced, and racialized difference exploited and reproduced. In order to reinscribe the logistical algorithm in contemporary socio-spatial texts — including through logistical media — labouring subjects must be writable into that algorithm, accessed as logistical labour. While the incomplete connections of geofencing apparatuses provide access to truckers' labour-power, the making of trucking as logistical labour proceeds through politico-economic and socio-political shifts that precede connective relationality.

Trucking, with its intermodal flexibility and lower infrastructural costs, became a vital logistical sector with the increasing adoption of the Just-In-Time (JIT) mode of logistics in North America and Europe through the 1980s. The neoliberalization of the trucking industry — such as through the Motor Vehicle Transport Act (MVTA) introduced in 1987 in Canada — allowed fleet operators to make truck movement more ‘productive’ by lowering labour-power costs while increasing the availability of trucks (Barzyk 1996; Jones 1999). This benefited shippers who required the movement of commodities through the supply chain in time with tighter schedules of production and distribution (Bonacich and Wilson 2008; Jaffee and Bensman 2016) The deregulation of trucking created the non-union trucking sector, with “independent contractors” or “owner-operators” emerging as a category of truckers who were legally loosely defined, classified as “non-asset-based firms” (Bonacich and Wilson 2008, 103-104) who could contract their labour-power to other carriers. It also enabled these carriers to choose ‘efficient’ transport routes and refuse ‘inefficient’ less-than-truckload shipments, decisively shifting the balance in favour of non-unionized truck operators (Boyer 1997). The first shift in making trucking amenable to demands of neoliberal logistical capitalism, then, involved structurally enlarging the pool of truckers who would be amenable to the demands of logistical capitalism.

The privileging of logistical-capitalist interests effected a rapid shift from company-attached trucking to owner-operator trucking under deregulation. These shifts affected truckers working in the long-haul trucking sector, which typically operated cross- and trans-nationally, as well as in the drayage or port trucking sector, which is involved in the transportation of containers or other freight between ports and logistical facilities such as warehouses in the adjoining region. In 1998, just over a decade after Canadian deregulation, nearly 50,000 or one in five (22%) Canadian truck drivers were owner-operators, with 15% in British Columbia (Bess 2000). As owner-operators have become the dominant form of trucking labour, other truckers without the support of regular employment and collective bargaining power are forced to adapt to exploitative employment models and contracts. This shift has also facilitated the outsourcing of logistical operations such as transportation to third party logistics providers (3PLs) such as Schneider Logistics. These 3PLs functioned according to shippers’ demands, severing employee-employer relations that may have allowed labour to contest the flexibilization of work (Cho et al. 2012). While owner-operators are legally designated as independent

businesses or contractors, most drivers end up working essentially as employees of trucking companies who were paid by trip, rather than by the hour by signing exclusive employment agreements (Bensman 2017). While being paid by the trip shifts the responsibility for 'efficient' routing onto truckers, in hourly trip rate models trucking companies seek to make their fleet of trucks collectively more efficient by route planning and managing truck movements accordingly (Friedman and Basiliij 2020). Low rates per trip also mean that owner-operators are forced to make up costs in volume (Bensman 2016; Mathieson 1994). As such, owner-operators work significantly longer hours than company-attached drivers. Drayage truckers who are paid by trip, for instance, deal with long wait lines at the port terminal, congestion on the roads, loading and unloading freight, clearing customs, and fulfilling administrative requirements (Bensman 2016; Bess 2000; Bonacich and Wilson 2008). Deregulation also contributes to forced flexibilization as trucking companies may hire owner-operators for intermodal/off-dock trucking at times of peak demand or when trip-rate pay is cheaper for the company (Friedman and Basiliij 2020). Since drayage owner-operators are compensated by carriers on a trip-wise revenue sharing basis, and need not be paid for the "third leg" of the trip carrying empty containers, they are assigned by carriers to trips between geographically dispersed logistical facilities across the region, i.e., where the uncompensated "third leg" may be longer than the revenue legs of the trip (Davies 2006). This allows the carrier to avoid employing company truckers who would have to be compensated hourly for the entire length of the trip.

The "operational flexibility" (Bess 2000) that contracting owner-operators gave trucking companies was therefore predicated on the exploitation of cheap non-union labour, whose historical "misclassification" as independent operators (Jaffee and Bensman 2016) has largely been supported by the neoliberal State. The deregulation of trucking shifted costs and responsibilities onto the increasingly-individualized owner-operator and away from capitalists. Owner-operators are hence made accessible to the ordering of the logistical algorithm, first as (flexibilized) logistical labour, which is to say in alignment with the imperatives of logistical capitalism, and further in the coordination of, and control over, their movement, their deployment of labour-power.

The ordering of truckers' labour-power that deregulation made possible is also highly visible in the panoply of sociotechnical controls instituted on the mobility of truckers.

Following the neoliberal model, this further focuses the enactment of governmental techniques such as route planning and data exchange on individual truckers while increasing the productivity of logistical circulation. Two-way cameras are increasingly common, and electronic logging devices (or ELDs) that record and transmit data about when a truck is in motion are required by law to ensure compliance with Hours of Service (HoS) regulation. Ironically, while HoS regulations were ostensibly designed to minimize truckers' overwork, its overdetermined rules deepen truckers' own flexibilization of their work in response to structural pressures (Balay 2018; McLean 2016). Canadian trucks are required to be fitted with anti-idling devices — such as automatic engine shut-off devices and direct-fired heaters — to manage fuel consumption and ostensibly to align with environmental policy. These devices are installed by trucking companies for company-attached trucks or by owner-operators themselves. While truck idling is frequently unavoidable for temperature maintenance in the trucker cabin, to lengthen battery life, or while waiting for dispatch and doing delivery/pickup, anti-idling devices take away the agency for these decisions from truckers themselves (Yen, Andrey, and Woudsma 2014). The Truck Licensing System (TLS) and SmartFleet strategies that mandates the installation of GPS units on port trucks at the Port of Vancouver makes it possible for trucking companies and shippers to demand truckers adhere to the tight schedules of JIT distribution. Even as the responsabilizing of port truckers as 'owner-operators' tends to produce truckers as entrepreneurial individuals competing for irregular and poorly-compensated work, then, social, legal, and technological regimes of control cement port owner-operators' largely working-class position (Balay 2018; Bess 2000; McLean 2017). Truckers as logistical labour are therefore made open to taking on the sort of flexibilized work that neoliberal logistical capitalism demands through alignment with technologically-produced metrics.

The making of trucking as logistical labour, however, is not only structured in the politico-economic sense, but in the racialized and settler-colonial inscriptions of difference that structure socialities. Logistical capitalism, which works through (re)producing regimes of racial capitalism, situates self-possessive whiteness as the normative social-subjective position, one that has the capacity for continuous improvement, the metrics of which are to be measured and managed by logistical-capitalist actors. The development of the trucking industry in Canada, with its historical support for colonial automobility, established "the white working class male body...as the normative trucker" (McLean 2017, 46).

Simultaneously, the capacity for Indigenous persons to engage in trucking early on was constrained by racist exclusion from labour markets and of mobility such as through the pass laws of the Indian Act (McLean 2017, 49, 55). Settler states such as Canada further produce labor precarity while securing the politico-economic interests of the State and multinational corporations through the differential inclusion of racialized labour. This happens through, for example, the racialization and criminalization of migrant workers who enter the country through programs such as Canada's Seasonal Agricultural Worker Program (Cohen 2019) and Temporary Foreign Worker Program. Such class and racial dynamics are also at play in the trucking industry. While dangerous working conditions and low wages artificially reduce the availability of 'skilled' truckers (Viscelli 2016), this apparent driver shortage has led to a growing industry-wide reliance on guest worker programs to ensure a steady supply of cheap labour — which also contributes to a racial acrimony between white and racialized truckers (McLean 2016a). For truckers, differentiation of 'skill' also comes into play through formal driver training and licensing models that entrench racialized inequalities in the industry (McLean 2017, 123, 131). Trucking in Canada is therefore conditioned by neoliberal deregulation and the rhythms of logistical capitalism, which has led to increased demands for drivers "who are willing to work longer routes, as well as [manage the] increased complexity in managing border crossings, and the differing transport regulations in the US and Canada" (Hanson 2021). The ordering of trucker movement per the demands of JIT logistics is effected and affected by the possibilities for movement logistical capitalism makes available to racialized labouring bodies.

The logistical algorithm proceeds in the first instance by producing a 'flexible' trucking labour force — which is to say by making logistical labour through the exclusion of non-logistical social relations. The temporality of JIT logistics works through and due to the deregulation of the trucking industry, which enrolls truckers as owner-operators to condition the possibilities of their relations to capital. The spatiality of trucking labour marks the differential inclusion of racialized workers. However, the very lands in which labour is made as such are made as territory through settler-colonialism. As such, the making of logistical geographies itself relies on the exclusion of Indigenous relations to land.

1.3.2. Land as Socio-Spatial Grounds: The Settler-Colonial Making of Canadian Territory

Canada is a settler-colonial State. As such, the relations inscribed in and by its socio-spatial text are conditioned by the encounter between Indigenous peoples and settlers, and the dis/possessive regimes of property — which is about how land is used and by whom — the latter set up through the State and capitalist actors. As instituting the “loss of sharing” (Harney and Moten 2022, 14), property grounds the development of logistical capitalism, and is arguably the defining relation of the logistical algorithm’s socio-spatialities. The settler-colonial encounter destabilizes Indigenous relations to land and rewrites them in/as regimes of property, but neither Indigenous life nor settler-colonialism has come to an end, and therefore that rewriting needs to be constant, repeated, recursive, and therefore remains an active process (Szeman 2004). The exclusion of other socio-spatialities, or ways of relating to land, is imprinted in the making of land as property and thereafter as national territory.

The (white) possessive logic of settler-colonial States such as Canada reproduces propertied and territorial logics of ownership and control over the social lives that mark land (Moreton-Robinson 2015). This logic materializes in legal mechanisms (such as immigration regulation that writes the differential inclusion of nonwhite populations), the built environment, and discourses of national identity. The settler-colonial ma(r)king of land, then, proceeds through a recursive logic of dispossession (Nichols 2018) that requires and reproduces the severance of Indigenous socialities from land. These relationalities were deemed incommensurate with the dictates of use and improvement of land that the settler-colonial State instituted (Bhandar 2018) and that logistical capitalism continues to rely on. The production of legal and social subjects who could be situated in the State’s sovereign space was thus intimately tied up with the ascription of racial difference (specifically, of inferior capacity to own and improve land), and Indigenous peoples’ concomitant exclusion from exercising their relations to land (Moreton-Robinson 2015). This production of whiteness as the apex of racial superiority, and therefore of “racial regimes of ownership” was “forged through nascent capitalist ideologies that rendered race contingent on specific forms of labor and property relations...[and is] subtended by property logics that cast certain groups of people, ways of living, producing, and relating to land as having value worthy of legal protection and force” (Bhandar 2018,

8-9). Such remaking of Indigenous socio-spatialities “names not only the forcible transfer of property but transformation into property” (Nichols 2018) so that land is recoded as an object of possession, use, and alienation, i.e., of market relations. Indigenous lives and their ways of being are therefore excluded through a double move: through the capitalist disregard for the Indigenous subject that exists outside white possessive logics (Moreton-Robinson 2015) and the realization of property for Indigenous persons only in their negation: in the selling of land that they were excluded from possessing (and which they never sought *possession* of) in the first instance (Nichols 2018). Only settlers (as white subjects) could ‘use’ and/or ‘improve’ property, and therefore lay claims to it. Indigenous peoples, owing to their legally subjected ‘status’ (Bhandar 2018), were not deemed capable of possessing property. Indigenous rights to land, which were mediated through racial regimes of ownership, were therefore based on a double exclusion: the structural negation of Indigenous proprietary interests became the socio-spatial grounds for invalidating other ways of relating to land, for excluding non-logistical socio-spatialities from mattering.

The legal discourse of ‘rights’, therefore, is founded on a dis/possessive logic that is inherently exclusionary of Indigenous epistemologies of lived responsibilities to the lands on which they live (Barker 2018). The socio-spatial notion of territorial rights, which are intimately tied to sovereignty, produces social groups as being able to claim relations to and through the lands in which they are situated, as well as exclude others from that territory. The continuation of Indigenous dispossession into the present day is therefore premised on a mode of land relations that exclude non-colonial ways of being-together. For Indigenous socialities, land “is both context and process” (Simpson 2014) in the embedded and embodied relationalities that were negated in the settler-colonial occupation of land, and were replaced by capitalist relations.

The logistical algorithm therefore reinscribes settler-colonial and capitalist relations to land in how geofencing apparatuses are deployed to the exclusion of Indigenous socio-spatialities. Geofencing apparatuses parse land as abstract space which is ‘filled’ only in the movement of commodity-bearing mobile objects, namely trucks, through that space. As that movement is represented as a linguistic computational model (Agre 1994) for the purposes of being read through the geofencing apparatus, it is disembedded from the social relations that make and mark truck movements through land owned by various State

and capitalist actors. Geofencing therefore does not account for Indigenous ways of being with and through the land. It is precisely in becoming property that land becomes a set of socio-legal texts that determine its relations and access, such that social lives are abstracted from their embedded context. Geofencing's reading of space presumes that land, tied up with logistical capitalism, is property amenable to access by trucks. It reproduces logistical-capitalist socio-spatialities at the same time as it does not read the racial(izing) texts of property.

Geofencing apparatuses therefore 'track' or read movement through space in terms of position, or the fixing of spatiotemporal coordinates. This movement is related to the temporalities of logistical capitalism through these apparatuses' recording of position and comparison with the desired scheduling of the logistical-capitalist actors that monitor space. The very reliability of that movement, however, relies on tethering truckers' labour-power to the demands of logistical capitalism, their making-assembly-line (Harney and Moten 2021). The classed and racialized making of trucking as logistical labour cements that relation as determined by capitalist actors. Simultaneously, ma(r)king the space through which truckers move — the lands they traverse — as logistical geographies relies in the first place on their making as spaces of property whose conditions of access are determined by logistical-capitalist actors. In other words, land needs to be made as property in order to find use in logistical capitalism to the exclusion of other ways of being with that land, which in settler-colonial States like Canada, is to the exclusion of Indigenous socio-spatialities. The socio-spatial text of logistical capitalism is therefore inscribed in the logistical algorithm that reads land and sociality in general but (re)produces those socio-spatialities as vacated of non-logistical relations. This thesis is therefore concerned with how the logistical algorithm is written into geofencing apparatuses and the connections they produce in their networking — connections that set up incomplete relations between logistical-capitalist actors and logistical labour, relations that are always already exclusive of non-logistical socio-spatialities.

1.4. Thesis Outline

The remaining chapters in the thesis describe three situated deployments of geofencing apparatuses in/across western Canada and elaborate their function as logistical media — their coordination and ordering of labour and life per logistical-capitalist imperatives —

through their (re)inscription of the logistical algorithm — its making of workers' movements as reliable and plannable, and land as property which can be put to logistical use — in the socio-spatial text. Through these cases, the socio-spatial exclusions that condition geofencing's making of connections-as-relations are mapped.

Chapter 2 takes up the Port of Vancouver as a logistical geography in which geofencing is deployed to measure trucks' turn times in order to improve them. The Port has been formative in the development of Vancouver as a logistical city, including in its settler-colonial and racial-capitalist registers. In its (re)making of urban space as logistical, especially through the built environment of roads and gates that mark movement in and through, the Port has excluded the use of that space by working class, racialized and Indigenous populations. The Port of Vancouver therefore facilitates commodity circulation through its administrative relation to its urban situation as a landlord. Simultaneously, the movement of trucks through these spaces has been produced, through the production of classed and racialized subjects, as reliable and trackable through (post-)Taylorist management techniques, as well as displayed to truckers who, per the neoliberal mode, are expected to plan their movement through the port accordingly. It is these writings of the socio-spatial text that are inscribed in the logistical algorithm.

The deployment of geofencing apparatuses, as a rewriting of the logistical algorithm, therefore produces connections-as-relations that are evacuated of non-logistical socio-spatial relations. Here, geofencing apparatuses, in the first instance, order truck movements in, through, and out of the Port according to the strict spatio-temporalities required to maintain logistical flows. At the politico-economic layer, this working of the logistical algorithm on labour privileges the Port's enactment of rentier relations, which further excludes non-logistical relations from being included, or written into, the socio-spatial text. The connections of geofencing apparatuses reproduce relations of labour and land that deepen the impression of logistical capitalism, to the exclusion of other relations.

Chapter 3 follows the inscription of the logistical algorithm throughout Metro Vancouver in the deployment of geofencing apparatuses in truck route (or trip) planning to warehouses/distribution centres (W/DCs). Geofencing is used in route planning to ensure that trucks follow their assigned routes, mapping when trucks would arrive at and leave

geofenced areas such as ports and warehouses per logistical schedules, and how long trucks may be allowed to dwell in other interstitial areas.

Trucking here is managed and oriented towards offsetting the costs of logistical sprawl — the geographical shift of logistical facilities such as warehouses outward from the metropolitan core. Warehousing labour, meanwhile, is required to enable the efficient passage of commodities through these facilities. Geofencing's reading of commodity movement as truck 'routes' relies on the making of logistical labour as precarious classed and racialized subjects, flexible and responsive to the demands of commodity movement on roads, as well as in and through warehouses, so that the actual relations that make circulation possible can be read as logistical 'flow'. The on-road and cross-warehouse movement of commodities (especially those entering the region through the Port of Vancouver) therefore produces Metro Vancouver as a regional logistical geography. This spatiotemporal shift in urban-regional goods movements refracts land use and property regimes in the region, so that the suburbs which truck routes traverse and in which warehouses become the spaces in which classed and racialized subjects live and work. As zoning produces either/or relationships of land use, the possibilities for other ways of relating to land are reconfigured towards the conditions of logistical capitalism.

Geofencing apparatuses therefore read space and socius made logistical. Racial-capitalist and settler-colonial histories produce logistical labour and land use regimes in the regional logistical geography of Metro Vancouver. This allows logistical-capitalist actors to treat the planning and routing of trucks throughout the region as space through which commodity movement is guaranteed, via access to both labour and land, and can be managed through geofencing apparatuses. The connections which geofencing apparatuses make with trucks need to be shorn of these historical socio-spatial relations in order for contemporary logistical relations to be taken for granted.

Chapter 4 describes how geofencing is used at the Canada-United States border — specifically, at the Blaine-Douglas, Ambassador Bridge, Blue Water Bridge, and Peace Bridge Ports of Entry (PoEs) — to calculate freight trucks' border crossing times. Border crossings, however, may produce wait times and delay in predicted freight mobility, which affects the reliability — the plannability and/or predictability — of freight movement vital to logistical capitalism.

The crossing times at these PoEs are tied up with truckers needing to make themselves legible to the discretionary power of Border Security Officers (BSOs) that represent the security regimes instituted at the border. Border crossings are therefore a relation exercise intimately tied to the racialized production of labouring subjects as 'risky' or not. The border crossing times that geofencing apparatuses read as spatiotemporal duration through their connections in fact hinge on the socio-spatial differential inclusion of labouring subjects in the sovereign space of Canada.

The risk of delay, however, needs to be minimized in order to enable the smooth logistical flows of 'secure trade' that, owing to the enormous volumes of cross-border trade between Canada and the US, are vital to logistical capitalism. While the measured border crossing times are periodically used to determine infrastructural investments, geofencing apparatuses are more often used to convey 'wait times' to truckers crossing the border, and therefore shift responsibility for adhering to the temporalities of JIT logistics to labour. Geofencing, then, reinscribes the logistical algorithm — the inseparable relations of land and labour that condition commodity movement — in its connections to trucks through a double movement: first, through reading the PoE's border spatiality not as a complex of histories and socialities tied up with racial capitalism and Canadian settler-colonialism, but as a passage for commodities, and second, through measuring and managing the spatiotemporalities of border crossing as if it was exclusive of labouring subjects' socio-spatial position. The connections of geofencing apparatuses, in other words, segment a durational space attuned to the time of logistical capitalism and the spaces of colonial settler states, with variances from the normative space-time of such duration — delay — marked as aberrant, as something that can be managed out by precluding non-logistical socio-spatialities.

The conclusion summarizes the arguments made throughout this thesis, particularly on how the connections-as-relations set up through geofencing reproduces — or perhaps more accurately, reinscribes — the exclusions of, and that come to matter in, logistical capitalism. The conceptual and methodological usefulness of the logistical algorithm is demonstrated, along with other sites and situations it might be deployed to understand.

Chapter 2. Geofencing at the Port of Vancouver, or, Reinscribing the Exclusions of Truck Turn Time

Geofencing apparatuses at the Port of Vancouver read the movement of trucks in, through, and out of the port terminals as ‘truck turn times’. The connections between the trucks and the geofencing apparatus, then, produce socio-spatially grounded relations between the logistical-capitalist actors active in the port and truckers, refracted through the port as a logistical geography which is also teeming with the dockworkers’ use of their labour-power. The spaces of the port are configured to hold and move commodities in alignment with the logistical-capitalist imperatives of JIT distribution, i.e., of *circulation*. The geofencing apparatus is used to produce a particular segment of logistical activity — the passage of trucks through port terminals, which involves the handling of freight, loading and unloading containers, and related logistical operations — as smooth logistical flow in order to make circulation as such value-productive for logistical-capitalist actors. What the geofencing apparatus reads as truck turn times, in other words, is the logistical algorithm — the configurations of space and socius produced by logistical-capitalist actors — made spatiotemporally measurable.

This chapter first examines how the Port of Vancouver — especially its container terminals — works as a complex space of institutional, securitized, and sociotechnical relations organized according to the imperatives of logistical capitalism. Especially important is the development of the Vancouver Fraser Port Authority’s (VFPA) administrative functions as a *landlord* with control over land through colonial and racial regimes of ownership (Bhandar 2018). The Port’s construction, improvement, and management of transportation infrastructure, as well as the VFPA’s regulatory authority over labour relations, are also significant to its logistical function. The writing of the Port of Vancouver as a logistical geography therefore forms the socio-spatial text that gets written into the logistical algorithm for the (a/relational) coordination and configuration of logistical activities today. This management of relations is made possible by, and expressed through, KPIs such as truck turn times that are measured by geofencing apparatuses.

Geofencing apparatuses, as logistical media, work as an inscriptive device of the logistical algorithm. The next part of the chapter therefore elaborates how these apparatuses

measure truck turn time through the socio-spatial differentiation of the Port. In particular, this section elaborates how the actual production of truck turn time is a result of trucks' passage through the Port's various spaces of logistical activity. The geofence-based internal differentiation of these spaces, such as port terminals, are precisely what makes it possible to capture the movement of truck(er)s as improvable 'metrics'. This section therefore introduces the spaces and socius that get reinscribed as logistical.

In order to apprehend how the spatialities of the Port of Vancouver come to matter for commodity movement, and therefore how that movement is read by the connections of geofencing apparatuses as truck turn time, this chapter turns to the Port's historical production and neoliberal reinscription as a logistical geography. The Port, in which subjects are read and move as labour, functions as a "borderzone" (Mezzadra and Neilson 2013) or zone of "extrastatecraft" (Easterling 2014), imbricated in territorial and logistical relations not just with distant shores, but with the urban spaces amidst which they are situated. As Canada's largest port, the Port of Vancouver has been historically entwined with the development of the city of Vancouver and its facilitation of global marine trade (Campling and Colás 2018). These relations are particularly pronounced in the socio-spatial text of land, written through Canadian settler-colonial regimes as *property*. Named as an *improvable* resource, land has historically been (re)made for logistical *use* to the exclusion of non-logistical socio-spatialities. In turn, logistical-capitalist actors — which includes the Port as well as, for example, terminal operators and trucking companies are able to extract value *through* their control of space and socius *from* the circulation of commodities, mediated through relations of *rent*. Historically and politico-economically, then, non-logistical socio-spatialities, such as those that might have been possible in working class neighbourhoods and Indigenous villages, also had to be excluded from the port's spaces to produce it as a space for value extraction. The spatial parameter of the logistical algorithm is a settler-colonial and racial-capitalist writing.

The next section of the chapter is concerned with the social text of durational logistical activities — of the production of truck turn time — that is written primarily through the histories and relations of truckers and longshoremen. The movement of trucks through port spaces, seemingly abstracted from the labour-power that makes it possible, actually relies on the production of logistical labour, of classed and racialized subjects, as reliably trackable. While the labour-power of longshoremen is put to container handling 'tasks'

managed through Taylorist techniques, truckers' movement is produced as a *process* targeted for continuous improvement through (post-)Taylorist management techniques; a process that geofencing apparatuses read as turn times. In the neoliberal mode, this measured movement is displayed via apps and websites to truckers who are expected to plan their movement through the port accordingly. It is these *a*/relational writings of the socio-spatial text that are inscribed in the logistical algorithm. The making of truck(er) movement through port terminals as turn time excludes the relations between labouring subjects that actually make that movement possible.

Finally, this chapter summarizes how geofencing apparatuses control the degree to which the socio-spatial relations considered thus far *matter*, both in terms of the actual spatiotemporality for which those relations can be recorded as active, i.e., the duration of connection, as well as the conditions under which those relations are rewritten as logistical. Following the ordering of land and labour — the (re)inscription of the logistical algorithm — reveals how the connections of geofencing apparatuses make certain socio-spatial relations possible through the exclusion of other non-logistical relations.

2.1. The Logistical Function of the Port of Vancouver

The Port of Vancouver has evolved geographically and infrastructurally with the region of Metro Vancouver and more broadly the Lower Mainland region of British Columbia. The port's physical jurisdiction touches most regional governments: situated within the city of Vancouver, on the southern shore of Burrard Inlet, are two major container terminals — Centerm and Vanterm — while the Fraser Surrey Docks are located along the Surrey side of the Fraser River, and Deltaport is closer to the municipality of Delta, along Robert Banks. These container terminals are of particular significance to the port, accounting for 24.6 million metric tonnes of the cargo moving through the port, second only to bulk cargo (Port of Vancouver 2021). Furthermore, these terminals have an outsized influence on the spatial ordering of the port, organizing it into a cluster (Husa 2006) that allows the Port as a whole to fit into global hub-and-spoke logistical networks.



Figure 1. Port of Vancouver (n.d.) jurisdictional map

Administratively, the port also functions “as a decision-making and infrastructure investment system” (Hall 2014) under the Vancouver Fraser Port Authority, or VFPA. The VFPA was formed through the consolidation of the existing Port of Vancouver (responsible for the Burrard Inlet and Deltaport/Roberts Bank), the mid-sized Fraser River Port Authority, and the small North Fraser Port Authority. The VFPA is a Crown Corporation, following a long history of a shift from federally centralized administration to an emphasis on local autonomy (Stevens 1999), particularly enforced with the enactment of the Canada Marine Act 1998 (CMA) (Ircha 2008), along with the Canada Transportation Act (CTA, 1996) and the Oceans Act (1996) (Ireland 2005, 4). Institutionally, therefore, the Port of Vancouver (in its various forms over the past few decades) has sought to integrate port activities across Metro Vancouver and the Lower Mainland, especially on and along Burrard Inlet and the Fraser River (Hall 2012). This integration has relied on a number of State initiatives such as Ports 2010 (Stevens 1999), the BC Ports Strategy (Husa 2006, 75), and the Asia-Pacific Gateway and Corridor Initiative (Transport Canada 2006), especially through the development of multimodal transportation infrastructure.

The enactment of these legal regimes, furthermore, emphasized the commercial role of the port over its public role. The VFPA was no longer funded by the federal government nor required to pay various taxes, but was expected to borrow from commercial lenders and make payments-in-lieu-of-taxes to the Metro Vancouver municipalities. As a government-owned corporate entity with ownership of land, then, the Port of Vancouver operates as a *'landlord port'* with control over its land use and leases of federal lands to private tenants and terminal operations to private operators (Hall 2014; Ircha 2008; Ireland 2005). From the mid- to late-20th c., the various port authorities that would form the VFPA, including the Vancouver Port Authority and the Fraser River Harbor Commissions, received revenues from various waterfront leases, permits, and licenses (Gresko and Howard 1986). In fact, by 2005, upto two-thirds of the port authority's employees were involved in landlord-related activities (Ireland 2005). The major stakeholders in the administration of the port, besides the VFPA itself, were to be *port companies* involved in various logistical and trade functions (Husa 2006, 69-71). These include terminal operators DP World, which leases the Centerm terminal from the Port, and GCT, which leases Vanterm and Deltaport. The *logistical* function of the Port of Vancouver, then, comes to be dictated by capitalist interests, with the VFPA supporting its *facilitation* (Husa 2006, 101). This includes transportation management and negotiation of logistical labour relations, refracted through the communication of information on supply chains.

While both rail and truck transportation is key to the Port of Vancouver's logistics — the Canadian National Railway Company and the Canadian Pacific Railway, operated privately, are vital to the port's functioning (Husa 2006, 95) — the VFPA is more closely involved with trucking. Local trucking companies primarily serve the Port, where the latter functions as a coordinating node for shipping lines, third party logistics providers (3PLs), and freight forwarders. These include "relationships related to ordering a trucking company's pickup or drop off services, checking driver availability, verifying driver access privileges, validating the trucking company's port license and processing the trucking company's order acceptance (or rejection)" (Ireland 2005, 89). The port authority itself is limited to being a landlord dependent on terminal operators for actual logistical operations, who are therefore treated by the port as the key actors in shaping the patterns of demand for port trucking, especially through the intensification of terminal throughput. The VFPA may be involved in rate-setting and enforcing financial penalties for delays at the terminal gates, but its involvement with truckers' difficulties with road movement is limited to

instances of labour strikes and their resolution (Hall and O'Brien 2018). The port aims primarily to minimize supply chain 'disruption' for private operators in the supply chain (Davies 2014). The port therefore retains limited formal regulatory authority beyond the port lands even in relations with labour and urban communities, focused instead on a supply chain logic on the docks and at the terminal gate, rather than a public role.

The active role that the Port of Vancouver takes with respect to transportation, then, is largely limited to the construction and improvement of related port infrastructure and land use. The proliferation of road and similar transportation infrastructure that port logistics demand, especially with Just-In-Time (JIT) delivery (Baldwin 2005), however, has impacted port-urban spatial relations. Trucks often queue up to enter the port on the streets leading into the waterfront, with consequent traffic delays for vehicles operating on the waterfront occur at the terminals, between the terminals and the city streets, and on the city street system (Griggs 1970, 111-116). Even though truck routes and off-peak delivery (OPD) strategies have been developed, port and intermodal facilities have grown too, as well as increases in sizes of travel modes and associated infrastructures (Lightstone, Bellony, and Cappuccilli 2021). Port expansion and truck routes are therefore key areas of port-urban conflict, especially over questions of land use (such as waterfront redevelopment) and route-related impacts such as traffic, noise and air quality (Hall 2014). These conflicts also have consequences for the spaces and times of truck movement, with the difficulty and time costs of navigating congested urban cores and longer truck routes impacts truckers' management of federally-mandated hours of service (HOS) limits on driving and requirements for off-duty time (Lightstone, Bellony, and Cappuccilli 2021). Truck traffic and waterfront land use, then, are closely tied up with the State-institutional management of capital and labour. Port logistics is not simply about the port itself.

The city and Port of Vancouver, then, have evolved "both separately and in relation to each other" (Hall and Jacobs 2012), with cargo owners' (shippers) and movers' (carriers such as Maersk or forwarders such as DHL) continued socio-spatial and routing preference for urban ports owing to their advantages in terms of access to labour and governmental resources. "[T]erritorially based institutional and social proximities" shape the Port of Vancouver as a logistical *and* institutional space (Hall and Jacobs 2010). Historically, the relationship between the port and the city of Vancouver has shifted from

a near-complete unity to a shift of industrial and trade activity away from the city, and across the regional hinterlands, even as geographical and political influences remained tied to the city. These shifts influenced socio-spatial pressures including waterfront zoning, land uses and values, the logistical movement of goods and people, as well as industrial, commercial, residential and other community requirements (Griggs 1970). However, as previously noted, these sets of *relations* have not generated an easy cooperative or collaborative environment; rather, the conflict between the port's logistical activity and the adjoining urban areas has hinged on their historical and institutional 'disconnection', "whereby once tight physical, economic, and institutional relationships between general cargo ports and their cities have changed with the introduction of containerization and other shipping innovations...[such that] the (private) benefits of increased cargo throughput have become more widely dispersed geographically, [even as] the (social) costs are concentrated locally" (Hall and Clark 2010). Such separation has taken place along infrastructural registers — as with different transportation requirements for the port and the city, with consequent congestion, and the historically dominant land ownership in Vancouver of the Port and Canadian Pacific Railroad (CPR) — as well as spatial registers — such as with the construction of the Deltaport terminal at a significant distance from the city and the use of urban and port lands along the waterfront. Even as container movement and the subsequent shift towards road-based transportation 'reconnected' the port to the broader Lower Mainland region, the governance structure and institutional responsibilities of the Vancouver Fraser Port Authority primarily concern it with the facilitation of transnational logistical capital through the management of urban space. The port's importance and possibility of value generation lies in the fixed infrastructure it has constructed and continues to manage (Chua 2018), as well as its ordering of logistical 'cargo mobilities' (Gregson, Crang, and Antonopoulos 2017), as enabled by the labour the city of Vancouver makes available. These moves produce Vancouver as an economic niche (Tsing 2009) whose socio-spatial differentiation helps situate the city within global supply chains via the port.

It is this urban-logistical relationship, with its dis-/re-connected spaces — *borders* — that logistical media intervene in to massage over and/or maintain socio-spatial difference. In other words, logistical media rewrite the logistical algorithm in the differentially inclusive space of the Port's borders. Digital technologies employed to improve intermodal shipment tracking and management are therefore key parts of the port's transportation-centered

infrastructure (Charron 2003). The Port of Vancouver has been involved in the development of digital systems to enable total visibility of the supply chain segments it is imbricated in for the shipper (i.e., the seller), the shipping line and/or the buyer of goods¹. Supply chain information, then, is closely tied to transportation management.

Geofencing was deployed with relative ease at the Port of Vancouver since, as part of the VFPA's Smart Fleets Strategy, every trucker licensed to operate in drayage trucking was required to install GPS tracking units on their trucks (Port of Vancouver 2015). Purchased from the private Webtech Wireless for all licensed drayage trucks, the installation of GPS units were projected "to help reach efficiency goals including reduced wait times, decreased dispatch office call volumes, lowered vehicle idling times, and improved overall operational efficiency" ("Port Metro Vancouver Implements Webtech Wireless' GPS Solution" 2014). The truck licensing system (TLS) set up by the VFPA, meanwhile, was part of its response to drayage truckers' strikes in 2005 and 2014 when truckers demanded resolution for the problems of pay and waiting associated with long turn times (Dupin 2015; Port of Vancouver 2014). The deployment of geofencing apparatus, then, was ostensibly part of the response to logistical and labour pressures. They were framed as "an objective means of verifying truck arrival time and terminal turn times" (Huynh, Smith, and Harder 2016), so that the port authorities could "have good data" (Dupin 2015) that they could use to contest claims that truckers weren't remunerated correctly or that they were forced to wait for especially long periods. Geofencing is used as a technological instrument that cements the port's 'objective' position as the arbiter of 'acceptable' wait times. The TLS, by mandating GPS tracking, acts as a form of State-institutional logistical power (Neilson 2012) over the *movement* of truckers and their *access to* the port, by setting the technological grounds for *access by* the port authority to these truckers *via the connections that geofencing generates*. The conditions of possibility for these connections themselves — the spatial and institutional borders of the port — make truck movements consequent

¹ The Pacific Gateway Portal, for example, provides advance information on container status, vessel activity, and real time visuals from port landside infrastructure. The container terminals also have long-standing electronic data interchange (EDI) relationships that enable the electronic processing and transfer of data contained in a shipping manifest between shipping lines and agencies, port managers, stevedores and other agencies in the logistical network (Ireland 2005; Morais and Lord 2006). The Port also developed the Common Data Interface (CDI) through which terminal operators, the VFPA, and truckers are intended to have visibility into container availability at the container terminals as well as plan and assign terminal labour and equipment requirements (Mongelluzzo 2016).

not on the port’s administrative and spatial profile, but on choices that truckers make in order to move (as) freight. The web of soft (Rossiter 2016) and mobile (Chua 2018) infrastructure that makes truckers and their movement accessible not just to the port authorities and terminal operators, but to *each other* through the port dashboard and eHub app ("Port Dashboard | Port Of Vancouver" 2022) also aims to hedge against future labour actions based on longer-than-average turn times.

Geofencing apparatuses (re)produce logistical connections, i.e., relations between logistical-capitalist actors and logistical labour that shapes the latter to be readable by that apparatus (Agre 1994) while excluding the power exerted by the former to produce that readability. These capital-oriented priorities of the Port of Vancouver are reflected in the “utilization” *metrics* the Port of Vancouver uses to indicate its adherence to the social, spatial, and temporal ordering that logistics demands (Harney and Moten 2021; Kanngieser 2013). These KPIs/KPIUs take into account shippers, carriers, terminal operators, and land carriers as primary stakeholders, but group work processes simply as productivity indicators (Comtois and Slack 2005; Ireland 2005). The Port’s KPIs point to the reinscription of the logistical algorithm: the temporal indicators of commodity movement through the socio-spatialities of labour made logistical.

Table 17: PoV Supply Chain KPIs

KPIs	Thresholds - Red	Data Sources
Vessel Operations		
Schedule adherence	Less than 95%	VTOSS, AIS
Dwell time at anchorage	Greater than 8 hrs.	VTOSS, AIS
Dwell time at terminals	Greater than 12 hrs.	VTOSS, AIS
Overall ship turn time	Greater than 22 hrs.	VTOSS, AIS
Terminal Operations		
Container Dwell Time	Greater than 12 hrs.	Terminals
Truck Operations		
Dwell time in gate lanes	Greater than 45 min.	RFID
Turn time in terminal	Greater than 45 min.	Terminals
Turn time on port property	Greater than 2 hrs.	RFID
Rail Operations		
Schedule adherence	Less than 95%	Railways or Terminals
Variance (cars delivered vs. scheduled)	Greater than +/- 5%	Terminals or Railways
Variance (cars delivered vs. demand)	Greater than +/- 5%	Lines

Figure 2 KPIs significant for the Port of Vancouver’s supply chain performance, as drawn from Ireland (2005, 93)

Amongst these KPIs, significantly, are staging/dwell times and turn times. These metrics measure truck movements through the Port as temporal durations. It is precisely to

measure and *target for improvement* these metrics — unavoidably bound up with space and socius — that geofencing apparatuses are deployed.

2.2. Geofencing at the Port of Vancouver and the Calculation of Truck Turn Times

Truck turn times refer to the total amount of time drayage trucks spend in the staging area — where trucks wait to enter the port gates — and the terminal — the functional space where freight loading and unloading takes place — of the port. These are respectively referred to as the “staging time” or “wait time”, and the “dwell time” or “terminal time” (The Tioga Group 2013). To capture the borders of this differentiation and the movement of trucks between these spaces, and therefore calculate turn times, the Port of Vancouver uses geofencing at its Vanterm, Centerm, Deltaport container terminals and the Fraser Surrey Docks (see figures 2-4). GPS units on drayage trucks combined with geofences defined around terminal queues and gates are used to collect turn time data at the port (Huynh, Smith, and Harder 2016). On the detection of a truck’s crossing of a geofence’s border, connections are established between the Port’s servers and the GPS trackers, so that the “Start Time” and “End Time” of a truck’s entry into and exit from a specific geofence, as well as each truck’s unique identifying information (WebTech ID and Locator No.) (The Tioga Group 2013) are databased (Munster 2013) for future reference as well as dynamic access by live dashboards.



Figure 3. The marked geofences, from L-R, indicate the Centerm and Vanterm terminals, respectively. The yellow zones indicate the staging areas, while the longer green stretches indicate the truck routes leading up to the port. Reproduced from Port of Vancouver (2014).



Figure 4. **Fraser Surrey Docks**



Figure 5. **Deltaport**

The Port of Vancouver's approach to geofencing, aiming as it does to separately capture staging and terminal times, spatially differentiates these temporal blocks along the borders of their logistical operational spaces. The geofencing apparatus therefore demarcates not only the staging area, terminal, and roadways at and around each terminal, but eleven constituent geofences across these terminals that distinguish between trucks' entry and exit areas for the terminals (The Tiago Group 2013) (see figures 5-6).

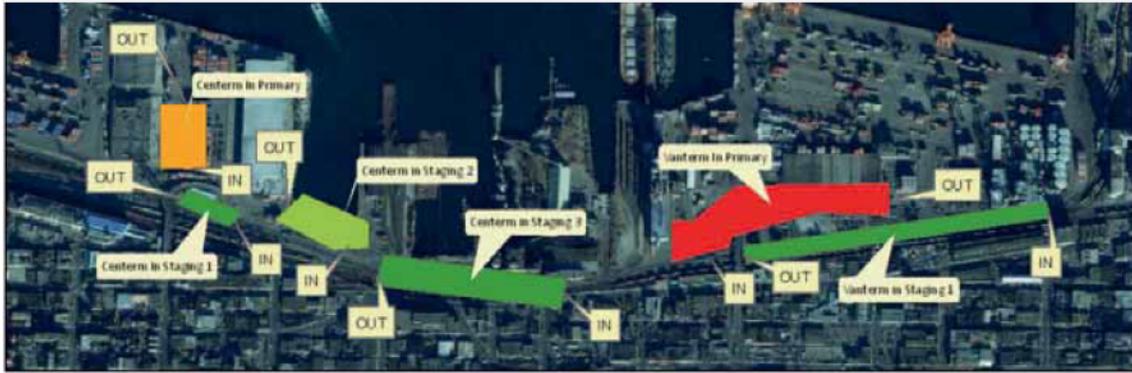


Figure 6. Vanterm and Centerm geofences. Reproduced from The Tiago Group (2013)

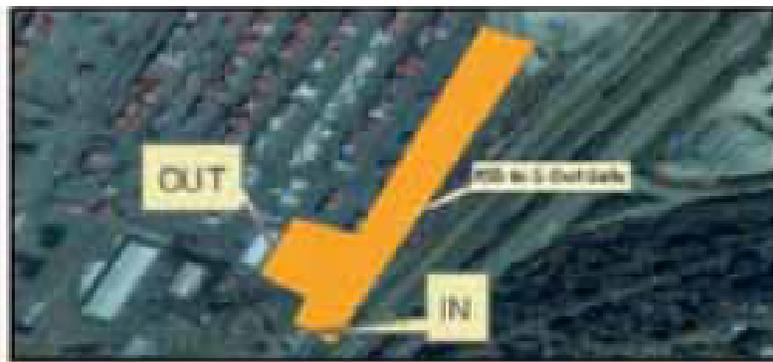


Figure 7. Fraser Surrey Docks (L) and Deltaport (R) geofences. Reproduced from The Tiago Group (2013)

The roadways include the Clark–Heatley, Commissioner–Victoria, and Victoria–Clark for the Vanterm and Centerm terminals. The actual coverage of these geofences are as follows (The Tioga Group 2013, 67):

- The Commissioner–Victoria geofence marks truck access to the Columbia and Marco container storage depots as well as the staging areas being developed by the Port along Commission Street.
- The Victoria–Clark geofence covers a truck exit that is crossed by multiple active railway tracks leading to industrial customers
- The Clark–Heatley geofence covers the entrances to Vanterm and Centerm and is crossed by multiple railway tracks.

The terminal is further divided into the following sectors, in which various operations relevant to port logistics are carried out (Morais and Lord 2006):

- Gate sector
 - the entrance point for the container trucks and represents the first contact point between truck drivers and terminal authorities, mediated by gate staff.
 - Operations included in this sector are checks on container availability and storage location, trucker appointments, equipment identification and security.
- Yard sector:
 - includes all ground or rail activities which take place inside the terminal, as well as security checks. The yard sector includes the interfaces between the Gate and the Quay at which ships are berthed
 - These activities include the loading and unloading of containers on terminal trucks, trains, and stacking containers in the yard. Other activities include container tracking, dispatching and inventory

The truck routes within the port itself are geofenced according to the *time that the operations associated with those spaces take*. Specifically, these geofences mark out port trucks' "moving and/or waiting periods"; the *agentiality* of these trucks is associated with their *mobility*, which is what geofencing allows port interests to *access*.

