KNITTING TOGETHER THE URBAN FABRIC:

Visions of the Past & Future on Shelburne Road

A thesis submitted by

Ethan Pepin

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Advisor: Dr. Rebecca Shakespeare

Reader: Christine Cousineau

Abstract:
This design thesis explores how contemporary bicycle and pedestrian planning methods and practices, along with sprawl repair theory could be applied to the Interstate 189 & Shelburne Road interchange in Burlington and South Burlington. The thesis begins with historical context and moves onto examining the existing conditions of the site and surrounding area. Three alternatives are presented for improving the site, including a small scale design option, a minor modification design option and full scale reconstruction design option. Finally, it concludes with a literature review which partially explores the development and history of contemporary sprawl repair and active transportation planning theory and practice.

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INTRODUCTION

In the United States, 20th-century planning policy reshaped the urban landscape around a single dominant technology: the personal automobile. As a result, many communities developed around car-oriented infrastructure, producing low-density, auto-dependent patterns now referred to as “sprawl.” In recent decades, planners and policymakers have turned greater attention to the consequences of sprawl—its environmental costs, impacts on public health, and the financial strain it places on governments. This shift has also sparked growing interest in strategies that can undo or “repair” sprawl and transition toward more sustainable, multi-modal urban forms.

This thesis explores one such opportunity for repair: the I-189/Shelburne Road interchange, located at the municipal

boundary between Burlington and South Burlington, Vermont. As a relic of incomplete highway planning, the interchange today creates a major barrier to walking, cycling, and cohesive urban development. Immediately surrounding the interchange are strip developments and shopping centers that serve automobiles as the primary users. To the north lies a mixed-use streetcar suburb. To the south are almost exclusively post-war era sprawlscapes with small stretches of street facing historical structures and new construction. With the interchange now connecting into a slow-speed Champlain Parkway and accompanying bicycle path, this site represents a physical and symbolic crossroads between the transportation ideologies of the past and present.

The cities of Burlington and South Burlington in Vermont have made it a priority to encourage denser, mixed-use development and support walking and cycling to reduce dependence on automobile travel (City of Burlington 2019, City of South Burlington 2024). However, the I-189 spur interchange presents a significant challenge to this larger urban development strategy. Located on the border between the two cities, it creates a significant gap in the urban fabric that is unpleasant and dangerous to cyclists and pedestrians (Chittenden County Regional Planning Commission 2022).

Furthermore, the interchange is a relic of past highway planning, which no longer aligns with the current planning goals that favor multi-modal transportation. I-189 was initially planned in 1965 to continue west and then north as a limited-access grade-separated freeway; however, the project faced significant challenges and remained in limbo for decades (Lyons 2022).

Finally, a recent plan to move forward with the project, now dubbed the “Champlain Parkway”, received final approval in 2022 and is currently under construction (City of Burlington 2021). The new Parkway will transition from the existing grade-separated, two-lane interstate highway to a single-lane, 25-mph city street, making the existing interchange design outdated and disjointed. The interchange will mark the meeting point between a high modernist interstate and a modern multi-modal road. While inertia will likely keep the interchange in its current state in the near future, the I-189/ US-7 interchange, rebuilt in 1988, has a fixed lifespan. This will provide an opportunity to redesign the interchange and bring it in line with the current context, the US DOT’s new National Roadway Safety Strategy, and local planning goals. While any eventual redesign project should entail a lengthy public process based on community planning, this thesis intends to envision how active transportation and sprawl repair design principles could be applied to the I-189-Shelburne Road interchange. Additionally, imagining a future partially unburdened by the present, provides an opportunity to create a vision that may inspire a new future.

VISIONS OF THE PAST & FUTURE

The Shelburne Road Interchange in Burlington, Vermont, along with the currently under-construction Champlain Parkway, presents an interesting case study that reveals the shifting priorities determining significant transportation infrastructure development in America from the 1950s until today. Once a shining example of American 1950s high modernist highway planning, Interstate 189 has yet to be fully finished, as of the time of writing. A project so long delayed that in 2002, a local artist created a tower of filing cabinets over 40 feet tall, dedicated to the project as a means of satirizing “the bureaucracy of urban planning” (Figure 1) (Frechette 2025). However, the installation of the piece, right in the planned path of the interstate, proved to be premature: it had to be moved in 2020 as the construction of the “Champlain Parkway” slowly but surely began rumbling into gear.