At the Port of Vancouver, the temporal blocks involved in the calculation of turn time as a metric for improvement are as below, where T1 is related to the roadway, T2-T6 the staging area and the remaining time the terminal time (Morais and Lord 2006):

- **T1:** Waiting period resulting from a disruption preventing access (train crossing) to the entry gate of the terminal – (truck is idling);
- **T2:** Waiting period resulting from having to wait in a queue to access the terminal gate (truck is idling);
- **T3_x:** Travel period required to arrive at the terminal gate (Entrance Gate);
- **T4:** Waiting period required while the delivery slip is reviewed and during check-in (container, truck, driver) (Truck is idling);
- **T5_x:** Travel period for proceeding to the gate (Pedestal Gate) for validation and instructions;
- **T6:** Waiting period for the data validation (truck, trucker and container ID) and receipt of instructions from gate's clerks (truck is idling);
- **T7_x:** Travel period for entering the terminal and reaching container stack;
- **T8:** Waiting period for loading a container on the truck using the appropriate CHE (Forklift, RTG, etc.) (Truck is idling);
- **T9_x:** Travel period for proceeding to the exit gates for verification and validation;
- **T10:** Waiting period while waiting in a queue to exit the terminal (Truck is idling);
- **T11:** Waiting period for validating and verifying container data (Truck is idling);
- **T12:** Waiting period required for a random, thorough inspection of the container's contents by Customs Officials (Truck is idling);
- **T13_x:** Travel period to leave for the terminal area immediately past the terminal's exit gate.

Here, the periods with the subscript “x” denote those “fixed” space-times which correspond to the trucks' movement, and which are used to define the areas of interest for geofencing.

Geofencing, as logistical media, divides the drayage network into several zones to describe the constituent parts of the calculable turn time. While the turn time as such is a target metric for continuous improvement, the ‘fixed’ durations *cannot* be reduced with the use of logistical technologies. The very movement of the *truck* denotes space which *cannot* be completely annihilated by time. On the other hand, the waiting periods, where the “truck is idling”, are considered targets for minimization — if not elimination — through the use of logistical technologies, increased labour ‘productivity’, or other infrastructural ‘improvements.’ That segmentation of space is made possible by geofencing and the service-level agreements (SLAs) between actors operating in that space. It is intended to be used, for example, by terminal operators to improve the container-handling operation

on the yard (Zhao and Goodchild 2011) and by port authorities to smoothen truck mobility across the port's terminal gate border. This very differentiation indicates a spatiotemporal limit where continuous improvement becomes discontinuous, even if these discontinuities are expected to be papered over through the contiguously calculated turn time. These discontinuities — the spaces port authorities and terminal operators are variously concerned with, as laid out in SLAs — are the borders of port logistics. Only truckers *cross* these geofenced borders.

These borders map onto the reality of port operations that cumulatively produce longer turn times. The factors contributing to longer-than-average turn times include “broken” transactions between truckers and port authority requirements (e.g., documentation problems, unpaid fees, equipment issues, customs holds), the knock-on effects of terminals handling multiple and/or late vessels, port gate capacity, infrastructural bottlenecks during peak gate hours, the pause in terminal activity during the Port's lunch breaks, “pulsing” or long queues before terminals' morning start-up, and rail switching blockages that may add to roadway queues. The data on truck movements acquired through the geofencing apparatus allows the port authority to differentiate spatially between the locations of these factors and ascertain their relative significance to turn time (The Tioga Group 2013). Consequently, the Port of Vancouver's geofences group together specific forms of labour and the infrastructures they are entwined with, even as the ostensible objects of their connections are limited to drayage trucks.

These socio-spatial relations shape the logistical assembly line (Harney, Fraportti, and Cupini. 2018; Harney and Moten 2021) through which truckers must pass in order *to access* the commodities they, as waged labour, are to transport, while being (algorithmically) *accessed by* the logistical media technology of the geofencing apparatus in the production of connections with trucks' onboard GPS units. Only the productive agent of turn time — the movement of the truck — is captured as the object of the geofencing apparatus' connections (Chun 2016). It is only the im/mobility of the truck, its representability as logistical flow (Harney, Fraportti, and Cupini 2018), that is treated as the object of logistical process improvement, measured as a KPI. The variability of turn time must be minimized, its fluidity maximized (Zhao and Goodchild 2011), if logistical processes are to be representable as flows. Improvements of the sociotechnical means of

measuring logistical activity are treated, essentially, as improvements *acting on* the movement of trucks.

Turn time, then, may be the measure of trucks' (as logistical agents) entry into the staging area and exit from the terminal, but it is *not simply a consequence of this movement*, but of the very reality of the port and its buzz of logistical activity. The grammars of action that shape the truck's mobility are not simply products of the geofencing apparatus (Agre 1994), but are delineated by the port's logistical imperatives, by logistics-in-action (Gregson, Crang, and Antonopoulos 2017). The calculation of truck turn time depends on the logistical labour of truckers being ordered by and according to the imperatives of logistical-capitalist actors, in relation to the borders of these geofenced areas — the demarcated spaces of logistical operations. It is the port, with all its spatial, institutional, and social relations at one end, and the sociality of logistical labour itself, with all its concrete histories and subjective relations, that define the conditions of possibility for geofencing, its entanglements with material contexts, and its operational and durational demarcation. Geofencing displaces considerations of these histories and relations since it is an inscriptive apparatus whose spatiotemporal parameters are written through the logistical algorithm's exclusion of non-logistical relations from the socio-spatial text. The deployment of geofencing to measure and manage the movement of trucks is only possible once the space and subjects it monitors are made logistical.

2.3. How the Port of Vancouver Came to Be, or, How Geofences Got Their Borders

The Port of Vancouver is inarguably a logistical hub. Simultaneously, as a key agent in land use and development via its State-backed ownership of property, it parcels out logistical functions to various private actors. The examination of geofencing reveals how these divisions technically play out, but also hint at the histories and socio-spatial relations that make such *bordering* (Mezzadra and Neilson 2021) possible. This section argues that producing logistical operations, which are 'read' by geofencing apparatuses as grammars of action (Agre 1994), as logistical flow "is achieved through a proliferation of new borders and spatial ordering and control" (Cowen 2014, 172). This *enclosure* (Mezzadra and Neilson 2021) of the Port through State-led racial-colonial closing off of land as property generates the conditions of total access to logistical labour and total movement through

an imagined *terra nullius* (Harney and Moten 2021). This is precisely what enables logistical-capitalist value extraction — specifically, through control over the spaces in which commodities circulate, and therefore from which *rent* can be extracted. Geofencing enables logistical-capitalist actors, including the Port, to reproduce the bordered areas written into the socio-spatial text. It is precisely these spaces, and the relations they make im/possible, that mark the connections these apparatuses generate in dis/connection.

The key thrusts of the making of the Port of Vancouver lie in the colonial-racial dispossession — and the colonial state’s taking possession — of land along the contemporary waterfronts of Burrard Inlet and Fraser River, and its (material-discursive) remaking through property-based justifications of land use and industrial ‘improvement’. Simultaneously, the logistical geography of the port is shaped by the sociotechnical-infrastructural conditions of possibility for movement and access. This is the logistical algorithm readable through the geofencing apparatus — space in which sociality is only possible when it can be interpolated for the use and improvement of land. Riven by spaces of containment and flow (Chua 2018), the Port has come to exert an outsized influence on urban and logistical life even as — or more accurately, *because* — it sharpens its borders.

2.3.1. Historical Regimes of Use and Improvement of Waterfront Land

The contemporary landlord role of the Port of Vancouver is inseparable from “the specific processes of colonial land appropriation and the historical emergence and contemporary dominance of markets in land-as-commodity that work to articulate a racial concept of the human in conjunction with modern laws of property” (Bhandar 2018, 11). This (dis)possession of land, connected as it is to a specific racial-colonial conception of civilizational subjectivity, began in the mid-late 19th century with the coastal lands of the Indigenous Coast Salish peoples, such as the Squamish, who had previously claimed a different form of property relation to the land that did not rest on private ownership. The *improvement* of land for logistical use was not possible until the socio-spatial text had been rewritten through such exclusion of Indigenous socio-spatialities. Colonial settlements that encroached the land around Howe Sound and on the North Shore of Burrard Inlet, as well as the waterfront spaces between False Creek and Burrard Inlet that formed Granville — which would come to be incorporated as the city of Vancouver in 1886 — dispossessed, displaced, and distorted Indigenous communal and family networks, as well as access to

resource sites and symbolic landscapes (Blomley 2003, 110-111; Parnaby 2006). The making of the Port as *logistical* is made possible only in excluding Indigenous persons from their relations to the land on which the Port sits — non-logistical relations that could not be put to work ‘improving’ that land.

The settler-colonial social shift in racial demographics — by the mid-1870s, the Indigenous population was equally matched by the mostly-European settler population (Delgado 2010, 35) — proceeded with and through the sociolegal mark of property ownership and the making of a racialized labour force. With the enforcement of British law and its land ownership policies in the 1860s, the gridding of Vancouver relied on the elision of native geographies and property relations towards colonial land speculation and urbanization, and the subsequent urban expansion of the settler city (Blomley 2003). This possession of land as property, and the ossification of Indigenous relations that land made possible (Harney and Moten 2021), relied on the treatment of the Indigenous-Other as unable to make land ‘productive’ for emergent capitalist interests. It relied on co-constitutive notions of racial difference and property logics “that cast [White] ways of living, producing, and relating to land as having value worthy of legal protection and force” (Bhandar 2018, 8-9) while Indigenous relations were evacuated of socio-spatial value. These “racial regimes of ownership” also made space for industrial and cultivational production, based on the ideological and sociolegal rationales of use and improvement. Sawmills displaced campsites and villages along the waterfront, from *Xwáyxway*, or Stanley Park, to *q’emq’emel’ay*, today known as the Downtown Eastside (DTES), often alongside roads and transportation routes (Blomley 2003). While a significant portion of the coastal Indigenous presence in the city was excluded to reserves or remained in pockets, much of the ownership of the waterfront land shifted to the (white) settler-colonial State and industrial enterprises throughout the late 19th century to mid-20th century.

Even as Vancouver was made out to be cosmopolitan (Delgado 2010), as a settler city it was primarily European, save some notable ethnic enclaves. The anti-Asian riots of 1907 marked the nadir of race relations in the city, with the Powell Street neighbourhood of ‘Japantown’ being a site of significant violence. Japantown also came to be the socio-spatial center of the dispossession of Japanese-Canadian property during World War 2, when from 1942-1943, the government of Canada uprooted and interned all of the 22,000 Japanese Canadians in coastal British Columbia and force them to sell all of their land-

based property (Stanger-Ross and Landscapes of Injustice Research Collective 2016). Moves such as this erasure of the historical community of Japanese Canadians in Vancouver put property at the core of larger patterns of exclusion and dispossession that characterized the relationship among people and with the (white) Canadian State as logistical-capitalist actor (Stanger-Ross, Blomley, and Landscapes of Injustice Research Collective 2017). The government of Vancouver, relying largely on racialized notions of Japanese living habits and, consequently, conditions of ‘blighted’ housing named Japantown as a slum that needed “improvement” — the outcome of which was to sell the land to private real estate developers (Stanger-Ross and Landscapes of Injustice Research Collective 2016). With this shift of waterfront land from racialized people to private landowners via the State, Powell Street and the surrounding neighborhood was set up for commercial and industrial use that continues into the present day.

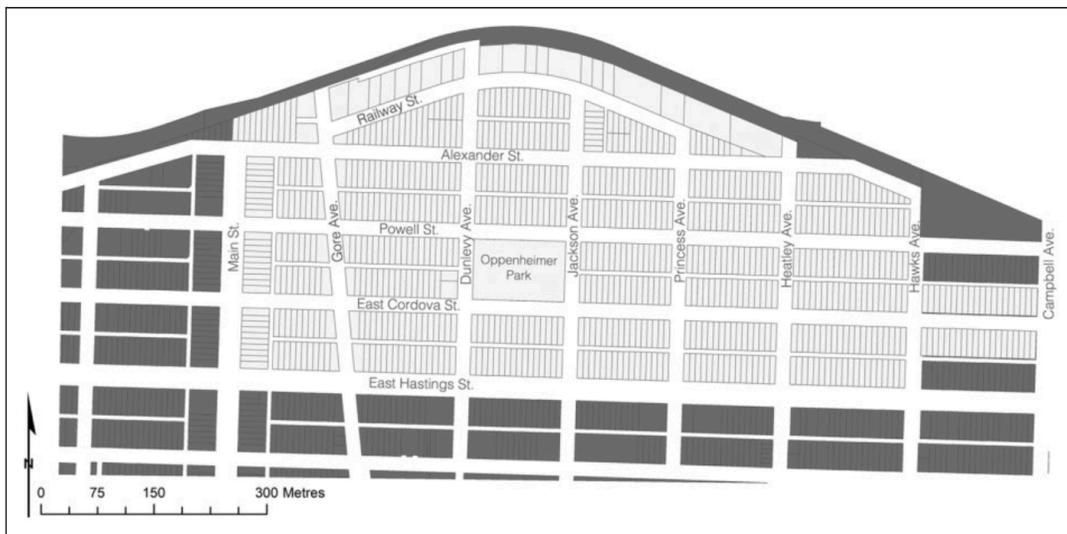


Figure 1. Japanese Canadian Settlement in the East End of Vancouver was concentrated in a well-known neighborhood loosely bounded by Main, Hastings, Campbell, and Railway Street. Pictured in light gray on this map are blocks where Japanese Canadians constituted at least 40 percent of the residential population in 1941. Cartography by Jacqueline Clare and the Historical GIS Cluster, Landscapes of Injustice Research Collective.

Figure 8. Reproduced from Stanger-Ross and Landscapes of Injustice Research Collective (2016)

The land that the Canadian Crown’s (dis)possession made available therefore formed the basis for the growth of the waterfront areas that today comprises the Port of Vancouver, while also laying the foundations for differentially-inclusive social borders that would cross the urban-logistical space. The use and improvement of land, then, did not simply follow

property logics. From its earliest days, Vancouver relied on the export of wheat and lumber from surrounding regions, made possible through the natural harbour at Burrard Inlet (Cornwall 1952). The growth of the Vancouver settlement, and the land use and values associated with that growth, were therefore as much a reflection of the *logistical* drive towards the use and improvement not just of land, but of labour — a historical twinning that was made possible through the production of commodities funneled through the port, and was vital to the development of logistical capitalism (Harney and Moten 2021) in Vancouver, and Canada more broadly.

The appropriation and development of waterfront land was primarily towards the development of the port at Burrard Inlet and industry, especially for lumber production and export. The Hastings Mill and the Burrard Inlet Lumber Mills were vital to establishing Burrard Inlet a Port of Entry into Canada via the purchase thousands of acres of land on the Fraser River, Burrard Inlet, Howe Sound, and adjacent coastlines (Delgado 2010, 29; ILWU Local 500 Pensioners 1985, 18-22). The main shipping and industrial area of what was then known as Vancouver Harbour was concentrated on the south, i.e., Vancouver shore of Burrard Inlet, stretching from Coal Harbour to the Second Narrows Crossing, now known as the Ironworkers Memorial Bridge. Throughout the 1890s, vast amounts of capital “poured into the resource and primary processing industries; into fish canning, mining, logging and sawmilling, into new rail lines, docks, and comparable facilities” (Knight 1980, 196-197) along with real estate development and public transport development along the eastern boundaries of the Port, from Nanaimo Street to Renfrew Street. Property development therefore laid the foundation for most of the infrastructure of the Vancouver waterfront until the late 1940s.

The increasing industrialization proceeded apace with the increasing spatial and social profile of the port concentrated in the eastern sections of the harbour. The construction of Terminal Dock and Warehouse, at the foot of Nanaimo Street (Knight 1980, 21), Ballentyne Pier, #1 and #3 Jetty, and Pier B.C through the 1920s was made possible by the Vancouver Harbour Commission’s ownership of approximately 40 acres of waterfront land. Meanwhile, major State-backed improvements along the Fraser River, such as the construction of stone jetties, proceeded between 1909 and 1912 to make the Fraser-side city of New Westminster a deepwater port. The post-WW2 corporate consolidation of sawmills also benefited logistical activity along the North Fraser River, as the Fraser

waterfront became the grounds for the transport of lumber (Delgado 2010, 70, 130). Much of the waterfront land, then, was tied up with logistical and industrial use.

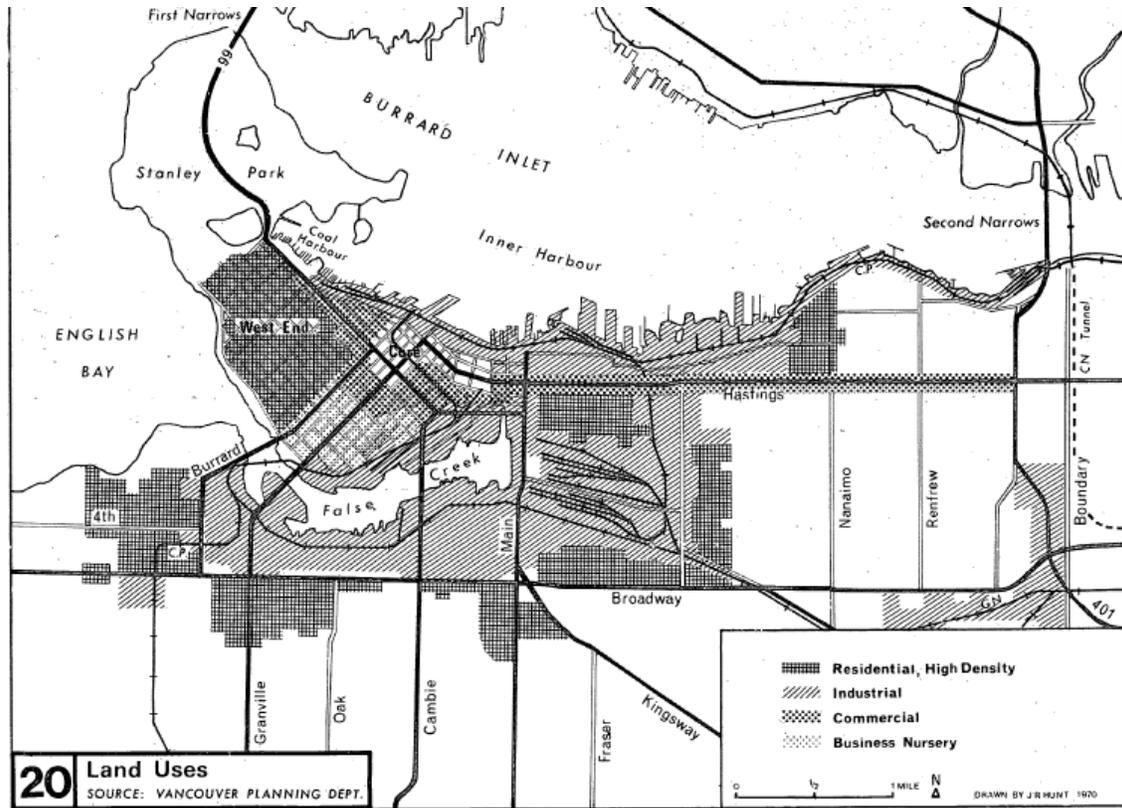


Figure 9. Vancouver land use in 1970. Reproduced from Griggs (1970, 141)

With the increasing sprawl of the port itself as well as non-industrial land use, however, newer industrial spaces began to shift to smaller coastal settlements nearer the source of raw material towards the mid-20th century. False Creek, too, raised concerns over its 'blight' close to the urban core, and needed to be improved for its livability (Cornwall 1952). Similar wastelands strewn with industrial detritus were scattered around the waterfront (Knight 1980). The border between the port and urban Vancouver began to grow firmer, with industrial activity being squeezed out. It was in this context, then, that the so-called logistics revolution of the mid-20th century came into play.²

² In fact, "the Alaska-Yukon Pacific Railroad's *Clifford J. Rogers*..., laid down by Canadian Vickers at Montreal and delivered to Vancouver in November 1955, [was] the world's first expressly designed container ship" (Delgado 2010, 126)

Throughout the 1960s and 1970s, the Vancouver Port — both Burrard Inlet and the Fraser River — saw an expansion of its facilities, especially for the increasing export of bulk commodities, and more importantly for the coming decades into the present, containerized goods. This included the expansion of the Centennial Pier and container berth facilities. Shipping, terminals and land transport facilities covered over 28.3 miles of metropolitan waterfront area along Burrard Inlet. Furthermore, in 1966, the Port of Vancouver began significant improvement projects, including a loading bulk terminal, along the Fraser River at Roberts Bank or what would come to be known as Deltaport. The Fraser River would also be the site for waterfront land for industrial requirements. By 1989, the Port of Vancouver had become the largest port in North America in terms of tonnage of imports and exports (Delgado 2010, Griggs 1970).

The growth of the Port of Vancouver, driven by changes to cargo-handling technologies (containerization, specialized bulk handling terminals, and intermodalism) and the spatial needs of modern ports (increased storage space and deeper water) (Ircha 2002), required the reservation of waterfront lands *and* continued access to port and terminal areas through urban space for logistical operations (Greater Vancouver Regional District 1980). Significant swathes of port-owned lands remained in sufficiently large and well-defined industrial estates along the Fraser River (Hall 2012). However, simultaneously throughout the 1960s and 1970s, waterfront land along and in both Burrard Inlet (such as Coal Harbour) and False Creek was rapidly gentrifying, remaking industrial and logistical space as residential space, and erasing the presence of the working-class and racialized workers who once lived there (Airas and Hall 2019; Delgado 2010, 143, 163). The Port, too, sought to exploit undeveloped or unimproved land in gentrifying areas such as Gastown by commercializing port-owned lands in the Downtown Eastside (a proposal that was ultimately defeated by community activism) (Blomley 1997). Urban growth had resulted in one-third of the port waterfront being used for non-logistical functions, and three-quarters of the port-city border being redeveloped for urban renewal and residential projects by the 1970s. The waterfront land available for port activity and ‘back-up’ land for the improvement of terminal facilities has been growing recursively with dis/possession (Nichols 2018), especially with zoning regulations displacing industries, working-class homes, and driving up land prices (Griggs 1970; Knight 1980). Effectively, then, this point of difference and contact (Konrad 2015) — this border — between the port and city

centered on the differing urban and logistical views towards the use and improvement of land, and contestations over ownership and property relations.

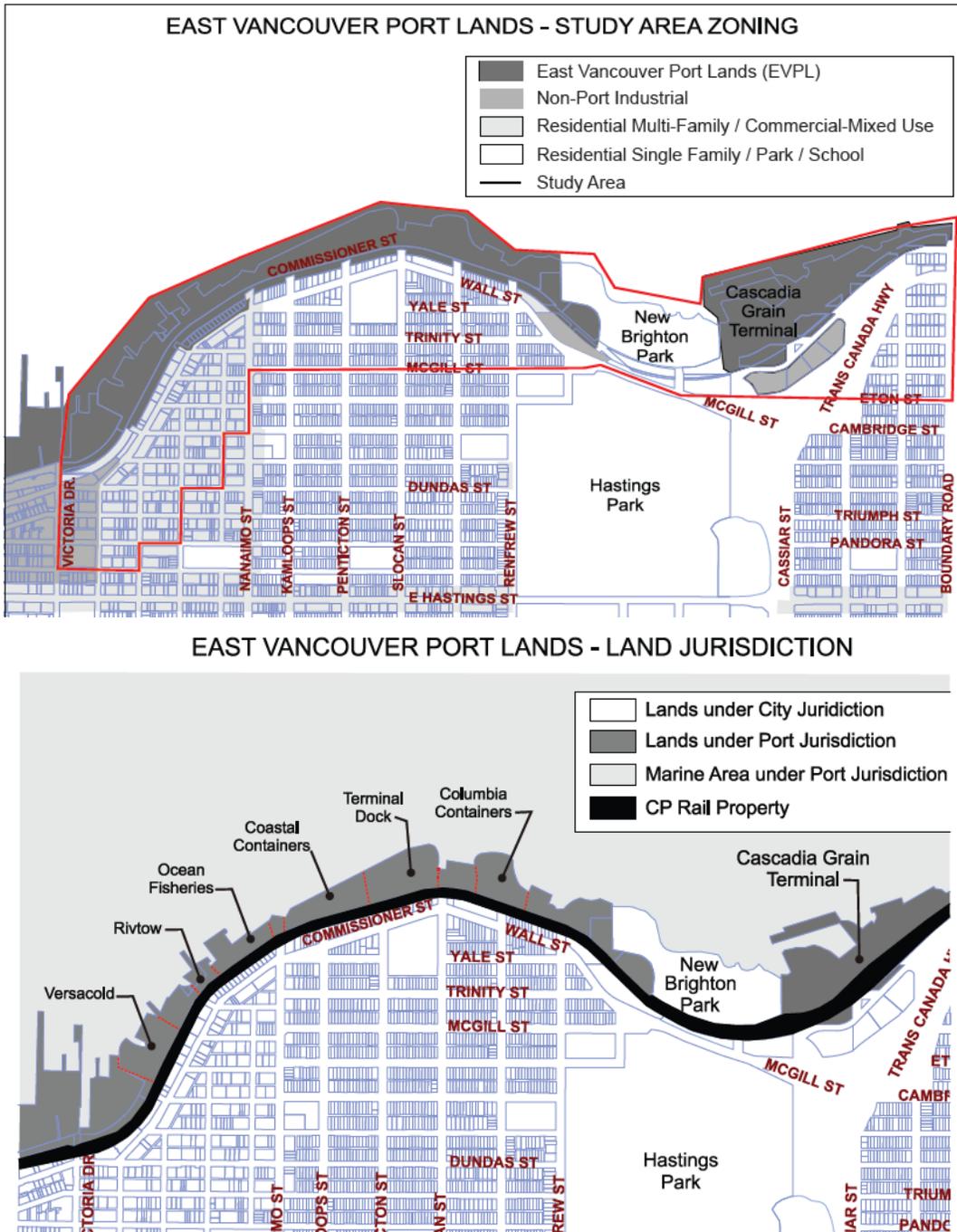


Figure 2: VPA and City of Vancouver Jurisdiction

Figure 10. *Reproduced from East Vancouver Port Lands Working Group (2007)*

The border between the port and the city of Vancouver proceeded along the lines of a growing distinction between residential and industrial use of urban waterfront land throughout the late-19th century to early 20th century, *through the dispossession of land and making of racialized labour for logistical functions*. These dispossessive forces of the settler-colonial State remain, even if the mechanisms have changed. The Tsawwassen Agreement of 2009, for example, which involved lands immediately adjacent to Deltaport, seemed to transfer (a small parcel of) land to the Tsawwassen First Nation, for an undervalued sum. However, this came with the stipulation that these lands will eventually be subject to State taxation and market mechanisms, opening the road for purchase by the Port — as an autonomous institution — and gentrification. Furthermore, almost 3000 acres of land along Roberts Bank was transferred to the federal government to be managed by the Vancouver-Fraser Port Authority (Cowen 2014, 178, 194). These patterns indicate that narratives of an *exclusionary* border between the port and urban space are mistaken; these borders produce the differential inclusion (Mezzadra and Neilson 2013) of life and labour. This becomes clearer when considering another key facet of the making and use of logistical geographies: transportation infrastructure.

2.3.2. Transportation Infrastructures and the Making of Urban Vancouver

With the industrial activity that once centered on Vancouver moving to the coastal hinterlands, the Port of Vancouver began its shift in the 1950s towards a more nodal, distributive position in a regional logistics network that also included the Port of New Westminster and the North Arm of the Fraser River, which would come to be constituted as the Port of Vancouver as a whole in the 21st century (Cornwall 1952). As such, transportation facilities through urban space and between these ports have significantly shaped the logistical geography of port spatiality. These facilities write in the possibilities of movement and access that are read(able) by logistical media.

Urban Vancouver from the mid-20th century onwards has been especially subject to the socio-spatial ordering of logistical requirements. Historical contingencies produced borders between port and residential land use that also fixed certain spatialities for logistical purposes, such that these infrastructures and the labour-power required to make them function were to be subject to continuous improvement (Slack 1994), towards

increasing logistical movement and access. The infrastructures of mobility, such as truck routes and railway lines that cross the Port of Vancouver tend to follow historically defined trajectories, especially as urban space constrains logistical use.

The very making of urban space in Vancouver, notably, begins with transportation infrastructure, especially railway lines, and the associated property regimes. In 1887, the Canadian Pacific Railway (CPR) acquired stretches of waterfront land along the skid road port of Vancouver from the Canadian federal government, with rails extended along Burrard Inlet's southern shore to the dock facilities of Coal Harbour. Throughout the 1880s and 1890s, the CPR continued to secure rights to public waterfront lands around Hastings Mill and other crops of industry (Delgado 2010, 49-50). The CPR was, in other words, Vancouver's first major landlord. The circuit of land-as-owned-property from the Canadian State through Crown corporations such as the CPR depend the tendrils of the settler State for logistical purposes. As with much of Canada, the railways were the colonial infrastructure par excellence (Cowen 2020). The main shipping and industrial region of what was to become the Port of Vancouver, along the southern shore of Burrard Inlet thus ran alongside the CPR's rail lines — lines that remain to this day as on-dock rail facilities for the port — with its deep-sea and coastal shipping docks being the first major port installation to the east of Coal Harbour (Cornwall 1952). However, the railway lines itself were limited to these waterfront spaces at the port's border with the rest of the city, leading into the yards tucked away beside False Creek (Knight 1980, 67). The CPR and its regimes of ownership therefore set up Vancouver's position as a logistical *and* settler city, facilitating the Port of Vancouver's trans-Canadian and trans-Pacific importance.

Simultaneously, the movement of freight through the city of Vancouver itself required transport infrastructure as industry, resource sites, and support for urban life shifted outward towards the hinterland and other regions of the Lower Mainland. These infrastructures were specifically tied to the development of the Port. Terminal Dock, for example, was inaccessible by road at the time of its construction, with longshoremen having to scramble down Nanaimo Street and then across the CPR tracks to the dock (ILWU Local 500 Pensioners 1985, 75). It was therefore towards the early-mid 20th century that roads leading into the port were built or otherwise cemented as port roads. These included a road north of the CP rail line between Victoria Drive and Kaslo Street in 1935 (East Vancouver Port Lands Working Group 2007), Commissioner Avenue, a high

level pedestrian overpass along Wall Street built from the foot on Nanaimo over the CPR tracks (ILWU Local 500 Pensioners 1985, 75), and Powell and Victoria Drive leading into Cedar Cove, the main portal to the eastern dockside on one end, and Cambie and Hastings as the the informal western boundary of the the port's waterfrontage. While these roads were not designated as truck routes, many of them — such as Water Street, Powell, Hastings, and Kingsway — were paced with trucks leading to waterfront facilities such as CPR's Pier D that would transfer freight from the ships and trains to other parts of Vancouver and the Fraser River Valley (Knight 1980). The construction of roads leading into and traversing the port, such as the Renfrew Street overpass and extension along the port's breadth, continued through the mid-20th century (East Vancouver Port Lands Working Group 2007). These infrastructures formed the bases for the extension of road networks all across Vancouver and the Fraser River waterfront with the explicit purpose of serving the logistical function of the Port of Vancouver.

Governmental (typically municipal) designation of a road as a truck route regulates truck access to city roads by embedding these relations into the geography of the city, with the logistical interests of the port extending beyond its physical borders. At the same time, the extension of logistical geographies has to compete with private real estate interests. These socio-spatial negotiations materialize in the use of designated truck routes as well as the routing choices these force truckers to make. The Vancouver municipality has 'improved' the passage through the Knight-Clark Street truck route through a series of incremental safety improvements and the introduction of turning lanes to reduce blockages. Commissioner Street is the primary east-west truck route that parallels the CP Rail mainline and links the Vanterm and Centerm container terminals in the Port with the regional road and rail networks. Privately owned and managed by the VPA, the rerouting of truck access from Renfrew Street to the Commissioner Street overpass in 1995 also cemented the distancing of truck traffic from the residential areas of neighbouring Burrardview (East Vancouver Port Lands Working Group 2007). In 2010, the Vancouver-Fraser Port Authority briefly chose to close the Clark Drive entrance to the Burrard Inlet in response to road traffic and the nodal location (especially in its intersection with Hastings Street) for protests — including by Indigenous activists — that blocked truck movements (Hui 2010; Plana 2021). The consequent shift to eastern roads to the port routed trucks through Nanaimo Street, which sought to smoothen truck movement and port access through increased availability of space for truck staging. However, the historic private

redevelopment of these waterfront areas for detached single-family homes drove urban community pressure on the municipality to restrict the movement of port-destined container trucks along these roads (Hall 2015).

In the contentious dialectic between logistical and urban space, then, the access to space — in the form of land — that the Port of Vancouver has and logistical capitalism's imperatives to movement — imperatives that are also key to the Metro Vancouver economy — lets the port authority set the terms of the road network it claims to require. These "large-scale, static transit infrastructures...act as conduits for commercial capital flows" (Chua 2018, 23) as the consequence of which the urban spatial form is systematized and networked as, for example, road networks. Logistics is and has historically been *constitutive* of contemporary urban space as logistical space (Cowen 2014). Urban socio-spatial constraints, then, shape the *borders* of logistical geographies, be it through the designation of truck routes or the limits to rail line. These spaces facilitate logistical flow and regulate, say, commuter traffic and the development of residential areas in logistical geographies. Their borders may not be made of wired fences, but they extend the port's socio-spatial power over places it may not physically extend to.

2.3.3. The Bordering and Enclosure of Port Space

While borders between port and urban space may be fluid, produced primarily through their enactment of differential inclusion of non-logistical subjects, there are also more hardened borders between port terminals and surrounding environments. These borders involve the enclosure (Mezzadra and Neilson 2021) and securitization (Cowen 2014) of logistical geography, enforced through physical infrastructures such as fences and at terminal gates. Simultaneously, the purpose of enclosure and securitization was to ensure the continuance of logistical operations in the face of apparent security threats. In other words, the securing of (logistical-)capitalist activity requires the securing of space — labour's movement may be marked by the strictures of security only to ensure commodities remain in motion.

From the Port of Vancouver's earliest days, public access to the waterfront was denied by a CPR fence parallel to its property (ILWU Local 500 Pensioners 1985). The evacuation of working class and racialized populations was the precondition for the enclosure of the port, as was evidenced, for example, by the virtual depopulation of the port-adjacent

Powell Street after the dispossession of the Japanese-Canadian population in 1942 (Knight 1980, 200-201). The coming of WW2 deepened State attitudes towards logistical activity in the Port as something to be protected, with the port's spatial management and active border enforcement passing to the Royal Canadian Navy (Delgado 2010, 112). The port itself was therefore marked off and denied public access. Logistical labour and the commodities they moved, however, continued to pass through the port with relatively few barriers.

The shift in the intensive securitization of the port occurred with the events of 9/11. The Port Security Plan instituted in 2004 included the installation of vehicle access control gates on the truck roads leading into the port, the installation of a perimeter security fence, and security cameras all along the border of the Port, railways, roadways, and terminals with the city. Terminal operators were also required to prepare security plans tailored to their specific operations (East Vancouver Port Lands Working Group 2007). Securitization also extended to maintaining the integrity of transportation infrastructure (Lam and Kitasaka 2009). The post-9/11 securitized waterfront is "patrolled by the Vancouver city police, by an army of security guards hired by the privately controlled Harbour Board, and at its margins by the [Royal Canadian Mounted Police, or] RCMP" (Knight 1980). The Vancouver Fraser Port Authority also funded port policing and security through the establishment of a National Port Enforcement Team (NPET) and the Waterfront Joint Forces Operation (WJFO) led by the RCMP, and including the Canadian Border Security Agency (CBSA) and representatives from the Vancouver and Delta police departments (Madsen 2018). The Port of Vancouver today follows the International Maritime Organisation's International Ship and Port Facility Security (ISPS) Code in accordance with geoeconomic security norms. This includes the emplacement of United States Customs and Border Protection agents in Canadian ports alongside CBSA agents and advance data sharing regimes such as the Advance Commercial Information (ACI) or Container Security Initiative (CSI) program, in place since 2004, that requires shippers to provide the Canadian Border Services Agency with detailed electronic data on containers' origin and contents 24 hours prior to departure from Asian ports (Ireland 2008; Ircha 2005).

Security initiatives at the Port of Vancouver also dovetailed with law enforcement policies. Criminal activity on the waterfront, including of organized criminal groups such as the Hells Angels, allegedly proceeded with the complicity and participation of the unionized longshoremen of the ILWU 500 and 502 Locals. The ILWU's "radical and militant tradition

that defied authority and state attempts to discipline the waterfront workforce” (Madsen 2018) seemed to justify the port authority and law enforcement’s view of logistical labour as prone to criminality. As a consequence of Transport Canada’s Marine Transportation Security Clearance Program (MTSCP), enforced by the Port of Vancouver since 2008, waterfront workers employed in sensitive or restricted areas and terminals had to apply and obtain a transportation security clearance, renewable every five years, and subject to checks by the RCMP and the Canadian Security Intelligence Service (CSIS) against background records via the Canadian Police Information Centre (CPIC) central database. In addition, port passes issued and administered by the Vancouver Fraser Port Authority gave access to longshoremen and truckers to general dock areas once they passed through security-manned gates. Those who do not clear background checks or have criminal records cannot be employed in the port. The MTSCP and Port Pass systems therefore “make crime, or even *potential crime*, a matter of national security” (Cowen 2014, 120). The port-city border is regulated not just through physical infrastructure, but through legal and security regimes that presume relationships between crime and national (in)security. These regimes follow the once territorial borders of national sovereignty — they are “fundamentally geographic” (92) — *and* differentiate between various (inter-)governmental authorities and spatial functions.

The bordering of the port, then, fundamentally aims to control, or contain, the “flows” of logistical labour that threaten the sustained mobility of commodities. The VFPA treats labour itself — and its political activities — as “disruptive” to the “fluidity” of supply chains that pass through its logistical geographies and must therefore implement means of regulating supply chain security that preempts “risks” (Whelen, Khan, and Ramsey 2015) to logistical networks by regulating the movement of labour at port borders (Cowen 2014, 124-126). The segmentation of space in the city that grew in tandem with logistical capitalism is necessarily a means of enclosure of private and public property — it is riven by borders.

2.3.3. Why Border the Port?

The geographies that make the Port of Vancouver have been made in turn through three historically concrete productions (Hall 2003): the making of racial regimes of ownership (Bhandar 2018) through the dispossession of Indigenous lands and ways of living, the concomitant making of logistical space facilitated by State and private property ownership

on settled (urban and waterfront) lands, and the bordering of logistical space through the differential inclusion of logistical labour and securitization of the supply chain.

The very making of property in and around the settler city — as Vancouver and the surrounding municipalities are — entails “the categorization and organization of space, whereby every space is known, named, and positioned....[and] the establishment of rules of interaction, by which space is to be used, shared, and appropriated” (Blomley 1997). This ordering of space entailed the utilization of economic, political-philosophical, and cultural rationales of the use and improvement of land and labour, as evidenced by the evacuation of Coast Salish and Japanese-Canadian people whose use of the land and racial difference excluded them from dominant models of property ownership and capitalist use, and the abstraction and commodification of land. The making of a property market in Vancouver therefore rested upon the underlying fiction of Crown sovereignty; a regime that also shored up the socio-spatial power of the landlord-port. These property regimes and commodity relations thereby set up the first *circuit* of capital, where “the *commodity form of ownership* and the *political form of dispossession*” (Arboleda and Purcell 2021) come to form a differentiated unity (Hall 2003) of commodity relations among state authorities and capitalist classes that allows them to exert spatial and economic control over land (Bhandar 2018). As a city equally shaped by logistics, however, the distributional relations that allow for the Port and city’s differential, often conflictual, control over increasingly scarce land assets and their use and improvement is oriented towards the circulation of the goods that the Port imports and exports, or distributes.

The urban-logistical borders of racial regimes of property, therefore, mark the spaces that can be used for logistical activity. This enables the Port to extract value from its *ownership* over space made static — land made property — and infrastructure. The port’s landlord role facilitates its leasing of logistical-geographical segments to private terminal operators such as GCT and DP World, while its corporate role allows the VFPA to establish SLAs with these private actors. The capitalist interests that operate within and through the port rely on the continued movement of commodities *through these spaces* to capture the value generated through the use of logistical infrastructures embedded in terminal space. The infrastructures required to facilitate circulation rely on an apparent integration of logistical ‘surfaces’ (Martin 2013) centered on containerized goods, and their movement from ship to dock to truck. These socio-spatial infrastructures are intended to minimize the turnover

time or latency of capital (Toscano 2013), so that the rate of value generation through the circuit of circulation sees exponential growth. The very modality of logistics therefore involves a dialectical relationship between fixity and mobility, or containment and flow, with the port functioning as an exemplar space for fixed infrastructures to enable the transportation of commodities; logistics functions as a mode of circulation (Chua 2018). The port authority, meanwhile, relies on terminal operators' continued interest in leasing land in order to receive income. It therefore facilitates the improvement of port infrastructure through SLAs, the expansion of the port's logistical geography to match logistical needs, and the development of logistical routes while seeking to manage labour and capital relations through legal and security regimes, especially in disciplining the former's spatiotemporal movement while facilitating the latter's mobility (Chua 2018; Gregson, Crang, and Antonopoulos 2017; Hatzopoulos, Kambouri, and Huws 2014). The port, as a logistical geography, therefore facilitates the production of value through "the *internment* and *circulation* of nonhuman flows as well as human bodies that are placed in relation to systems of circulation" (Chua 2018, 138). Circulation works through seams not just in the material spatialities of the port, but also in the alignment of operational differences across capitalist enterprises. These actors seek different means of value extraction from the circulation of commodities, while attempting to reduce the costs invested in maintaining the labour-power and infrastructure necessarily involved in dock work and intermodal transportation.

Logistical-capitalist forces engage, therefore, in *rentier* relations, where rent as a category of value production maps onto the dialectic of (fixed) production and (mobile) distribution (Arboleda and Purcell 2021). The rentier status, the identity-property juridical knot (Bhandar 2018), is facilitated by the control over property previously elaborated — not merely in terms of ownership, but as the facilitation of circulation. Rentiership is therefore not *limited* to the port authority. Private interests, such as terminal operators and logistics service providers, can extract rent through their configurational control over the spaces and infrastructures involved in the distribution of commodities.

Terminal operators who seek to maximize the efficiency of goods movement *through* the terminal extract value from their control over the mobilization of commodities whose costs of production and distribution are — through their imbrication in global supply chains — significantly low. The surplus value released through the devaluation of production and

distribution can, then, be captured in the *circulation* of commodities, which port terminals are perfectly suited to do. The movement of these *rent-bearing commodities* across port space means that “rent appropriation is not restricted to the private owners of non-reproducible resources from production—i.e. the traditional landlord figure—but also includes the extent to which other social subjects can appropriate rent from the sphere of circulation” (Arboleda and Purcell 2021). The circulation of containerized goods as rent-bearing commodities enables their taking the value-form of money *while continuing to circulate as commodities*.

The more accelerated the process of circulation, the larger the volumes of rent-bearing commodities moving through port space, and the more value that can be captured by the logistical-capitalist interests operating in these spaces. At the same time, these interests compete amongst each other to be able to capture relatively larger shares of the surplus value these commodities make available. For terminal operators — and in turn, port authorities — then, the efficient use of logistical infrastructures and labour-power grows in importance, while such ‘efficiency’ may rest on the devaluation of trucking or other transport infrastructures that other logistics providers and the bordering city are in control of. Port actors therefore enroll spatial and legal regimes that are “designed to harness rent relations for the disciplinary organisation of labour (and the concomitant production of labouring subjects) through a [logistical-capitalist] ideology of technological-organisational improvement” (Arboleda and Purcell 2021). The very production of value for various port interests rests simultaneously on the subdivision of the port’s logistical functions, as well as the SLA-based alignment of the interests of *competing* actors to valorize their respective socio-spatial-temporal seams of commodity circulation. The historical bordering of port and city, *as well as the bordering within the port geography and among logistical-infrastructural spaces*, are key to producing the seams in commodity circulation that allows various capitalist enterprises to extract rent.

The rentier relations between the Port and other logistical-capitalist actors such as terminal operators, then, have to be *coordinated and organized across bordered spaces*. This making-legible of logistical socio-spatialities is precisely the role of logistical media. The borders of geofences, which are congruent with the spatiotemporal blocks that denote various rentier interests, delineate the logistical operations that are the concern of various logistical-capitalist interests and are therefore essential in differentiating the purposes of

measuring the duration of truck movements. The geofences within the terminal can further help terminal operators identify those socio-spatial areas of labour and infrastructure whose ability to generate value, i.e., whose ‘productivity’ they can ‘improve’, while still maintaining borders between their concerns and those of the port’s, and therefore continuing to exploit the various lines of ownership towards the circulation of rent-bearing commodities. The port authorities, however, are not only concerned with these constituent geofences whose impediments to logistical flow they seek to smoothen, but with the terminal geofence *as a whole*, since that is the leased space through which the port earns income and whose efficiencies must be maintained in order to keep the terminal operator leasing that space. This is also the case with staging area geofences. However, the geofences aligned with roadway borders depict those spaces which may be relevant to logistical operations but are outside the concern of either port authority or terminal operator, since neither collect rent on those lands. The movement of trucks on these logistical routes are therefore tracked in order to drive neoliberal policies that displace the responsibility for their efficiency onto truckers. The temporal marker of turn time that geofencing ostensibly tracks is an illusive abstraction — a metric that can be improved.

Logistical media technologies such as geofencing apparatuses therefore serve to maintain the borders that reflect socio-spatial relations between rentiers. Rentiership itself follows the long historical trajectories of spacemaking and bordering that rest on the twinning of racial regimes of property ownership and the logistical operations involved in commodity circulation. Such possession, however, is not perfect; it also requires labour regimes that are subject to the imperatives of logistical capitalism in order to proceed effectively and efficiently (Gregson, Crang, and Antonopoulos 2017). It is, as noted throughout this thesis, “deeply intertwined with the constitution of social subjects” (Arboleda and Purcell 2021). The historical antecedents of such active making and ordering of labour (Barad 2007) are clearly colonial and racial-capitalist. This production of contemporary logistical labour, tied as it is to concrete historical relations as well as the continued demands of logistical capitalism, therefore seeks to order labour’s socio-spatial lives towards their capture (Agre 1994) by the geofencing apparatus.

2.4. Logistical Labour at the Port of Vancouver

The labour forces directly involved with producing the movement of commodities at the Port of Vancouver are longshoremen or dock workers, who are involved in various container handling activities, and port or drayage truckers, who are involved with the transportation of ocean containers from the docks to either railheads or to warehouses and distribution centers (W/DCs) and back. In a very real sense, it is these segments of logistical labour, in their *relations* and *across* those socio-spatial borders, that keep the trucks moving. However, geofencing sets up connections-as-relations only with truck(er)s, so that its measurement of truck turn time is delimited by the borders between these labour segments. The social-relational element of commodity movement — what geofencing purports to capture — is precisely what is *excluded* from its recording as turn time, its readability in the media apparatus' connections. The assembly line of logistical capitalism, then, requires that both truckers' and longshoremen's social lives can be accessed and regulated in order to make the actual use of their labour-power conducive to the improvement of turn time, *while excluding those socialities from coming to matter in the socio-spatial text*. The logistical algorithm reinscribes only the social text that matters to logistical capitalism.

The logistics revolution of the 20th century — especially with the widespread adoption of containerization — accelerated, if not wholesale produced, certain tendencies in the management of labour forces and processes. The globalization of production and the ability to sort and select sites of production and distribution in places with lower labour-power costs simultaneously applied pressures on existing logistical geographies, such as the Port of Vancouver, to reduce the costs of circulation. These cost reduction strategies required the politico-economic flexibilization of labour, as described in the introduction. While both truckers and longshoremen were unionized in the earlier years of the 20th century, deregulation of the trucking industry at one end and increasing privatization of port functions on the other, began the trend towards the casualization and flexibilization of these labour forces, as logistical-capitalist actors sought to offset the sunk cost in improved infrastructure and acquisition of land — the bases of rentiership, key to logistical capitalism — elsewhere. Capitalist strategies to reduce labour-power costs, be it the “misclassification” of port truckers or the subcontracting of dock work, therefore increased the precarity of labour and made it more difficult to organize political activity (Bensman

2008; Hall 2009; Jaffee and Bensman 2016). This made it easier for logistical-capitalist actors to align the actual performance of labour with the spatiotemporal ‘metrics’ of JIT logistics (Harney and Moten 2021), reinscribing the logistical algorithm that excludes political relations of solidarity from emerging.

The reading of turn time — the temporalization of socio-spatially used labour-power — through the connections of the geofencing apparatus, then, requires that the use of labour(-power) be made reliable and repeatable. Sociotechnical shifts in the organization of logistical work not only reduced the turnover time for commodities (Toscano 2013) by speeding up the handling of cargo on the terminal and its loading/unloading, but also reduced the amount of labour-power required for these operations. The parceling out of these work *tasks* performed by dock workers, then, is what produces trucks’ passage through the port terminal as a *process* subject to continuous improvement. It is essential to understand the socio-spatially produced relations of labouring subjects in order to understand the production of truck turn time as ‘improvable.’

2.4.1. Dock Work and Trucker Relations, Now and Then

The sociolegal control over port truckers’ mobilities does not proceed independently of the flexibilization and automation of dock work. While longshoremen at the Port of Vancouver (and they remain largely men) were once themselves involved in the manual transportation of goods across port space³ to be stored or loaded onto other modes of transport, developments in motorized transportation and mechanized container handling facilities (ILWU Local 500 Pensioners 1985; Madsen 2018; Woodsworth 1918/2016) have allowed for the division of logistical labour based on the movement of freight from sea to land and the spatial bordering of logistical operations.

The imperatives of post-deregulation logistical capitalism have accelerated these historical processes. Terminal privatization and trans-sector deregulation have significantly shrunk the dock workforce (Bensman 2008) and increased their precarity. These regimes of labour precarity are based on a complex mixture of flexibility in labour management and strict discipline in the labour process (Hatzopoulos, Kambouri, and Huws 2014). Pay for

³ Notably, hand carts were frequently referred to as ‘trucks’ in the late 19th - mid-20th century

higher levels of work has depressed, or at least plateaued (Hall 2009). Especially in response to increased aggregate demand for commodities and with the ability to use the port's technological infrastructures, longshoremen are constantly expected to accelerate logistical operations.

These same imperatives have deepened the divisions between various labour processes even as their improvement, or smoothening into logistical flow are tied up with their relationalities — the 'self-improvement of one labour process has always been contingent on the improvement of another. The modality of such improvement tends to be tied up with sociocultural views of workers' own labour-power that need to be deliberately directed towards the fulfillment of logistical operations. In other words, the social organization of logistical labour emphasizes self-improvement as a means to economic improvement. Truckers in North America have historically hewed to a view of their work as independent and highly mobile — they speak of the 'freedom of the open road' and being a possessive 'master of the truck', able to move with little frictions from either State regulation or social interactions with shippers (Knight 1980; Lorentzen 2020). Trucking companies encourage these subjective perceptions of trucking work that allow them to demand longer hours on the road, obscure the work that goes into truck maintenance and non-driving work, offset the lower hourly wages, and set aside social relations (Balay 2018). For longshoremen, their involvement with fixed port infrastructure, and the preparing, assembling, loading and discharging cargo to and from ships, requires a degree of physical ability and skill that feeds their self-perception as "a tough, rugged individual who guards and protects his loyalties, freedom and independence" (ILWU Local 500 Pensioners 1985, 10). Dock work continues to emphasize the 'improvement' of these abilities and skills, with those who achieve an acceptable degree of improvement finding regular employment through the ILWU. Even as these sectors of logistical labour seek to preserve their ability to stay mobile — in the case of truckers — or get more work done quicker — in the case of longshoremen — in the face of direct and indirect labour exploitation and harmful regulation seemingly independently of each other, they align with logistical-capitalist imperatives *and with each other's labour processes* to drive the circulation of commodities.

The deregulation of trucking and consequent shifting of self-improvement in terms of truckers' mobilities reflects the hardening of spatial borders between the port terminal and, for example, the staging area and roadways. The very production of turn time is made

contingent on truckers' self-presentation as data subjects and self-verification as non-threats to supply chain fluidity. The making of logistical "flow", especially through technological configurations of labour(-power) such as containerization is "at once an imperative for capital and also a source of division and difference" (Chua 2018, 15), where the management and flexibilization of work through (de)regulation, the intensification of work, and the containment of workers in certain logistical spaces. The compression of time across dock work in its differentiated unity as well as within the segmented work functions and spaces also reduces the spatiotemporal contact surface between workers involved in these various labour processes. The making of bordered logistical space is therefore a driving force behind the atomization of labour collectivity that actually makes logistical operations possible through working relationalities⁴. The relations set up by the overlapping socio-spatialities of logistical labour at and around the Port of Vancouver did not translate into shared politics; the borders between these labour processes were firmly entrenched.

Many of the political struggles that truckers serving the Port of Vancouver are engaged in today, such as not being paid for long waits at port terminals, are related to the "efficient" use of logistical infrastructure and routes (Parry 2014) whose relation to the labour-power of longshore workers is abstracted through the calculative form (Chua 2018) of trucks' turn time. Both labour processes are subject to the same imperatives of use and improvement of logistical capitalism, but these abstractions of spatiality and mobility bracket out the realities of social formations and logistical geographies. Drayage trucking is a port-centered activity, and owner-operators are thereby forced to hew closely to both the long hours involved in such transportation as well as the flexibility demanded by JIT delivery (Gregson, Crang, and Antonopoulos 2017). However, the inconsistent rhythms of container loading, handling, and unloading — packing, consolidation, and deconsolidation, are reflective of the varying labour-power intensities demanded of longshoremen by these processes, such as during surges in containerised cargo (Gregson 2017). Longshoremen, too, are pushed to keep up with the pace of JIT delivery, even as the consequent delays are displaced onto truckers as long queues outside the port terminal. The socio-spatial

⁴ The relational use of labour-power can, in other words, be made logistical while labour *collectivity* may not

borders of the port set up by the imperatives of logistical capitalism thereby reinforce intra-class antagonisms.

2.4.2. Racialization of Logistical Labour as Sociotechnical Control

While borders between labour processes and between logistical spaces are actively produced via the division of labour, the very participation of workers in these processes depends on their differential inclusion in these spaces (Mezzadra and Neilson 2013). While many truckers and longshoremen no longer fit the normative image of a working-class white man, the (classed) perceptions of trucking as a means of escape, of freedom from the rigidity of social fixity, or of dock work as an expression of physical strength (Balay 2018; Parnaby 2006) remains. These discourses materialize for racialized logistical workers as justifications for their social degradation via individualistic improvement of their labour processes, improvement that ultimately serves to reinforce the hyper-management of logistical labour(-power). Extending Stuart Hall, one might say that race is the modality through which logistical labour is lived. With logistical capitalism being racial in the first instance (Harney and Moten 2021), the assembly of logistical labour is indelibly marked by the history of its racialization. The twinning of Vancouver as a logistical and racialized settler city therefore conditions the production and inclusion of (certain social groups of) logistical labour in its spaces, including the port⁵.

The earliest participants in logistical labour at the Vancouver Harbour were seamen who now lived ashore, as well as Indigenous Squamish inhabitants. As the growth of the settler city dispossessed Indigenous lands, the pool of wage labour grew in the very same spaces, staffing pericapitalist and logistical enterprises. These workers participated in wage labour that moved (often seasonally) between the sawmills, forests, and other resource sites, and the port, owing to the similarity in skill and physical ability that both logging and waterfront work required (Delgado 2010, 71; Parnaby 2006). The waterfront sections and the campworker districts that bordered the waterfront were therefore, in part, an extension of mills and resource industries and formed the working-class parts of the city. These proximities grew tighter with the growing size of the city as well as demand for

⁵ While gender and sexuality have also been key modalities of logistical labour's life (cf. Balay 2018), this is less so the case in Vancouver. This may have to do with the masculinist ideologies of strength, skill, and endurance largely embodied in port-centered logistical labour such as longshoremen and port truckers

the harbor — and hence, labour — in the aftermath of WW1 (Madsen 2016). These geographies also formed the residential areas for (often racialized) workers who were retired, subject to the racist conservatism that sought to exclude non-white-Europeans from the labour force (even though Japanese and Canadian populations near the port were a key source of waterfront labour (Griggs 1970, 175-176)), or those otherwise unable to work — this was the origins of the Downtown Eastside of Vancouver⁶ (Knight 1980). The labour profile at the Port of Vancouver has historically reflected the parts of the city that border the port.

The making of class through racial difference — Indigenous “seminomads” who seasonally participated in logistical labour were excluded from racial regimes of property ownership that conflated whiteness with the logistical and property-based imperative to improvement of self and land (Bhandar 2018) — was therefore significant in “shaping the day-to-day decisions that [Squamish] longshoremen...made about what job they might do, whom they might work with, and what their political options were, on the waterfront and off” (Parnaby 2006). During these years, the deeply entrenched racism that pervaded largely white Vancouver also forced the minority of the population that claimed Asian ancestry to the margins of Vancouver's economy, “where they sold their labour at one-half to two-thirds the value of white labour” (McDonald 1986). Chinese labour formed a significant portion of the labour force at the Moodyville mills in the early 20th century, and (along with the Japanese) got longshore work when Indigenous workers went fishing and hop picking in the summer (ILWU Local 500 Pensioners 1985, 13). These patterns of racialization in the labour force continued through much of the 20th century, where cultural rules and structural barriers to entering professionalized labour forces meant later working-class immigrants to Canada relied on ethnic networks (Bauder 2005) that were already embedded in logistical labour.

⁶ While an extended examination of the Downtown Eastside and its complex history and contemporary form are outside the scope of this research (see Blomley (2003), Burnett (2014), and Culhane (2003) for extended examinations of these sociospatialities), it is vital to understand how the urban spaces bordering the port are shaped by histories of racial-capitalist and colonial dispossession.

TOTAL EMPLOYMENT RELATED TO PORT OPERATIONS, CITY
OF VANCOUVER AND STUDY AREA, 1969

	Total Employment Full Time
Waterfront On Site	2,415
Off Site	914
Vancouver Longshoremen	1,800
Marine Service, Agents, etc.	8,656
Waterfront Trucking (a)	1,340
Railway, Off Site (b)	200
Total	15,325

Figure 11. *Reproduced from Griggs (1970, 188)*

The deregulation of trucking and privatization of ports — which were key political-economic factors in the so-called logistics revolution — led to changes in the composition of logistical labour at the Port. As drayage owner-operators needed to navigate fewer regulations set by the very State that was denying them structural protection from capitalist exploitation, immigrants who did not have the sociolegal support of citizenship came to enter the sector for significantly lower pay than company-attached truckers. Racialized truckers are subject to increased micromanagement — and consequent mistreatment — owing to their limited employment options and the social vulnerability that comes with (white) working-class attitudes toward racial difference that are underlied by anger, resentment, and blame (Balay 2018) over the degradation of the industry’s labour processes — the general degradation of relations tends to zero, to the absolute dea(r)th of sociality (Harney, Fraportti, and Cupini 2018). Trucking companies seek to maximize their value generation through precisely this minimization of sociality, recruiting from certain ethnic and national enclaves while they “pay the immigrants less, push them to break rules that they don’t fully understand, and mobilize racism and Islamophobia against them to distract native-born truckers from protesting this wage undercutting woven into working-class attitudes toward racial and sexual difference” (Balay 2018, 79). The writing of racialized subjects into the logistical algorithm therefore proceeded such that immigrant truckers are subject to neoliberal regulation that shifts responsibility for compliance and operational fluidity to individual truckers.

In Vancouver, increasing numbers of immigrants from India and Pakistan began entering trucking, especially as drayage owner-operators (Bensman 2008). As of 2006, three-fifths of immigrants in the trucking sector were of South Asian origin and over half (55%) of all port drayage drivers reported Punjabi as their primary language. Trucking itself does not

offer new vectors of sociality, and the demands of trucking also frequently estranges South Asian truckers from their families and communities (Sandher 2021). Engaging in logistical labour also enrolls South Asian immigrants in the settler-capitalist relations of the Canadian State. While working class jobs enabled everyday proximity to the life and labour of Indigenous persons, the borders these respective groups carried with them and in their encounters remain material owing to the dispossessive-rentier logistical enterprises that South Asian logistical labour helps sustain (Upadhyay 2016). The sociocultural niches produced by immigration and its encounter with colonialist logistics help sustain supply chain capitalism (Tsing 2009). The social borders between immigrant South Asian truckers and other racial groups (McLean 2017), and between the labour and life of these truckers, are not necessarily reflected in the spatial borders of logistical routes and port geographies, but they are historically materialized and still of consequence to their differentiated assembly by logistical capitalism. In reading the socio-spatial text with its racialized and classed subjects made amenable to the logistical algorithm, the production of geofencing's connections-as-relations is preconditioned by grammars of action that are entwined with the production of social subjects.

2.4.3. Geofencing's Access to the Movement of Labour

The coordination of logistical activity — their making as grammars of action (Agre 1994) — requires the capture and control of logistical labour(-power) on the port by logistical-capitalist actors (be they port authorities, terminal operators, or logistics providers). The usufruct of logistical labour (Harney and Moten 2021) — economic improvement through labour's self-improvement — is sought to be encouraged through the (de)regulation and associated neoliberalization of labour's function, such as truckers' "choice" to be owner-operators (Bate 2005) and even "routing choices" (Anderson 2009). Standards such as the Truck Licensing System allow ports to 'professionalize' and therefore control the supply of truckers (Dupin 2015), which also allows terminal operators to plan their use of port labour(-power) (Huynh and Walton 2008). The metric of truck turn time therefore describes the calculable form of labour-power, whose very measurement is predicated on trucks crossing certain socio-spatial borders while accepting the necessity — the inevitability of historical contingencies — of others. These borders reinforce a certain order to truckers' movements and aim to keep logistical labour as *socially* separate as possible, while exerting control over the functioning of the port terminal as a system centered on the

intermodal transportation of containerized cargo (Cowen 2014). The historical making of (classed and racialized) logistical labour, modes of control over the actual use of labour-power through State-led regulation that also delimit the extent of workers' socialities, and enabling labouring subjects' exposure to social vulnerability and risk, are all intended to make logistical labour open to access and use by capital.

Logistical capitalism requires labour processes to be socio-spatially circumscribed in order to paper over their seams, to produce the actual operations at the port as logistical flow. Logistical-capitalist actors including port authorities and terminal operators seek to make the relations of logistical labour productive for themselves through the socio-spatial division of logistical labour. As such, these actors — terminal operators for dockworkers involved in the loading and unloading of container cargo between ship and truck and trucking companies for truckers — are keen to manage the spatiotemporalities of various uses of logistical labour.

Examining the form that the management of these labour processes takes through the lens of geofencing reveals two mutually-reinforcing tendencies: the improvement of truck motions' "economies of speed" towards consistent and predictable outputs in accordance with a just-in-time logic (Conti and Warner 1993), or Total Quality Management (TQM), and the Taylorist management of dock work in which the *completion* of container handling activities is based on "the *use of [logistical-capitalist] monopoly over knowledge to control each step of the labor process and its mode of execution*" (Braverman 1998, 82). The calculation of turn time through geofencing may be considered a re-scaled type of time and motion study (Cowen 2014) where the various movements of labouring subjects are mapped as generalized data with the aim of determining time requirements for the completion of *tasks* that keep the *process* going. This means that dock work can be treated as disjunctive movements relative to the flow of the truck's motion (Braverman 1998). Such management of logistical labour(-power) at the port is therefore a type of scientific management — it is not for nothing that logistics is often described as a science. Certain geofences map onto the "avoidable delay" motion symbols of Taylorist 'science', while other geofences map onto the "unavoidable delay" symbols. The calculative logistical media of the geofencing apparatus supports the Taylorist separation of the conceptualization of logistical labour processes and its actual execution. The relationality of these labour processes is no longer of consequence to the subjective performance of

work — logistical workers are progressively alienated from the entire circulatory process. This machinic view of labour — not *automatic* but *predetermined* — drives “the displacement of labour as the subjective element of the labor process and its transformation into an object” (130-131) that turns the gears of circulation. With turn times communicated to truckers and dock workers through public-facing online portals, logistical labour is also interpellated into its own Taylorization (Boje and Winsor 1993), made responsible for the ‘efficient’ completion of each task involved in truck movement through the port terminal (that each maps onto geofences at varied scales). The division of labour processes therefore aligns with geofencing to enable a high degree of control over the port’s logistical labour through a “mediated form of Taylorism” (Conti and Warner 1993), a discontinuous bridging of task and process, of completion and improvement.

The port authority and terminal operators seek to ‘improve’ truck turn *processes* through ‘solutions’ that center on the relational *tasks*, such as “expanded monitoring of waiting times for trucks accessing the port’s terminals; improving productivity; looking at expanding truck gate hours”, or shift responsibility onto truckers and their management of mobility themselves, described euphemistically as “involving truckers in strategic planning” (Bate 2005). In the former case, the minimization of turn time still hinges on infrastructural improvements and/or the improved productivity or efficiency of other port workers, which often involves gate staff and longshoremen working to meet the demands of nights and off-peak hours terminal usage while terminal operators seek to avoid paying overtime or otherwise add to their costs (Anderson 2009; Parry 2014). This bordering of labour’s socio-spatial relations towards the improvement of the asocial turn time metric is precisely the role of geofencing. The geofences themselves act as the socio-spatial text written through the logistical algorithm, thereby allowing port authorities and terminal operators to reproduce borders as geofences.

While logistical media is typically understood to capture several layers and scales of labour operations to generate a terminal-wide view of the port (Kanngeiser 2013; Rossiter 2016), the geofencing apparatus is a seemingly more humble sociotechnical instrument that enables the coordination and control of labour without requiring the direct observation of every labour process that suffuse the spaces it describes. After all, it only captures the movement of trucks through connections with their onboard GPS units, movement that is produced when truckers meet not just the materiality of (physical and technological)

infrastructure (Hall 2015) but the concrete socialities they make im/possible and in turn, that delimit the conditions of possibility for infrastructural use. This technical lightness is, however, precisely what makes it so pervasive and logistically useful⁷. Not only are geofencing apparatuses embedded in a range of socio-spatial contexts that serve logistical-capitalist aims, but they “centralize and redistribute operational information; they isolate data from surrounding circumstances while creating new referential frames” (Levy 2015). They “resocialize” the linear compressions of connection (Chun 2016) by deploying this information towards control over several labour processes. Geofencing follows historically formed socio-spatial borders as/through the logistical algorithm and uses these borders to control labour through their division.

2.5. Metrics, Improvement, Relations, and the Exclusions of Connection

The connections made through the geofencing apparatus to port trucks generate the metrics that are made the object of continuous improvement — turn time — but exclude the historically formed flux of life and labour in which the logistics-in-action of trucking (Gregson, Crang, and Antonopoulos 2017) is actually situated. The agential cut (Barad 2007) of connection puts a particular form of logistical labour — trucking — under observation to the exclusion of the socio-spatial relations of dock work that make truck movements through the port possible. Geofencing, then, controls the degree to which these relations *matter*, both in terms of the actual spatiotemporality for which those relations can be recorded as active, i.e., the duration of connection, as well as the conditions under which those relations can be reduced, or degraded (Harney and Moten 2021), such that only their facilitation of logistics is still of material importance. Connection, in other words, is an ahistorical expression of what social relations are deemed of value to the port’s metrics *at the moment of making that connection*.

This is not to say, however, that the very layering of geofences on real geographies is not conditioned by these other spaces and relations. In fact, they actually shape the borders of geofences, as well as what logistical operations these geofences are supposed to delineate. The historical formation of the Port of Vancouver as a logistical geography

⁷ Refer back to Section 1.1. for details on the same

expresses what social lives suffuse these geofences, and how this differential inclusion is produced and through the corresponding borders. The contemporary form of the port as a State-backed landlord that coordinates rentier relations and the infrastructures that make these relations productive for the logistical-capitalist actors sets up borders between what *matters* to the circulation of rent-bearing commodities and what doesn't. Geofences are delineated by when and where truck movements come under the purview of the port.

What, then, does *geofencing* do? Connections are relations, and considering only *what* these relations make possible does not adequately explain *why* they are set into motion. At one level, geofencing makes the *spaces* of work visible in order to maintain the social division of labour, *and* at another level, it produces a new spatial configuration (Cowen 2014) that aims to make possible the reduction of turn time through the improvement of labour processes working *through* and *across* those spaces. This “process-mapping aims to make the system visible so its component parts can be measured and managed” (110). While geofencing does rely on capturing capital's making and shaping of certain socio-spatialities, it also *adds* information on these socio-spatialities (Hind 2020) in the form of truck turn time. However, geofencing *does not* generate a metric that takes into account the activity that happens *in* and *between* those spaces. Those activities do not count herein as processes that can be improved. In this case, while the truck-enabled mobilization of commodities towards their circulation is considered a *process* subject to improvement, the *tasks* involved in dock work — such as loading and unloading of cargo — are only considered consequential in terms of their facilitation of circulatory processes, namely, transportation. It is no great leap, then, to suggest that the socio-spatial bordering of logistical labour as and through geofencing reflects the *management*, the making-assembly-line, of labour-power at the Port of Vancouver.

Following the borders of geofences reveals the management of dock work as tasks that serve the making-flow of truck-movement-as-process. The functioning of the geofencing apparatus as logistical media whose connections take the truck as their agential object discloses what relations do not count. The rentier relations that control the spaces geofences describe, on the other hand, are elevated as the relations that count. The Port of Vancouver is not just its terminal space. The agents of its logistical functioning overstep their borders, retreat behind interests, meld subjects and geography through the stretching

and compressions of times and spaces. Its determinate conditions (Hall 2003) are unavoidably social and material, and therefore political-economic.

By situating geofencing at the heart of dialectical tensions between ostensibly older forms of Taylorist management and newer forms of TQM, between production and distribution, between fixity and mobility, between port and city, between assembly and sociality, we are directed to the historical contingencies and complex social relations that suffuse logistics at the Port of Vancouver. These conditions of possibility of logistical 'flow' reveal the latter to be, at best, an optimistic description, an illusion only made possible by the deliberately narrowed selection of connections' objects. While logistics opens access to sociality in general, the logistical *algorithm* (Harney and Moten 2021) can only produce incomplete connections through the geofencing apparatus.

Chapter 3. Truck Trip Planning in Metro Vancouver: What Gets Excluded in Connecting a Regional Logistical Geography?

The voluminous commodity traffic that flows from and through the Port of Vancouver needs to *go somewhere*. The very form of JIT logistics and the attendant dilation of production and distribution that conditions commodity movement means that much of these commodities' circulatory life is spent in trucks and warehouses. The logistical geography that extends inland from the Port of Vancouver comprises the entire distributive infrastructure, from roads and bridges to cross-dock and transload facilities that serve as intermodal points in the warehousing network. As such, trucking companies seek to generate smooth logistical flows by keeping their trucks in near-constant motion, while warehousing companies not only hold commodities for future distribution, but (re)organize the holding *form*, be they as containers, pallets, or bulk cargo (Orenstein 2019). Aligning the modes of logistical labour who traverse these spaces, namely truckers and warehouse workers, requires their making-assembly-line (Harney and Moten 2021) *on* the roads, *through* warehouses and *across* the region. Geofencing apparatuses are deployed, then, to achieve this socio-spatial alignment — this reinscription of the logistical algorithm — as and through trucks' route planning across the Metro Vancouver region.

This chapter begins with examining Metro Vancouver as a *regional* logistical geography, with the Port and warehousing facilities linked up by roads. Since the Port is fixed in place — it has a large degree of spatial inflexibility (Kumar 2019) — the warehouse/distribution centres (W/DCs) that are essential to the integration of ports into global supply chains grow distant. Typically, they move away from the urban core and towards the swathes of land in the metropolitan suburbs and hinterland, in a shift described in the logistics literature as 'logistical sprawl'. Sprawl reconditions the geographical movement (or lack thereof) of labouring subjects via transportation infrastructure and the attendant rewriting of the socio-spatial text.

This chapter goes on to examine the use of route planning software as made possible by geofencing. These apparatuses read and write the logistical algorithm as an interpolative one-two beat of space and socius, of land and labour. Specifically, geofencing is used in route planning to ensure that trucks follow their assigned routes, arriving at and leaving

geofenced areas such as ports and warehouses at planned-for times, and dwelling in other areas for the planned periods of time. The connections produced by the geofencing apparatus in trucks' crossing of a geofenced border, then, describe a particular set of relations between the im/mobilities of life and labour made logistical and the spaces they traverse and are grounded in. Geofencing, then, allows for the *networking* of logistical operations through the planning interface.

The following section examines how this spatiotemporal shift in urban-regional goods movements refracts land use and property regimes in the region, as logistical-capitalist actors seek to negotiate access and use, time and space. Spatial shifts redirected logistical capital's attention away from the metropolitan core. The logistical algorithm's rewriting of Vancouver's socio-spatial text also had implications for the regional transportation network and land use for its infrastructure. In particular, the logistical algorithm is reinscribed through geofencing's reading of truck movement across spatial differentiation in order to produce logistical 'routes'. These *borders* written into the geofencing apparatus rely on — if not reproduce — the borders of property and territory in order to presume their availability for logistical use and access. This section therefore reads the racial and settler-colonial histories and its effects in, for example, contemporary suburbanization of racialized immigrant populations in the socio-spatial text of Metro Vancouver. It is these histories and spaces that produce the assembly-line of logistical capitalism, even as they exclude those histories from mattering in its relations. The region is therefore also analytically useful (De Lara 2018) as a stretched logistical geography, a politically economized geography oriented across socio-spatial scales towards the facilitation of commodity movements. It is the regionalization of transnational supply chains as a zone of instability (Szeman 2004), then, that conditions the writing of the socio-spatial text.

Furthermore, the deployment of geofencing requires the rewriting of various socialities as logistical labour, as described in the next section. Trucking companies and shippers seek to exploit the spatial im/mobility of roads and warehouses in service of productivity, matched at the granular level by renewed demands on the efficient facilitation of truck movements — for example, in the loading and unloading of containers — through warehouses. It is, however, the precarity of trucking and warehousing labour as classed and racialized subjects that makes them vulnerable to logistical ordering — their relations

are made logistical. As demonstrated with container handling in the previous chapter, the *tasks* that warehouse workers complete are essential to producing trucks' passage through warehouses as *process*, as logistical flow. These tasks are performed prior to, during, and between trucks entering and leaving the warehouse, and therefore require the adherence of warehouse workers to the demands of JIT logistics. Similar to the relational and structural situation of longshoremen and truckers, the exclusion of warehousing labour from the connections of geofencing apparatuses happens through two moves that produce asocial relations with truckers: the management of warehouse work which is itself made possible through the structural flexibilization and social vulnerabilizing of warehousing labour. In this rewriting of the socio-spatial text as logistical — in the production of social lives as relational not to each other, but connected to logistical media — truck routes are produced as 'smooth' logistical flow.

This chapter concludes by explicating how the connections that are produced by the apparatuses are both a linguistic representation, or model, of material activity (Agre 1994) and a repetitive imagin(in)g (Chun 2015; Munster 2013) of commodity movement across a regional geography — Metro Vancouver — produced as logistical. The logistical algorithm reinscribes the differentially-inclusive borders between urban core and periphery, labour and capital, whiteness and racial difference in how those borders are managed by the geofencing apparatus. The socio-spatial text that comes to matter in and through the connections of the geofencing apparatus are a refraction of logistical-capitalist imperatives, and as such, exclude the *making* of life and labour in logistical geographies.

3.1. The Regional Metro Vancouver Logistical Geography

Metro Vancouver is crossed by intra-regional roads and highways that have been historically used to connect the Port of Vancouver with its hinterland industrial and agricultural activities across a sparsely populated geography. In recent decades, however, the socio-spatial text of the deindustrialized city has been rewritten so that non-residential land use has moved outwards, melding with residential suburbs as well as renewing and reconfiguring historical industrial geographies. This discursive production of the regional geography as usable for certain purposes to the de-emphasis, if not exclusion, of others is made possible through zoning and designation of certain roads as truck routes.

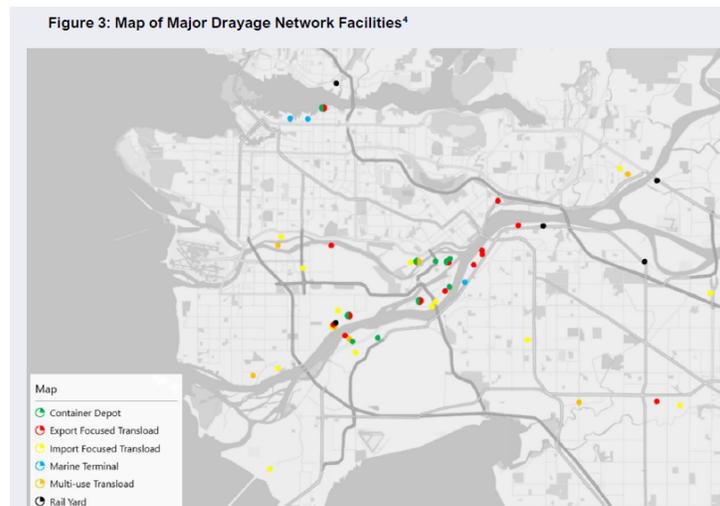


Figure 12. **Drayage and Transload Facilities in Metro Vancouver. Sourced from Friedman and Basilij (2020)**

Warehousing has been a significant factor in this spatial shift; while previously located near the port areas, the land that these facilities require has exceeded what is available within the city. They now dot the regional landscape, sprawling every which way to keep up with the volumes of global and regional supply chains. These facilities include off-dock facilities, cross-dock warehousing where materials are moved from incoming trucks to outgoing trucks with limited warehousing and storage in between, transload facilities, and unstuffing/restuffing warehouses where containers and other goods are (re)packaged for distribution. Many W/DCs also operate as bonded warehouses under the regulatory authority of the Canadian Border Services Agency (CBSA), so that dutied commodities can be secured inland of territorial borders. Notably, several off-dock facility operators in the region also operate trucking fleets, including for drayage, thereby providing business services to importers and exporters across the regional component of the supply chain (Friedman and Basilij 2020). While warehousing itself has historically been a space of storage, i.e. stalling commodity capital in place rather than expediting its movement (Orenstein 2019), when warehousing and trucking — the modes of circulation — are coordinated by the same logistical-capitalist actor, the direction of resolution in the dialectical tensions between fixity and flow can be managed by that actor. Warehouses therefore function as a “spatio-temporal apparatus for modulating flows of capital” (Orenstein 2019, 30) via their *enclosure* (Mezzadra and Neilson 2021). The fragmentation of warehousing facilities across Metro Vancouver, then, is accompanied by business-side

integration of logistics services, such that the logistical geography of the Lower Mainland is a *regional* logistical network connected by road.

Transloading and cross-docking are intermodal logistical operations that bring together distribution — transportation — and storage — warehousing — in a circulatory continuum in response to the demands of JIT logistics. These operations also generate competition amongst warehouse operators and trucking companies to attract shippers by virtue of their efficient distribution. JIT also suppresses the need for stock in warehouses and instead emphasizes fast turnaround times and coordination between logistical-capitalist actors (such as shippers, carriers and warehouse operators) across scales and spaces (Lightstone, Belony and Cappuccilli 2021). Warehouse operators, in response to the diminishing importance of storage functions and reduced opportunities for value extraction, preempt shippers' need to perform goods agglomeration functions within warehouse spaces and therefore extract value from the circulatory sphere. They seek to minimize, if not eliminate⁸, dwell-time by making intervening storage and order picking operations much more efficient, and by using digital technologies to minimize disconnects between commodity supply and demand, i.e., inventory and distribution (De Lara 2018; Jennings and Holcomb 1996). Dwell-time itself functions as a temporality specific to trucks' transit through warehouses, as “a period of shifting gears, the *interval of disconnection in a connection...*, a *pause*, a *conjunction*” (emphases added) (Orenstein 2019, 248) that is treated as “empty time” for the logistical-capitalist actors invested in unabated circulation. In turn, the cheapening of transportation (owing to, among other factors, deregulation at a political-economic level and containerization at an infrastructural level), the proliferation of 3rd party logistics providers (3PLs) that shift the actual operation of circulation away from shippers, and the emphasis of companies such as Walmart on “demand-driven, small-batch shipment, and low-inventory retail model[s]” (De Lara 2018, 71), also allow for warehouses to be located at some distance away from ports, in places proximate to trade activity and where relatively cheap land is more widely available (Gingerich, Maoh, and Anderson 2015; Lightstone, Belony and Cappuccilli 2021). However, these spatially expansive tendencies are also in tension with the logistics of, for example, empty container

⁸ This is not an exaggeration — the ‘street turn’ strategy, for example, (Zhang 2015) seeks to eliminate the use of large warehousing facilities by enabling direct truck-to-truck movement of containerized goods without storage

repositioning which may require closer port accessibility (Theofanis and Boile 2009). These spatial tensions are evident in Metro Vancouver.

Port logistics has increasingly moved off-dock in Metro Vancouver, with the former Vancouver Port Authority aiming a 50% shift of empty containers to off-dock storage as far back as 2003. Off-dock warehouse operators have, in turn, sought to keep up with the increased container volumes through a strategic dispersal of warehouse facilities of various sizes across the Lower Mainland, as well as management of gate truck traffic. This is often made possible by warehouse operators prioritizing their trucks over those of other carriers' (Davies 2006). Warehouses manage logistical flows through their enclosure of land (Mezzadra and Neilson 2021) — a mode of bordering.

Still, the availability of industrial land for warehousing is shrinking, even as demand grows. Metro Vancouver has increasingly seen the movement of logistics facilities outward from the metropolitan core *as well as* higher warehousing prices (see figs. 13-14 on this trend), leading to the spatial concentration of W/DCs (Oliveira, Schorung, and Dablanc 2021). This logistics sprawl is intimately tied with transportation costs and efficiencies. Their geographical 'center' shifts, especially as their increasing sizes require more land and their co-location brings distributive efficiencies for shippers and carriers. As port terminal facilities come to cover waterfront lands, warehouses which were typically clustered follow centrifugal shifts from the port. However, these shifts are not merely a natural linear outward movement — land use policies, the availability of land zoned for industrial use and access, and proximity to physical roads and transportation infrastructure produce regional *patterns* of logistics sprawl (Aljohani and Thompson 2016; UN Habitat 2013). In large metropolitan areas "the vectors of *freight demand* and *land price distribution* explains the variance in decentralization," (Kang 2020) especially with the large warehouses required to manage circulation in a logistically key region like the Lower Mainland. As regions like Metro Vancouver⁹ seek to retain (and even expand) their nodal role in global and national logistics networks, warehouse operators integrate more logistical functions such as repackaging, labelling, and inventory management into their spaces and local governments seek to convert more land into logistical and transport use. These may

⁹ The Greater Toronto area (Woudsma, Jakubicek, and Dablanc 2016) and Los Angeles metropolitan area (Dablanc, Ogilvie, and Goodchild 2014; De Lara 2018) provide comparable contexts

include regulatory shifts such as land subsidies and lower taxes (Jakubicek and Woudsma 2011).

Much of the warehouse land is located in the suburbs, or geographical periphery, of Metro Vancouver in what are zoned as industrial lands — upto 20% of zoned lands in 2020, with warehousing seeing the highest recent increases in land additions. Delta/Tsawwassen First Nation, with its proximity to the Deltaport terminal, has the Lower Mainland's largest share of W/DCs (28%) by acreage — upto 210 acres — while the Langleys (City and Township) have the second largest share (20%). Surrey, which has the largest amount of industrial lands in the region, is also significantly covered by W/DCs (Metro Vancouver Regional Planning 2020). As more of these suburbs' lands are covered by warehouses, co-locational benefits — in terms of travel times and spatial economies — accrue to warehouse operators as well as shippers, to the negation of land availability for other purposes. In the suburban city of Richmond, through which the major truck corridor of Knight Street runs, much of the surrounding region has been given over to warehouses, even as the Vancouver side of the corridor remains largely pedestrian (Clement 2004). These patterns are observable across the regional logistical geographies, mainly around the Port of Vancouver, and other transportation infrastructure. Many transload facilities at the center of off-dock drayage activity are located close together along the Fraser River, meaning a significant portion of off-dock activity (particularly repositioning empty containers for export transload) takes place across short distances with consistent travel times (Friedman and Basilij 2020) (see figs 12-13 for an overview of W/DC locations in Metro Vancouver). These spatial strategies are meant to offset the costs of distance for goods movement (Newman 2009).

Container Transportation Facilities in the Lower Mainland



Figure 13. Sourced from Davies (2006)

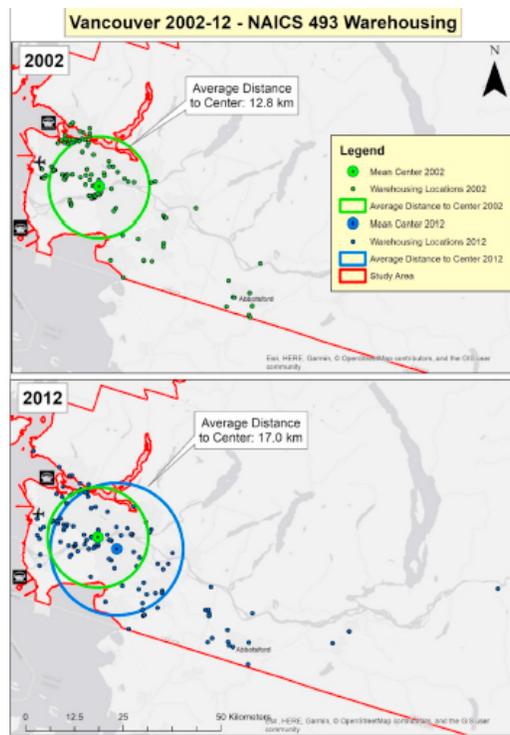


Fig. 3. NAICS 493 locations in Vancouver.

Figure 14. Logistics sprawl in Metro Vancouver. Sourced from Woudsma and Jakubicek (2020)

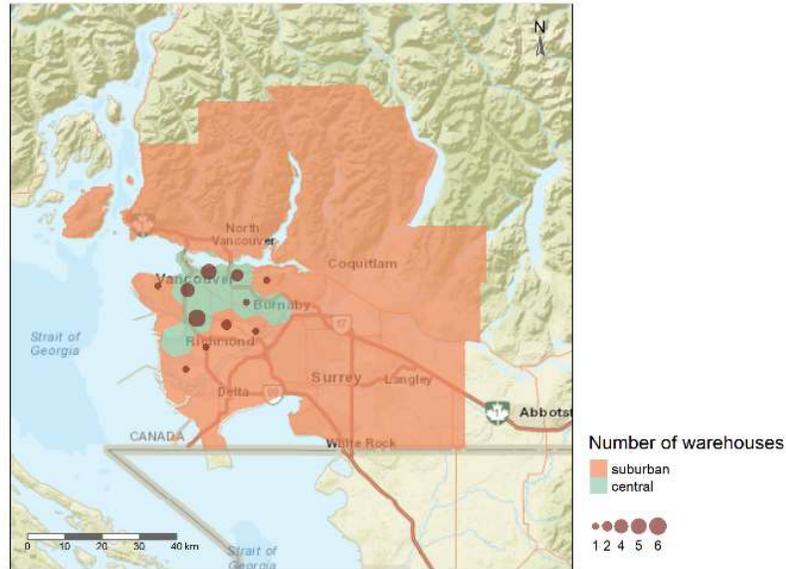


Figure 15. **Warehouse distribution outward from Vancouver. Sourced from Oliveira, Schorung, and Dablanç (2021)**

With the spatial fragmentation of the off-dock industry, including the widespread distribution of import transload and warehousing facilities (Friedman and Basilij 2020), the land-transport connection in the region is subject to constant negotiation. The spatial shifts in Metro Vancouver’s warehousing geography is conditioned by the form and costs of its transportation infrastructure, especially drayage trucking, which is responsible for transporting 25-30% of laden import containers (or 250,000 - 300,000 containers annually) to local transload, cross-dock, and intermodal facilities.