The Parkway, a single-lane 25-MPH road with an accompanying bike path, is a far cry from the high-speed elevated vision of previous eras. Nonetheless, in bureaucratic terms, the “Parkway” is merely a rebrand for Interstate 189, and the current project is still using the now-discontinued Interstate project financing mechanism, which requires that only 2% of project costs be borne locally. How did this project emerge, and how did it change and evolve to its current

Figure 1: World’s Tallet Filiing Cabinet (Wikimedia Commons)

incarnation? To understand this, we need to go back to the 1950s, the era of high modernism in planning. The 1956 Interstate Highway Act, along with Urban Renewal (1949-1973) and Euclidean Zoning established in 1926, together formed the foundations for a radical new model of city building that prioritized the personal automobile as the dominant user of the city. The Interstate Highway Act in particular had the most impact in Vermont, a largely rural state that did not experience rapid growth in the 20th century. In 1940, there were just 30,000 more people living in Vermont than there were in 1870, seventy years prior. By contrast, Vermont would add over 210,000 new residents in just forty years between 1960 and 2000. Although Vermont had for decades planned for the development of modern limited-access highways, it lacked the funding to construct them. With the Interstate Highway Act, Vermont found the mechanism by which to enable its Freeway plans.

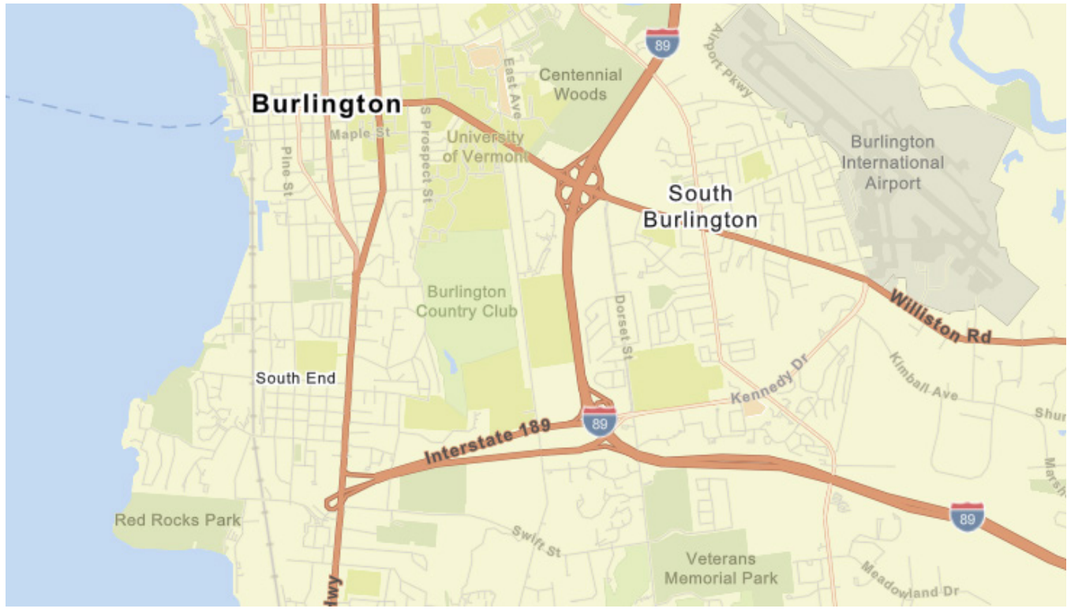

Figure 2: Context Map of I-89 and I-189 (ArcGIS Online)

Vermont's interstate highway system was built out between 1957 and 1982, and focused on two key north-south highways, Interstate 89 (I-89) and Interstate 91 (Freedom and Unity 2021, Curtis 2016). I-89 was one of the first of these freeway plans to get built. Interstate 89 would become the key highway corridor connecting the Burlington Metro area east to Boston and north to Montreal. Initially planned by Vermont to travel north-south along the western half of the state, larger politics resulted in the routing of Interstate 89 along the eastern border of Vermont before bearing west towards Burlington. As a result, Vermont constructed Interstate 189, a small interstate spur that connected I-89 to the main north-south highway in western Vermont, US-7, known as Shelburne Road in the project area (Figure 2).

Vermont was largely rural, with compact town and village centers. Hence, the construction of the Interstate system was generally more disruptive to the natural environment and working landscapes than to the built environment. Nonetheless, the impact was certainly felt, most notoriously in the case of Romaine Tenny, who, facing the prospect of losing his family farm to build an interchange in Weathersfield, nailed

his doors and windows shut, set his farm on fire, and shot himself (O'Connor 2024).

In Burlington, the project area was largely undeveloped, but there was a small village cluster within and just south of the project area. Most of the old development has disappeared, with several properties becoming part of the highway and most others redeveloped into more auto-oriented forms set back from the road. Nonetheless, fragments remain.

While I-89 and I-189 both left the developed areas of Burlington and South Burlington minimally impacted, Burlington nonetheless engaged in a period of "slum clearance" as part of Urban Renewal initiatives. During the 1960s, Burlington would grind into dust 27 acres of largely immigrant neighborhoods in the center of the city. It developed in its place office towers, government buildings, and a large complex comprising a hotel and a massive windowless mall that together subsumed five blocks of the city.

Burlington is in Chittenden County, which was suburbanizing in the 1950s. Burlington's population by 1960 had dropped below 50% of the county's total (Keller 2023). To save the old city, as the logic of the time went, it needed to be made accessible for the new suburban automobile-driving middle class.