Transportation infrastructure has therefore been a focus of significant attention for logistical-capitalist and political actors across Metro Vancouver, especially for trucking, even as the use and growth of that infrastructure is circumscribed by discursive commitments to public transit and environmental sustainability (Strategic Planning Department, Greater Vancouver Regional District 1994). One major way for these actors to discursively produce a spatial network of roads that can facilitate truck movement is through the designation of truck routes and regional truck route networks, especially in alignment with the circulatory imperatives of the Port of Vancouver, and with broader provincial, national, and/or transnational supply chains, that translate into infrastructural use and access. As container and other freight volumes grow, the alignment of port and road infrastructure — overland and inland — are driven by the discursive and material

mapping of the region as an integrated space, as De Lara (2018) notes was the case in the Inland Empire in the USA. *Inter-modal* shifts in distribution were frequently led by trucking companies. The physical considerations of roads, such as lane count, width, and bridge height, also decide their use as arterial routes or intra-city grids.

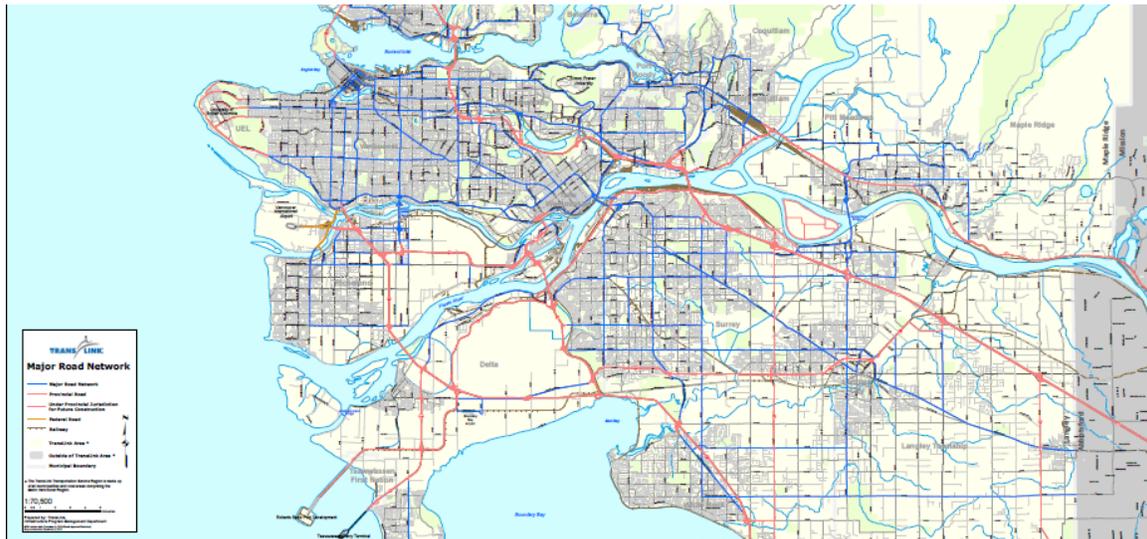


Figure 16. **The Major Road Network in the Lower Mainland. Sourced from TransLink (2018)**

TransLink, the region's premier transportation agency, is responsible for the designation of truck routes (Hall 2015), producing the Major Road Network (MRN). Much of this road planning is relative to the Port of Vancouver whose jurisdiction touches municipalities such as such as Richmond and New Westminister that host major logistics and warehousing facilities, and others that are traversed by truck routes (e.g. Coquitlam, Burnaby) (Hall 2014). Off-dock drayage activity between transload facilities and container depots makes up a significant portion of overall container trucking activity in the Lower Mainland, and often need to be coordinated across these warehousing and port facilities' hours of operations (Friedman and Basilij 2020). This activity affects trucks' road use, turning them into mobile warehouses.

Across these political-economic and socio-spatial strategies, transportation infrastructure is designed to integrate regional spaces and municipalities into a spatial contiguity. The very logistical imperatives that drive such use of transportation infrastructure — strict delivery schedules, municipal regulations on what times of the day trucks can move through urban spaces, demands for rapid turnaround times, empty container repositioning strategies that result in more one-way (deadhead) trips — also produce regional road

congestion (TransLink 2017; Zhang 2015). This results in highly variable truck travel times, with fluctuating outcomes for congestion, as well as delays at trip ends, such as when crews waiting to load container ships are forced to wait for unpredictable amounts of time for their containers to arrive (Arnold 2014). Trucking companies therefore build these delays into their route planning and logistics.

To overcome urban congestion, trucking companies aim to improve the efficiency, safety, and security of truck movements through the planned designation of truck routes *and* granular tactics such as increased speed limits, longer left turn lanes, improved signal coordination, truck signal priority, and the wider dissemination of route information. Simultaneously, the proliferation of key inter-regional transportation facilities index the increase in freight intensive land uses that logistical-capitalist actors seek to manage by improving loading and unloading efficiency at warehouses and other means for trucks to decongest warehouse access. The MRN and initiatives like the APGCI therefore represent the poles of the tensions between regional and municipal sociopolitical priorities and the considerations of “global value chains” (Brunelle et al 2021), exemplifying the de/politicized socio-spatialities and differential-relational character of transnational supply chains (Tsing 2009). The roads and bridges on which large volumes of truck traffic cross Metro Vancouver are therefore vital to the shape of the regional logistical geography.

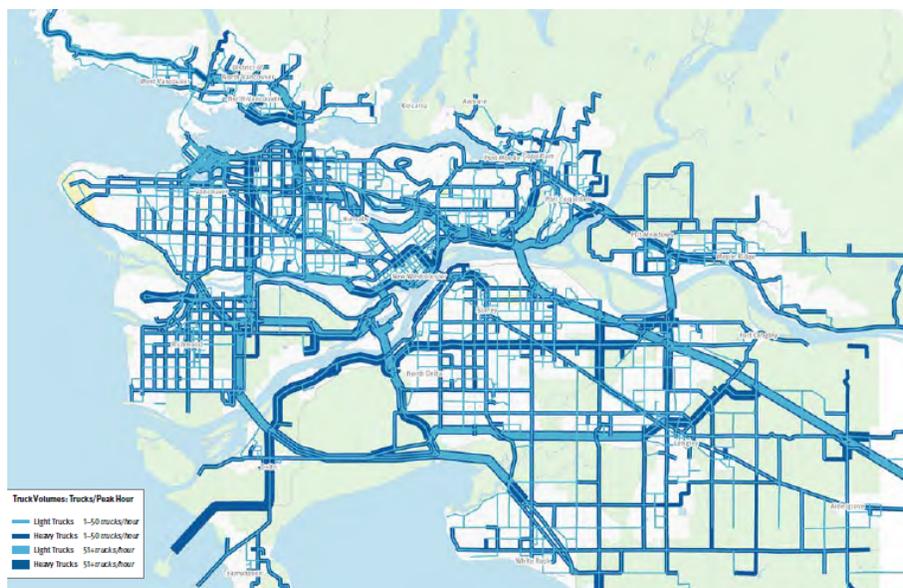


Figure 1: Truck Volumes on all Roads in Metro Vancouver (AFRI 2012)

Figure 17. **Truck traffic across the Lower Mainland. Sourced from TransLink (2017).**

These roads and bridges integrate Metro Vancouver as a *region*, and their use for, and designation as, trucking routes, helps produce them as a *logistical* geography. The highest volumes of trucks are seen across much of Highways 1 (or the Trans Canada Highway), 91, 99 and along Lougheed Highway, between the Port and Highway 91/99 along Knight Street through Vancouver and Richmond, as well as on the South Fraser Perimeter Road that links up with Deltaport container terminal. The Alex Fraser, Pattullo and Port Mann Bridges along New Westminster, the Second Narrows, or Iron Workers' Memorial Bridge from Vancouver to the north shore of Burrard Inlet, as well as the George Massey Tunnel, are important bridges for truck traffic in the region (Arnold 2014; City of Richmond 2019; Clement 2004; Hall 2015; Parkin 1997; Strategic Planning Department, TransLink 1999; TransLink 2017).

This network of roads and bridges through which the Port of Vancouver and various warehousing facilities are linked together is not simply an imprint upon *terra nullius*, writing upon a blank socio-spatial text that can be reimagined as a logistical network (Chun 2021). All infrastructures are shaped politico-economically, but in a geographically vast settler-colonial state like Canada, this is especially true of transportation infrastructure. Truck routes are no different, as their designation often expands land use and elevates logistical-capitalist use over others (Hall 2015) as expanded trucking brings with it, for example, the rezoning of agricultural land as industrial land (City of Richmond 2019). Truck roads shape and are shaped by the actual movement of containers throughout the Lower Mainland, owing to the actual shape of the trips that trucks take in order to travel through warehouses scattered across the region, first-/last-mile considerations and travel to container checking facilities that may be out of the way, such as in Burnaby. The concomitant growth in logistics facilities such as transloading and container yards therefore introduce additional strategic constraints and reconfigurations of truck route infrastructure (Hall 2014; Skabar 2021). Besides highways that lead outside the Lower Mainland or onto trans-Canada railway lines, over 60% percent of heavy truck trips and 95% of light truck trips in the region serve a local destination where goods are assembled or processed along the supply chain by businesses within Metro Vancouver (TransLink 2017).

3.1.1. Where Do the Trucks Go? Problems of Movement and Location in Metro Vancouver

The growth in transnational commodity circulation centered on the Port of Vancouver and other logistical infrastructure across Metro Vancouver has been accompanied by spatial problems in accommodating the increased volume of goods movement in and between urban areas. This manifests as logistical sprawl of warehousing facilities outward from the metropolitan core of Vancouver, which is interrelated with the costs of freight movement to these peripheral locations. These are interrelated problems; the more trucks need to travel larger distances, the more traffic there is on the roads throughout the region.

The designation of truck routes (with the congestion that arises on them due to everyday traffic) and logistical sprawl fit into the paradigm of supply-chain urbanism (Danyluk 2021), remaking urban space in line with the imperatives of logistical capitalism, which locally and regionally orders supply chains in alignment with transnational spaces. The geographies of supply-chain urbanism, then, are politico-economic, and predicated on the logic of capitalist circulation — between a general dialectic of fixity and flow, as expressed in the tensions produced by warehousing's logistical sprawl and the road congestion that trucks face in traveling between these facilities. These spatial patterns cannot be treated as natural consequences of geography or a logistical *telos*, but are directly shaped by logistical-capitalist actors' strategies and tactics in navigating real geographies.

The maps and figures that depict truck routes and logistical sprawl are themselves tools in naturalizing logistical effects, especially when used in depicting truck routing — both in planning and everyday navigation — as common-sense decisions logistical-capitalist actors such as shippers and carriers make. Truck routing is a consequence of political decisions on the re-routing in space and time of urban freight flows, as well as which logistics facilities shippers and carriers use in service of efficient supply chains; in other words, it is a consequence of the wholesale re-routing of logistical activity towards spaces where political problems place the least constraints on those activities (Beelen et al. 2008). In Metro Vancouver, routing has increasingly become sites for micromanagement — through, for example, turn and signal management and lane use — as the space for infrastructural reconfiguration has shrunk (Clement 2004). Changes in routing strategies are significantly shaped by infrastructural use and access.

The use of location-based logistical media apparatuses have become a key tool in this context. GPS-based network apparatuses (Arnold 2014; Hall 2015) collect data on routing choices to guide, for example, regional empty container repositioning (Zhang 2015) and bridge crossings (Lam and Kitasaka 2009). This is the context in which geofencing is deployed to plan truck routes across the sprawling Metro Vancouver region, against the delays induced by congestion. In turn, the networking apparatus instantiates a flurry of connective relations between the spaces and labour of trucking and warehousing — connections that extend the logistical algorithm into the capture of the bodies and socialities that make commodity movement possible.

3.2. Geofencing and Truck Routing: Modeling the Regional Logistical Network

The geofencing apparatus, as employed by carriers and port officials for route planning and tracking, is exemplary of a *networking* apparatus, where the physical logistical network of roads and warehouses and its *simulation* — which is to say, a mathematically modulated presentation — by the apparatus' visual interface (Munster 2013) are treated as congruent¹⁰. The actual movements of trucks through the logistical geography is turned into an ostensibly representative map by capturing individual truck trips and reproducing them as the grammars of action (Agre 1994) for route planning; it is only by producing the trips as the edges of the network can this network be produced. The connections generated in the geofencing apparatus' tracking of truck movements provide the spatio-temporal coordinates for the logistical algorithm's measurement and management of land and labour *as logistical*.

The difficulties of making route planning efficient for carriers, with the multiplicity of logistics routes and the spatiotemporal problems of congestion and sprawl described in the previous section, is expressed mathematically as a Vehicle Routing Problem (VRP). The movement of containers to and from ports and warehousing facilities — linehauls and backhauls (wherein the problem is modified accordingly, as a VRPB) — is therefore dependent on where goods 'originate', e.g., where trucks load containers, their route

¹⁰ This is different from data 'capture' (Agre 1994), which is treated as a more straightforward reflection or representation of logistical activity

planning, and where freight ends up, e.g., where trucks unload containers. Freight transport is thereafter planned and divided into several valid logistics routes as a logistics solution to VRP and VRPBs such that they effectively balance both computational time, or resource requirements, and route 'quality', i.e. the efficiency and reliability of the planned route in terms of their spatial distribution (Lu and Yang 2019). To split aggregate freight movement into truck trips, however, requires associating GPS points to particular areas or routes *and* individual trucks, identifying the trucks' direction of movement (to verify their function in logistics strategies), and the cleaning of travel patterns of individual trucks to obtain their routing information (Flaskou et al 2015). Truck routing is therefore planned based on route modeling in response to VRPs, and compares simulations of the resulting routes in generating the fastest and most reliable route and travel time prediction. This data, however, is further complicated by spatio-temporal variations owing to particular traffic flows and infrastructural design, and route planners requiring time-sensitive information for their routing decisions (Ehmke et al. 2009). Truck route planning therefore requires the coordination of multiple truck routes, individually *and* as aggregate commodity flows, with respect to spatially distributed logistical network of roads and warehouses, where trucks can be digitally located and infrastructures digitally marked out. The networking of this hard and soft infrastructure — both roads and GPS apparatus — proceeds at one end, through spatial conceptions of territory and property, and at the other end through the nonspatial territoriality of data in conjunction with the temporality of interface design and data transmission (Rossiter 2016). *Planned* truck routes are the aggregation of trips actually taken by truckers — the (re)production of the ideal route is the result of labour(-power) optimized for logistical efficiency. Geofencing, as a *proactive* locative service, offers the means to imagine precisely this kind of representation of networking, to align the work of supply chains with the logistical algorithm inscribed in the socio-spatial text.

Geofencing algorithms set up a spatial *relation* between moving trucks and a set of bordered geographical areas, such as at and around logistics facilities, through *connections* between the the Location Monitoring Unit (LMU) of the geofencing apparatus — responsible for tracking truck position — and the GPS or other on-board data unit on the truck. These connections are produced semi-actively, when trucks pass through or are in proximity to the borders of geofenced spaces, generating the spatio-temporal coordinates for the definition and ordering of planned routes. The geofencing apparatus

therefore first determines the most plausible *path traveled* by an individual truck from the recorded data, and then generates the optimal *traveled path* for truck movement in general, which in turn is used to plan trucks' everyday routing, or navigation of routes. The actual determination of the *roads* these routes follow is made possible through "route-matching techniques" that compare the GPS-derived truck movement data with geographical road network data, while that of the warehouses that geofences cover is based not just on the geographical landscape, but the space that is of interest to the logistical-capitalist actor — namely, their space of business, the enclosure of their loading and unloading zones, parking spaces, and the gated warehouse itself. In case of bonded carriers, the territorial border carried forth by the truck is a temporal border instituted when freight is 'in-bond', i.e., the duration of the trip from where the freight is loaded to its deposit at a bonded warehouse (Orenstein 2019). The fidelity of truck routes, then, is dependent on the road map data used by the geofencing algorithm, the legibility and precision of trucks' trackability based on the capabilities and computational resource intensity of the soft infrastructure of locative media, and the implementation of the matched-map routing process (Modica et al. 2018; Schneider et al. 2008). Through geofencing, therefore, trucking companies can map and plan commodity movements in real time, adjust routes in response to conditions of congestion and environment, and communicate task completion — such as when a shipment arrives at a warehouse — across the logistical network. The connections that geofencing apparatus produce can preempt the actual relations they purport to ideally describe.

Drayage carriers that work with the Port of Vancouver make use of truck management software tools developed by the private TransSystem Corporation and TransLink for route planning. These tools take advantage of the SmartFleet program that mandated, as part of the Truck Licensing System (TLS), the installation of GPS units on trucks. The "Dedicated Operations Planning and Analysis" tool "integrates GPS data, discrete event simulation, and data processing" to produce a drayage model and plan entire transportation networks across the Metro Vancouver region through "simulation modeling and other analytical methods to evaluate transportation projects, facility improvement and goods movement strategies" (Pittman and Stanevicius, n.d.). The region itself is mapped as a series of roads and warehousing facilities, as a logistical geography whose "spatial data layers" used to determine the borders and spatialities of sentences are based on the Truck Route Network (TRN), Major Road Network (MRN), Provincial Highways and zoned

industrial lands, and other points of interest such as truck parking, inspection stations, and cardlocks, while routing functions are designed to follow municipal truck route bylaws on height clearances, speed limits, and bridge load limits, among others.

Geofencing in particular is used to capture truck cycle times at all port and rail facilities, plus at off-dock terminals and other warehousing facilities (Payne 2014). These logistics infrastructures, as areas of significant container activity (see figs 18-19) are geofenced to capture, per previously generated grammars of action, the longitude, latitude, speed, direction, street name, and address to capture the *position* of the identifying NumberTruck ID at the date and time that the 'event' of truck entry or exit from the geofences' borders is recorded — when and where the connection is made. The relations captured by the apparatus' connections are spatio-temporal *at the moment of capture*, but ahistorical and asocial. They say nothing of the conditions of capture and the making of what can be captured. The geofencing-based platform can therefore use the following drayage model analysis tools (Pittman and Stanevicius, n.d.):

1. Isolate Truck Movement tool: "Produces total trips for an individual truck"
2. Isolate From-To Trips tool: "Produces total trips for a specific origin/destination geofence combination"
3. Isolate Individual Trip tool: "Produces a specific trip by a single truck"
4. Origin Destination Matrix Table tool: "Reports total number of trucks entering and leaving each geofence"
5. Bridge Crossings Map tool: "Produces total number of trucks crossing each bridge for...specific time periods"
6. Hourly Truck Volumes by Direction tool: "Shows total number of trucks intersecting a user-defined line, broken down by hour and direction"
7. Origin Destination Traffic Volume Maps tool: "Shows routes taken to and from each of the geofences"

For carriers, these tools enable the integration of "the dispatch and billing functions with the real time tracking of all trucks, chassis, containers" (Payne 2014) all along the supply chain, from port to warehouse.

These routes and facilities are not just lines and polygons on a map, then. The very presence of logistical facilities that can serve JIT systems means that these facilities are suffused with the sociotechnical infrastructure of circulation (Chua 2018). The relations

between labour and capital that are inscribed in the making of connection are overdetermined by the imperatives of productive use, of capitalist value extraction from the movement of people and things — of commodities. Reliable route planning relies, in other words, on reliable commodity movement, which itself depends on producing the *labour* of that movement as reliable. The tools used to image truck trips, then, are used, on one hand, by logical-capitalist actors such as carriers to discipline the actual movement of truckers in accordance with logistical demands (see fig 20). On the other hand, tools intended for use by truckers themselves, such as the CVRP app (see fig 17), interpellated them in a neoliberal mode in planning their own routes — also referred to as routing ‘choices’ — in accordance with the spatiotemporalities of JIT logistics. The logistical labour employed in trucking and at warehousing facilities, then, must be written *into* the logistical algorithm that geofencing presumes, the social assembly line (Harney and Moten 2021) that circulation demands — labour that is relational, but whose social lives are written *out* of the logistical algorithm.

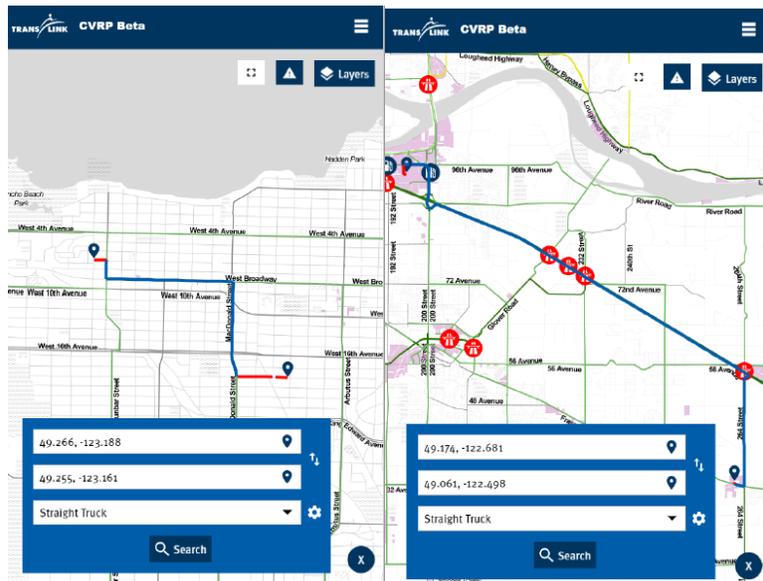


Figure 18. Route planning with TransLink’s Commercial Vehicle Route Planner app



Figure 19. Geofenced areas of significant container activity in the Metro Vancouver region. Note that these align with the presence of ports and airports, as well as warehouses across the region.



Figure 20. Individual truck trip through geofenced areas of significant container activity in the Metro Vancouver region



Figure 21. Aggregated truck travel patterns across the Metro Vancouver region (the thickness of lines indicate the frequency of that trip).



Figure 22. The truck trip tool used to track all the carrier's trucks' positions and their status with respect to the completion of a trip, or a leg of the operation. Sourced from Payne and Payne (2014)

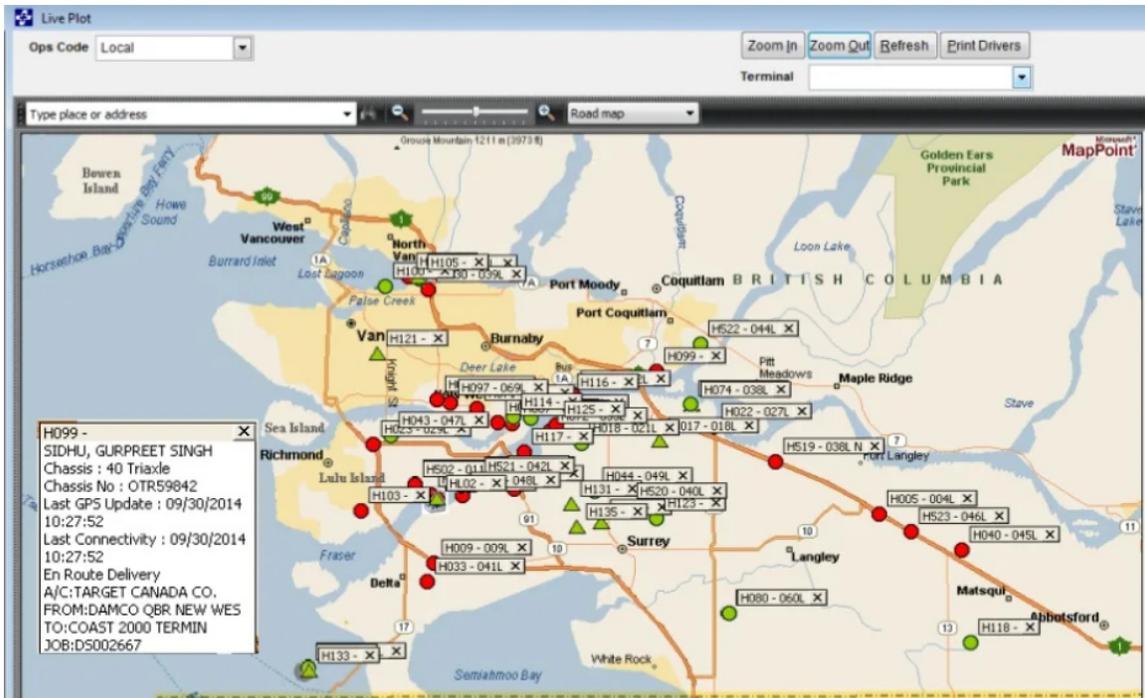


Figure 23. The truck trip tool used to track individual trucks' positions and their status with respect to the completion of a trip, or a leg of the operation. Sourced from Payne and Payne (2014)

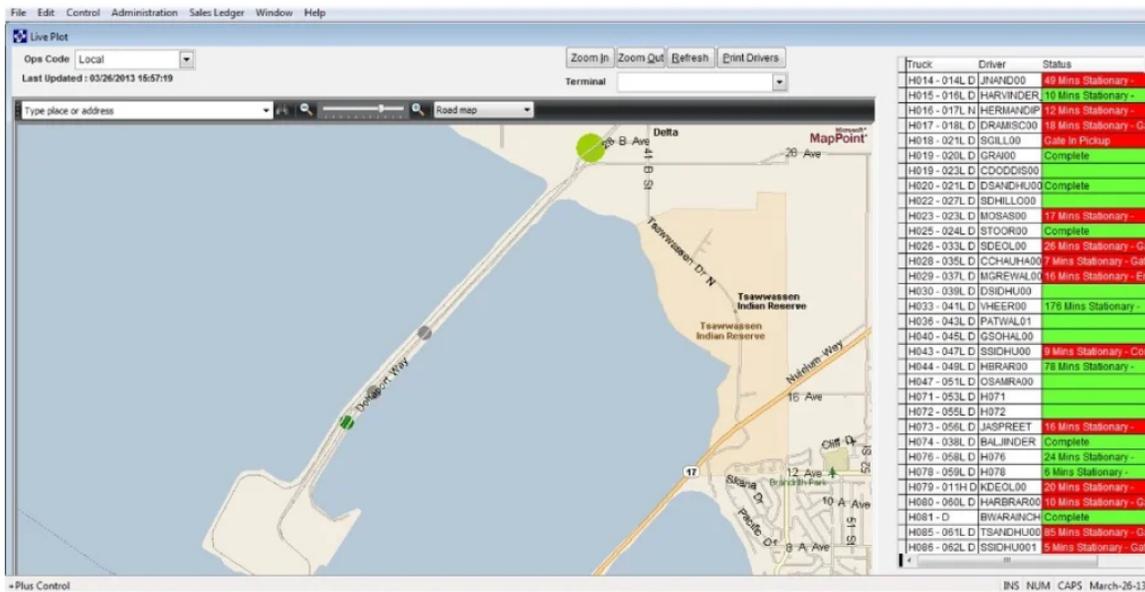


Figure 24. Depiction of how geofencing is used to plan a truck route down to the finest detail — the circular areas marked on the interface are the geofences used to mark the exact route taken during the trip. Sourced from Payne and Payne (2014)

Figure 25. *The Job Dispatch screen which describes the truck trip, its origin and destination, and assigns the trip to a particular trucker. Sourced from Payne and Payne (2014)*

Geofences are therefore connected — *networked* — across the logistical geography — the region of Metro Vancouver — to identify the entire truck trip line in terms of origin and destination geofences, as well as spatio-temporal coordinates, *and* aggregated to generate patterns of freight movement, which actually take the form of differentiated unities, as a ‘route’ (see fig. 24). The geofences are not only multispatial, but also multiscalar — they can cover large swathes of the region in order for route planners to map areas of significant logistical activity and truck trips along and between these areas (see figs. 21 & 22), but can also be used to provide extremely granular detail on logistical activity, such as when trucks load up at a port, exit the port terminal, park, unload and load containers at a transloading facility, may be stuck in traffic, are waiting to cross a toll gate, and any number of minutiae of transport activity (see fig 23). In other words, the position of the geofence’s borders indicate the *degree* of spatial coverage that route planners seek, be they around ports or warehousing facilities and its attached spaces. As spaces of (private) property, logistical facilities such as warehouses are distinguished at the level of ownership and enclosure (Mezzandra and Neilson 2021); as spatial forms they seek to

resolve the social contradictions that the movement of commodities against bordered¹¹ logistical geographies brings (Orenstein 2019), such as through service-level agreements between logistical-capitalist actors. In following the space and time in which socio-spatial relations, or connections, are set up between moving trucks and static geographies at this material-discursive and politico-economic level of logistical capitalism, we may map how land is made logistical, how logistics facilities come to be differentiated, how geofences get their borders.

3.3. How Land Use in Metro Vancouver Writes the Logistical Algorithm

The geofencing apparatus itself does not *make space* for the truck(er)s it connects to. It is the socio-political and politico-economic making of land as an ‘improvable’ (read: exploitable) resource that makes it a parameter for the logistical algorithm. The tensions between logistical (urban) sprawl and road congestion described above may be viewed as a business problem to be (at least partially) addressed through effective route planning, but these problems also bring significant consequences for the possibility of cultivating non-logistical socio-spatialities in Metro Vancouver. These consequences fit into longer histories of social composition and, importantly (much like at the Port of Vancouver), land use. Economic factors that play out spatially, such as rising property prices and demand for faster transportation (Gutelius and Theodore 2019), are key in pushing warehouse operators to expand their use of logistical media. Despite the imaginative power of media technologies, they continue to *connect* to what is written into the socio-spatial text even as they relate to what is excluded from that text.

Warehouse location is businesswise a reflection of the location of industries that depend on that region’s supply chains, as well as availability of transportation labour and infrastructure. The spatial *extent* of facility location also takes into consideration the co-location of other warehouses, sufficient space for truck yard space and parking, proximity to other logistical facilities, and property prices (Meczes 2006) — all of which factor into land zoning and use. Land use in a heavily urban region such as Metro Vancouver — in particular, the density of the street layout and decentralized and dispersed urban spatial

¹¹ As rent-bearing commodities, freight that passes through warehouses also circulates in logistical geographies as value to be extracted

structure — is furthermore tied to urban goods distribution. Land use also affects the average trip length of freight trucks. Both freight movement, with its demand for truck waiting spaces, parking, rights of way over passenger transport, wider roads & bridges, as well as intermodal terminals and off-dock facilities that tend to be highly land and capital intensive, compete with other forms of land and infrastructure use and access such as housing and public transit (UN Habitat, 2013). Urban land use tends to be the inscriptive modality through which space is written with the logistical algorithm to the exclusion of other socio-spatialities.

Zoning, as a form of urban planning, discursively produces land use in Metro Vancouver. Decided upon by municipalities, land zoning policy — along with subdivision and servicing bylaws that set conditions on land use — is still shaped in relation to that of *regional* socio-spatial structures (Strategic Planning Department, Greater Vancouver Regional District 1994). Simultaneously, regional goods movement is aligned with the demands of global commodity circulation, as the politico-economic structure of Metro Vancouver reflects American and Asia-Pacific supply chain economies, especially with the Asia-Pacific Gateway Corridor Initiative. The logistical priorities of transportation infrastructure in urban-regional networks therefore contribute to their spatial dispersion and their ‘disarticulation’ from local politics (Brunelle et al. 2021). The expansion of road infrastructure in the region — such as the Fraser River crossings and regional highway projects that aim to ease congestion on the Port Mann Bridge — in fact increases automobile use (Senft 2009) and the production of truck routes. Zoning, then, “permits certain land uses within an area while, at the same time, excluding other uses” (Strategic Planning Department, Greater Vancouver Regional District 1994), so that the competing uses of land tends to the politico-economic priorities of the Metro Vancouver region, namely, making space for trucks and warehouses. While zoning functions as a specific form of urban planning, it relies on property forms that function as a form of space-making in Metro Vancouver. They produce a set of material-discursive relations between (classed and racialized) socialities, land (Bhandar 2018), and transport. In a region shaped by logistics, that shape of space tends to be of the assembly line.

The dis/connections of Metro Vancouver’s urban and logistical situations is not new. Vancouver grew as a (settler-)logistical city, owing largely to the port and railway terminus, which brought with it warehousing facilities and road infrastructure close to the waterways

that bounded the city, namely, Burrard Inlet and the Fraser River. However, with deindustrialization (and the provincial move to a “post-staples” economy) and rising demand for land dedicated to non-logistical purposes, facilities located in the metropolitan core shifted to other parts of the region, reshaping those spaces along with the city itself. These spatial shifts also implicated social reconfigurations along classed and racial lines — as the downtown neighbourhood of Yaletown demonstrates, land once dotted with warehouses and working-class homes can be remade as a corporate business district with extremely high residential property prices through zoning policy (Barnes and Hutton 2009). Shifts in urban capital structure and land use led by the Vancouver municipality therefore redirected logistical capital’s attention away from the metropolitan core. The logistical algorithm’s rewriting of Vancouver’s socio-spatial text also had implications for the regional transportation network and land use for its infrastructure.

Urban transportation planning in the early-mid 20th century shifted to *regional* imperatives with the development of roads meant for commuter traffic, especially with the 1986 World Exposition on Transportation (Frank and Bigazzi 2019). This shift also made regional goods movement more feasible, benefiting also from the Gateway Program that expanded highways throughout the region. In recent years, expansion of port facilities — especially the Centerm, Vanterm and Deltaport container terminals — and increased commodity volumes have placed significant demands on existing regional transportation networks, and raised demands for prioritizing land use for logistical purposes. As of 2021, “about half of the more than \$1 billion in federal funds appropriated to the freight transportation sector in the region is designated for road, rail, and off-dock storage yards for transloading and temporary storage of containers” in order to address road congestion (Mongelluzzo 2022). The “land use-transport connection” (Newman and Kenworthy 1996) in the peripheries of Metro Vancouver, then, remains strongly oriented towards commodity transportation and public transport (Frank and Bigazzi 2019).

The dominance of housing land use in Vancouver’s metropolitan core, meanwhile, displaces logistical facilities to peripheral areas. The location and spread of warehousing itself is a reflection of property prices (Woudsma, Jakubicek, and Dablanc 2016) where the operators of warehouses are landlords (Orenstein 2019) determining the spatialities of logistical networks. Property pricing in Metro Vancouver itself has been significantly influenced by the influx of real estate capital. Speculation has always been a factor in the

trajectory of land prices and use in Metro Vancouver (McGovern 1961). A significant portion of the capital for expensive real estate comes from the Asia-Pacific logistical orientation of the region. The Business Immigration Programme (BIP) in particular, which attracted investor-immigrants to Metro Vancouver from Hong Kong and Taiwan in the 1980s and 1990s, and from Mainland China since 2000, had invested over \$40 billion in a trans-Pacific real estate market before the turn of the millennium (Ley 2017). However, these same transnational dynamics drove unaffordable property and rental prices for working-class immigrants to the region and are especially visible in the consequences of urban-logistical sprawl. Largely populated by low-income and racial minority groups, these peripheral residential spaces are located in close proximity to warehouses, heavy industrial sites, and agricultural land (Airas, Hall, and Stern 2015). The borders between the metropolitan core and the peripheral suburbs, then, are significantly classed and racialized, especially in spaces where logistical and non-logistical socio-spatialities rub up against each other.

The making-logistical of the Metro Vancouver region is tied up with the making of regional lands as property, shoring up commodity relations. How that land-as-property is *used*, however, relies on zoning. As land use policy pushes warehousing facilities to the region's periphery, transportation infrastructure is developed to hold the region together as a logistical geography. The geofencing apparatuses that make possible route planning, then, don't read blank space, but land use as written through the logistical algorithm.

3.3.1. The Making-Logistical of Metro Vancouver

The spaces that are geofenced across Metro Vancouver as "areas of significant container activity" or at hyperlocal levels in service of route planning are neither simply spaces through which trucks pass nor exclusively covered in warehouses. They are not *merely* spaces of circulation. While only the truckers that pass through these areas' borders matter to the geofencing apparatus and are read through its connections, the borders that make the region logistical — between the socialities that matter for logistical capitalism and those that don't, between the bodies that count and those that don't — are mirrored by the borders between the metropolitan core and urban periphery, logistical and non-logistical land use. Logistical capitalism has always been racial capitalism (Harney and Moten 2021), ordering socio-spatialities historically and contemporaneously for the transit

of people and circulation of commodities towards a doubled schema of logistical capitalism and its infrastructure: use and access via improvement-by-possession. The conditions for such ordering can be located in the industrial and logistical histories of the region.

The Lower Mainland, in the early years of settler colonialism, was firmly oriented towards resource industries and the colonial capital that came with it. The region was dotted with work camps that “combined an abundant resource, elements of industrial technology, and transportation connections to distant markets” (Harris 1997, 81) to support extractive minerals, timber, and fishery industries, many of which were set up along the Fraser River (Barman 2007a). The settlers therefore sought industrial and residential land ownership and the lower land prices along the (Upper) Fraser — such as at New Westminster — set the terms for the colonial enterprise (Harris 1997). This industrial base lasted well into the mid-20th century, when the depleted resource industries began a shift to post-industrial economic forms.

The inability of older economic forms and its reliance on industrial infrastructures to generate value through the 20th century saw the Lower Mainland’s capitalists reconfiguring socio-spatial and spatiotemporal relationships in the region to extract value from logistical enterprises. In Metro Vancouver, newer logistical geographies were made in the shuttering of mills along the Fraser River border between Vancouver and New Westminster, and the corporate concentration of forestry and fishery resource extraction industries in parts of Metro Vancouver that were located away from the residential cores (Barman 2007a), increasing the availability of land for warehousing and road expansion. Looked at differently, then, the port and waterway industrial development as well as the development of transportation infrastructure to the resource-rich hinterland that is still ripe for ‘improvement’ (McGovern 1961) produce certain spaces as logistical. For particular spaces to be made logistical, then, requires their spatial relation *across* the region. The distributive infrastructure, especially of transportation — a sector of historical importance to the Metro Vancouver region — is therefore an important modality through which land is written into the logistical geography.

In the early settler period, the Fraser River was the primary artery of transportation to the hinterland, with arterial trails and seasonal roads forking outwards from the waterway to link industrial sites and work camps. With the completion of the CPR lines through

Vancouver (and later the suburb of Port Moody) towards the end of the 19th century, the Lower Mainland was linked to the rest of Canada, but transportation routes within the region were sparse, made mostly of dirt roads and trails inscribed by Indigenous peoples and settler miners. Farming's growth in the Lower Fraser Valley also drove the development of rural roads and related transportation infrastructure (Harris 1997). Such work happened all along the length of the river, at Langley and Richmond's industrial sites (Thirkell and Scullion 1997). Within the early metropolitan core, Vancouver and New Westminster functioned as the primary nodal junctions of road and railway networks for the region (today's suburb of Port Coquitlam began as Westminster Junction for the CPR with merchant-capitalist support), as well as coastwise steamer traffic and deep-sea shipping (Harris 1997). The Kingsway road, built in 1913, connected the two cities (Thirkell and Scullion 1997) and set up the expansion of roads beyond the urban core.

The development of transportation infrastructure enabled the development of commercial trucking in Metro Vancouver. In the 1930s, several small trucking companies were set up to access parts of the region with railway lines as well as connect Vancouver with the interior, although at this time the vagaries of informal roadage caused prices to be higher than that of railway transport. Earlier bridges that provided thoroughfares for commercial and personal vehicles as well as railway traffic across the Fraser, such as what is today known as the Pattullo Bridge from New Westminster, were improved to better handle heavy road traffic such as trucks. (Harris 1997). Throughout the 20th century, the declining industrial centrality of Metro Vancouver proceeded with its increasing logistical importance, as its transportation infrastructure connecting the region to the Canadian hinterland as well as the United States developed in tandem with the Port of Vancouver's importance in transnational supply chains. As freight costs reduced with the deregulatory turn of the 1980s-90s, shippers and carriers saw Metro Vancouver as an attractive space of transit for low value bulk commodities and containers, which meant that road transport *within* the region intensified, even as long-distance transport became less attractive (McGovern 1961). The making-logistical of the Lower Mainland's industrial and agricultural lands is tied up with efficient and reliable transportation in the region.

The Lower Mainland therefore has been historically oriented towards the remaking of geography towards accessing and using social and natural resources, justified by the 'improvement' of land as industrial property. The decline of industrial geographies,

however, set the stage for another remaking of the region as logistical, eased by the historical imprint of transportation on the land. These economic shifts, however, have never simply been teleological responses to changing world-historical conditions, nor have those historical imprints been the unproblematic invention of the European settler. Logistics presumes to fill the world with things as if the spaces its actors move through have no history, no interruptions or diversions (Harney and Moten 2021). However, in its racial-capitalist imaging and imagination of Metro Vancouver, the logistical algorithm that now surfaces in its mediation has had to evacuate contemporary logistical geographies of certain historical socio-spatialities in order to be able to produce the ahistorical connections — at the borders that only exist to make property and labour regimes value-extractive — of geofencing apparatuses.

3.3.2. Axes of Socio-Spatial Differentiation in Metro Vancouver

The borders of logistical media are produced as if they were ahistorical, their spatial text exclusive of the actual social and historical relations that suffuse space: spaces of property, of race, of labour, of capital. These borders written into the geofencing apparatus rely on and reproduce the borders of property and territory in order to presume their availability for logistical use and access. Geofencing apparatuses exploit this particular writing of the socio-spatial text as logistical to coordinate the relations that cross those borders as if they were linear, lined up, as if social liveliness could simply be the connections of networks. But the racial and settler-colonial histories that produce the assembly-line of logistical capitalism — even as they exclude those histories from mattering in its relations — are readable in the socio-spatial text of Metro Vancouver.

The making of logistical space has always been a racial-capitalist project (De Lara 2018), one that has relied in Metro Vancouver also on the evacuation of indigeneity from the urban core of the region. Racialization here does not simply come about as a consequence of the movement of racialized peoples into space, but “in the very nuts and bolts of possession-by-improvement” (Harney and Moten 2021, 29) that has defined the settler-colonial project. Warehousing in particular has been violently racist in its origins as “factories” that held and ordered slaves on the West Coast of Africa (Orenstein 2019). Neoliberal logistical capitalism has, through its “fusing of race, space, and capital” (De Lara 2018, 11) produced a regional socio-spatial regime in which the logistical sprawl of

warehousing and the location of racial minorities and new immigrants in the suburbs are entwined, a consequence of lower land (and property) prices in the urban periphery. The supply-chain urbanism (Danyluk 2021) of Metro Vancouver reborders the region according to national-territorial images via the socioeconomic precarity and vulnerability to expulsion immigrant workers find themselves subject to.

The industrial Asian workforce has been historically pushed both socially and spatially to the margins of the Lower Mainland economy, located in the urban periphery as well as hinterland towns such as Kamloops. Industrial work camps, built by the Royal Engineers on the sites of Indigenous villages, were largely populated by European settlers, supported by racialized Asian and Indigenous labour who were excluded from the settler towns (Barman 2007a). While Vancouver's Chinatown itself functioned as a distributive nodal point for capital and labour — transportation and communication networks for workers from the Asia-Pacific were often located in these areas — its merchant-capitalists invested in land and industry at the margins where they put Asian labour to work — many of which make the suburbs of today, such as Burnaby, New Westminster, and Port Moody (Anderson 1988; Yee 1986). Other temporary migrant workers, while resident in the city, were confined to their work sites, especially the port areas of Burrard Inlet and the Fraser River. The small proletarianized Sikh-Indian population too lacked a spatial center at the time.

The marginalization of immigrant racial groups proceeded through the same historical spatiotemporalities as that of Indigenous dispossession, although the latter's relation to waged labour was preconditioned by settler-colonialism and its making of a European social geography. The bordering of settler and Indigenous spaces was enabled in the Lower Mainland through the reserve system that demarcated Indigenous lifeworlds and the pass system that fixed their mobilities. The urban-regional socio-spatialities of Indigenous life therein was made logistical through this tension between fixity and mobility.

Indigenous people were evacuated from the urban core (Barman 2007b) and coveted reserve lands that once bordered the urban core were resettled through urban planning processes of zoning and taxation, or "municipal colonialism" (Stanger-Ross 2008). These processes were also predicated on the settler-colonial State's desire — represented by

the Department for Indian Affairs and its mediation of the Indian Act that brought reserves and their colonial management into being — for the ‘improvement’ of Indigenous lands (which were framed as overtaken by (Chinese and other Indigenous) squatters or ‘wastelands’), such as the purchase by the federal Harbour Commission of the Burrard Inlet-adjacent Kitsilano Reserve for port terminal and docks facilities in 1916. These power relations that sought to border land use and property regimes along racialized lines (Bhandar 2018) also set the bounds for the future development of the region — the reserves were already engaged in semi-industrial and agricultural activity that the colonial State did not recognize as legitimate ‘use’. The State sought to be the authoritative mediator for intersocial and politico-economic relations among the residents and workers of the region, and therefore delimited socialities that may have resisted future formatings of capital(ism). These formatings also presented Indigenous lifeworlds as incompatible with the urban modernity that the region was being politico-economically oriented towards. That apparent incompatibility — itself trafficking in racialized visions of property and sociality, or the logistics of a/sociality (Harney and Moten 2021) — was used as justification for barriers set on Indigenous spatialities that continue into the present day.

The racial regimes of property and propriety that were imposed by settler-colonial capitalist society remained more or less static until the mid- to late-20th c. The liberalization of immigration regimes during this period opened up the Metro Vancouver region to a sharp increase in the number of racialized minorities in the region, in particular of Asian-Canadians who already had some — albeit (deliberately) limited — presence in the region, while doing little to trouble the classed borders of urban space. Until 1971, Chinese-origin residents were scattered through the urban periphery — including in Burnaby, Delta, Richmond, Surrey, Port Coquitlam, and North Vancouver — while outside Japantown, Japanese immigrants were clustered around the Fraser River (where they once worked the canneries and sawmills) and Indo-Canadians had growing presences on the south Main Street corridor in Vancouver and near the agricultural lands around the Fraser River, at the New Westminster/Richmond border. In this period, primarily the small "Caribbean, Black, and African" group — per census records — was highly suburbanized compared with other minority populations. However, other immigrants continued to settle in the urban core, such that the social geography of immigrant Metro Vancouver had not yet turned suburban, the latter of which was still primarily White bourgeoisie (see figs 25-26) (Hiebert

1999). This began changing, however, from 1986 as the racial borders between the city of Vancouver and its peripheral suburbs deepened in their classed formations.

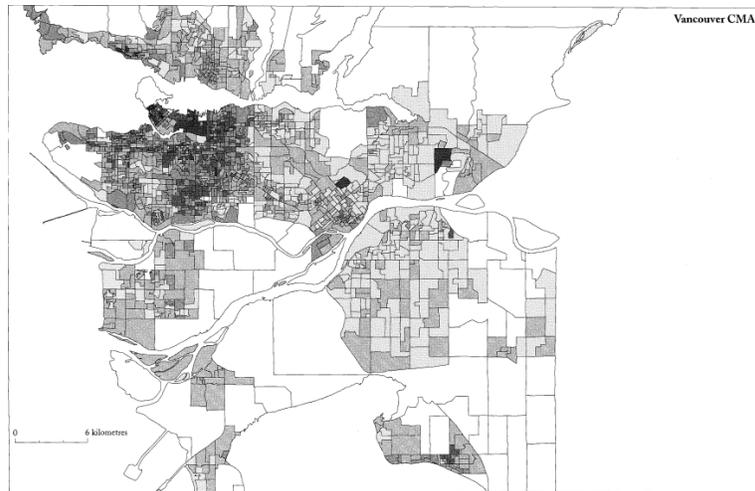


Figure 26. Immigrants' geographical distribution in Metro Vancouver as of 1971. Sourced from Hiebert (1999)

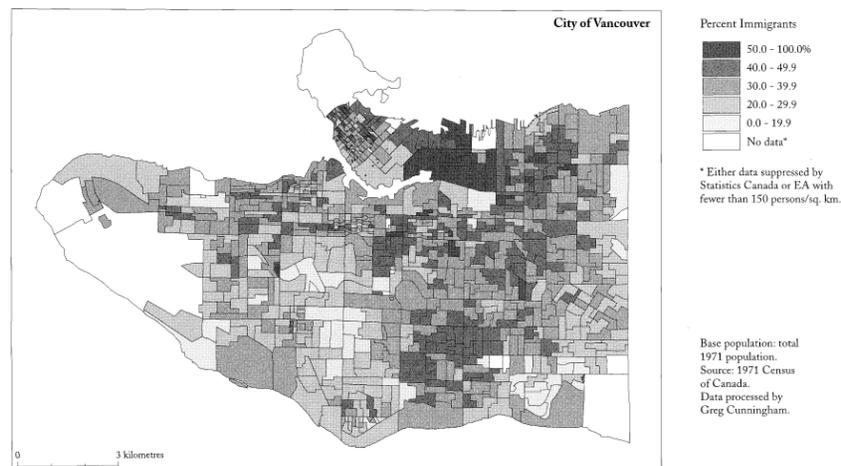


Figure 2: Immigrant population by enumeration area (EA), Vancouver CMA, 1971.

Figure 27. Immigrants' geographical distribution in Metro Vancouver as of 1971. Sourced from Hiebert (1999)

Notably, newer immigrants to Metro Vancouver settled first in the suburbs rather than the urban core. In general, Asian immigrants to the urban periphery — especially Richmond, Surrey, and Burnaby — who entered the region in the 1990s significantly outnumbered immigration to the city of Vancouver (Statistics Canada 2022). Most Chinese-Canadian immigrants through the '80s and '90s were working-class families who settled in Richmond

to live close to sites of industrial and logistical development. Historically, the suburb was sparsely populated, with the village of Steveston notably being home to a number of Japanese and Chinese families and labourers involved in the fishing industry. With the construction of bridges across the Fraser in the 1950s and '60s and hence Richmond's routes to Vancouver, the suburb — as was typical with modern Western cities — was initially constructed as being for the White bourgeoisie. However, by 1991, the immigrant population in the suburb had grown to comprise 35% of the total Richmond population, and Chinese-Canadians in particular accounted for over 27%. The proximity of Chinese and European-Canadian residents of Richmond did not, however, follow multicultural imaginations of deracinated socialities — in fact, borders between White and Asian neighbourhoods were hardened, even if they shared other socioeconomic characteristics such as family structure and income levels (Ray, Halseth and Johnson 1997). The differentiation of space within Richmond, as with Metro Vancouver in general, was also significantly classed. In the same period as increased immigration, Richmond also saw the most rapid increase in low-income populations in the region (Kloepper 2017).

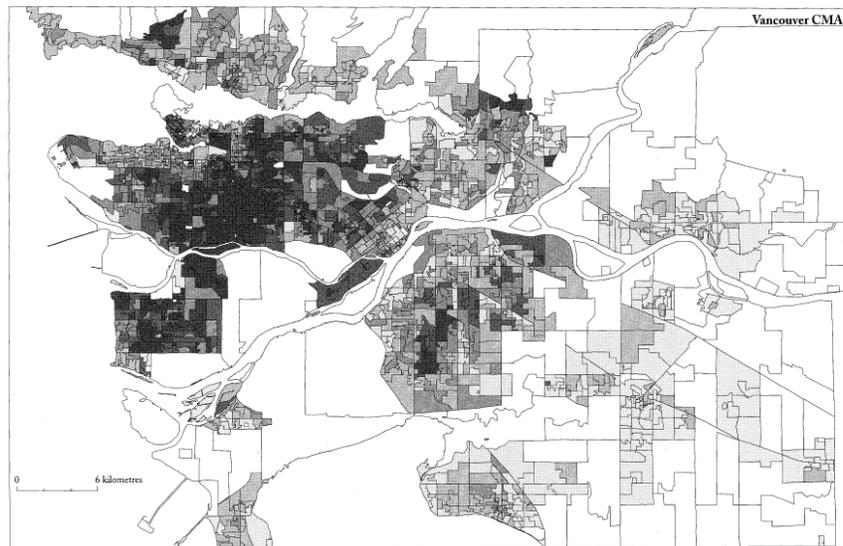


Figure 28. Immigrants' geographical distribution in Metro Vancouver as of 1986. Sourced from Hiebert (1999)

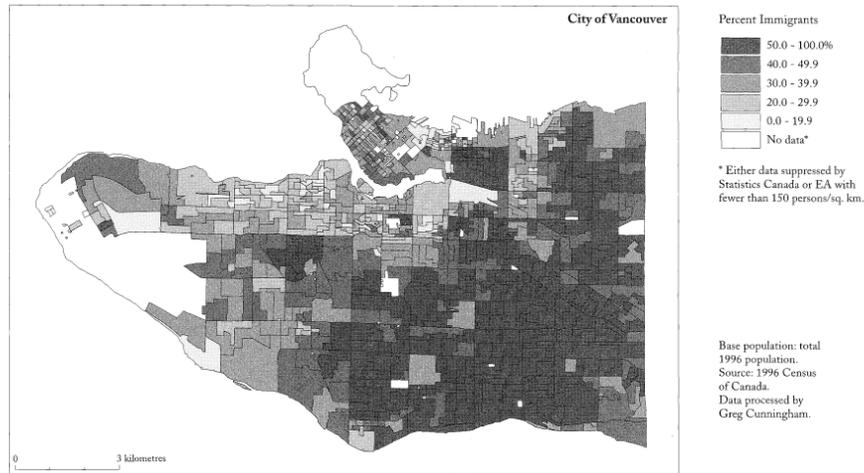


Figure 4: Immigration population by enumeration area (EA), Vancouver CMA, 1996.

Figure 29. **Immigrants' geographical distribution in Metro Vancouver as of 1986. Sourced from Hiebert (1999)**

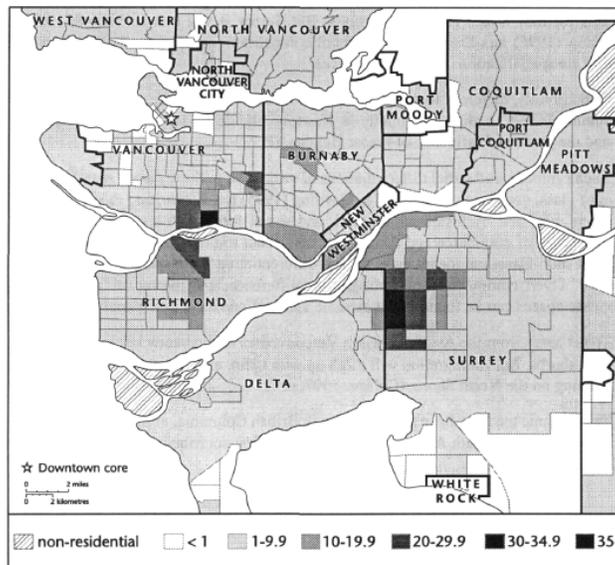


Fig. 1. Percentage of Indo-Canadians per census tract, Greater Vancouver Regional District. Source: 1991 census.

Figure 30. **Indo-Canadian geographical distribution in Metro Vancouver as of 1991. Sourced from Walton-Roberts (1998)**

The suburban areas of Northeast Delta and West Surrey that bordered agricultural land and sawmills, on the other hand, were largely settled by Indo-Canadians (especially Sikh-Punjabis), with some pockets in east Richmond and New Westminister. These socio-spatial changes were more or less firmly in place by the '90s (see fig 29). Surrey also has the second-highest total number of people under LICO in Metro Vancouver (Kloeppe

2017). The location of Metro Vancouver's commercial transportation industry, primarily trucking, has also converged on Surrey with the co-location of Punjabi entrepreneurs and their businesses (Hiebert 1999). These classed differences also locate other racial minorities in Surrey — its cheaper real estate and rental housing are linked to significant populations of Indigenous persons, nearly a third of all refugees in the region, and immigrants who are under LICO in Guildford and Newton (Kloeppe 2017), and a growing concentration of African immigrants (Creese 2011), a group that is otherwise scattered across Metro Vancouver.

The racial coding of space, then, plays out in/as classed socialities. The spaces of logistics that have sprawled suburban, integrated regionally through transportation networks, border the spaces where racialized populations live. Inevitably, the latter cross these borders to enter logistical space, *but can only do so as labouring subjects*. The logistical algorithm rewrites the liveliness of social subjectivity only to reduce it to linearity. It produces the logistical assembly line by erasing the spatial differences in logistical labour's social worlds. As zoning produces either/or relationships of land use, the possibilities of land-based relations are reconfigured towards the imperatives of logistical capitalism.

3.3.3. Geofencing and the Reinscription of Logistical Land Use

The socio-spatial text of Metro Vancouver is written through histories of industrial land use, the (settler-colonial) expansion of transportation infrastructure, and land zoning policy. In reading these histories and contemporary forms of land use, the logistical algorithm takes as its parameters the spatial imprint of warehouses and roads — the making of a regional logistical network that links up spaces of property — and excludes other spatial forms from coming to matter in that reading. In turn, the spatial borders set up through the logistical algorithm's writing of space produces the differential inclusion of socialities. The socio-spatial relations of geofencing apparatuses, then, reinforce the logistical view of Metro Vancouver produced by urban and logistical planners — one arranged to enable logistical flow while also extracting value from the spatial inflexibility (Kumar 2019) of (a/)social space.

Geofencing apparatuses, whose every reading of the socio-spatial text is the writing of the blank space of networking (Chun 2015; Chun 2021; Munster 2013) therefore reinscribes

the logistical algorithm that takes land as always already available for logistical use and access. In the apparatus' generation of connections-as-relations, the reading of position also writes in what relations *matter* to the apparatus (and therefore to logistical-capitalist actors). Put differently, the spaces which the geofencing apparatus (re)inscribes as logistical require the fixing of socialities as coordinated and oriented towards the demands of logistics (Rossiter 2016). This requires making other unfixable socialities logistical, or excluding them from mattering — writing them into the strictures of logistical capitalism.

3.4. The Logistical Labour of Circulation in Metro Vancouver

The geofencing apparatus does not produce its objects, but a particular linguistic model of them (Agre 1994), a version of social subjects that allow the logistical algorithm to further its goals of total movement + total access (Harney and Moten 2021). The relational form of logistics is vital to its shaping of diverse spaces and socialities as coherent across the supply chain (Tsing 2009), including increasingly in urban spaces that seem to have multiple axes of space-making power acting on them (Danyluk 2021). The relations between logistical labour unfold in the spaces where they come into contact — the borders of logistical geographies — in order to *facilitate* commodity circulation, and can be apprehended through which of these spaces are geofenced. Specifically, in container movement from port to warehouse and back, the delays and turn times that trucks encounter must be minimal — to the point of negligible — for the geofencing apparatus to be able to depict a trip as a continuous linear process, or logistical 'flow'. It is also in the complex logistical operations and interactions that warehouse workers perform not just *within* the space of the warehouse, but with the loading and unloading of trucks, that the smoothing out, the making-assembly-line of truck trips comes to be of material spatiotemporal consequence. Despite the lack of *connections* between these modes of logistical labour, then, their *relations* matter.

These socio-spatialities that may seem to exist on either side of the bordered logistical facilities are therefore connected to how logistical-capitalist actors imag(in)e logistical networks and the labour-power that goes into making them — or don't. It is through "how workers, capitalists, state agents, and social movement organizers [deploy] various cognitive and material mappings to link differentiated but intersecting spatial scales—the

warehouse..., the foreclosed home, the racialized state apparatus—into a contested political space” (De Lara 2018, 2-3) that the connections that the logistical algorithm makes or doesn’t make can be traced, that the material effects of its exclusions can be understood. Urban logistics intensifies the *exploitation* of logistics workers through the *expropriation* of urban communities in alignment with the demands of global supply chains (Danyluk 2021), producing a spatial division of labour in ports, roads, and warehouses — “spaces of dispossession” of workers (De Lara 2018, 75) — that is conditioned primarily by classed and racialized difference.

Be they as truckers or warehouse workers, then, labour is driven to productivity and efficiency for logistical capitalism — their use of labour-power is shaped towards continuous improvement — *through* their relations. This requires that the space for other social relations — such as collective action that may come from working across the borders of logistical geographies (De Lara 2018), of geofences — be excluded from mattering in the connections the geofencing apparatus sets up. The deployment of geofencing, then, requires the differentially inclusive production of socialities as logistical labour. Simultaneously, then, as the space for those relations to vitalize social lives shrinks — as the precarity of trucking and warehousing labour makes them vulnerable to logistical ordering — those relations are made logistical. The *tasks* that warehouse workers complete are essential to producing trucks’ passage through warehouses as *process*, to producing routes as logistical flow. These tasks happen prior to, during, and between trucks entering and leaving the warehouse, and therefore require the adherence of warehouse workers to the demands of JIT logistics. The exclusion of warehousing labour from the connections of geofencing apparatuses, then, happens through two moves that produce asocial relations with truckers: the management of warehouse work which is itself made possible through the structural flexibilization of warehousing labour.

3.4.1. Warehousing Labour in Metro Vancouver: Making the Regional Assembly Line

While drayage trucking is subject to remaking as logistical flow across truck trips through the *regional* making-assembly-line of their mobilities, or route planning, the interstices of such flow — the stops on their routes — are the consequence of intervening processes at cross-dock, transloading, and off-dock warehousing facilities that are especially tailored to

the demands of JIT production and distribution¹². Under the tightly controlled “pull” system in shipper-driven supply chains, “agility” is the name of the game — a euphemism for labour(-power) being highly responsive to the demands of logistical-capitalist actors beyond the road or the warehouse (Jaffee and Bensman 2016). While route planning, and the geofencing it depends on, only produces connections in the movement of trucks relative to those geofences’ borders, i.e., their movement through warehousing facilities, that ‘seamless’ movement itself depends on warehouse labour being moulded to the demands of those routing efficiencies. Warehouses are typically considered asocial spaces, filled with commodities — dead labour — and little else (Orenstein 2019). Warehouse labour is therefore managed not just *internally* to the spaces of these facilities, but in their *relation* to trucking labour so as to seem inconsequential.

The Taylorist management of labour (as described in the previous chapter) begins in the spaces of production (Braverman 1998), and with warehouses increasingly becoming spaces not just of circulation but of value extraction, the tasks performed by warehouse workers — as logistical workers — are configured in the shape of the assembly line (Delfanti 2021; Harney and Moten 2021). The notebooks and time-motion studies of Taylorist factories in the past may have been replaced by the stream of data generated by worker activity in the Taylorist warehouses of today (Delfanti 2021) — including GPS-based location systems — but the purpose remains the same — to optimize work and control labour in relation to capitalist imperatives. These shifts in managerial practices have been led by companies like Walmart and Amazon that are the “supply chain incarnate” (Posner 2018), and given their tendrils have spread through global supply chains, they have spread their practices throughout the warehousing industry, intensifying the labour-shaping imperatives of logistical capitalism.

The job processes within the warehouse are primarily of four types: receiving freight from trucks, stowing or storing commodities in the warehouse space, picking or retrieving items from their storage locations, and packing commodities into containers, pallets, or as break-

¹² I use warehousing as shorthand to describe a set of logistical operations that happen at warehouses/ distribution centers. Storage, historically the remit of warehouses, has become only one of the many activities cross-docking and transloading facilities engage in. Companies like Amazon therefore linguistically shift attention away from the actual work of warehousing by describing them as “fulfillment centres.” Choosing to refer to these spaces as warehouses is therefore also a political choice.

bulk, as well as loading/unloading containers onto/from trucks, achieved through a mix of labour-power and machinery like forklifts and, increasingly, warehouse robots. These broader processes are themselves comprised of tasks that are expected to be performed such that people and machinery are in constant motion, oriented towards the fulfillment of the processes. These interconnected tasks may be qualitatively different, and therefore may be the target of different strategies in improving their efficiency, in reconfiguring how the labour-power is used so as to exclude the liveliness that introduce variability into the process (Škerlič and Muha 2017). Warehouses often also follow the “chaotic storage” model, which is efficient for storage when commodities are received, but puts greater time pressures on workers to pick and deliver commodities for loading onto trucks and shifts the knowledge on storage locations wholly to the managerial level. However, in cross-docking and transloading facilities — widespread in regional drayage networks, storage and order picking functions are eliminated, as port-outward freight is unloaded from trucks, depalletized or otherwise unpacked or broken up into smaller batches as necessary, and then loaded onto waiting trucks that move the freight to other off-dock or last-mile distribution centres. Stowing and picking functions are therefore replaced by sorting and shipping tasks. Cross-docks were especially widespread in JIT distribution systems that apply “[Taylorist] scientific management techniques, dynamic market information, and rapid response logistics techniques to reduce redundant inventory” (De Lara 2018, 67-68) that may take up warehouse space. The fulfillment of warehousing jobs, then, is reliant more so on the warehouse operators’ *design* and *planning* of the warehouse’s space and management of worker tasks — the production of a logistical system in the warehouse — than the ability of workers themselves to perform these tasks (Grosse et al. 2016; Škerlič and Muha 2017) — a strategic choice that elevates the interests and imperatives of logistical-capitalist actors over those of labour. The abstraction and (re-)visualization of warehouse space produces new vectors of improvement for warehouse labour(-power) (De Lara 2018). For 3PLs as the logistical-capitalist actors who coordinate warehouse labour, tasks such as commodity handling produce the least surplus value for that actor. As such, their relations with labour are oriented purely towards efficiency, so that “the 3PL has emerged as the handler merchant for the age of the digital border” (Orenstein 2019, 251). Many of these tasks are therefore subject to being broken down into subtasks and

planned in ways that override physiological¹³ factors, “human error,” and exploit workers through pay and hours. Quotas and KPIs, as well as managerially enforced rules on freight handling, function as means of aligning workers to the demands of logistical-capitalist actors beyond the warehouse (De Lara 2018; Delfanti 2021). The conversion of worker expertise into machinic and automated technologies (Braverman 1998) is rewritten into the logistical algorithm that, through logistical media, writes the (a)social-relational text of the use of their labour-power. The socio-spatial world of commodity circulation, then, is linked through the bodies of warehouse workers, as, per De Lara (2018, 80) “the human element that enables technology to do its work.” The making of logistical flow and the minimization of frictions between warehousing operations and truck loading/unloading relies on the making-assembly-line of labour, the shaping of their lively relations as work *tasks* to be managed.

Circulation, then, is a matter of labour at the interface of the hard infrastructures of the warehouse and the soft infrastructures of logistical technologies. It is facilitated by logistical media(tion) between road and warehouse, trucker and warehouse worker — a mediation that geofencing apparatuses, through the connections that are generated in trucks’ passing through the digital-visual blank space (Chun 2021) of warehouses, only produce as truck trips. This set of asocial relations that, in the bordering of function and space at the warehouse produces disconnected relations between truckers and warehouse labour, relies on the *making* of logistical labour in its relations with (logistical) capital, which is shaped by the logistical-capitalist exploitation of labour and life in general.

3.4.2. Classed and Racialized Warehouse Labour in Neoliberal Logistical Capitalism: Flexibilization and Temp-ing as Writing the Logistical Algorithm

The flexibilization of warehouse labour is linked to the very form of JIT distribution. Based on the rapidly fluctuating peaks and lulls of goods movement through warehouses, the contracting of temp labour is synchronized to the demands of logistical capitalism. In other words, the flexibilization of logistical tasks proceeds apiece with the flexibilization of labour(-power). The racial differentiation of class proceeded through the neoliberalization

¹³ Per Gutelius and Theodore (2019), warehouse workers currently “experience work-related injuries at a rate nearly twice that of other private industry workers— higher than construction, coal mining, and most manufacturing industries”

of the regional economy. This produced hyper-exploitative segments of the regional logistics sector, namely trucking (as noted in the introduction) and warehouse work, that employed precarious racialized (and gendered (Lindemann and Boyer 2019)) groups through contracts (Alimahomed-Wilson 2019; Cho et al 2012; De Lara 2018). Similar class and racial dynamics are at play in Metro Vancouver¹⁴, which produces logistical labour as a socially vulnerable group through deregulation of the transport and warehousing industries and lower wages.

While the deregulation of the trucking industry initiated a shift towards the predominance of owner-operators,¹⁵ the neoliberal warehousing sector came to rely on outsourced temporary labour, usually supplied to 3PLs by temp agencies and employee leasing firms. Temp agencies offered pathways for “the reserve pool of immigrant labour” (De Lara 2018, 100) and other vulnerable social groups employment, but of a kind that kept them in precarity. Furthermore, these workers are usually drawn from the racialized and immigrant populations in the vicinities of warehousing facilities. The spatial concentration of these facilities produced a steady supply of warehouse temporary agencies that draw from these racialized populations (De Lara 2018) — the logistical geographies of warehousing are co-constitutive of the turn to temp staffing. Across Canada, 37% of warehouse workers belong to a “visible minority” while 32.5% workers in the broader “Transportation and warehousing” are immigrants (Unifor 2021). Warehousing operators also exploited gaps in overtime provisions in labour law when contracting with temp staffing agencies, as with Amazon’s implementation of mandatory overtime as a means of synchronizing labour with the warehouse’s facilitation of efficient circulation, “to deal with sudden spikes or drops in orders, or simply with an increased number of trucks to be unloaded” (Delfanti 2021, 89). This switch made the spread of JIT models more feasible, as swathes of labour could be hired and fired at the whims of the warehouse operators. Developing these flexible labour systems for, say, cross-docking depended on commodity tracking technologies that

¹⁴ In fact, Canadian ports such as Vancouver have actively sought to make the region more competitive vis-a-vis West Coast American ports

¹⁵ These shifts in labour-capital relations have also been the case with the off-dock drayage trucking industry in Metro Vancouver, with only approximately 30% of licensed drayage trucking companies being unionized, a substantial portion of off-dock drayage activity being shifted to unlicensed companies that pay significantly lower rates, and non-unionized truckers being paid much lower hourly rates

allowed logistical-capitalist actors to contract the precise number of workers required for jobs during specific periods of activity (De Lara 2018). The racial formation of logistical labour is therefore interrelated with the dynamics of JIT logistics. Racialized groups are overrepresented in categories of logistical labour that make them especially vulnerable to the differential assembly of social lives under logistical capitalism.

The immigrant labour force in Metro Vancouver is made up of primarily South and East Asians. Historically, these populations were subject to racist laws and norms of social exclusion, and were therefore limited to small populations in ethnic enclaves (although the Chinese-Canadian population held some sociopolitical influence, they were still subject to racialized discourses that ontologized them as other (Anderson 1988). Between 1971 and 1986, there was an exponential increase in the regional population of primarily Chinese- and Indo-Canadians, as well as significant Filipino-, Japanese-, Vietnamese-, and Korean-origin communities. The relative proportion of Asian-Canadians was also far higher in Metro Vancouver than in the other major immigrant-receiving centres of Canada (Hiebert 1999), contributing to the racialization of the region. The immigrant Indian population — primarily Sikh-Punjabi — have also been historically economically and socially marginalized, both by the Canadian state and from particular forms of labour through their racialized identity, such that they were relegated to various forms of manual labour, such as in the lumber and milling industries, as well as trucking more recently. Even as many of these immigrants may have had professional credentials, higher education, or work experience, institutionalised and State-driven processes of credentialing, as well as cultural distinctions in the Canadian labour market, enforces a racialized division of labour according to “national origin,” reifying preferences for Canadian-born and Canadian-educated workers. Such segmentation — the internalizing of national borders — of the labour market actively excludes immigrant labour from better-paid occupations (Bauder 2003) while doing little to offset the historical preferential treatment offered to (white) immigrants from other parts of the West (Hiebert 1999). This re-bordering of the labour market can cause immigrants to turn to logistical jobs that do not have such barriers in place, such as trucking and warehousing.

The borders between truckers and warehouse workers are also effected through the very form of the warehouse as a *securitized* space of property. The enclosure of private property — visible in the fences and gates of warehouses — reproduces the regimes of

suspicion that turn on (classed and racialized) labour and are characteristic of contemporary territorial borders (as will be seen in the next chapter). Such regimes are also enacted throughout the regional logistical network and at the borders of logistical facilities. Bonded warehouses securitize space within and across territorial borders via the sealed lock, reproducing (imperial) customs borders based on the sovereign government that institutes a bond, so that the warehousing system itself “indexed the breadth of the nation-state’s formatting of capital’s circuits” (Orenstein 2019, 102-103)¹⁶. Policing in (Metro) Vancouver was constituted in the early 20th century in response to the labour unrest and possibilities of strikes by unionized workers (Russwurm 2007). State policing, however, is only one component of the security regime in logistical geographies. Private security employed by shippers as well as 3PLs are a frequent presence at warehouses and in direct contact with warehouse labour (Cho et al 2012). Security gates at warehouses, too, are meant to verify the identities of the warehouse workers that pass through its borders, as well as order trucks come to unload/load containers — the latter also acts as a mechanism of prioritizing certain company trucks, such as those owned by the 3PL warehouse operator. Security cameras are also ubiquitous, and the managerial class is tasked with spotting collective organizing and union activity (Delfanti 2021, 68). Logistical facilities may be networked through roads and warehouses for the flow of commodities, but the labour that suffuses those spaces are subject to borders and social and subjective mechanisms of differential inclusion.

The flexibilization and temp-ing of work described here and elsewhere in this thesis is the *classed* condition of logistical labour. Of the over 134300 workers employed broadly in transportation and warehousing in British Columbia, mostly focused in the Lower Mainland (WorkBC n.d.), only about 7000 belong to the ILWU, and less than 1700 warehouse workers across Western and Central Canada are unionized through Unifor. Warehouse workers therefore have a closer relationship to temp agencies than to warehouse operators, making them more vulnerable to work intensification and schedule flexibilization since the regulatory conditions for such agencies are looser than for direct employment. With these functional changes in logistics too have warehouse operators found it beneficial

¹⁶ The securitization of logistics is also key to its financialization, another level of bordering of the im/material, of real labour and pure exchange value (“the circulation of one form of capital [— commodity capital—] to make possible the circulation of another — finance capital, or credit” (Orenstein 2019, 72))

to engage in “permatemping”, where the labor subcontracting and temporary staffing that was meant to respond to fluctuations in labour requirements, become a permanent feature of warehouse employment. The combined effect of schedule flexibilization, permatemping and piece-rate pay (Cho et al 2012) is to make warehousing work more precarious.

It is precisely this shaping of warehouse labour, as a desocialized group who can be fit into the assembly line of logistical capitalism, that allows their mapping onto the metrics of their work. Many of these racialized workers are relegated to cross-loading and transloading facilities with demanding work schedules and low pay (Gutelius and Theodore 2019) where task-based quotas and productivity standards are in place to align their performance of labour with logistical schedules. These quotas also meant that many 3PLs, such as Schneider Logistics, could pay piece-rates per container loaded or unloaded from trucks and therefore emphasize metrics of efficiency¹⁷. The epistemology of warehousing — “in how it prolongs the interlude” (Orenstein 2019, 248) that is immanent to commodity circulation (and allows warehouse operators to extract rent from their property ownership of these facilities) — is rewritten with the production of temporary warehousing labour. Warehousing is still reliant on modulating the *temporality* of circulation, but not for storage — not on the pause — but in speeding up distribution, extracting more value from labour, and therefore making more value available to other logistical-capitalist actors. The deployment of geofencing (among other logistical media) demonstrates this shift in how it produces a truck’s route, not as a series of interrupted trips, but as continuously improvable process where the warehouse functions as a site for the extraction of value.

3.4.3. The Relations Between Warehousing and Trucking Labour are Broken

The relations set up between truckers and warehouse workers, made as they are in the exclusions of networking apparatuses, and therefore what is *not* in the logistical algorithm, are not inscribed in the socio-spatial text read by geofencing. The social relations that are set up through these apparatus’ connections excludes non-logistical relations that exceed

¹⁷ Warehouse workers also perform high-velocity tasks such as picking, stowing, and labeling that shippers have come to expect be offered as part of warehousing services, but for which they may be paid low hourly wages

the linearity of truck routing from coming to matter. The logistical algorithm, as reinscribed through geofencing, reads logistical labour made flexible, and is therefore ahistorical and asocial in its reading of socius. In fact, it is the flexibilization (and temp-ing) of logistical labour itself, and the flexibilized *use* of their work (via being broken down into tasks that can be ‘managed’) that make such a reading of their relations possible. The logistical algorithm’s reading of social lives as logistical labour is made possible through the deregulation of relations between logistical-capitalist actors and labour, which is to say through reproducing the social vulnerability of classed and racialized labouring subjects. In this rewriting of the socio-spatial text as logistical — in the production of social lives as relational not to each other, but as relational to logistical media — truck routes are produced as ‘smooth’ logistical flow.

The making of Metro Vancouver as a regional logistical geography, as a spatial contiguity of warehouses connected by road, is therefore inevitably tied up with the making of labour as flexible — in the social and practiced senses — and therefore logistical. The logistical algorithm written through the continuous improvement of labouring subjects, towards their remaking as empty of subjectivity and and the evacuation of latent sociality, is reinscribed in the connections-as-relations set up by geofencing apparatuses. While the apparatus tracks one segment of the labour that sets commodities in motion — truckers — warehouse labour is equally key to the facilitation of goods movement, and the exclusion of that category from route planning allows for the depoliticizing of those labour relations, generating borders in the possibility of being-together. What the geofencing apparatus connects to — the ‘client’ that carries commodities, the truck — is actually the trucker, whose activity is captured and remade as open to the logistical algorithm’s access and use.¹⁸ The incompleteness of these connections surfaces, then, precisely is what is *not* connected to, but remains in relation to them — warehouse labour.

¹⁸ The geographies made by and for logistics and the degradation of logistical labour, then, go hand-in-hand owing to the imperatives of logistical capitalism. The neoliberal shift in trucking makes it possible for trucking companies and shippers to demand truckers adhere to the tight schedules of JIT distribution. With the Truck Licensing System (TLS) and SmartFleet strategies that the Port of Vancouver implemented, this also allows the deployment of technological modes such as geofencing-based route planning to manage their mobilities.

3.5. The Logistical Connection is Incomplete

Connections enable an exclusionary (or conversely, a differentially inclusive) rewriting of socio-spatial relations produced in the fixing of labouring subjects' locative coordinates that cross asocial and ahistorical borders produced through logistical media, namely, geofencing apparatuses. These borders, typically marked around logistical facilities such as warehouses, are markers of property in Metro Vancouver — of enclosure — that materialize the extractive and exclusionary relations of logistical capitalism. The relations of those who count in the logistical algorithm are not necessarily those who the algorithm, in its melding with the geofencing algorithm, connects to, but those that matter to regimes of circulation. It is therefore certain social *relations* that don't count in the logistical algorithm, not people or things. The making of connections by logistical media, such as geofencing apparatuses employed in route planning, are therefore determined by racial-capitalist and settler-colonial makings of those who are connected to, those who make connections work — the subjects enrolled in the logistical algorithm as labour.

The making-logistical of the racialized suburban geographies of Metro Vancouver proceeds through their bordering from the European settler-city and the borders between logistical and non-logistical land use. Where the region's people live and labour (re)produce racial and classed logics that imag(in)e Metro Vancouver as a regional logistical geography integrated through its transportation infrastructure. In other words, the region's distribution of people is intimately tied to the distribution of commodities. The labour-power commodity too, then, can be placed in the dialectic of fixity and flow that characterizes supply-chain urbanism. The making of space proceeds in tandem with the making of labour.

The logistical mediation of land and labour commoditized as such — the capture of liveliness and sociality to be reduced to digitally trackable actions (Agre 1994) in spaces abstracted from land — is therefore what keeps the logistical algorithm operational. This is also the function of the geofencing apparatus. Its connections are social relations shorn of the social and spatialized as lines on a map, as edges of a network (Chun 2016) that elevate racial-capitalist relations to the exclusion of all else that could be, of all that settler-colonialism ground down. It is precisely what *does not matter* to logistical capitalism, then,

that is the matter of its antagonism — the socialities of labouring subjects that cannot be captured by the logistical algorithm. Connection is always incomplete.

Chapter 4. Geofencing at the Canada-US Border and the Dis/Connections of Delay

Geofencing is deployed across the Canada-United States border to enable the calculation of (various segments of) border crossing times. These apparatuses measure the time a truck(er) may take in crossing from Canada to the United States, or vice versa, through one of several Ports of Entry (PoEs) that manage cross-border logistical flows. By reading the duration of connection and the spatiotemporal coordinates of that movement, geofencing apparatuses track trucks moving through the differentiated spaces of the border. The connections produced through geofencing apparatuses produce relations between the movement of labouring subjects and sovereign space — that appears to logistical-capitalist actors as tensions between trade and security — but only through the apparatus' reinscription of the logistical algorithm at national-territorial borders.

This chapter first explores how border crossing times are measured and calculated by geofencing apparatuses. These durations are of consequence to logistical-capitalist actors when they exceed an expected threshold and are therefore named as delay, or as wait times for the truckers attempting to cross the border. It is trucks' actual passage through a PoE that produces delay (and wait times). The alignment of media time and logistical space-time is theorized here in how the connections of geofencing apparatuses 'read' delay through the reinscriptions of the logistical algorithm. Delay is produced *and* expected to be managed logistically so that commodity movement can be 'improved' (much like truck turn times and other temporal metrics of JIT logistics).

The following section describes PoEs along "the longest undefended border in the world", sometimes referred to simply as border crossings, as complexes of border infrastructures across through which trucks — holding people and commodities — pass and can be tracked. Border crossings are discursively presented as facilitating 'secure trade' through the Canadian and US States' attempts to resolve the dialectical tension between trade and security. As such, this movement is conditioned by intersecting material-discursive writings of the socio-spatial text by state and capitalist interests, as well as legal, geopolitical, and geoeconomic (Cowen 2010) regimes. Of particular interest are the Blaine-Douglas PoE bordering Washington, USA and British Columbia, Canada, the Ambassador and Blue Water bridges in the Detroit-Windsor region, and the Peace Bridge

in the Buffalo-Niagara border region that together account for approximately 67% of the total cross-border commercial truck movement between Canada and the United States (Border Policy Research Institute, Western Washington University, et. al. 2021). They are therefore useful places to track commodity movement, namely, the cross-border movement of freight to facilitate JIT production along transnationally integrated supply chains (Public Safety Canada and Department of Homeland Security 2011). It is here that the calculation of border crossing and wait times becomes important, or comes to matter, for state and capitalist interests such as Transport Canada, the Federal Highway Administration, and fleet management companies (Sabean and Jones 2008). This metric plays into the calculation of transnational economic costs and supply chain planning (Border Policy Research Institute, Western Washington University, et. al. 2021). Delay affects the reliability — the plannability and/or predictability — of freight movement vital to logistical capitalism.

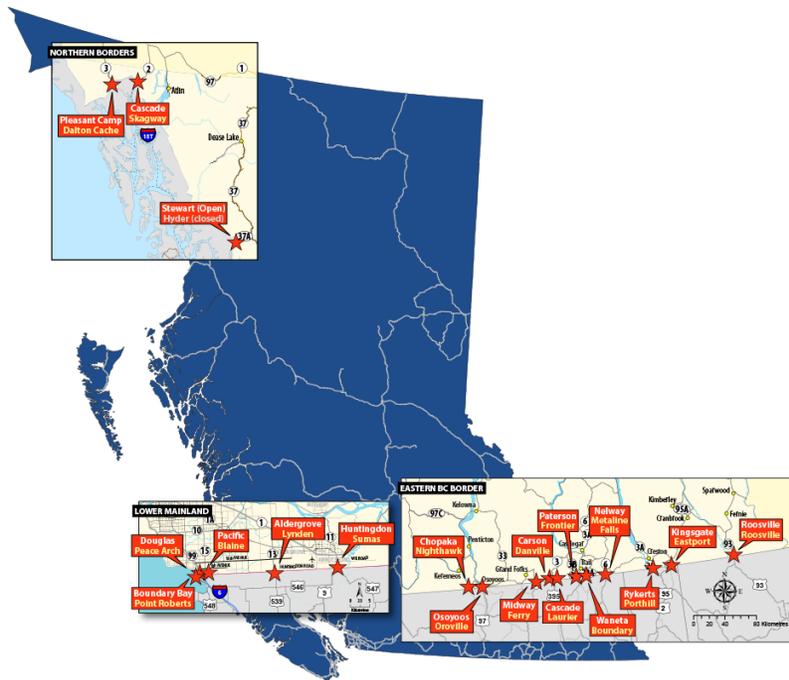


Figure 31. Border crossings between British Columbia, Canada and Washington, USA. Sourced from Government of British Columbia (n.d.)



Figure 32. Major commercial border crossings between Ontario, Canada and Michigan, USA. Sourced from CBC News (2022)

The continuous improvement of border crossing times as a metric of logistical flow requires the making of land and labour as logistical at and through that geography. The following sections, then, describe how the Canadian settler-colonial State functions as a logistical-capitalist actor across territorial borders. These spaces mark the conditions of possibility for racialized labouring subjects' border crossing (Mezzadra and Neilson 2013). Asian subjects were historically written out of that movement and (South) Asian immigrants continue to be differentially included in the State's sovereign spaces owing to their 'riskiness': the apparent threats they posed to Canadian 'security' could interrupt (or at least, delay) commodity movement. More specifically, border crossings set up inter-subjective and a/social relations between truckers as labouring subjects and Border Security Officials (BSOs) who deploy their 'discretionary' authority and techno-legal regimes of risk assessment. These relational activities are precisely what produce wait times and *delay* in predicted freight mobility. This making-logistical of the border also relies on excluding Indigenous socio-spatialities that preceded and crossed the border from coming to matter at (or distending) the colonial-territorial border. Geofencing apparatuses, then, are deployed in the fluid space of borders (Konrad 2015) by State institutions in order to facilitate commodity circulation. In their reinscription of the logistical algorithm, these apparatuses exclude non-logistical socialities from counting.

Made through the logistical algorithm, the territorial relations that mark truckers in their movement across borders (of States and geofences) attempt to write *out* delay from the socio-spatial text of the PoE. Geofencing apparatuses are used to mark the borders of such attempts: the spatiotemporal limits for the minimization, if not elimination, of delay. Simultaneously, however, geofencing relies on the socio-spatial making of these borders, borders that maintain certain productive factors of delay — especially security — while excluding (classed, racialized) social lives from mattering in that production. The connections-as-relations that read the border space of PoEs as logistical, then, reinscribe the exclusions that made such a reading possible in the first place.

4.1. Geofencing and the Spatialized Calculation of Time

Geofencing apparatuses are situated within traveler information systems that record, help calculate, and disseminate wait times to cross-border travelers (Paselk and Mannering 1994). This information is made available through various websites and apps, including those such as Canada's Border Wait Time Interactive Tracker (iTrack-Border) that are maintained by State institutions.

Geofencing, through the segmentation of the space around a PoE, i.e., at and around segments of the Canada-US border, makes possible the calculation of border crossing times by tracking the time of freight trucks' entry into and exit from the geofenced spaces. These segments map onto specific parts of the PoE complex, such as entry and exit lanes, primary and secondary driver inspection booths and vehicle inspection facilities, and customs inspection booths (see figure 30). Geofence boundaries may therefore be placed immediately before and after primary inspection facilities (McCord, Brooks and Banach 2016), surrounding international crossings and customs plazas (Gingerich, Maoh, and Anderson 2016a), as well as highways and urban roads on either side of the PoE itself (Anderson, Maoh, and Gingerich 2019) (see figures 31-34). The size of these geofences reflect the layout of the physical infrastructure at and around the PoE, including changes in that layout (Gingerich, Maoh, and Anderson 2016b), and hence the space that the planning interests who institute these geofences denote as the spaces of calculation.

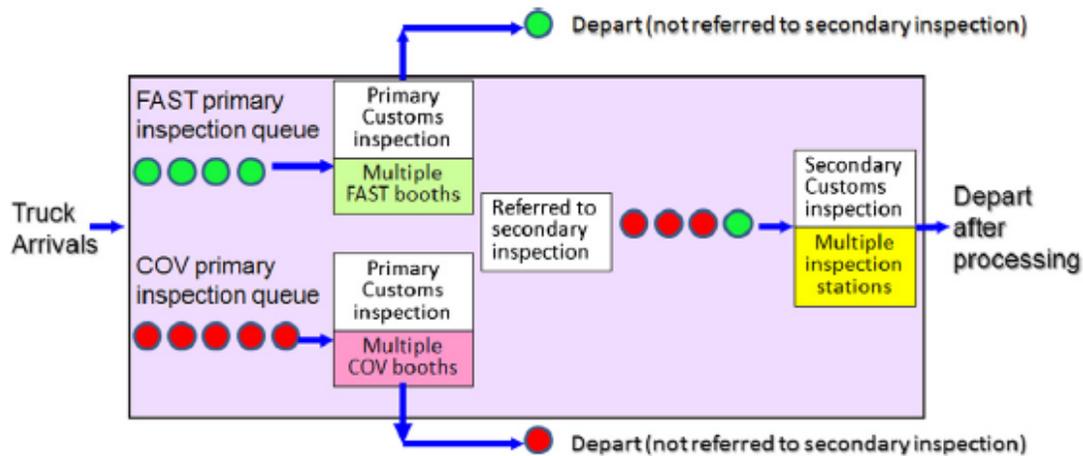


Fig. 2. Stylized depiction of the commercial truck processing system at the Detroit-Windsor (Ambassador Bridge) border crossing.

Figure 33. **Freight trucks' passage through a PoE. Reproduced from Houghton and Isotupa (2012)**

Trucks' onboard GPS or Onboard Data Unit (ODU) (McCord, Brooks, and Banach 2016) were installed on most freight trucks engaged in transborder travel today as part of the installation of electronic logging devices, or ELDs (McCord et al. 2017; Sabeen and Jones 2008). Geofence-based truck tracking, then, relies on "Position, Navigation, and Timing (PNT) systems" (McCord, Brooks, and Banach 2016). A connection made by a geofencing apparatus is also a record "that identifies the location of a subject at a given point in time" (Gingerich, Maoh, and Anderson 2016b) and therefore captures the movement of trucks (which is actually the capture of truckers' movements (Agre 1994)) across the border, in their entry and exit from the PoE. The dis/connection that marks the spatial bounds of the geofence also measures its temporal duration in the apparently momentary encounter of the truck with the geofence's borders.

The time taken to traverse a geofenced segment is calculated by taking the difference between the time the truck crosses the segment's 'entry' boundary and the 'exit' boundary. This allows for the apparatus, via the un/making of connections with trucks, to record various space-times at a PoE. These may include the queuing time leading into the PoE, inspection or service times spent in primary and secondary inspection and custom booths (McCord, Brooks, and Banach 2016) — which together are considered as the border crossing times (Gingerich, Maoh, and Anderson 2016a) — and surface street times that may track truck movement on city roads, with their variable 'surface street conditions', immediately downstream of a PoE. Border wait times are therefore calculated as the difference between the border crossing time, i.e., the total time spent at the PoE (which is

when a vehicle enters the PoE queue in one country and exits the PoE on the other side of the border, in the other country), and the inspection time (Paselk and Mannering 1994). PoEs are, in other words, the locus of the tension between trade and security that marks the socio-spatialities of cross-border logistics. The segments of the PoE, aligned with segmented geofences, mark the various State functions that condition cross-border logistics. It is trucks' passage through the PoE, and the reinscription of the logistical algorithm therein, that produces border crossing times.



Figure 34. Geofences at Ambassador Plaza. Reproduced from McCord, Brooks, and Banach (2016)



Figure 35. Geofences at Ambassador Plaza. Reproduced from McCord, Brooks, and Banach (2016)



Figure 36. Geofences at Blue Water Bridge. Reproduced from McCord, Brooks, and Banach (2016)

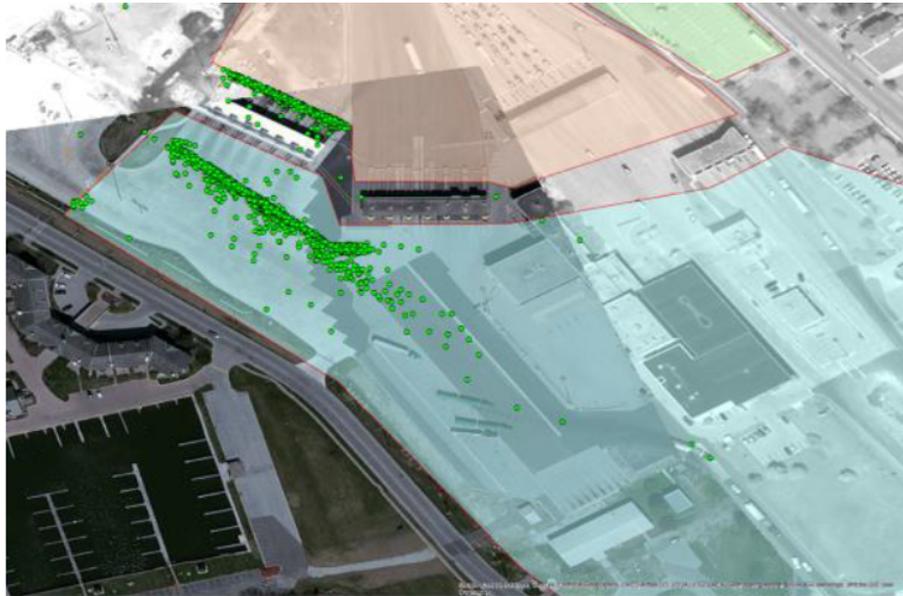


Figure 37. Geofences at Blue Water Bridge. Reproduced from McCord, Brooks, and Banach (2016)

It is the time added to trucks' overall travel or trip times¹⁹ by the border crossing crossing time, and/or the associated "variability" that increased crossing time introduces to trip times (Goodchild, Albrecht and Globerman 2007; McCord, Brooks, and Banach 2016) that are of consequence to the assembly-line spatiotemporality that JIT logistics introduces into the circulation of commodities. This is what is named as delay — the excess or additional time over the expected "minimum travel time" between a particular origin and destination point on either side of the border (Gingerich, Maoh, and Anderson 2016a), or, more specifically at the PoE, the "wait time *in addition* to the required processing time" (Goodchild, Albrecht, and Leung 2008). While a mean delay time is often presumed in the calculation of a truck's overall travel time, what is mainly of importance to the JIT logistical network is *unanticipated* or unexpected delay, when an individual truck or a sequence of trucks waits longer or has a longer than expected border crossing time (Goodchild, Albrecht and Globerman 2007). Such delay is directly related to longer wait times or inspection times, or additional time a trucker may spend in secondary inspection

¹⁹ Here truck travel or trip is not limited to cross-border travel as experienced at the PoE, but can begin and culminate at any point in either country of a binational trade or logistical network. See Boyer (1997) and Anderson, Maoh, and Gingerich (2019) for explanations on the forms of truck travel or trips

or immigration (Goodchild, Albrecht, and Leung 2008), and infrastructurally when the upstream truck traffic “approaches or exceeds the available capacity of the supporting infrastructure (i.e. highways, border facilities and/or the processing capacity of the crossing” (Sabeau and Jones 2008). The temporal outliers that produce logistically consequential delay are therefore interpolated in a productive relationship, where (crossing, wait, queuing, etc) time and truckers’ labour time are treated as mutually dependent but variably interchangeable functions in the production of delay (Goodchild, Albrecht and Gliberman 2007). It is the variances in excess of the labour time required to enact a border crossing that are named as delay.

Border crossing times are experienced by cross-border truckers who encounter the border crossing and its infrastructures. What is of interest, then, is how the geofencing-based measurement of border crossing times — and therefore the calculation of delay — reads the socio-spatial text of the PoE. This reading is consequential since it is precisely what conditions the re-inscription of those socio-spatial relations (Szeman 2004) as the connections of logistical media. What gets excluded from that text is excluded from the connections geofencing apparatuses make, so that socio-spatially complex cross-border freight movements can be described as a straightforward calculation of time in a spatially limited encounter. As seen in previous chapters, this is a defining characteristic of logistical (networking) media. Clearly, these connections materialize in the movement of trucks and the sociotechnical encounters they set up at the PoE. However, the exclusions already written into the socio-spatial text of the border are immanent to the making of delay and therefore the making of connective relations.

4.1.1. Delay and Wait Times

Wait times are the subjective obverse of delay — the temporal-agential view (Flaherty 2011) against the logistical-capitalist view, i.e., those institutional and capitalist interests for whom delay factors into geoeconomic considerations such as transnational supply chain efficiency. Delay and wait times, then, are mutually linked in a circular mode, where the larger the mean or unanticipated delay in border *crossings*, the longer the wait times for those *waiting to cross the border*, while the longer the wait time, the greater the possibility for *unanticipated* delays. They are both border effects — or more precisely, border *crossing* effects — whose calculation relies on a continuum of spatiotemporal

passage through the PoE, at and across the border, i.e., logistical flow. Geofencing, as a networking apparatus and an instrumentalization of logistical media, is grounded in its “ability to fix moments [a]s a condition of the analyzability of temporal processes” (Ernst 2016, 8). The hardwired temporalities *internal* to media technologies may be relatively immaterial to the geofencing apparatus’ production of delay as a calculable temporality, but the networking apparatus’ very entanglement with social encounters at and through the border means that it marks social time as networking time (Stine and Volmar 2021) — the infrastructurally made temporality, or tempor(e)ality (Ernst 2021), of the spaces of geofencing is the time of connection. Media time aligns with logistical time-space. Connections are maintained as long as trucks are crossing the border, i.e., moving through the geofenced space. Freight movement is therefore indexed as the duration of these connections (Terranova 2004) between the geofencing apparatus and the tracked trucks, also marking the phenomenon of delay as a durational experience — an experience that is *noticed* in waiting (Farman 2018, 14).

In logistical capitalism, wait times — which are acknowledged as unavoidable, even as their embodied and relational causes are excluded from social consideration (Harney and Moten 2021) — are acknowledged only to be interpolated in the productivity of circulation. Waiting is not *productive* for logistical capitalism, but it *is* a seamful time that surfaces what is excluded from productive time (Farman 2018, 187). Wait times are subjectively important in that they exemplify the differential and differentiating exercise of neoliberal governmentality over freight mobility, where individual truckers are expected to manage their choice of lanes, ensure minimal time is spent in inspection with adequate preparation of documentation, etc., *prior* to the border crossing. This is emblematic of the recalibration and synchronization of labouring bodies to productive time (Sharma 2017), where efficiency as an agential choice — a matter of “personal logistics” (Gregg 2018, 94-95) — is often mediatically tied to a structural temporality. Delay, while calculably inseparable from wait time, more accurately indexes the soft temporalities — “that are variable, exist beyond the machinic, and emerge in embodied practice” (Starosielski 2021, 187) — of PoE infrastructure that truckers may encounter. These infrastructures are instituted by state interests while accounting for the facilitation of trade and supply chains that are vital to capitalist interests. In this sense, the distribution of delay also maps the distribution of power (Schwartz 1975) — specifically, the power that has historically accrued to these institutions in their regulation of social relations. While waiting, then, is a mode of *enduring*

time — being in-between, in the socially and medially liminal (Ernst 2016, 213; Sutton, Vigneswaran, and Wels 2011) — it is not precisely the present; rather, it links up with delay “as a form of waiting [that] is linked...to the temporal drag of the past, as it infects and anticipates the future” (Baraitser 2017, 93-94). Therefore, the focus on delay registers the tempo-materialization of truckers’ encounters with structural interests at the border, while wait time, as a temporal region, is tied to the *experience* of chronopower (Auyero 2011) — it is a “medium that takes on meaning” (Farman 2018, 16) in the act of waiting.

Paying attention to waiting reveals its own temporality that may or may not be synchronized with other social or geoeconomic temporalities (Hage 2009); wait time is not simply the period between activities, but “represent[s] part of the connective tissue by which [social] interactions are *held together and ordered*” (Schwartz 1975, 193; emphases added). The experience of waiting is also conditioned by its ‘site’ (Auyero 2011); the spatial differentiation of where one waits is an important aspect of the ‘capacity’ of that space (such as upstream from the PoE), and therefore conditions the measure of delay (Schwartz 1975, 58).

Delay is not empty time, one of asociality and/or inactivity — precisely the opposite. It is only by treating the silences of delay as inactivity that delay can be conceptualized as arelational and ahistorical (Farman 2018). Delay is *first and foremost* relational and social. It emerges from the routine interactions of those with the power to distribute attention or other resources and those seeking those distributions. Such power is a historical effect. The impossibility of the total synchronization of such ‘activity’ is precisely what produces wait times and therefore delay. Furthermore, only the incorporation of delay can allow for the operation of temporally ordered processes (Schwartz 1975, 194) such as border crossing.

Furthermore, attempts to massage over delay suggests that time is always thick with the possibility of failure of capitalist imperatives. “Temporal irruptions” that mark when the infrastructure supporting sociotechnical relations has fallen ‘out of sync’ with the expected temporalities (Starosielski 2021, 186) of logistics are frequently immanent to that duration — delay quantifies them to ‘repair’ them in real time (Jackson 2017). Delay comes to matter when expectations of instant connection (Farman 2018), or attempts to bypass the grounded speed of infrastructures and our encounters with them, which is continuously

produced “through the consistency and regularity of network bodies, architectures, practices, and environments” (Starosielski 2021, 179), fail.

The connections of the geofencing apparatus are therefore qualitatively (a/e)ffected by their duration, and therefore also by the space through which they track freight movement (Terranova 2004). These tempo-spatializations are wrought with social relations, the mappings of power onto their (infrastructural) organization, coordination, calibration, and ordering, as well as the historical forces that are reproduced and distorted therein. However, “time-critical processes” can only be captured “through the development of measuring media that could capture and calculate them” (Ernst 2016, 9). The GPS-ping-as-connection reduces those socio-(technical-)spatial relations that produce duration to the momentary timestamp and gridded position of the un/making of the connection, its dis/connection as a calculative strategy. These connections exclude that which produces delay in the geofenced area. To conceptualize delay merely as a techno-mathematical product(ion) is to depoliticize it²⁰.

While the duration of delay *qua* time is itself recorded through the geofencing apparatus’ connections, then, the social relations and inflections that condition truck movement through the border’s spaces are excluded from the socio-spatial text read through those connections. That which is unknowable *through the connection* nevertheless conditions the making of the connection. *Delay makes connection necessary as well as possible.*

The production of delay, then, is contingent on the management of social relations in the geofenced spaces of the border. More specifically, it is tied up with the making-logistical of labouring subjects’ movement through those spaces, their lining-up in order to read their situation with respect to territorial space, and write their access to that space. Truckers are reinscribed as logistical labour to be read by the regimes of security they must navigate in crossing the (inter-)national border.

²⁰ Delay is also political in that it keeps the future open and waiting (Derrida 1997), but its naturalization and therefore interminable spatiotemporal extension can also foreclose ‘futural sense’ (Baraitser 2017, 96). Delay excludes the potential of mobilizing against historically determined temporalities by instituting a (neo)liberal mode of subjective stasis. One may (and I would argue, must) disagree with its political aims, but the 2022 “freedom convoys” of Canadian truckers that produced significant delays — sometimes to the point of breakdown — in supply chains and material sourcing through their blocking of border crossings (“Supporters”) demonstrate how delay is actively made and politically read.

4.2. Producing ‘Secure Trade’ Across the Border

The geofencing-based calculation of delay is made necessary by the temporal demands of integrated cross-border supply chains and just-in-time (JIT) logistics. Delay is *produced*, however, when the demands of logistical efficiency — which is oriented towards ease and speed of movement — come up against the decelerating (infra)structures of the PoE. In other words, delay is produced in the very instances of border crossing that such geoeconomic rhythms necessitate. The border crossing therefore sets up a dialectical encounter between logistical circulation and sovereign security, especially in the post-9/11 era. While the connections the geofencing apparatus makes follows the border crossing itself, and therefore can only capture the movement of the truck (Agre 1994), these a/social relations make cross-border logistics and the connections they generate possible.

Bilateral agreements between the US and Canada such as the Beyond the Border Action Plan and Smart Border Action Plan make explicit the dual aim of achieving enhanced (inter-)national security and accelerated “legitimate flow of people, goods, and services” (Public Safety Canada and Department of Homeland Security 2011, i) through “perimeter” and “risk management” approaches to border security. Furthermore, geoeconomically influential trade agreements such as NAFTA decisively tilted the balance from intranational east-west trade in Canada to cross-border freight movement by truck (Barzyk 1996). 56% of the trade through the shared Canada-US land border is moved by trucks. Such integration therefore sought to simplify the movement of *commodities*. PoEs provide the dis/enabling infrastructure for commodity-carrying trucks to cross the border.

PoEs are a complex of roads, customs and inspection booths, and vehicle inspection facilities. The road lanes that cross PoEs are not straightforward spaces of entry and exit; they are also differentiated by who is able to use them. Some of these PoE lanes are allocated to use by participants in various ‘trusted traveller’ programs established through cooperation between Canada and the US. These programs are part of the Western Hemisphere Travel Initiative (WHTI) established after 9/11, which established stringent conditions for cross-border travel as part of the expanded security regime (Konrad 2014, Nicol 2012). The FAST, or Free And Secure Trade program is one such program specifically designed for commercial freight traffic, where the loosely defined parameter of ‘efficiency’ is satisfied through cargo preclearance and pre-approval for “low-risk” truck

drivers, carriers, and commodity importers. FAST is designed precisely to reduce — or at least make more consistent and predictable — delays in trucks' border crossings. It also subsumes future crises, by guaranteeing cross-border movement of commodities even if the security threat were to be raised to the highest level (Bradbury 2010). The post-9/11 attention to border infrastructure that could meet the additional security demands at the busiest border crossings in Ontario and in the Pacific Northwest was aimed to ensure speedy movement of the increased truck and vehicular traffic, or more accurately, reconfigure the border as a series of “multispeed” lines with differential forms of surveillance, security, and access (Konrad and Nichol 2004; Muller 2010). PoEs are hence often described not just as physical or geographical spaces, but in terms of their commodity and trade ‘profiles’, which can be used to predict the volume and frequency of trucks' border crossings (Galloway, Jessup, and Casavant 2007). In other words, the security-based ‘thickening’ of the border proxies, among other things, longer wait times, and hence increased delays (Beyond Preclearance Coalition 2018) which FAST seeks to offset. The alignment of PoE lanes where cross-border travelers queue up with the borders of geofences indicates precisely how these writings of labouring subjects as ‘trusted’ is consequential to the making of cross-border movement as logistical flow.

Enrolment in FAST, for example, is explicitly meant to move border management away from the geographical space of the border itself, and also demonstrates the stakes of sovereignty for the two countries (despite the program ostensibly being multilateral) (Public Safety Canada and Department of Homeland Security 2011). The program thereby sets up a matrix of technolegal relations between labour and capitalist interests, where the facilitation of ‘free’ trade depends on the entire chain of production and circulation being preemptively exposed to risk-based surveillance and security logics delineated by the sovereign neoliberal state and enacted by the CBSA and CBP at the border (Lalonde 2021). The determination of freight mobility is conditioned primarily by the security regime instituted by the WHTI, which attempts to resolve the tension between free trade and security by affirming the ‘safety’, i.e., low risk accorded to citizenship where “the citizen is ‘becoming digital’ and thus ‘knowable’ to the state and non-state authorities allied with the state” through rubrics of risk maintained through databases populated by programs such as FAST (Muller 2010). This is the historical shift in the approach to border security post 9/11— also described as border control as in the Deleuzian vein, where the dividualization of truck drivers makes commodities the primary mobile subject (Walters 2006) — involving

the expansion of risk profiling and the addition of new layers of governmentality to existing issues of international and transportation security, situated at and through the border (Bell 2006). In sum, the streamlining of commodity circulation and supply chain “connectivity” aligns the employment of FAST, the implementation of a border wait time measurement system, the facilitation of “secure passage”, and expedition of document and cargo processing (Public Safety Canada and Department of Homeland Security 2011) with the (logistical-)capitalist imperatives of free-trade regulatory regimes.

The volume of relatively cheap Canada-US freight movement has hence also channeled the cross-border economic geography of the two countries into regional gateways and corridors. These regional ‘trade corridors’ are “strategies developed by [logistical-capitalist actors] to attract to particular regions some of the increased flow of materials generated by deepening North American economic integration” (Blank 2006), especially towards deepening the regional specializations of supply chains (Tsing 2009) and facilitation of transborder logistics.

4.2.1. PoEs and Regional Logistical Geographies

Gateways such as the Cascade Gateway Region in the Pacific Northwest, where the Blaine-Douglas PoE is located, and the Great Lakes region, in which the Detroit-Windsor borderlands and the (privately owned) Ambassador Bridge and the (publicly owned) Blue Water Bridge and Peace Crossing PoEs are situated, is especially important for the cross-border integration of industrial supply chains for automotive production, which have grown to be especially dependent on JIT logistical planning (Andrea and Smith 2002; Border Policy Research Institute, Western Washington University, et. al 2021). These automotive supply chains follow a long history of transborder movement of labour, capital, and goods in the region. These historical trends accelerated throughout the 20th century, especially as CUSFTA and other neoliberal policies came into force in the 1980s, creating economies of scale where intermediate goods — semi-finished products and vehicle components that move between production sites — frequently criss-crossed the border. This freight movement is primarily carried out by truck, and the concordant traffic is concentrated at a few major PoEs (Anderson, Maoh, and Gingerich 2019). These border regions are therefore made as regional logistical geographies in their facilitation of truck-driven transnational chains of production and distribution, or circulation.

Consequently, the management of trade and security can be concentrated in specific border crossings rather than be dispersed lengthwise along the border. In other words, these cultural-economic niches of logistical activity populate the soft infrastructures for tracking freight movement along a manageably small number of corridors. The harmonized transborder conditions that are therefore read by logistical media — such as geofencing — produce the conditions that require the measurement and calculation of delay — delay that materializes in the encounter owing to the structural preconditions of (national) security. The measurement of delay would not be required without the capitalist imperative to organize production and circulation along strict temporal rhythms and segmentations. Trade and security generate the flux of constitutive exclusions for transborder freight movement.

4.2.2. The Securitization of Border Crossing

The dialectical tension between trade and security is therefore structured by geoeconomic regimes that come to matter for subjects of logistical capitalism through digital and legal technologies — technologies that recognize the heterogeneity of actual social relations only to exclude those considered to be risks to relatively unimpeded commodity circulation from crossing the border, and therefore also exclude their social registers from the considerations of logistical media. The Canada-US border has been framed in post-9/11 discourse as “the skin of the body politic” that must be protected against external, Otherized threats, and also the lifeline to the transnational economy that must be open (Salter and Mutlu 2012). This dialectic of the border was managed through “technological improvements, gateway acceleration, crossing-point staff enhancement and other enabling measures” especially at high-volume border crossings that were vital to the security- and risk-based regulation of trade and immigration through monitoring for cross-border security (Konrad and Nichol 2004). These are not incidental, but functional ‘costs’ *for* the facilitation of trade, for continued commodity circulation.

Border security measures therefore attempt to solve the sovereign problem of national insecurity, “while maintaining a normalcy that allows for economic interactions to flourish” (Salter and Mutlu 2012). This security apparatus is therefore inseparable from the logistical apparatus, reflected in how “security primacy” and its intensification of security measures

at the Canada-US border produces a hierarchy of border crossing points that are sharply defined and differentiated according to the availability of socio-spatial infrastructures such as FAST lanes and staffing of inspection booths — a “spatial ordering” or reconfiguration that discontinuously extends “security spaces” through gateways, corridors, and other geographies of trade (Konrad 2014). The demands of security paradoxically also increases the need for cross-border policy alignment, shared standards, and information sharing (Davis and Friske 2013), thereby privileging border crossing points where local-regional cooperation can deterritorialize borders away from the PoE itself (Muller 2010) and dampen the impact of security measures on the actual duration of border crossing. The politics of security measures themselves are therefore ways to protect as well as develop spatially specific economic advantages, and therefore preserve geoeconomic privileges against unimpeded cross-border trade (Rosière and Jones 2012). Reconsidering the security and cross-border discourse post-9/11, then, it is more accurate to name security as *barriers* only to certain flows of people and commodities; borders are differentially inclusive.

The space of the border is therefore conditioned by the socio-spatial histories, infrastructures, and technologies that are embodied and materialized at the border crossing. The trusted-traveler programs, border security and risk management technologies, and the demands of free trade build in potential exclusions from cross-border passage. At the same time the cumulative effect of these temporalities produces larger geoeconomic effects, as the subjects of logistical capitalism are excluded from mattering *as subjects* in and through the operations of supply chains and ‘secure trade.’ It is therefore in the seemingly “open space of agency” (Barad 2007, 179) of these exclusions that we can read the historical, social, and material conditions that actually produce delay.

The measurement of border crossing times and the subsequent calculation of delay, in other words, relies precisely on the making of borders as open(able) to logistical access, on reading that socio-spatial text into which exclusions have been written in through the logistical algorithm. The measurement of delay, conversely, requires geofencing apparatuses that reinscribe the logistical algorithm and its writing of the border as differentially inclusive. The setting up of connections-as-relations between tracked freight and their spatiotemporal passage between countries relies on producing spaces where

that passage can be tracked, where it is useful for logistical capitalism to mark and manage the temporal irruptions that may swerve JIT logistics away from the assembly line. Geofencing apparatuses, in measuring the duration of border crossing as a temporal unit, rely on the making of PoEs as a transborder space, one that is already marked by exclusionary histories of settler-colonial and racialized territoriality.

4.3. Making the Border, Made by the Border: Racialization and Settler-Colonialism in Canadian Border Security

The borders of geofences at PoEs and of countries are not necessarily congruent, but the latter makes the space for the former. Geofences may extend on either side of territorial borders to cover the PoE infrastructure that matters in the measurement of border crossing times. In other words, in producing the PoE as a space for commodity-carrying trucks to cross borders, States function as logistical-capitalist actors whose borders can be stretched so that commodity movement can be lined up and shaped into logistical flow, where delay is both produced and managed. While delay is itself marked as a spatiotemporal metric, the making of that metric — the geofencing apparatus' reading of the PoE's socio-spatial text as written by the logistical algorithm — excludes non-logistical socio-spatialities from being written in. As such, the differential inclusion of labouring subjects who move commodities across borders is written into the socio-spatial text of the PoE. The PoE is written through the logistical algorithm by the State in accordance with conditions of access to, and across, the territorial border.

4.3.1. Supply Chains and Transportation Infrastructure Across the Border

The building of railway infrastructure was a key colonial project for Canada through the 19th century, leading into the early 20th century (Cowen 2020). Cross-border circulatory spaces — gateways and corridors such as Detroit-Windsor or Buffalo-Niagara) — created in part by cross-border rail connections 'thinned' the border socially and economically, if not geopolitically, and enabled the integration of supply chains within the cross-border region. These infrastructures laid the foundation for transborder trucking with the decline of railway lines (Widdis 2019). The growth of automobile manufacturing in the 20th century, supported by capital flows from US automakers such as Ford, GM, and Chrysler who established manufacturing units on both sides of the border, cemented cross-border

supply chains, as intermediate as well as finished goods moved back and forth in high volumes and frequency (Anderson, Maoh, and Gingerich 2019). From the view of capital, then, the border was a site for the facilitation of free trade, and labour was organized around that ideological assumption.

The Canadian-US borderlands are, however, a racial-capitalist formation relationally produced by colonial settler states. While borderlands such as parts of the Pacific Northwest and the Great Lakes region are key to transborder trade, industrialization, and supply chains, they have also historically been notable sites of border securitization and colonial remaking of territory. As such, the border is not a uniform line of demarcation but leads to the formation of socially and geoeconomically distinct regions, more accurately described as transborder gateways and corridors marked by specific histories and patterns of the movement of people, goods, and capital (Widdis 2010) that “placed Canada at the center of the international circuits of population and labor” (Ramirez 2018, xiii). These historical patterns of mobility and migration — supported by infrastructural developments such as in transportation — concretized in the mid-late 19th and early 20th centuries, with repercussions in the present day. The making of border security and its built in racial-colonial exclusions therefore also continue to shape present formations of cross-border movement of labour and commodities.

4.3.2. Differential Inclusion in the Making of Canadian Borders

In the early 19th century, the PNW became interlinked with eastern Asian countries — especially China, and later Japan — and their trade networks through the fur trade, while growing increasingly reliant on the Asian migrant labour force in a number of industries (Chang 2012), including the construction of railways through the Canadian Pacific Railway Company (CPR) (Lee 2002). In the early 20th century, Indian migrants moved traveled across the Pacific British Columbian borders to seek employment within Canada and to circumvent discriminatory immigration policies and practices at U.S. mainland ports, as well as to organize radical diasporic anti-colonial movements (Sohi 2011). At the same time, Indigenous interactions with European settlers — and with Asian immigrants — were marked by colonial territoriality, in that the settlers frequently attempted to build national borders through and against pre-existing Indigenous territorial boundaries (Hoy 2021). The regional economy until the late 19th century also relied in large part on transnational

Indigenous labour — for example, large populations of First Nations from British Columbia migrated seasonally to Washington — allowing Indigenous peoples to assert their cross-border mobility through both settler states (Hoy 2014). Through the 19th century, Indigenous labour, as well as non-logistical Indigenous relations to land that were excluded from mattering in colonial State’s territorial imaginations, underwrote the creation of the border. However, as a colonial construct, Canada (and the United States) excluded Indigenous people from the treaty negotiations that determined the path the border took²¹ (Hoy 2021).

These dynamics of the border, which spatially situated and delimited labour, territoriality, and race, came with the colonial expansion in the PNW and as the number of white European immigrants into Canada steadily grew through the second half of the 19th century. The PNW segment of the Canadian-US border, primarily British Columbia in Canada and Washington in the US, where the present-day Blaine/Douglas Pacific Highway border crossing is situated, became a site for the exclusions of Asian migrant labour — Chinese, Japanese, and Indians — and inter-national divisions of Indigenous people. This period witnessed significant anti-Asian violence as white workers and labor leaders in Canada and US demanded the exclusion of Asian labour and increased border security (Chang 2012). In 1914, PNW politicians and immigration authorities used the specter of the “Hindu agitator” freely moving across the border to advocate for greater securitization of the Canada-US border against “Hindu laborers” — hardening the western U.S.-Canadian border as an antiradical strategy (Sohi 2011). The criminalization of Asian border crossers was further rationalized as a reasonable response to their taking advantage of established opium smuggling networks in the Vancouver–Puget Sound area (Lee 2002). The Canadian and American white settler states with “a mutual interest in policing the boundaries of race and nation” therefore collaborated transnationally and bureaucratically to criminalize the mobilities of racialized subjects through local law enforcement, customs houses, and immigration departments (Chang 2012, 158). These

²¹ Encoded through historical treaties such as the Jay Treaty of 1794, the border crossed Indigenous communities such as the Haudenosaunee or Iroquois Confederacy that previously had freedom of movement across these spaces (Simpson 2014). The imposition of the international border in 1796, along with Indigenous military losses drove many from the Northwest Confederacy to the Canadian side of the border, as the state promised recognition of Native economies such as trapping, hunting, and sugaring), producing Indigenous nations divided by settler-colonial borderfs (Valentine and McDougall 2004).

racial-capitalist historical patterns were also evident in the Great Lakes region that crosses Canada and the US. The Ambassador and Blue Water bridges and the Peace Crossing situated therein have been historically significant in the making of cross-border industrial supply chains. The Detroit-Windsor's proximity to industry and railroad lines meant that cross-border travelers were often a major component of the labour force in these newly industrializing regions in the early-mid 19th century. The (logistical-)capitalist drive for a steady supply of cheapened labour-power was hoisted onto Eastern and Southern European populations, who did not easily fit into whiteness, and were therefore in conflict with Anglo-Canadian workers' attempts to preserve some racial privilege. As such, these racialized workers were excluded from the mobility privileges of white workers at the Canada-US border, where "commuter cards" marked the first stage of the distinction and multiplication of racialized labour (Bavery 2020). Border security in the early 20th century was therefore intended to enable the rapid movement of commodities and white labour, while constraining the mobility of Asian and Indigenous labour.

4.3.3. The Historical Securitization of the Canadian Border

The deepened enforcement of border security included border patrols, immigrant detention and deportation, checkpoints, and intelligence gathering. In the early 20th century, the Canadian security programs that sought to expel Asian migrations also involved cultivating closer ties with the U.S. Immigration Service (Chang 2012). The policing of racialized labour mobilities was a founding politics of the Detroit-Windsor border, where armed immigration officials and border security officials, in collaboration with grassroots nativist groups, unions, and politicians, enacted security regimes at border crossings and surrounding areas. The Royal Canadian Mounted Police (RCMP), established in 1873, worked closely with the US Border Patrol in Detroit to investigate alleged criminal activity, including immigration violations and smuggling by non-Anglo-Canadian workers. These militarized border security officials associated southern and eastern European nationalities with foreignness and crime (Bavery 2020). The final decades of the 19th century also saw the cementing of Canada's North-West Mounted Police (NWMP) as a border security enforcement agency that doubled as a force of logistical capitalism, as the quasi-military, law-enforcement-based securitization of the border by the NWMP also facilitated the movement of commodities (McKenna 2006). Furthermore, information sharing on the movements of 'illegal' Asian migrants and

diasporic Indian radicals between the Seattle Immigration Service and Dominion authorities in British Columbia contributed to the emergence of Canada as a surveillance state that “collected information, distributed regulations, and imposed spatial order, which in turn established the border as an objective spatial reality that the nation-state had a “natural” right to delimit and control” (Chang 2012, 166). At the same time, Canadian authorities instituted orders and legislation that allowed ‘white’ (Anglo-)workers a degree of cross-border mobility that Chinese, Japanese, and South Asian labour, as well as immigrants from southern and eastern Europe (even as their social desirability and inclusion in the Anglo-Saxon nation was being questioned), were barred from.

Centrally constitutive of the racial-capitalist multiplication of labour was therefore the enforcement of border security against labour, and the complex patterns of responses various racialized labour groups had to such border securitization. “Hoboes,” for example — a term for the itinerant workers who moved across the Canadian and American Wests between 1870 and 1920, typically on railway lines — were a racially heterogeneous group that frequently worked in natural resource industries. While for these workers the border *meant* little, their material-symbolic presence — especially as IWW union members — reinforced the necessity of border security enforcement from the view of the states trying to secure their sovereignty (Pickett 2006). In other words, border policing tactics and strategies that were honed against Asian migrant labour were later turned against racially heterogeneous solidarity networks of labour radicals (Chang 2012).

The transnational movements of labouring subjects, then, has historically been conditioned by the regimes and infrastructures of Canada’s territorial borders. In particular, this movement has been determined by the logistical-capitalist correspondence between racially and colonially differentiated populations and the circulation of commodities — be they goods or labour-power. It is precisely to enable this movement, this logistical flow, that requires the border to be ‘secured’. Furthermore, with such passage being concentrated at particular points at the border that produce regional zones of instability (Szeman 2004), the writing of their socio-spatial text is extended beyond the border itself. Goods and (white) labour — that are written into logistical relations to space and *socius* — are marked by these histories, so that the social lives of racialized and Indigenous peoples are unwritable as logistical. As such, the socio-spatial text of the border is written

by, *and rewrites*, the logistical algorithm that conditions how the border is accessed by excluding non-logistical socio-spatialities.

Geofencing apparatuses that today read the spaces of the border across which commodities move — the PoE — therefore rely on this logistical writing of the socio-spatial text. Through historical regimes of border security, those who pass through the PoE, and can therefore be *connected to* by that apparatus, are assumed to have access to that space. Those who are excluded from that access — those who cannot cross the borders of countries, and therefore of geofences — do not figure in the connections of geofencing apparatuses. The prefiguration of the border's social space is premised on the differential inclusion of nonwhite subjects. This (exclusionary) writing of the logistical algorithm is reinscribed in the socialities that may pass through that space. While social norms and laws around cross-border movement have changed, these connections-as-relations still read the spaces of the border as *secured* from non-normative — which is to say, non-logistical — ways of being and moving.

4.4. Crossing the Border, Crossed by the Border²²: The Logistical Writing of Border Security and Logistical Labour Relations

The socio-spatially used labour-power of truckers who move through the border spaces of PoEs (McLean 2017) and the discretionary power of Canadian BSOs²³ who staff (alternatively, infrastructure) the PoE (Côté-Boucher 2020) relationally produce commodity movements as logistical flow. These relations constitutes and are constituted by the exclusions that make delay, and are therefore unread by the connections of geofencing apparatuses. Geofencing apparatuses read the movement of truck(er)s with

²² This title references the radical slogans that emphasize the transgression of racialized and Indigenous societies and bodies by the borders of settler states. See e.g. Cisneros (2014) and Simpson (2014)

²³ By focusing on *Canadian* border security, I aim to demonstrate how the Canadian state secures its sovereignty at its ports of entry while maintaining an asymmetric mutuality with the United States of America. This is not to say that the CBSA is interchangeable with the US' CBP in its enactment of trade and/or security regimes, but that the distinct history and relations it sets up with inbound travelers allow for an analytical specificity on the entanglements of the material-discursive with the social.

the presumption that they would successfully cross the border *since commodities must remain in circulation*. In other words, when delay is recorded through the geofencing apparatus, it reinscribes the logistical algorithm that (re)writes the border crossing as conducive to commodity movement. The use of *labour-power* that makes such movement possible remains written out of the logistical algorithm, and is therefore inconsequential to the relations rewritten through that algorithm, and (re)produced through the geofencing apparatus as connections.

The social differentiation of cross-border access — what Mezzadra and Neilson (2013) term differential inclusion — is spatially enacted at the PoEs on the Canadian border and on cross-border travelers, including truckers, while commodities are expected to pass unobstructed, if occasionally delayed. This border orders the movement of labour and commodities through the major PoEs by embodying the material-discursive regime of ‘secure trade’ (Konrad and Nichols 2004) in the relations between truckers and border security officers (BSOs). The work of border crossing, in other words, is not a straightforward performance of passing, but involves differentially a(nta)gonistic encounters between these agents of the seemingly oppositional ends of trade and security in border space.

4.4.1. Trucker-BSO Relations, or, the Making of a Border Crossing

Truckers and BSOs’ relational work dampens the timing of encounter in relation to the registers of their orientations to the other’s’ structural position in logistical capitalism, which can be conflictual even in their facilitation of commodity circulation — it is what might produce delay. These encounters are diffracted through technologies that read and rewrite the mobility of people and things as logistical, demanding border crossers produce themselves as data subjects (Vukov and Sheller 2013) while modulating the ‘discretionary’ authority of BSOs (Kalman 2015). The border space therefore becomes a durational space of discretion and decision whose concentration of security functions turns the crossing into a checkpoint (Muller 2016). The level of scrutiny that BSOs consider ‘reasonable’ is also heavily dependent on the trade/security profile of a PoE, so that suspicion and risk are often localized to certain niches of the supply chain (Tsing 2009) and therefore produce differential delays. High-volume border crossings are often subject to an “enforcement mentality, [where] any amount of suspicion is likely to be seen as healthy, prudent and

acceptable, if not reasonable” (Pratt 2010), while low-volume crossings may rely on familiarity with BSOs (and therefore more on their individual discretion) to be deemed low-risk (Andrea and Smith 2002; Kalman 2018). The facilitation of secure trade depends on security regimes producing certain cross-border truckers as accessible by the State and as having access to the State’s territory through BSOs’ discretionary reading of their ‘riskiness’.

BSOs (re)produce security regimes even as they facilitate logistical flow (Lalonde 2019). They are primarily concerned with the management of ‘risky’ individuals — including truckers — rather than of goods, but as agents of security they may detain otherwise frictionless movement of commodities across the border (since the latter’s movement is tied to the former, although the consequences of carrying risky goods still falls on the trucker). It is in this detainment, or capture (Agre 1994), that the duration of cross-border passage, which geofencing apparatuses read through their connections, is produced. This ‘discretion’ of BSOs is mediated through various digital and legal technologies in order to minimize its variability (Côté-Boucher 2016) (which may increase the variability of delay).

The increasing securitization of the border, especially of the ‘commercial’ sections of PoEs, through the 90s and past 9/11, was accompanied by the incorporation of the virtualization of customs assessment, e-declarations of cargo, and other database systems such as eManifest, Accelerated Commercial Release Operations Support System (ACROSS), immigration systems, query systems, intelligence and investigation systems, and trusted traveler enrolment and passage systems such as FAST. BSOs are “socialised through training and organisational governance technologies” (Lalonde 2019) that inform how they decide to, for example, allow a trucker quick passage through a PoE or direct them to a secondary inspection booth or detain them for further questioning²⁴. While they enact a form of securitization whose parameters are set by the state and its administrative and bureaucratic arms, BSOs still wield considerable amounts of *discretionary* power in their (re)production and (re)interpretation of what it means for a trucker to be low-risk and their cargo therefore secure. In their work at the border,

²⁴ Notably, then, the discretization and associated spatial differentiation of BSO work — the bordering — aligns with their discretionary power over low- and high-risk mobilities. These infrastructural borders of the PoE map onto geofences. The very writing of geofences as reading movement *through* the PoE presumes, then, that these borders come to matter only in their relation to the subjects who can or cannot cross them, that disconnection is always immanent to connection.

therefore, BSOs also have the power to decide what constitutes reasonable suspicion of a cross-border traveler (Pratt 2010). While the trade-security dialectic is therefore produced at a structural level, its discursive resolution as “secure trade” (Konrad and Nicol 2004) is hedged by the discretionary agency of BSOs.

‘Security moments’ occur (Lalonde 2019) when BSOs apply their discretionary power to intervene in or interrupt the passage of truckers across the border, i.e., through the PoE. These can be significant contributors to unexpected delay. The spatiotemporality *and* socio-spatiality of enacting security — which is ostensibly only a small fraction of the CBSA’s duties at the border, as, say, the collection of duties and taxes and other state revenue work is more regular — is particularly consequential to delay. The minimization of delay, then, relies on writing out subjects that may be especially consequential to these security regimes’ production of delay *before they ever make it to the border*. The guaranteed passage of commodities across the border relies on excluding certain subjects from writing themselves — and their labour-power — into the logistical algorithm. While delay may never be fully eliminable, it is differentially relational to logistical capitalism such that social difference makes a difference to in/secure trade.

4.4.2. Racialized Immigrants as Logistical Labour: the Possibilities of Border Crossing

Border crossing therefore becomes a question of subject position in the socio-spatial text of transnational logistical capitalism, opened up by the technologies and agents of logistical power that labouring subjects are accessed by at the border crossing. It is a moment of dialectical determination at the border between truckers’ situation as logistical labour and the discretion of the sovereign’s representative, the BSO (Muller 2011; Salter 2008). Delay, then, is a consequence of “a redesigned citizenship that is multi-speed: where access, convenience and/or hassle are the direct result of one’s own (consumer) choices” (Muller 2010), where the capitalist settler-state’s enactment of security is “technophilic, liberal and individualist, and self-policing [and predicated on] technical questions of verification, authentication, and signal-detection” (Salter and Mutlu 2012). This citizenship, as an ontologically ambiguous mechanism of social distinction and reproduction, is premised on the differential inclusion of migrants and the subordination of their labor (Bauder 2008, Mezzadra and Neilson 2013). The riskiness of a cross-border

trucker is often linked through race and nationality, or citizenship, which have an ambiguously coded relationship. Even if one is documented as 'belonging' to a nation, and therefore preemptively 'allowed' to cross that nation's border, the differentiated racial ontologies of immigrant/migrant communities situated within nation-states means such border crossers may still be open to suspicion. The ordering of trucker mobilities from the origin to destination and back of cross-border supply chains depends on their reliable movement across the border. This reliability is therefore affected and effected by the mobility of labouring subjects whose citizenship ascribes racial difference.

The tenuous link between race and nationality may be treated as categorically and politically distinct by the state, but BSOs, in their deployment of racialized risk knowledges at the border, enact the 'discretionary' conflation of criminality and security concerns (Pratt and Thompson 2008). While nationality or citizenship is relatively stable, place-bound and guaranteed against the stability of sovereign states through documentation such as passports (Bhandar 2008; Konrad and Nicol 2008), race is constantly reproduced through the discretionary technologies employed by BSOs. The 'objectivity' of risk assessment technologies that support this discretionary power often assumes the postraciality (Vukov 2016) of a subject materially and ontologically privileged as the border crosser (Bhandar 2008) — a privilege of whiteness (Helleiner 2012) — and a naturalization of the sovereign settler state against Indigenous nations (Miller 1996; Tonra 2006). The border crosser is therefore an unambiguously racial-capitalist subject formation.

The violent exclusions of nationality — and the racial making of criminality — that mark the temporalities of border crossing, and which is euphemized as delay, is founded on the exclusions of Indigenous people from territorial relations that cross the settler-colonial Canadian border. In other words, the socio-spatial text of 'secure' border crossing that makes logistical 'flow' possible is written through the racial and settler-colonial rewriting of non-logistical relations to land. While under historical treaty conditions, Indigenous people were allowed a degree of free passage through the Canada-US border, even this limited mobility has been significantly affected by settler states' enframing of 'national' security as overriding the territorial rights of Indigenous nations (Tonra 2006; Miller 2012). Under the WHTI, tribal ID cards — which marked Indigenous border crossers as non-normative — were insufficient in *guaranteeing* cross-border passage (Singleton 2008), and therefore potentially contributing to delays for normative (logistical) cross-border travelers.

Furthermore, the deployment of border security in Indigenous border spaces deepened direct settler violence (Tonra 2006). These securitized relationships of settler states to Indigeneity also, through historical legal regimes, named Indigenous persons as racialized minorities. The Canadian (and US) settler state reduced Indigenous sovereignty to criminality through a series of equivalences between smugglers and other ‘criminal’ cross-border movement and that of Indigenous border crossers (Simpson 2014, 138, 142). Such racialization was deepened by the refusal of many Indigenous border crossers to show documentation, as a refusal of settler state sovereignty — which was read by BSOs who saw themselves as law enforcement officials as emblematic of criminal behaviour, especially in the post-9/11 security regime (Kalman 2018). Crossing the border, then, relied on writing Indigenous lives into the security regimes that are materialized at PoEs — their making-logistical — to the exclusion of their historical non-logistical ways of being with that space.

The settler-colonial making of border crossers — and therefore as logistical labouring subjects — aligns with the development of the trucking industry in Canada, where the implementation of colonial automobility established “the white working class male body...as the normative trucker” (McLean 2017, 46). However, the racial-capitalist dynamics that marked the Canada-US border have also been historically evident in trucking. As early as the 1920s and 1930s, some Chinese, Japanese, and South Asian (primarily Punjabi) truckers were involved in long-haul cross-border operations. While some Black men worked in the industry, the passage through the US, where they would struggle to find sleeping or eating establishments that would allow them in, limited the opportunities for cross-border trucking. While white working class men came to be the majority of Canadian truckers, cementing associations between trucking and colonial whiteness, that very norm of cross-border passage burdened racialized truckers with being the objects of security regimes.

In the contemporary long-haul and cross-border trucking industries, these historical (re)writings of labour’s social relations and its ties to Canadian nation-building imperatives are reproduced through exploitative neoliberal labour ‘reforms’ as the racialization and ascription of (embodied) risk to migrant labour — especially South Asian drivers. This reinscription of neoliberal logistical capitalism — its algorithmic reparameterization of social lives through space — has led to increased demand for drivers “who are willing to

work longer routes, as well as [manage the] increased complexity in managing border crossings, and the differing transport regulations in the US and Canada” (Hanson 2021). In other words, “race and processes of racialization [are] increasingly articulated through mobility practices, through algorithmically tracked forms and routes of nonnormative movement” such as patterns of migration that may be deemed suspect target “racialized bodies on the move, as well as [enable] the biopolitical facilitation of the mobilities of racially privileged (white) subjects” (Vukov 2016). Security demands that race be foregrounded as a technology of difference (Bhandar 2008; Chun 2009), even if racist profiling is officially treated as unacceptable. Logistical media technologies such as geofencing apparatuses, then, read the socio-spatial text that has already been cleared of non-logistical socialities through the inscription of that space with security technologies.

The timing of differential trucker mobilities is therefore profoundly shaped by the politics of classed and racialized mobilities (McLean 2016a). In other words, the temporality of border crossing — waiting — is a temporality of the differential experience of that crossing (Bhandar 2008). Indigenous border crossers too, subject to detainment by BSOs owing to the differential registers of sovereignty that their documentation presents, experience wait times and produce delay in the act of crossing (Simpson 2014). Delay is frequently caused by driver documentation processing time, which may consequently flow into secondary yard inspection times for those trucks that the primary inspection booth BSOs deem require further inspection (Taylor, Robideaux, and Jackson, 2004). FAST rewrites the subjective confluence of trade and security too. Certain drivers in the trucking industry, who are frequently non-white and/or immigrants, may be considered high-risk and therefore unable to enroll in the FAST program, or may otherwise be subject to more intense scrutiny by BSOs — which means increased delay for trucks driven by racialized truckers²⁵. This embodied mattering of time in trucking is also evident in the Hours of Service (HoS) regulations of neoliberal logistical capitalism, which is used to govern the on- and off-duty scheduling of truckers, and the recording of labour time by electronic logging devices, or ELDs (McLean 2016b). HoS regulations work as a neoliberal marriage of legal and digital technologies — especially with the increasingly operator-mandated use

²⁵ This also points to the multiplication of racialized labour at the Canadian-US border. Racialized truckers undertake longer hours and dangerous work conditions for lower pay to compensate for the uncertainty their differential inclusion in (trans)national regimes seem to present, while carriers present the inability to hire cheap labour as a shortage of ‘qualified’ drivers (Bradbury 2010; McLean 2017).

of GPS technology within trucks — that responsabilize truckers (especially truckers with unstable claims to citizenship and racial privilege) for their self-management and self-improvement of border crossing temporalities.

Truckers may therefore be hired based on the smoothness of their cross-border passage (relational to the visibility of security logics (Amoore 2011)), reinforcing the normative image of the white trucker. However, trucking companies continue to hire racialized immigrant and guest workers even though they may be delayed at the border crossing. This indicates that operators are able to force these truckers to use their labour-power as border wait time, which is legally classified as on-duty time (McLean 2016b); in their moving of rent-bearing commodities (Arboleda and Purcell 2021), the lower cost of racialized truckers' labour-power offsets the costs of delay. Such exploitation of the classed and racialized dynamics of trucking mobilities, along with their management of labour, keeps logistical operations spatiotemporally functional and financially inexpensive. In turn, they seem to justify the racialized risk profiles that BSOs deploy as discretionary technologies at the border. Logistical-capitalist actors find ways around unexpected delay that rely on the making-logistical of labour. The racial-capitalist making of logistical labour reproduces the tensions between trade and security that are vital to the continued circulation of commodities, that reinscribes the logistical algorithm in and through the lives of those who are otherwise excluded from mattering in logistical capitalism.

4.4.3. Making Delay/Excluding Delay: Classed and Racialized Labour at the Border

From either end of the trade/security dialectic, therefore, delay is tied up with the socio-spatiality of trucker-BSO relations, while the minimization of delay is directed at the trucker. The historical racial exclusions of cross-border labour mobilities, as well as restrictions on labour mobilities in general, laid the foundations for the nationality- and race-linked risk profiling that constrain cross-border movement today. The 'discretion' of BSOs has been conditioned by a long history of border security being premised on anti-Asian, anti-Indigenous, anti-'foreign' differential inclusion and reproduced through raced and classed assumptions of criminality and national (in)security. The delay produced in the inspections of contemporary border crossings, then, is directly linked to normative notions of low-risk

mobility or secure trade that have been historically sedimented in certain mobile bodies²⁶, even as commodities have historically been assured uninterrupted circulation.

This *making-logistical* of the labouring subjects that cross borders, the classed and racialized production of this labour-power, produces the differential inclusion of socialities through and against technologies of security founded in Canadian settler-colonialism and racial capitalism. The exclusion of non-logistical socialities — such as through producing Indigenous persons' cross-border travel as non-normative, or dissolving racialized immigrants' ability to resist the exploitation of their labour — from the relations between truckers and BSOs is what makes the 'secure trade' of logistical capitalism possible.

It is precisely in this reading of border crossing as secure trade — in the reinscription of the logistical algorithm — that logistical-capitalist actors aim to minimize, if not eliminate, the possibility of delay. However, delay, in the frictive border crossing produced in the relations between truckers and BSOs, remains relevant for the entire duration of the border crossing, and therefore requires geofencing apparatuses that can measure the spatiotemporal production of border crossing times. As such, the connections of geofencing apparatuses (re)write a double exclusion: first, of the social histories that mark cross-border passage, and second, of the relational work that makes possible the discursive resolution of the trade-security dialectic. Delay itself is produced as an improvable metric, as the signifier for the 'smoothness' of logistical flow, by *not counting* the labour-power used in crossing the border. Geofencing apparatuses therefore read the movement of trucks through the PoE in the recording of their dis/connection, their entry into and exit from the geofenced segments of the border crossing, through connections-as-relations that cannot account for, cannot count, *exclude* what makes such a logistical-algorithmic reading possible.

4.5. Making the Border (Crossing) Logistical: Geofencing and the Management of Delay

The un/making of relations, or the dis/connections of geofencing apparatuses used to mark time and space on the Canada-US border, are imagined to bring logistical agencies

²⁶ I owe this formulation of embodied history to hannah holtzclaw (cf. Barad 2007)

together in the networking of tracking and tracing (Munster 2013), even as they pattern the very form of those agencies (Agre 1994) at and through the border. At a purely technical level, geofencing apparatuses at border crossings make possible the generation of connections that record position and moment; at a political level, these apparatuses fix points in space and time where the just-in-time logistics of commodity mobility *and* the neoliberalized subjective burden of passage across the border comes to matter to the sovereign settler State as logistical-capitalist actor. Geofencing apparatuses deployed at Canadian ports of entry make connections to record how people and things move. These connections segment a durational space attuned to the time of logistical capitalism and the spaces of colonial settler states, with variances from the normative space-time of such duration — delay — marked as aberrant, as something to be excluded from being reinscribed in the socio-spatial text of the border crossing, or PoE.

The signification of delay as a calculable mathematical quanta, however, is a means of depoliticizing delay. The temporal mattering of delay is a consequence of the movement of embodied workers — truckers — through the border crossing infrastructure, relational to agents of security regimes — BSOs. It is the consequence of the writing of border spaces as secure through the exclusion of non-logistical relations — those that cannot be shaped to the assembly line — to that space. It is the consequence of territorial space being marked as accessible to subjects written into technologies of security — of logistics — as normative. It is the result of the differential inclusion of classed and racialized labour across the Canadian border, and the colonial power to enforce border ‘security’ embedded in people, institutions, infrastructures, and technologies. It is the result of these social, technological, and spatial — these reinscriptive — modulations of non-logistical ways of being towards their making-logistical, towards being ordered and coordinated so that, in their final reading, they can be *excluded*. As such, the *spaces* of border crossing are interwoven with the *socialities* that are ordered towards the facilitation of commodity movement. Their socio-spatial texts of PoEs are, in other words, written through the logistical algorithm that is reinscribed through the connections of geofencing apparatuses, through the reading of space and socius made logistical. These relations and histories cannot be excluded from mattering, but neither can they be absorbed into technomathematical logistical media (Ernst 2016; Rossiter 2016). *Delay isn’t going anywhere*. So it is that the connections of geofencing apparatuses, those that describe the relations

between territorial border space and the labouring subjects that cross that space, are inscribed with the exclusions that make delay manageable.

Chapter 5. Conclusion

Geofencing apparatuses and the connections they produce are situated within the social, historical, and spatial — the *concrete* — conditions in which the production of exclusionary difference, or obversely differential inclusion, is immanent. Logistical capitalism, in its rewriting of land and labour across historical moments works through precisely this inscriptive power, parameterized to reproduce itself, to reinscribe itself socio-spatially. This rewriting seeks to remake and delimit — *improve* — land as property through set conditions of use and access, and order and configure labour-power — set labour to its self-improvement — to facilitate commodity circulation. These moves are intertwined, necessarily resting on logistical-capitalist actors being able to take possession of land as *terra nullius* and labour as empty of subjectivity. The very space for these social inscriptions — their making as socio-spatial text — is premised on racial-capitalist and settler-colonial differentiation of which subjects have the capacity for the continuous improvement, recursive and reinscriptive, of themselves and the space they inhabit, move through, and access. Logistical capitalism can only put to work land and labour that is made in the image of whiteness — the image of possession that writes sociality as linked up not with relations to other lives and spaces, but *with(in) itself*. The agencies and operations of logistical capitalism can therefore be described as *algorithmic*: parameterizing space and socius to put them to work, and *excluding*, or making unwritable the unshapeability of the unpossessed, the swerve and non-linearity of non-logistical socio-spatialities. The *logistical algorithm* stretches the assembly line outside spaces of production and into logistical geographies of circulation.

Geofencing apparatuses situated in logistical capitalism, then, are configured to coordinate and order the movement and relationality of labouring subjects in and through space — they are *logistical media* (Rossiter 2016). The networking — the spatiotemporal setting up of connections-as-relations — of logistical-capitalist actors and labour is always already marked by the logistical algorithm. What gets written into these connections is exclusionary of the non-logistical, of what could not be remade and rewritten as logistical.

Methodologically and conceptually, then, the reading of geofencing apparatus' connections is inseparable from the logistical algorithm's writing of the socio-spatial text, of logistical capitalism's making of land and labour. But how does one surface what is

unreadable in the text? The algorithms of geofencing and what work they purport to do hint at the *materiality* of their production *and* their effects. But it is only in resurfacing the socio-historical formation of the spaces in which geofencing apparatuses are deployed, and the actual relations of life and labour that suffuse these spaces, that the making-logistical of these networking apparatuses can be emphasized. As zones of instability (Szeman 2004) the classed, racialized and settler-colonial socio-spatialities of logistical capitalism condition the discourses that emerge from certain (logistical) geographies, *political* discourses which reveal what gets written into the logistical algorithm and what gets excluded, written out.

Reading the sites and uses of geofencing apparatuses examined here are therefore indicative of certain pivotal *positions* — the fixing of labour-in-motion put to work in (making) logistical geographies (Kannegieser 2013) — in transnational supply chains, and the metrics they materialize. Trucking, as one of the most politico-economically significant sectors of logistics — of commodity circulation — across the settler-colonial territorialization and racial-capitalist subjectification of North American States, is an exemplary object for logistical capitalism's attentions and the deployment of geofencing apparatus as logistical media. Be they to measure truck turn times at the Port of Vancouver, plan and track adherence to truck routes across Metro Vancouver, or to record border crossing times (and mark aberrant delay) across the Ports of Entry (PoEs) on the Canadian border, geofencing apparatuses read the specific form(ation)s of land as property and territory and trucking as classed and racialized logistical labour as space and *socius* in general, or as non-relational. These relations between labouring subjects, between labour and logistical-capitalist actors, and of life to land are cleaved by socio-spatial borders that come to matter in their crossing. What comes to matter in the connections of geofencing apparatuses, then, is how, in logistical capitalism's making of land and labour *in toto* (Harney and Moten 2021) through regimes of property and territory, land use policy, rent extraction, neoliberal deregulation of trucking, classing and racialization of truckers, national security, and 'free trade', this palimpsest, scrubbed of social liveliness and ways of being with land, of non-logistical relations, sets the conditions of possibility for the connective socio-spatial relations that are read and rewritten by the apparatuses *through their exclusions*.

Geofencing apparatuses are set up by logistical-capitalist actors interested in measuring and managing the movement of labour. These apparatuses rewrite the latter's spatiotemporality and social relations as *metrics* such as of productivity, efficiency, or other quanta that are indexed to themselves. In the moment of making connections, geofencing apparatuses read the movement of mobile *objects* through *space* and write that object's crossing of the geofence as its *position*, as momentarily recorded spatiotemporal coordinates. This is a reading that treats labouring subjects as objects (Agre 1994) always already in motion in an abstract space free of the subjective social relations that mark land. This is a rewriting of *borders*, in accordance with the logistical algorithm, as a virtual layer that stretches and rewrites historically formed borders (Mezzandra and Neilson 2013). Geofencing is inscribed with the logistical algorithm in its reading of space and *socius*, and reinscribes the logistical algorithm in the simultaneous writing of spatiotemporal position. Its connections set up spatially un/grounded relations between logistical-capitalist actors and labouring subjects that are shorn of non-logistical socio-spatialities that might interrupt, even make impossible, the metricization of those relations' actual form. Something important is missing from these connections.

5.1. The Exclusions of (Making) Connections

To consider the production of connections, their networking, then, requires paying attention to that production's *a/sociality* and *a/historicity*. While networks are seemingly made in the ahistorical moment of *dis/connection*, "each 'moment' has its determinate conditions – each is subject to its own social laws: indeed, each is linked to the other in the circuit by quite distinct, determinate, forms – processes" (Hall 2003) that are historically formed. Simultaneously, networks are made through the spatialization of time, so that the ahistorical moment of connection is *situated* in the conditions of possibility for connections historically made *through space*. Connections, as technically produced and modulated, configure relations between actors cleaved in space and time (Feldman 2011) and emplotted in a socially rewritten palimpsest. Networking apparatuses, through their connections, read the socio-spatial text that matters for their instituting actors — texts written historically through inscriptive force.

This thesis has sought to answer an ostensibly simple question: how do the (re)inscriptions of networking apparatuses make connection possible? In the technical sense, the answer

seems obvious. Network infrastructures are seemingly omnipresent, almost backgrounded (Thrift 2004a), linked up through connections — though always carrying the possibility of failure, owing to noise, physical interference or technical glitches — between server and client, sender and receiver, subject/object and subject/object. However, as the critical literature has taught us, the technical is always the *sociotechnical*. Connections made through *networking* apparatuses (Munster 2013) comprise *social relations* stretched across space and time imag(in)ed to be held together, to simply *be* linear (Chun 2016; Terranova 2004). Furthermore, what gets left out of the connection — the blank *space* of the network (Chun 2021) — is as consequential to the making of the network as what makes (it into) the connection itself. It is in the social text that one can read what we cannot in the connection. It is through excluding the social-relational from mattering that makes connections, typically understood, *incomplete*. The question then turns not only on what makes the connection, but what *doesn't*.

This incompleteness of connection is a tricky thing, precisely because it is no(-)thing. What connection does to social lives cannot be understood simply in its presence as-is, its pretensions at ontology. Connection needs to be understood as holding together (some of) what is only through discarding what else might be. To put it differently, connections are relations that (re)configure, (re)inscribe certain ways of being-together in their algorithmic reading of the socius in general. This *material production* is always already social and historical (Hall 2003), and therefore the relations that connections (re)make are *already* marked by what does not get written into those relations. At the same time, connections *situate* these relations *in space*. The *position* of subjects is as much a historical production as it is a consequence of their relationally — even antagonistically — produced spatiotemporalities. Space and socius are tied up in a historical knot from which certain relations are written out. As such, the production of relations as connections, the recursive reading-writing of life through technical apparatuses (Chun 2016), necessarily writes out — *excludes* — particular socio-spatialities from counting in the making of connections-as-relations.

5.2. The Logistical Algorithm Elsewhere

The making-logistical of land and labour in and around the examined sites is a sprawling, ongoing process. It would not be possible to cover its every dimension within this thesis; the socio-spatial text this thesis reads, then, necessarily has its absences that do not, however, figure in the making of connections through geofencing apparatuses. These absences may, however, figure in and through the (re)inscription of certain other connections-as-relations²⁷. The concept developed herein of the *logistical algorithm*, in which these other writings of land and labour may figure and be reinscribed through other logistical media, offers ways to consider situations and socio-spatialities with their own conditions of possibility for producing connections.

For example, the ecologies that precede and are embedded in Canadian sovereign space are consequential to logistics as such, and their degradation is tied up with forms of social degradation such as environmental racism (Chua 2018; Danyluk 2021). In fact, environmental concerns are sometimes used as discursive justification for the importance of metricizing 'efficiency', such as being important to reducing the environmental impacts of idling trucks (Yen, Andrey, and Woudsma 2014). However, the ecological, while certainly socio-spatial, is *not determinate in the deployment of geofencing apparatuses*; it does not condition this specific mediatic reading of the logistical algorithm in the last instance. There is a break in the circuits of reinscription between the making-logistical of land through environmental destruction and its reading through these apparatuses; the land and labour that is measured and managed by these logistical media — their metricization towards continuous improvement — is not environmentally *produced* (even if environmentally consequential). This may mark how discursive and operational realities diverge. Where the former might mark an ideological — and therefore political — justification, there might be no space for them to materialize as the latter, no inscriptive device through which to be imprinted on certain socio-spatial texts of logistical capitalism.

²⁷ An earlier version of this thesis, for example, detailed the making-logistical of land use policy as tied up with housing development, public transit, and gentrification. Ultimately, however, that writing of the logistical algorithm does not parameterize geofencing apparatuses. This form of making land as property is therefore not *excluded* from the relations of networking apparatuses so much as it produces a *different* inscription

This is not to say that ecological degradation does not figure in other modes of the making-logistical of land and labour. As a founding infrastructure of settler-colonialism (Cowen 2020) *and* historically on the leading edge of logistical capitalism, the railways in Canada are inextricably tied up with, for example, the extinction of bison and the subsequent violence inflicted on Indigenous life (Feir, Gillezeau, and Jones 2022; Mamers 2020). Such “railroad colonialism” is logistical-capitalist in the fullest sense, and marks also the making of relations between classed and racialized subjects in the early days of settler colonialism, such as Indigenous peoples and Chinese workers who migrated to the North American imperial core to work on the construction of the railways (Karuka 2019). The declining importance of railways to regional logistical geographies in the mid-20th century, and the subsequent remaking of the transportation sector so that trucks became more important for JIT logistics means that these histories come to matter differently for the deployment of logistical media. However, how such writings of the socio-spatial text are parameterized in the logistical algorithm for reinscription in and through other logistical media is outside the scope of this thesis.

The theoretical and methodological usefulness of considering the logistical algorithm, then, is in mapping how the exclusions of logistical capitalism, written through its racial-capitalist and settler-colonial histories, is reinscribed through networking apparatuses. Life and labour is marked by this inscription, is ordered and coordinated according to the imperatives of logistical-capitalist actors, be they States, Crown corporations, or private business. However, this algorithmic networking of labour is not limited to logistical media typically understood, but can also be surfaced on other apparatuses that generate connections-as-relations, such as social media.

5.3. (A) Social Media as Logistical Media?

In the period this thesis was being written, Canadian truckers ostensibly frustrated with federal and provincial vaccine mandates as a precondition for cross-border travel participated in “freedom rallies” or “freedom convoys.” Many of these protest movements were situated within broader streams of far-right agitation (Ward 2022). However, it would be a mistake to dismiss these activities merely as the activities of a nefarious. Clearly, the discourses of freedom from the strictures of the State — specifically, of freedom as self-possession, a distinctly *logistical-capitalist* discourse (Harney and Moten 2021) — struck

a chord with the many truckers who did participate in these protests, including in the now-notorious occupation of parts of Ottawa. All of this is widely acknowledged. What has been less discussed is how the coherence of spatiotemporally dispersed truckers as a protesting multitude might have affected their tactics. This is arguably better understood when situated within the material conditions of logistical capitalism.

While it tempting to dismiss the Freedom Convoy truckers as a homogeneously far-right formation whose politics predetermined their participation in the protests, this is to understate the role that the circulation of mis- and dis-information on social media played in projecting vaccine mandates as an attack on truckers' individual rights (Alden 2022). Social media enrolls a networking apparatus that connects truckers dispersed in space and time, with little space or opportunity for sustaining social relations or intersubjective relations with other trucker. Truckers use social media precisely because their social relations are constrained by the imperatives of logistical capitalism, the particular spatiotemporalities of JIT logistics. The stretching of spaces of production and distribution — of land as property — and the making of logistical labour as amenable to traveling long distances and/or adhering to strict temporalities rewrites truckers' socialities through the logistical algorithm. These shapes of space and socius are reconfigured — some might say, compressed — through the connections of social media. Where truckers once communicated with each other over shortwave radio and other relatively intimate media (McLean 2017), their use of social media situated them in spaces shared with previously unknown actors, and therefore with discourses that may materialize differently in the lives of logistical labour²⁸. For example, the discursive construction of truckers having personal freedom on the 'open road' (Balay 2018), of white colonial automobility that excludes racialized truckers from participating in such freedoms (McLean 2017), has been historically formulated. But these discourses took on another hue when emplaced alongside and against the apparent unfreedoms of vaccine mandates that clamped down on 'their' free movement (which is anyway afforded only by the circulation of commodities). It is precisely the exclusion of non-logistical relations from truckers' social lives that makes them vulnerable to the ideological contents of mis- and dis-information on social media.

²⁸ I am deeply grateful to Amie McLean for her insight on the lives and complexities of truckers in British Columbia, and the conversation that sketched out how the pressures of logistical labour might have influenced truckers' susceptibility to mis- and dis-information. Her scholarship and thoughtful attention to the *concrete material conditions* of trucking's life and labour has been important to this thesis.

At the other end, these truckers' protest tactics were shaped by their embodied working knowledge (Braverman 1998) of logistical spatiotemporalities and therefore of the chokepoints (Ness and Alimahomed-Wilson 2018) written into the socio-spatial text of logistical geographies. This knowledge materialized in their blockade of the Ambassador Bridge (Alden 2022), a key node in road-based transnational supply chains across North America. Be they in the social, relational, and subjective (re)production of truckers as the Freedom Convoy, or their actions therein, the logistical algorithm lines up lives that could've been otherwise.

The exclusions of logistical capitalism, the non-logistical ways of being-together that get written out of our lives, are necessarily made through the socialities and histories we (don't) carry. Networking apparatuses such as of geofencing that seek to reproduce such relations, such *incomplete connections*, leave behind the liveliness that exceeds logistics; they can only rewrite what they deem readable. Social media too is logistical — the loss of sharing (life in its fullness) that it institutes is, in this author's opinion, exactly why it's fucked. As Stuart Hall (2003) put it, "the capitalist mode of production depends on social connection assuming the 'ideological' form of an individual dis-connection." To put it differently, by reconsidering the incompleteness of our sociotechnically produced connections not as the result of discard, but as an opportunity to write our socio-spatial texts differently, as *non-logistical*, we might still find value in the unwritten, the unwritable, the non-commodifiable.

References

- Agre, Philip E. 1994. "Surveillance and capture: Two models of privacy." *The information society* 10, no. 2: 101-127.
- Airas, Annika, and Peter V. Hall. 2019. "Reinventing Urban Waterfronts Beyond the Urban Core." *Canadian Journal of Urban Research* 28, no. 1: 1-18.
- Alden, Edward. 2022. "Canada's Trucker Protests: What to Know about the 'Freedom Convoy'." Council on Foreign Relations. Council on Foreign Relations. <https://www.cfr.org/in-brief/canadas-trucker-protests-what-know-about-freedom-convoy>.
- Aljohani, Khalid, and Russell G. Thompson. 2016. "Impacts of logistics sprawl on the urban environment and logistics: Taxonomy and review of literature." *Journal of Transport Geography* 57: 255-263.
- Alimahomed-Wilson, Jake. 2019. "Unfree shipping: the racialisation of logistics labour." *Work Organisation, Labour & Globalisation* 13, no. 1: 96-113.
- Amoore, Louise. 2011. "Data Derivatives: On the Emergence of a Security Risk Calculus For Our Times." *Theory, Culture & Society* 28, no. 6: 24-43.
- Anderson, Kay J. 1988. "Cultural hegemony and the race-definition process in Chinatown, Vancouver: 1880–1980." *Environment and Planning D: Society and Space* 6, no. 2: 127-149.
- Anderson, William P., Hanna F. Maoh, and Kevin Gingerich. 2019. "Cross-Border freight movements in the Great Lakes and St. Lawrence Region, with insights from passive GPS data." *The Canadian Geographer/Le Géographe canadien* 63, no. 1: 69-83.
- Andrea, David J., and Brett C. Smith. 2002. *The Canada-US border: an automotive case study*. Center for Automotive Research, Altarum Institute.
- Antenucci, Iliia. 2019. "The Making of Urban Computing Environments." *Synoptique*: 54.
- Arboleda, Martín, and Thomas F. Purcell. 2021. "The turbulent circulation of rent: towards a political economy of property and ownership in supply chain capitalism." *Antipode* 53, no. 6: 1599-1618.

- Arnold, Jonathan Mark. 2014. "Caught in Traffic: Road Congestion in Metro Vancouver and its Impact on Commercial Goods Movement." MPP Project Essay, Simon Fraser University.
- Ash, James, Rob Kitchin, and Agnieszka Leszczynski. 2018. "Digital turn, digital geographies?." *Progress in Human Geography* 42, no. 1: 25-43.
- Auyero, Javier. 2011. "Patients of the state: An ethnographic account of poor people's waiting." *Latin American Research Review* : 5-29.
- Balay, Anne. 2018. *Semi queer: Inside the world of gay, trans, and Black truck drivers*. UNC Press Books.
- Baldwin, Gord. 2005. "Too Many Trucks On The Road?". Ottawa: Transportation Division, Statistics Canada.
- Barad, Karen. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press.
- Baraitser, Lisa. 2017. *Enduring Time*. Bloomsbury Publishing.
- Barker, Joanne. 2018. "Territory as analytic: The dispossession of Lenapehoking and the subprime crisis." *Social Text* 36, no. 2: 19-39.
- Barman, Jean. 2007a. *The west beyond the west: A history of British Columbia*. University of Toronto Press.
- Barman, Jean. 2007b. "Erasing indigenous indigeneity in Vancouver." *BC Studies* 155: 3-30.
- Barnes, Trevor, and Thomas Hutton. 2009. "Situating the new economy: Contingencies of regeneration and dislocation in Vancouver's inner city." *Urban Studies* 46, no. 5-6: 1247-1269.
- Barron, F. Laurie. 1988. "The Indian pass system in the Canadian West, 1882-1935." In *Prairie Forum*, vol. 13, no. 1, pp. 25-42.
- Barzyk, Fred. 1996. "Trucking In A Borderless Market: A Profile Of The Canadian Trucking Industry, 1988 To 1994". In *Transport Gateways And Trade Corridors*, 24-41. Winnipeg: Canadian Transport Research Forum.

- Bate, Alison. 2005. "What The Truckers' Fight Is All About | The Tyee". *The Tyee*. <https://thetyee.ca/News/2005/07/30/TruckersFight/>.
- Bauder, Harald. 2003. "'Brain abuse', or the devaluation of immigrant labour in Canada." *Antipode* 35, no. 4: 699-717.
- Bauder, Harald. 2005. "Habitus, rules of the labour market and employment strategies of immigrants in Vancouver, Canada." *Social & Cultural Geography* 6, no. 1: 81-97.
- Bauder, Harald. 2008. "Citizenship as capital: The distinction of migrant labor." *Alternatives* 33, no. 3: 315-333.
- Bavery, Ashley Johnson. 2020. *Bootlegged Aliens : Immigration Politics on America's Northern Border*. University of Pennsylvania Press.
- Bell, Colleen. 2006. "Surveillance strategies and populations at risk: Biopolitical governance in Canada's national security policy." *Security Dialogue* 37, no. 2: 147-165.
- Beelen, Marjan, Hilde Meersman, Eddy Van de Voorde, Thierry Vanelslander, Britt Vergauwen, and Ann Verhetsel. 2008. "New concepts in city logistics and distribution: which are the promising best practices?." In *EUROPEAN TRANSPORT CONFERENCE 2008; PROCEEDINGS*.
- Bensman, David. 2008. "Globalization and the labor markets of the logistics industry." In *2008 Industry Studies Conference Paper*
- Bensman, David H. 2017. "Port Trucking as a Test Case of Precarious Work in the Grey Zone of Work and Employment." *Revue Interventions Économiques. Papers in Political Economy* 58.
- Bess, Irwin. 2000. *The Cost of Independence: Socio-economic profiles of independent truck drivers*. No. 53F0002-XIE. Statistics Canada. Transportation Division.
- Beverungen, Armin. 2021. "Remote Control: Algorithmic Management of Circulation at Amazon." In *Explorations in Digital Cultures*, edited by Marcus Burkhardt, Mary Shnayien, and Katja Grashöfer. Lüneburg: meson press. DOI: 10.14619/1716
- Beyond Preclearance Coalition. 2018. *Beyond Preclearance: The Next Generation Canada–U.S. Border*.

Bhandar, Brenna. 2018. *Colonial lives of property: Law, land, and racial regimes of ownership*. Duke University Press.

Bhandar, Davina. 2008. "Resistance, detainment, asylum: The onto-political limits of border crossing in North America." *War, citizenship, territory*: 281-302.

Blank, Stephen. 2006. "North American Trade Corridors: An Initial Exploration". Faculty Working Papers. Paper 50.
http://digitalcommons.pace.edu/lubinfaculty_workingpapers/50

Blomley, Nicholas K. 1997. "The properties of space: history, geography, and gentrification." *Urban Geography* 18, no. 4: 286-295.

Blomley, Nicholas. 2003. *Unsettling the city: Urban land and the politics of property*. Routledge.

Blomley, Nicholas, Natalia Perez, and Andy Yan. 2018. "Evictions in the private rental housing market of Metro Vancouver - preliminary findings". Retrieved from:
<https://www.sfu.ca/content/dam/sfu/people/blomley/documents/evictions%20report%202018.pdf>

Boje, David M., and Robert D. Winsor. 1993. "The resurrection of Taylorism: Total quality management's hidden agenda." *Journal of Organizational Change Management* 6, no. 4.

Bonacich, Edna, and Jake B. Wilson. 2008. *Getting the goods: Ports, labor, and the logistics revolution*. Cornell University Press.

Border Policy Research Institute and University of Buffalo Regional Institute. 2009. "Border Barometer". Border Policy Research Institute Publications. 99.
https://cedar.wvu.edu/bpri_publications/99

Border Policy Research Institute. 2009. "Issues with Efficacy of FAST at the Cascade Gateway". Border Policy Research Institute Publications. 34. https://cedar.wvu.edu/bpri_publications/34

Border Policy Research Institute, Western Washington University, et. al. 2021. "Border Barometer". Border Policy Research Institute Publications. 127.
https://cedar.wvu.edu/bpri_publications/127

- Boyer, Kenneth D. 1997. "American trucking, NAFTA, and the cost of distance." *The Annals of the American Academy of Political and Social Science* 553, no. 1: 55-65.
- Bradbury, Susan L. 2010. "An assessment of the free and secure trade (FAST) program along the Canada–US border." *Transport Policy* 17, no. 6: 367-380.
- Braverman, Harry. 1998. *Labor and monopoly capital: The degradation of work in the twentieth century*. NYU Press.
- Brunelle, Dorval, Claudia De Fuentes, Peter V. Hall, and Jean Michel Montsion. 2021. "Global value chains and regimes of urban governance: A comparison of four Canadian gateway cities." *Canadian Journal of Urban Research* 30, no. 1: 1-15.
- Burnett, Katherine. 2014. "Commodifying poverty: gentrification and consumption in Vancouver's Downtown Eastside." *Urban Geography* 35, no. 2: 157-176.
- Campling, Liam, and Alejandro Colás. 2018. "Capitalism and the sea: Sovereignty, territory and appropriation in the global ocean." *Environment and planning D: society and space* 36, no. 4: 776-794.
- CBC News. February 10, 2022. *CBC News*.
https://i.cbc.ca/1.6347158.1644528050!/fileImage/httpImage/image.jpg_gen/derivatives/original_1180/ambassador-blue-water-bridges-map.jpg.
- Chang, Kornel. 2012. *Pacific Connections: The Making of the US-Canadian Borderlands*. Univ of California Press.
- Charron, Nicole. 2003. "Freight Efficiency And Technology Initiative". In *Crossing Borders: Travel, Trade, Security And Communication (Traverser Les Frontières: Voyage, Commerce, Sécurité Et Communication)*, *Canadian Transportation Research Forum, Proceedings Of The 38Th Annual Conference*, 148-152. Saskatoon: Canadian Transportation Research Forum.
- Cho, Eunice Hyunhye, Anastasia Christman, Maurice Emsellem, Catherine K. Ruckelshaus, and Rebecca Smith. 2012. "Chain of greed: How Walmart's domestic outsourcing produces everyday low wages and poor working conditions for warehouse workers." *National Employment Law Project*.
- Cho, Jungwoo, and Yoonjin Yoon. 2018. "How to assess the capacity of urban airspace: A topological approach using keep-in and keep-out geofence." *Transportation Research Part C: Emerging Technologies* 92: 137-149.

- Chua, Charmaine Siu-Wei. 2018. "Containing the ship of state: Managing mobility in an age of logistics." PhD diss., University of Minnesota.
- Chun, Wendy Hui Kyong. 2009. "Introduction: Race and/as Technology; or, How to Do Things to Race." *Camera Obscura: Feminism, Culture, and Media Studies* 24, no. 1: 7-35.
- Chun, Wendy Hui Kyong. 2015. "Networks NOW: Belated too early." In *Postdigital Aesthetics*, pp. 289-315. Palgrave Macmillan, London.
- Chun, Wendy Hui Kyong. 2016. *Updating to Remain the Same: Habitual New Media*. Cambridge: MIT Press.
- Chun, Wendy Hui Kyong. 2021. *Discriminating data: Correlation, neighborhoods, and the new politics of recognition*. MIT Press.
- Cisneros, Josue David. 2014. *The border crossed us: Rhetorics of borders, citizenship, and Latina/o identity*. University of Alabama Press.
- City of Richmond. 2019. "Translink Regional Goods Movement Strategy". Richmond.
- Clement, Henry Sebastian. 2004. "Urban goods movement: providing priority for trucks along a major arterial." PhD diss., University of British Columbia.
- Cohen, Amy. 2019. "'Slavery hasn't ended, it has just become modernized': Border Imperialism and the Lived Realities of Migrant Farmworkers in British Columbia, Canada." *ACME: An International Journal for Critical Geographies* 18, no. 1: 130-148.
- Comtois, C., and B. Slack. 2010. "Measuring port performance: lessons from the waterfront." *Integrating Seaports and Trade Corridors, Ashgate, Aldershot*: 119-136.
- Conti, Robert F., and Malcolm Warner. 1993. "Taylorism, new technology and just-in-time systems in Japanese manufacturing." *New Technology, Work and Employment* 8, no. 1: 31-42.
- Cornwall, Ira Hugh Brooke. 1952 "A geographical study of the Port of Vancouver in relation to its coastal hinterland." PhD diss., University of British Columbia.
- Côté-Boucher, Karine. 2008. "The Diffuse Border: Intelligence-Sharing, Control and Confinement along Canada's Smart Border." *Surveillance & Society* 5, no. 2.

- Côté-Boucher, Karine. 2016. "The paradox of discretion: Customs and the changing occupational identity of Canadian border officers." *British journal of criminology* 56, no. 1: 49-67.
- Côté-Boucher, Karine. 2020. *Border frictions: gender, generation and technology on the frontline*. Routledge.
- Cowen, Deborah. 2010. "A geography of logistics: Market authority and the security of supply chains." *Annals of the Association of American Geographers* 100, no. 3: 600-620.
- Cowen, Deborah. 2014. *The deadly life of logistics: Mapping violence in global trade*. U of Minnesota Press.
- Cowen, Deborah. 2020. "Following the infrastructures of empire: Notes on cities, settler colonialism, and method." *Urban Geography* 41, no. 4: 469-486.
- Creese, Gillian Laura. 2011. *The new African diaspora in Vancouver: Migration, exclusion, and belonging*. University of Toronto Press.
- Culhane, Dara. 2003. "Their spirits live within us: Aboriginal women in Downtown Eastside Vancouver emerging into visibility." *American Indian Quarterly* 27, no. 3/4: 593-606.
- Dablanc, Laetitia, Scott Ogilvie, and Anne Goodchild. 2014. "Logistics sprawl: differential warehousing development patterns in Los Angeles, California, and Seattle, Washington." *Transportation Research Record* 2410, no. 1: 105-112.
- Danyluk, Martin. 2021. "Supply-Chain Urbanism: Constructing and Contesting the Logistics City." *Annals of the American Association of Geographers* 111, no. 7: 2149-2164.
- da Silva, Denise Ferreira. 2021. "Introduction." In *All Incomplete*. Minor Compositions
- Davies, Philip. 2006. "Off-dock storage of empty containers in the lower mainland of British Columbia: industry impacts and institutional issues." In *Proceedings of the National Urban Freight Conference*, pp. 1-10.
- Davies, Phil. 2014. "Economic Impact of a Port Trucking Strike ~ Shipping Matters Blog." *Wave Point Consulting*, March 16, 2014. <https://www.wavepointconsulting.ca/economic-impact-of-a-port-trucking-strike/>.

- Davis, Donna F., and Wesley Friske. 2013. "Defining the Soft Infrastructure of Border Crossings: A Case Study at the Canada–US Border." *American Review of Canadian Studies* 43.4: 477-493.
- De Lara, Juan. 2018. *Inland shift: Race, space, and capital in Southern California*. Univ of California Press.
- Delfanti, Alessandro. 2021. *The Warehouse*. London: Pluto Press.
- Delgado, James P. 2010. *Waterfront: The Illustrated Maritime History of Greater Vancouver*. Stanton Atkins & Dossil Pub.
- Easterling, Keller. 2014. *Extrastatecraft: The power of infrastructure space*. London: Verso Books.
- East Vancouver Port Lands Working Group. 2007. "East Vancouver Port Lands Area Plan."
- Ehmke, Jan Fabian, Stephan Meisel, Stefan Engelmann, and Dirk Christian Mattfeld. 2009. "Data chain management for planning in city logistics." *International Journal of Data Mining, Modelling and Management* 1, no. 4: 335-356.
- Ernst, Wolfgang. 2016. *Chronopoetics: The Temporal Being and Operativity of Technological Media*. Rowman & Littlefield.
- Ernst, Wolfgang. 2021. "Suspending the "Time Domain": Technological Tempor(e)alities of Media Infrastructures" *Media Infrastructures and the Politics of Digital Time: Essays on Hardwired Temporalities*. Edited by Axel Volmar and Kyle Stine, 89-103. Amsterdam University Press.
- Farman, Jason. 2018. *Delayed Response*. Yale University Press.
- Feir, Donn L., Rob Gillezeau, and Maggie EC Jones. 2022. *The slaughter of the bison and reversal of fortunes on the Great Plains*. No. w30368. National Bureau of Economic Research.
- Feldman, Gregory. 2011. "If ethnography is more than participant-observation, then relations are more than connections: The case for nonlocal ethnography in a world of apparatuses." *Anthropological theory* 11, no. 4: 375-395.
- Flaherty, Michael G. 2011. *The textures of time: Agency and temporal experience*. Temple University Press.

- Flaskou, Mania, Maxim A. Dulebenets, Mihalis M. Golias, Sabyasachee Mishra, and Robert M. Rock. 2015. "Analysis of freight corridors using GPS data on trucks." *Transportation Research Record* 2478, no. 1: 113-122.
- Fox, David. 2010. "Halting urban sprawl: Smart growth in Vancouver and Seattle." *BC Int'l & Comp. L. Rev.* 33: 43.
- Frank, Lawrence D., and Alexander Y. Bigazzi. 2019. "Transportation: Vancouver The City And Vancouver The Region". In *Planning On The Edge: Vancouver And The Challenges Of Reconciliation, Social Justice, And Sustainable Development*, 125-143. Vancouver: University of British Columbia Press.
- Fraser port: freightway to the Pacific, 1858–1985*, ed. Jacqueline Gresko and Richard Howard. 1986. Victoria: Sono Nis Press.
- Friedman, Jared, and Pietra Basilij. 2020. "Off-Dock Drayage Insights". Vancouver: BC Ministry of Transportation & Infrastructure.
- Galloway, Hamilton; Eric L Jessup.; and Ken Casavant. 2007. "Projecting Washington - British Columbia Truck Freight Border Crossings and Arterial Usage". *Border Policy Research Institute Publications*. 109. https://cedar.wvu.edu/bpri_publications/109
- Garzon, Sandro Rodriguez, and Bersant Deva. "Geofencing 2.0: taking location-based notifications to the next level." In *Proceedings of the 2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, pp. 921-932. 2014.
- Garzon, Sandro Rodriguez, Bersant Deva, Gabriel Pilz, and Stefan Medack. "Infrastructure-assisted geofencing: proactive location-based services with thin mobile clients and smart servers." In *2015 3rd IEEE International Conference on Mobile Cloud Computing, Services, and Engineering*, pp. 61-70. IEEE, 2015.
- Gillespie, Tarleton. 2016. "2. Algorithm." In *Digital keywords*, pp. 18-30. Princeton University Press.
- Gingerich, Kevin, Hanna Maoh, and William Anderson. 2015. "Choice of land use development type within commercial and industrial zoning." *Journal of Urban Planning and Development* 141, no. 2.

- Gingerich, Kevin, Hanna Maoh, and William Anderson. 2016a. "Big data analysis to measure delays of long-haul truck trips." *TAC 2016: Efficient Transportation-Managing the Demand-2016 Conference and Exhibition of the Transportation Association of Canada*.
- Gingerich, Kevin, Hanna Maoh, and William Anderson. 2016b. "Characterization of international origin–destination truck movements across two major US–Canadian border crossings." *Transportation Research Record* 2547.1: 1-10.
- Goodchild, Anne Victoria; Albrecht, Susan; and Globberman, Steven. 2007. "Service Time Variability at the Blaine, Washington, International Border Crossing and the Impact on Regional Supply Chains". Border Policy Research Institute Publications. 86. https://cedar.wvu.edu/bpri_publications/86
- Goodchild, Anne Victoria; Albrecht, Susan; and Leung, Li Ying, 2008. "Cross Border Transportation Patterns at the Western Cascade Gateway: Implications for Mitigating the Impact of Delay on Regional Supply Chains". Border Policy Research Institute Publications. 83. https://cedar.wvu.edu/bpri_publications/83
- Government of British Columbia. n.d.. https://www2.gov.bc.ca/assets/gov/driving-and-transportation/driving/border-crossing/bordercrossings_map_2016_all.png.
- Graham, Mark. 2014. "Internet Geographies: Data Shadows and Digital Divisions of Labour". In *Society and the Internet: How Networks of Information and Communication are Changing our Lives*, eds M. Graham and W. H. Dutton. Oxford: Oxford University Press. 99-116.
- Graham, Mark, Stefano De Sabbata, and Matthew A. Zook. 2015. "Towards a study of information geographies:(im) mutable augmentations and a mapping of the geographies of information." *Geo: Geography and environment* 2, no. 1: 88-105.
- Graham, Mark, and Matthew Zook. 2013. "Augmented realities and uneven geographies: exploring the geolinguistic contours of the web." *Environment and Planning A* 45, no. 1: 77-99.
- Graham, Stephen. 1998. "The end of geography or the explosion of place? Conceptualizing space, place and information technology." *Progress in human geography* 22, no. 2: 165-185.
- Graham, Stephen, and Simon Marvin. 2002. *Splintering urbanism: networked infrastructures, technological mobilities and the urban condition*. Routledge.
- Graham, Stephen. 2005. "Software-sorted geographies." *Progress in human geography* 29, no. 5: 562-580.

- Greater Vancouver Regional District. 1980. "Plan For The Lower Mainland Of British Columbia". Vancouver: Greater Vancouver Regional District.
- Greenwald, Amie, Georg Hampel, Chitra Phadke, and Viswanath Poosala. 2011. "An economically viable solution to geofencing for mass-market applications." *Bell Labs Technical Journal* 16, no. 2: 21-38.
- Gregg, Melissa. 2018. *Counterproductive*. Duke University Press.
- Gregson, Nicky. 2017. "Logistics at Work: Trucks, Containers and the Friction of Circulation in the UK." *Mobilities* 12, no. 3: 343-364.
- Gregson, Nicky, Mike Crang, and Constantinos N. Antonopoulos. 2017. "Holding together logistical worlds: Friction, seams and circulation in the emerging 'global warehouse'." *Environment and Planning D: Society and Space* 35, no. 3: 381-398.
- Griggs, Neil John Francis. 1970. "Urban growth and transportation implications in port development: A case study, Vancouver, British Columbia." PhD diss., University of British Columbia.
- Grosse, Eric H., Shane M. Dixon, W. Patrick Neumann, and Christoph H. Glock. 2016. "Using qualitative interviewing to examine human factors in warehouse order picking." *International Journal of Logistics Systems and Management* 23, no. 4: 499-518.
- Gutelius, Beth, and Nik Theodore. 2019. "The future of warehouse work: Technological change in the US logistics industry." *UC Berkeley Labor Center*.
- Hage, Ghassan. 2009. *Waiting*. Melbourne Univ. Publishing.
- Halegoua, Germaine R. 2020. *The Digital City*. New York University Press.
- Hall, Stuart. 2003. "Marx's notes on method: a reading of the 1857 introduction." *Cultural studies* 17, no. 2: 113-149.
- Hall, Peter V. 2009. "Container ports, local benefits and transportation worker earnings." *GeoJournal* 74, no. 1: 67-83.

- Hall, Peter V. 2012. "Connecting, disconnecting and reconnecting: port logistics and Vancouver's Fraser River." *LEspace géographique* 41, no. 3: 223-235.
- Hall, Peter V. 2014. "Port-city governance: Vancouver Case Study." In *Port-city governance*, edited by Yann Alix, Claude Comtois, and Bruno Delsalle, 209-224. Caen: Editions EMS.
- Hall, Peter V. 2015. "The social life of truck routes." In *Transport, Mobility, and the Production of Urban Space*, pp. 117-133. Routledge.
- Hall, Peter V., and Anthony Clark. 2010. "Maritime ports and the politics of reconnection." In *Transforming urban waterfronts*, pp. 33-50. Routledge.
- Hall, Peter V., and Wouter Jacobs. 2010. "Shifting proximities: The maritime ports sector in an era of global supply chains." *Regional studies* 44, no. 9: 1103-1115.
- Hall, Peter V., and Wouter Jacobs. 2012. "Why are maritime ports (still) urban, and why should policy-makers care?." *Maritime Policy & Management* 39, no. 2: 189-206.
- Hall, Peter V., and Thomas O'Brien. 2018. "Trucking regulation as a critical chain asset in port complexes." *Research in transportation business & management* 26: 122-127.
- Hanson, Natasha. 2021. "The intersections of global capital and family rhythms in truck driving: elucidating the Canadian trucking industry labour crisis." *Applied Mobilities* 6, no. 2: 153-168.
- Harney, Stefano, and Fred Moten. 2021. *All Incomplete*. Minor Compositions
- Harney, Stefano, Mattia Fraportti, and Niccolo Cupini. 2018. "Logistics genealogies: A dialogue with Stefano Harney." *Social text* 36, no. 3: 1-16.
- Harris, Cole. 1997. *The resettlement of British Columbia: essays on colonialism and geographical change*. UBC Press.
- Hatzopoulos, Pavlos, Nelli Kambouri, and Ursula Huws. 2014. "The containment of labour in accelerated global supply chains: The case of Piraeus port." *Work organisation, labour and globalisation* 8, no. 1: 5-21.

- Haughton, Michael, and KP Sapna Isotupa. "Scheduling commercial vehicle queues at a Canada–US border crossing." *Transportation Research Part E: Logistics and Transportation Review* 48, no. 1 (2012): 190-201.
- Haythornthwaite, Caroline. 2005. "Social networks and Internet Connectivity Effects." *Information, Communication & Society*, 8:2, 125-147, DOI:10.1080/13691180500146185
- Helleiner, Jane. 2012. "Whiteness and narratives of a racialized Canada-US border at Niagara." *Canadian Journal of Sociology/Cahiers canadiens de sociologie* 37, no. 2: 109-135.
- Hepworth, Kate. 2014. "Enacting logistical geographies." *Environment and Planning D: Society and Space* 32, no. 6: 1120-1134.
- Hiebert, Daniel. 1999. "Immigration and the changing social geography of Greater Vancouver." *BC Studies: The British Columbian Quarterly* 121: 35-82.
- Hind, Sam. 2020. "Between capture and addition: The ontogenesis of cartographic calculation." *Political Geography* 78: 102-147.
- Hogue, Michel. 2006. "Crossing the Line: Race, Nationality, and the Deportation of the "canadian" Crees in the Canada-u.s. Borderlands, 1890-1900". In *The Borderlands of the American and Canadian Wests: Essays on Regional History of the Forty-ninth Parallel*, edited by Sterling Evans, 155–171. U of Nebraska Press.
- Hoy, Benjamin. 2014. "A Border without Guards: First Nations and the Enforcement of National Space." *Journal of the Canadian Historical Association/Revue de la Société historique du Canada* 25, no. 2: 89-115.
- Hoy, Benjamin. 2021. *A line of blood and dirt: Creating the Canada-United States border across indigenous lands*. Oxford University Press.
- Hui, Stephen. 2010. "Vancouver Protesters Burn Canadian Flag During March In Solidarity With G20 Detainees, Black Bloc". *The Georgia Straight*. <https://www.straight.com/article-332171/vancouver/vancouver-g20-protesters-burn-canadian-flag-march-solidarity-detainees-black-bloc?page=1>.
- Husa, Anja Marita. 2006. "The Port of Vancouver-Just a Pawn in the Game of Commerce?." Master's thesis, Simon Fraser University.

- Huynh, Nathan, and C. Michael Walton. 2008. "Robust scheduling of truck arrivals at marine container terminals." *Journal of transportation engineering* 134, no. 8: 347-353.
- Huynh, Nathan, Daniel Smith, and Frank Harder. 2016. "Truck appointment systems: where we are and where to go from here." *Transportation Research Record* 2548, no. 1: 1-9.
- ILWU Local 500 Pensioners. 1985. "Man Along The Shore!." *The Story of the Vancouver Waterfront as Told by the Longshoremen Themselves, 1860s-1975*.
- Ircha, Michael. 2002. "COMMERCIAL PORTS AND URBAN ACTIVITIES: CONFLICTING PERSPECTIVES." In *Transportation Visioning-2002 and Beyond (Vision d'avenir des transports-2002 et au-dela)*, Canadian Transportation Research Forum, Proceedings of the 37th Annual Conference. CANADIAN TRANSPORTATION RESEARCH FORUM
- Ircha, Michael. 2008. "Canadian ports: trends and opportunities." *Canadian Political Science Review* 2, no. 4: 4-25.
- Ireland, James. 2005. "Port of Vancouver supply chain system." Masters diss., Faculty of Business Administration, Simon Fraser University.
- Jackson, Steven J. 2017. "Speed, Time, Infrastructure: Temporalities of Breakdown, Maintenance, and Repair." *The Sociology of Speed: Digital, Organizational, and Social Temporalities*, edited by Judy Wajcman and Nigel Dodd, 169-185. Oxford University Press.
- Jaffee, David, and David Bensman. 2016. "Draying and picking: Precarious work and labor action in the logistics sector." *WorkingUSA* 19, no. 1: 57-79.
- Jagoda, Patrick. 2016. *Network aesthetics*. University of Chicago Press.
- Jakubicek, Paul, and Clarence Woudsma. 2011. "Proximity, land, labor and planning? Logistics industry perspectives on facility location." *Transportation Letters* 3, no. 3: 161-173.
- Jennings, Barton, and Mary Collins Holcomb. 1996. "Beyond containerization: the broader concept of intermodalism." *Transportation Journal*: 5-13.
- Jones, John T. 1999. "The effects of transborder trucking regulations on inbound trucks and the trucking infrastructure." *Journal of Transport Economics and Policy*: 173-183.

- Kanngieser, Anja. 2013. "Tracking and tracing: Geographies of logistical governance and labouring bodies." *Environment and Planning D: Society and Space* 31, no. 4: 594-610.
- Kalman, Ian. 2015. "'Don't Blame Me, It's Just the Computer Telling Me To Do This': Computer Attribution and the Discretionary Authority of Canada Border Services Agency Officers." *Max Planck Institute for Social Anthropology Working Papers* 116. ISSN 1615-4568
- Kalman, Ian. 2018. "Proofing Exemption: Documenting Indigeneity at the Canada-US Border." *Anthropologica*: 212-222.
- Kang, Sanggyun. 2020. "Why do warehouses decentralize more in certain metropolitan areas?." *Journal of Transport Geography* 88, no. 102330: 1-12.
- Karuka, Manu. 2019. *Empire's tracks: Indigenous nations, Chinese workers, and the transcontinental railroad*. Vol. 52. University of California Press.
- Kealey, Gregory. S. 1984. "1919: The Canadian Labour Revolt." *Labour/Le Travailleur*, 13: 11-44.
- Kitchin, Rob, and Martin Dodge. 2011. *Code/space: Software and everyday life*. MIT Press.
- Kitchin, Rob. 2017. "Thinking critically about and researching algorithms." *Information, communication & society* 20, no. 1: 14-29.
- Kloepper, Karla. 2017. "On the Wrong Track?: Perspectives on Affordable Housing and Transit Oriented Development in Metro Vancouver." PhD diss., University of British Columbia.
- Knight, Rolf. 1980. *Along the no. 20 line: reminiscences of the Vancouver waterfront*. New Star Books.
- Konrad, Victor. 2014. "Borders, bordered lands and borderlands: Geographical states of insecurity between Canada and the United States and the impacts of security primacy." In *Borders, fences and walls: State of insecurity*, edited by Elisabeth Vallet, 85-102. London & New York: Routledge.
- Konrad, Victor. 2015. "Toward a theory of borders in motion." *Journal of Borderlands Studies* 30, no. 1: 1-17.

- Konrad, Victor, and Heather Nicol. 2004. "Boundaries and corridors: Rethinking the Canada-United States borderlands in the post-9/11." *Canadian-American Public Policy* 60: 1-51.
- Konrad, Victor, and Heather Nicol. 2008. "Passports for All." *Canadian-American Public Policy* 74: 1-62.
- Kumar, Ashok. 2019. "A race from the bottom? Lessons from a workers' struggle at a Bangalore warehouse." *Competition & Change* 23, no. 4: 346-377.
- Küpper, Axel, Ulrich Bareth, and Behrend Freese. "Geofencing and background tracking—the next features in LBSs." In *Proceedings of the 41th Annual Conference of the Gesellschaft für Informatik eV*. 2011.
- Lalonde, Patrick C. 2018. "Cyborg work: Borders as simulation." *The British Journal of Criminology* 58, no. 6: 1361-1380.
- Lalonde, Patrick C. 2019. "Border officer training in Canada: identifying organisational governance technologies." *Policing and Society* 29, no. 5: 579-598.
- Lalonde, Patrick C. 2021. "Border Security Meets Black Mirror: Perceptions of Technologization from the Windsor Borderland." *Journal of Borderlands Studies*. DOI: 10.1080/08865655.2021.1968927
- Lam, Joseph K., and Keenan Kitasaka. 2009. "Smart Commercial Corridors". In *2009 ANNUAL CONFERENCE AND EXHIBITION OF THE TRANSPORTATION ASSOCIATION OF CANADA - TRANSPORTATION IN A CLIMATE OF CHANGE*. Ottawa: Transportation Association of Canada.
- Lee, Erika. 2002. "Enforcing the borders: Chinese exclusion along the US borders with Canada and Mexico, 1882–1924." *The Journal of American History* 89, no. 1: 54-86.
- Leszczynski, Agnieszka. 2015. "Spatial media/tion." *Progress in Human Geography* 39, no. 6: 729-751.
- Levy, Karen EC. 2015. "The contexts of control: Information, power, and truck-driving work." *The Information Society* 31, no. 2: 160-174.
- Ley, David. 2013. "Asian Immigrants in Vancouver: From Caste to Class in Socio-Spatial Segregation?." In *Immigrant Adaptation in Multi-Ethnic Societies*, pp. 68-77. Routledge.

- Ley, David. 2017. "Global China and the making of Vancouver's residential property market." *International Journal of Housing Policy* 17, no. 1: 15-34.
- Lindemann, Danielle J., and Teresa M. Boyer. 2019. "Desperate Fortunes: Latina Warehouse Workers in the "Matrix of Domination"." *Labor Studies Journal* 44, no. 2: 161-183.
- Lightstone, Adrian, Tony Bellony, and Jean-François Cappuccilli. 2021. "Understanding Goods Movement in Canada: Trends and Best Practices." Transportation Association of Canada. <https://www.tac-atc.ca/sites/default/files/site/doc/publications/2021/ptm-goodsmvmt-e.pdf>.
- Lorentzen, Christian. 2020. "Truckers." *Sewanee Review* 128, no. 2: 300-319.
- Lu, Eric Hsueh-Chan, and Ya-Wen Yang. 2019. "A hybrid route planning approach for logistics with pickup and delivery." *Expert Systems with Applications* 118: 482-492.
- Madsen, Chris. 2016. "Vancouver's Waterfront and Longshore Labour in 1918: Background Context to James Shaver Woodsworth's On the Waterfront." *The Northern Mariner/Le marin du nord* 26, no. 1: 31-47.
- Madsen, Chris. 2018. "Pacific gateway: state surveillance and interdiction of criminal activity on Vancouver's waterfront." *Salus journal* 6, no. 1: 26-43.
- Mamers, Danielle Taschereau. 2020. "'Last of the buffalo': bison extermination, early conservation, and visual records of settler colonization in the North American west." *Settler Colonial Studies* 10, no. 1: 126-147. DOI: 10.1080/2201473X.2019.1677134
- Martin, Craig. 2013. "Shipping container mobilities, seamless compatibility, and the global surface of logistical integration." *Environment and Planning A* 45, no. 5: 1021-1036.
- Mathieson, Andrea. 1994. "Owner Operators in Canada: Who are these Guys?." In *29th Annual Canadian Transportation Research Forum, Vancouver, British Columbia, May 15-18, 1994*, no. 306028. Canadian Transportation Research Forum (CTRF).
- Marx, Karl. 1877/1967. *Capital, Vol. 1*. Translated by Ben Fowkes. New York: Penguin
- Marx, Karl. 1939/2005. *Grundrisse: Foundations of the critique of political economy*. Penguin UK.

- McCord, Mark R., Colin N. Brooks, and David Banach. 2016. *Truck Activity and Wait Times at International Border Crossings*. NEXTRANS Project No. 120OSU2. 1.
- McCord, Mark R., et al. 2017. *Documenting and determining distributions, trends, and relations in truck times at international border crossing facilities*. NEXTRANS Project No. 172OSU2.2.
- McDonald, Robert AJ. 1986. "Working class Vancouver, 1886-1914: urbanism and class in British Columbia." *BC Studies: The British Columbian Quarterly* 69/70: 33-69.
- McGovern, P. D. 1961. "Industrial Development in the Vancouver Area." *Economic Geography* 37, no. 3: 189-206.
- McKenna, Marian C. 2006. "Above the blue line: Policing the frontier in the Canadian and American west, 1870–1900." *The borderlands of the American and Canadian Wests: Essays on regional history of the forty-ninth parallel* edited by Sterling Evans. U of Nebraska Press: 81-106.
- McLean, Amie. 2016a. "'Four Guys and a Hole in the Floor': Racial Politics of Mobility and Excretion among BC-Based Long Haul Truckers." *Transfers* 6, no. 1: 45-61.
- McLean, Amie. 2016b. "Battling blind spots: Hours of service regulations and contentious mobilities in the BC-based long haul trucking industry." *Canadian journal of sociology* 41, no. 3: 277-298.
- McLean, Amie. 2017. "'We used to be kings of the road': Negotiations of ethics, embodiment, and subjectivity in the BC-based long haul trucking industry." PhD diss., Simon Fraser University.
- Meczes, Robin. 2006. "Location, Location, Location". *Motor Transport*: 16-17.
- Metro Vancouver Regional Planning. 2020. "Metro Vancouver 2020 Regional Industrial Lands Inventory: Technical Report". Vancouver: Metro Vancouver Regional Planning.
- Mezzadra, Sandro, and Brett Neilson. 2013. *Border as Method, or, the Multiplication of Labor*. Duke University Press.
- Mezzadra, Sandro, and Brett Neilson. 2019. *The Politics of Operations*. Duke University Press.

- Mezzadra, Sandro, and Brett Neilson. 2021. "Borders". In *The SAGE Handbook Of Marxism*, 1st edited by Beverley Skeggs, Sara R. Farris, Alberto Toscano and Svenja Bromberg, 1591-1608. New York City: SAGE Publishing.
- Miller, Bruce G. 1996. "The "Really Real" Border and the Divided Salish Community." *BC Studies: The British Columbian Quarterly* 112: 63-79.
- Miller, Bruce G. 2012. "Life on the hardened border." *American Indian Culture and Research Journal* 36, no. 2: 23-46.
- Mitchell, William J. 1996. *City of Bits: Space, Place, and the Infobahn*. MIT Press.
- Modica, Paolo Walter, Mark Phillip Loria, Marco Toja, Vincenza Carchiolo, and Michele Malgeri. "A geofencing algorithm fit for supply chain management." In *2018 Federated Conference on Computer Science and Information Systems (FedCSIS)*, pp. 737-746. IEEE, 2018.
- Mongelluzzo, Bill. 2016. "Vancouver port's drayage initiative cuts truck turn times." *The Journal of Commerce*, February 25, 2016. https://www.joc.com/port-news/international-ports/port-metro-vancouver/innovative-approach-drayage-cuts-vancouver-turn-times_20160225.html.
- Mongelluzzo, Bill. 2022. "Vancouver Capacity Needs Spark Conflict Among Port, Tenant". *JOC.Com*. https://www.joc.com/port-news/international-ports/vancouver-capacity-needs-spark-conflict-among-port-tenant_20220328.html.
- Morais, Philippe, and Elisabeth Lord. 2006. *Terminal appointment system study*. No. TP 14570E.
- Moreton-Robinson, Aileen. 2015. *The white possessive: Property, power, and indigenous sovereignty*. U of Minnesota Press.
- Muller, Benjamin J. 2010. "Unsafe at any speed? Borders, mobility and 'safe citizenship'." *Citizenship Studies* 14.1: 75-88.
- Muller, Benjamin J. 2011. "Risking it all at the Biometric Border: Mobility, Limits, and the Persistence of Securitisation." *Geopolitics* 16.1: 91-106.
- Muller, Benjamin J. 2016. "The day the border died? The Canadian border as checkpoint in an age of hemispheric security and surveillance." In *National Security, Surveillance and Terror*, edited by Randy K. Lippert, Kevin Walby, Ian Warren, and Darren Palmer, 297-318. Palgrave Macmillan, Cham.

- Munster, Anna. 2013. *An Aesthesis of Networks: Conjunctive Experience in Art and Technology*. MIT Press
- Namiot, Dmitry. 2013. "GeoFence services." *International Journal of Open Information Technologies* 1, no. 9: 30-33.
- Neilson, Brett. 2012. "Five theses on understanding logistics as power." *Distinktion: Scandinavian journal of social theory* 13, no. 3 (2012): 322-339.
- Ness, Immanuel, and Jake Alimahomed-Wilson, eds. *Choke Points: Logistics Workers Disrupting the Global Supply Chain*. London: Pluto Press, 2018.
- Newman, David, and Anssi Paasi. 1998. "Fences and neighbours in the postmodern world: boundary narratives in political geography." *Progress in human geography* 22, no. 2: 186-207.
- Newman, Joshua. 2009. "HOW TRANSPORTATION P3S HELP SHAPE CANADA'S URBAN CENTRES." In *Proceedings of the... Annual Conference*, p. 84. Canadian Transportation Research Forum, 2009.
- Newman, Peter WG, and Jeffrey R. Kenworthy. 1996. "The land use—transport connection: An overview." *Land use policy* 13, no. 1: 1-22.
- Nicol, Heather N. 2012. "The Wall, the Fence, and the Gate: Reflexive Metaphors along the Canada–US Border." *Journal of Borderlands Studies*, no 27 vol 2: 139-165, DOI: 10.1080/08865655.2012.687213
- Nichols, Robert. 2018. "Theft is property! The recursive logic of dispossession." *Political Theory* 46, no. 1: 3-28.
- Oliveira, Renata, Matthieu Schorung, and Laetitia Dablanc. 2021 "Relationships among urban characteristics, real estate market, and spatial patterns of warehouses in different geographic contexts." Postdoctoral research development, Université gustave eiffel.
- Oliveira, Rodrigo R., Ismael MG Cardoso, Jorge LV Barbosa, Cristiano A. da Costa, and Mario P. Prado. 2015. "An intelligent model for logistics management based on geofencing algorithms and RFID technology." *Expert Systems with Applications* 42, no. 15-16: 6082-6097.

- Orenstein, Dara. 2019. *Out of stock: The warehouse in the history of capitalism*. University of Chicago Press.
- Özkul, Didem. 2021. "The algorithmic fix: Location intelligence, placemaking, and predictable futures." *Convergence* 27, no. 3: 594-608.
- Parkin, Tom W. 1997. "Two cable bridges of Vancouver [Lions Gate Bridge and the Alex Fraser Bridge]." *British Columbia History* 31, no. 1: 30-33.
- Park, JiYoung, Changhyun Kwon, Ha Hwang, and Kathryn Friedman. 2016. *The Ties that Bind: Bi-national Trade and its Implications of the U.S. and Canada Using Bi-national Freight Movement Network via Border Crossings*. University at Buffalo, SUNY. <https://rosap.nrl.bts.gov/view/dot/31761>.
- Parnaby, Andy. 2006. "'The best men that ever worked the lumber': Aboriginal Longshoremen on Burrard Inlet, BC, 1863-1939." *The Canadian Historical Review* 87, no. 1: 53-78.
- Parnaby, Andrew. 2008. *Citizen Docker: Making a New Deal on the Vancouver Waterfront, 1919-1939*. University of Toronto Press.
- Parry, Jacob. 2014. "Port And Truckers Turn To Traffic Following Strike". *Bcbusiness*. <https://www.bcbusiness.ca/port-and-truckers-turn-to-traffic-following-strike>.
- Paselk, Theodore A., and Fred L. Mannering. 1994. "Use of duration models for predicting vehicular delay at a US/Canadian border crossing." *Transportation* 21, no. 3: 249-270.
- Payne, R. Gordon. 2014. "The Port And Terminal Truck Interface". Presentation, Vancouver, , 2014.
- Payne, David, and Gordon Payne. 2014. "The Port Metro Vancouver Interface". Presentation, Vancouver, , 2014.
- Pedersen, Morten Axel. 2013. "The fetish of connectivity." In *Objects and materials: a routledge companion*: 197-207.
- Pickett, Evelyne Stitt. 2006. "Hoboes across the Border: Itinerant Cross-Border Laborers between Montana and Western Canada". In *The Borderlands of the American and Canadian Wests: Essays on Regional History of the Forty-ninth Parallel*, edited by Sterling Evans, 203-221. U of Nebraska Press.

Pittman, Shane, and Andrew Stanevicius. n.d. "Where Are The Trucks? Using GPS Data To Drive Port Decision-Making". Vancouver: Port Metro Vancouver.

Plana, Vincent. 2021. "Indigenous Youth Demonstrators Block Traffic Near Vancouver Port | News". *Dailyhive.Com*. <https://dailyhive.com/vancouver/indigenous-demonstrators-block-traffic-vancouver-port>.

Port of Vancouver. n.d., https://www.portvancouver.com/wp-content/uploads/2015/05/Map_Jurisdiction-1536x1187.jpg

Port of Vancouver. 2015. "PORT METRO VANCOUVER TRUCK LICENSING SYSTEM For Local Drayage TLS Handbook". Vancouver: Port of Vancouver.

Port of Vancouver. 2021. "Statistics Overview, 2021." Port of Vancouver. <https://www.portvancouver.com/wp-content/uploads/2022/03/Stats-Overview-2019-to-2021-1.pdf>

"Port Dashboard | Port Of Vancouver". 2022. *Port Of Vancouver*. Accessed July 5. <https://www.portvancouver.com/port-dashboard/>.

"Port Metro Vancouver Implements Webtech Wireless' GPS Solution". 2014. *T-Net British Columbia*. <https://www.bctechnology.com/news/2014/6/3/Port-Metro-Vancouver-Implements-Webtech-Wireless-GPS-Solution.cfm>.

Posner, Miriam. 2018. "See No Evil". *Logic Magazine*. <https://logicmag.io/scale/see-no-evil/>.

Pratt, Anna, and Sara K. Thompson. 2008. "Chivalry, 'race' and discretion at the Canadian border." *The British Journal of Criminology* 48, no. 5 (2008): 620-640.

Pratt, Anna. 2010. "Between a hunch and a hard place: Making suspicion reasonable at the Canadian border." *Social & Legal Studies* 19, no. 4: 461-480.

Public Safety Canada and Department of Homeland Security. 2011. *Beyond The Border: A Shared Vision For Perimeter Security And Economic Competitiveness*.

Ramirez, Bruno. 2018. *Crossing the 49th Parallel: Migration from Canada to the United States, 1900–1930*. Cornell University Press.

- Ray, Brian K., Greg Halseth, and Benjamin Johnson. 1997. "The changing 'face' of the suburbs: Issues of ethnicity and residential change in suburban Vancouver." *International Journal of Urban and Regional Research* 21, no. 1: 75-99.
- Reclus, Fabrice, and Kristen Drouard. "Geofencing for fleet & freight management." In *2009 9th International Conference on Intelligent Transport Systems Telecommunications, (ITST)*, pp. 353-356. IEEE, 2009.
- Rosière, Stéphane, and Reece Jones. 2012. "Teichopolitics: Re-considering globalisation through the role of walls and fences." *Geopolitics* 17.1: 217-234.
- Rossiter, Ned. 2014. "Logistical worlds." *Cultural Studies Review* 20, no. 1: 53-76.
- Rossiter, Ned. 2016. *Software, Infrastructure, Labour: A Media Theory of Logistical Nightmares*. Routledge
- Russwurm, Lani. 2007. "Constituting authority: Policing workers and the consolidation of police power in Vancouver, 1918-1939." PhD diss., Dept. of History-Simon Fraser University.
- Sabeen, J. and Jones, C., 2008. *Inventory of Current Programs for Measuring Wait Times at Land Border Crossings*. Customs and Border Protection, Department of Homeland Security and Canada Border Services Agency.
- Salter, Mark B. 2008. "When the exception becomes the rule: borders, sovereignty, and citizenship." *Citizenship studies* 12.4: 365-380.
- Salter, Mark B., and Can E. Mutlu. 2012. "Psychoanalytic theory and border security." *European Journal of Social Theory* 15.2: 179-195.
- Sandher, Rupinder. 2021. "Understanding women's autonomy: Wives of Punjabi truck drivers in Punjab and BC." Masters thesis, Simon Fraser University.
- Schneider, Georg, Björn Dreher, and Ole Seidel. "Using GeoFencing as a means to support flexible real time applications for delivery services." In *Proc. of the 5th Int. Workshop on Ubiquitous Computing (IWUC-2008)*. 2008.
- Schwartz, Barry. 1975. *Queuing and waiting: Studies in the social organization of access and delay*. Chicago: University of Chicago Press.

- Schwartz, Mildred A. 1998. "NAFTA and the Fragmentation of Canada." *American Review of Canadian Studies* 28, no. 1-2: 11-28.
- Seaver, Nick. 2014. "Knowing Algorithms." *Media in Transition* 8.
- Senft, Graham. 2009. "The conscious city: Traffic congestion and change toward sustainability in metro Vancouver." *Environnement Urbain/Urban Environment* 3: 93-103.
- Shapiro, Aaron. 2020. *Design, control, predict: Logistical governance in the smart city*. U of Minnesota Press.
- Sharma, Sarah. 2017. "Speed Traps and the Temporal: Of Taxis, Truck Stops, and TaskRabbits." In *The Sociology of Speed: Digital, Organizational, and Social Temporalities*, edited by Judy Wajcman and Nigel Dodd, 131-151. Oxford University Press.
- Shelton, Taylor, Matthew Zook, and Alan Wiig. 2015. "The 'actually existing smart city'." *Cambridge journal of regions, economy and society* 8, no. 1: 13-25.
- Simpson, Audra. 2014. *Mohawk Interruptus: Political Life across the Borders of the Settler States*. Duke University Press.
- Simpson, Leanne Betasamosake. 2014. "Land as pedagogy: Nishnaabeg intelligence and rebellious transformation." *Decolonization: indigeneity, education & society* 3, no. 3: 1-25.
- Singleton, Sara. 2008. "'Not our borders': Indigenous people and the struggle to maintain shared cultures and polities in the post-9/11 united states." *Journal of Borderlands Studies* 23, no. 3: 39-54.
- Skabar, Kip. 2021. "A Trip Through B.C. In The Life Of A Shipping Container]. *Transport Association Of Canada*. <https://www.tac-atc.ca/en/trip-through-bc-life-shipping-container>.
- Škerlič, Sebastjan, and Robert Muha. 2017. "Reducing errors in the company's warehouse process." *Transport problems* 12.
- Slack, Brian. "Enhancing the Value Added: Terminals and Logistics in Canada." In *29th Annual Canadian Transportation Research Forum*, no. 305990. Canadian Transportation Research Forum (CTRF), 1994.

- Sohi, Seema. 2011. "Race, surveillance, and Indian anticolonialism in the transnational western US-Canadian borderlands." *The Journal of American History* 98, no. 2 : 420-436.
- Stäheli, Urs. n.d.a. "The Right to Remain Silent: From a Politics of Connectivity to a Politics of Disconnectivity?" Unpublished draft.
- Stäheli, Urs. n.d.b. "On Disarticulation, or, What It Means to Be a Discursive Element." Unpublished draft
- Stanger-Ross, Jordan. 2008. "Municipal colonialism in Vancouver: City planning and the conflict over Indian reserves, 1928–1950s." *Canadian Historical Review* 89, no. 4: 541-580.
- Statistics Canada. 2022. "Canada's Large Urban Centres Continue To Grow And Spread". Statistics Canada.
- Stanger-Ross, Jordan, and Landscapes of Injustice Research Collective. 2016. "Suspect properties: the Vancouver origins of the forced sale of Japanese-Canadian-owned property, WWII." *Journal of Planning History* 15, no. 4: 271-289.
- Stanger-Ross, Jordan, and Nicholas Blomley. 2017. "'My land is worth a million dollars': How Japanese Canadians contested their dispossession in the 1940s." *Law and History Review* 35, no. 3: 711-751.
- Starosielski, Nicole. 2021. "Grounded Speed and the Soft Temporality of Network Infrastructure." In *Media Infrastructures and the Politics of Digital Time: Essays on Hardwired Temporalities*, edited by Axel Volmar and Kyle Stine, 177 - 189. Amsterdam University Press.
- Stevens, Henrik. 1999. "Canada: the Port of Vancouver." *The Institutional Position of Seaports: An International Comparison*: 189-206.
- Stine, Kyle, and Axel Volmar. 2021. "Infrastructures of Time: An Introduction to Hardwired Temporalities." In *Media Infrastructures and the Politics of Digital Time: Essays on Hardwired Temporalities*, edited by Axel Volmar and Kyle Stine, 9-38. Amsterdam University Press.
- Strategic Planning Department, Greater Vancouver Regional District. 1994. "Creating Our Future: The History, Status, And Prospects Of Regional Planning In Greater Vancouver". Vancouver.
- Strategic Planning Department, TransLink. 1999. "1999 Lower Mainland Truck Freight Study". Vancouver.

- "Supporters Of Trucker Convoy Delay Traffic At Canada's Busiest Border Crossing". 2022. CTV News Windsor. <https://windsor.ctvnews.ca/supporters-of-trucker-convoy-delay-traffic-at-canada-s-busiest-border-crossing-1.5771424>.
- Sutton, Rebecca, Darshan Vigneswaran, and Harry Wels. 2011. "Waiting in liminal space: Migrants' queuing for Home Affairs in South Africa." *Anthropology Southern Africa* 34.1-2: 30-37.
- Szeman, Imre. 2004. *Zones of Instability: Literature, Postcolonialism, and the Nation*. JHU Press.
- Taylor, John C., Douglas R. Robideaux, and George C. Jackson. 2004. "US-Canada transportation and logistics: border impacts and costs, causes, and possible solutions." *Transportation journal*: 5-21.
- Terranova, Tiziana. 2004. *Network Culture: Politics for the Information Age*. Ann Arbor, Michigan: Pluto Press.
- Theofanis, Sotirios, and Maria Boile. 2009. "Empty marine container logistics: facts, issues and management strategies." *GeoJournal* 74, no. 1: 51-65.
- The Tioga Group. 2013. "PORT METRO VANCOUVER TRUCK TURN TIME STUDY." The Tioga Group. <http://tiogagroup.com/docs/PortMetroVancouverTruckTurnTimeStudy2013.pdf>.
- Thirkell, Fred, and Robert Scullion. 1997. *Places Remembered: Greater Vancouver, New Westminster And The Fraser Valley*. Surrey, B.C.: Heritage House Pub.
- Thrift, Nigel, and Shaun French. 2002. "The automatic production of space." *Transactions of the institute of British geographers* 27, no. 3 (2002): 309-335.
- Thrift, Nigel. 2004a. "Remembering the technological unconscious by foregrounding knowledges of position." *Environment and planning D: Society and space* 22, no. 1: 175-190.
- Thrift, Nigel. 2004b. "Movement-space: The changing domain of thinking resulting from the development of new kinds of spatial awareness." *Economy and society* 33, no. 4: 582-604.
- Tonra, Joshua J. 2006. "The Threat of Border Security on Indigenous Free Passage Rights in North America." *Syracuse J. Int'l L. & Com.* 34: 221.

- Toscano, Alberto. 2004. "Factory, territory, metropolis, empire." *Angelaki: journal of the theoretical humanities* 9, no. 2: 197-216.
- Toscano, Alberto. 2013. "Gaming the plumbing: High-frequency trading and the spaces of capital." *Mute Magazine* 16.
- TransLink. 2017. "Moving The Economy: A Regional Goods Movement Strategy For Metro Vancouver". Vancouver.
- TransLink. 2018. *Major Road Network* [map]. Vancouver: TransLink.
- TransLink. 2022. "TransLink - Transport 2050 Regional Transportation Strategy." Publitas. <https://view.publitas.com/translink/transport-2050-regional-transportation-strategy/page/1>.
- Transport Canada. 2006. "Canada's Asia-Pacific Gateway and Corridor Initiative." Transport Canada. <https://publications.gc.ca/collections/Collection/T22-131-2006E.pdf>
- Transport Canada and United States of America Department of Transportation. 2016. *BORDER INFRASTRUCTURE INVESTMENT PLAN 3.0*.
- Tsing, Anna. 2009. "Supply chains and the human condition." *Rethinking Marxism* 21, no. 2: 148-176.
- UN Habitat. 2013. "Planning And Design For Sustainable Urban Mobility: Global Report On Human Settlements 2013". UN-HABITAT. <https://unhabitat.org/planning-and-design-for-sustainable-urban-mobility-global-report-on-human-settlements-2013>.
- Unifor. 2021. *Warehouse Sector Profile*. Unifor. https://www.unifor.org/sites/default/files/documents/Warehouse%20Sector%20Profile_FINAL_December%202021LV2.pdf.
- Upadhyay, Nishant. 2016. "'We'll Sail Like Columbus': Race, Indigeneity, Settler Colonialism, and the Making of South Asian Diasporas in Canada." PhD Diss., York University.
- Valentine, Lisa Philips, and Allan K. McDougall. 2004. "Imposing the border: The Detroit River from 1786 to 1807." *Journal of Borderlands Studies* 19, no. 1: 13-22.

- van Dorp, Kees-Jan. 2002. "Tracking and tracing: a structure for development and contemporary practices." *Logistics information management*.
- Viscelli, Steve. 2016. *The Big Rig: Trucking and the Decline of the American Dream*. Oakland: University of California Press.
- Vukov, Tamara, and Mimi Sheller. 2013. "Border work: Surveillant assemblages, virtual fences, and tactical counter-media." *Social semiotics* 23.2: 225-241.
- Vukov, Tamara. 2016. "Target practice: The algorithmics and biopolitics of race in emerging smart border practices and technologies." *Transfers* 6, no. 1: 80-97.
- Walters, William. 2006. "Border/control." *European journal of social theory* 9, no. 2: 187-203.
- Walton-Roberts, Margaret. 1998. "Three readings of the turban: Sikh identity in Greater Vancouver." *Urban Geography* 19, no. 4: 311-331.
- Ward, Myah. "What's Happening with the Canadian Trucker Convoy? Here's What You Need to Know." POLITICO, February 14, 2022. <https://www.politico.com/news/2022/02/14/canadian-truckers-block-bridge-strike-protests-00008620>.
- Whelen, Matthew, Ata Khan, and David Ramsey. 2015. "Reducing Disruption-Induced Impacts on Transportation Supply Chain Fluidity." In *Canadian Transportation Research Forum 50th Annual Conference-Another 50 Years: Where to From Here?//Un autre 50 ans: qu'en est-il à partir de maintenant? Montreal, Quebec, May 24-26, 2015*.
- Widdis, Randy William. 2010. "Crossing an intellectual and geographic border: the importance of migration in shaping the Canadian-American borderlands at the turn of the twentieth century." *Social Science History* 34, no. 4: 445-497.
- Widdis, Randy William. 2019. "Railways and borderland spaces: The Canada–US case." *The Canadian Geographer/Le Géographe canadien* 63, no. 1: 11-26.
- Woodsworth, James Shaver. 2016. "On the Waterfront With the workers on the docks at Vancouver-some observations and experiences." *The Northern Mariner/Le marin du nord* 26, no. 1: 48-68.
- Woudsma, Clarence, and Paul Jakubicek. 2020. "Logistics land use patterns in metropolitan Canada." *Journal of Transport Geography* 88, no. 102381.
- Woudsma, Clarence, Paul Jakubicek, and Laetitia Dablanc. 2016. "Logistics sprawl in North America: methodological issues and a case study in Toronto." *Transportation Research Procedia* 12: 474-488.

WorkBC. n.d. "Transportation and Warehousing". <https://www.workbc.ca/labour-market-information/industry-information/industry-profiles/transportation-and-warehousing>.

Yee, Paul. 1986. "Sam Kee: A Chinese Business in Early Vancouver." *BC Studies: The British Columbian Quarterly* 69/70: 70-96.

Yen, Dorothy, Jean Andrey, and Clarence Woudsma. 2014. "Truck drivers' perspectives on vehicle idling." Canadian Transport Research Forum.

Zhang, Hanxing. 2015. "Optimization of Empty Container Movements Using" street-turn" Strategy: Application to Metro Vancouver Area." PhD diss., University of British Columbia.

Zhao, Wenjuan, and Anne V. Goodchild. 2011. "Truck travel time reliability and prediction in a port drayage network." *Maritime Economics & Logistics* 13, no. 4: 387-418.