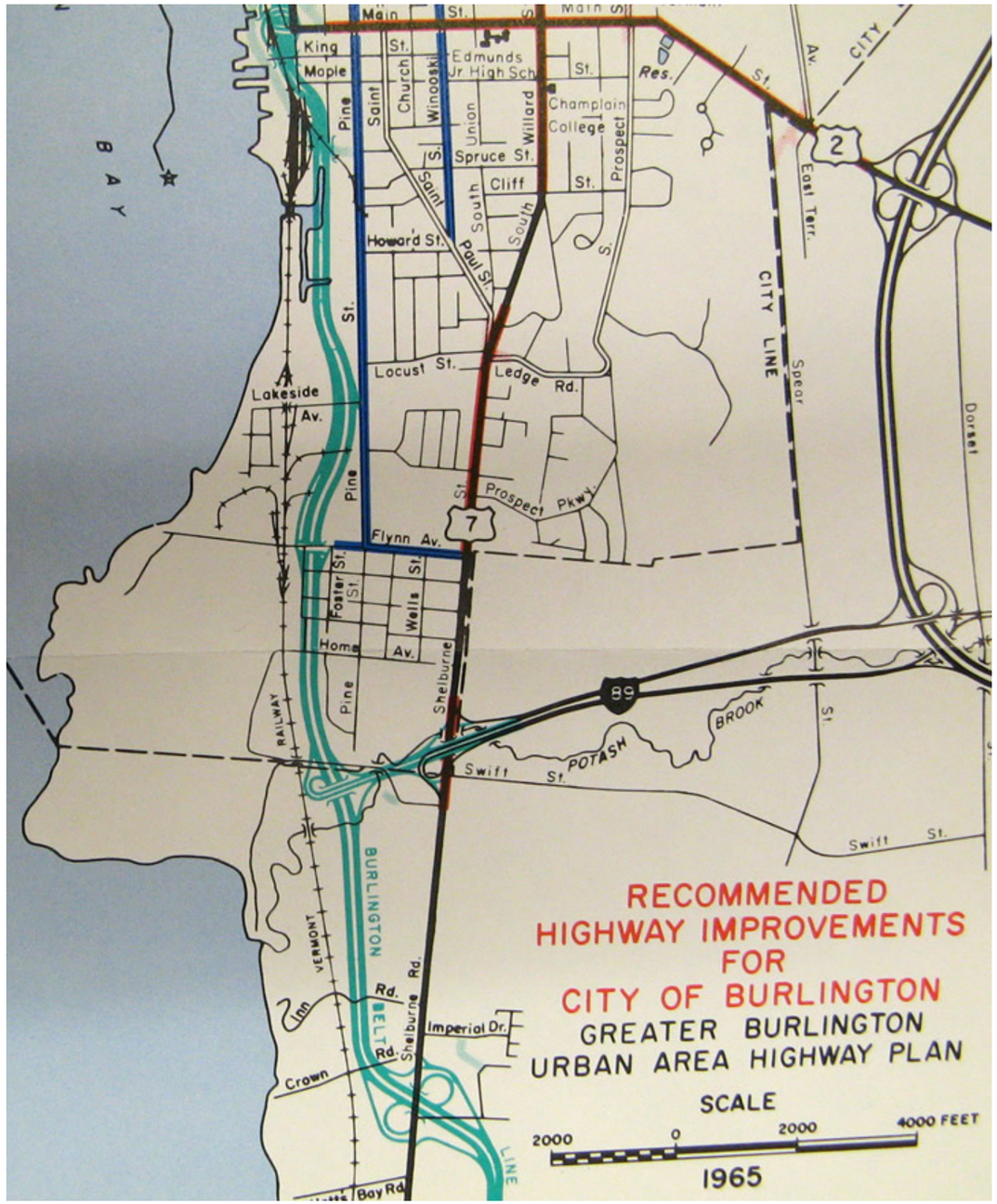

Figure 3: Burlington Beltline Plans (Greater Burlington Urban Area Highway Plan, 1965)

To that end, just as Burlington was refurbishing what was then considered an ‘outdated design’ for its downtown, the State Highway Agency was planning for a new freeway that would extend I-189 straight into the core of Burlington. The Burlington Beltline, proposed in 1965, was to be an elevated expressway that would cut through the city and provide access to downtown as well as the industrial South End. (Figure 3) Without strong political support, the project failed to advance, and in the 1970s it was scaled down to a ground-level highway that would connect Shelburne Road and I-189 to the downtown (Silberman 2019).

Dubbed the ‘Southern Connector’, this proposal moved forward but was beset by issue after issue, which tied the project up. The most significant finding was that the Pine Street Barge Canal, a site through which the highway was planned to run, was contaminated with oil and coal tar. The federal Environmental Protection Agency (EPA), established in 1970, would end up designating it a Superfund site. By 1987, the city was serious enough about the project that it constructed the first connection to Shelburne Road. However, a solution to the Superfund site never materialized, and the project once again stalled out.

During the 1990s, the project would officially become the “Champlain Parkway” and the city would take control of the project from the state (Lyons 2022). In 2002, the project officially slimmed down to just one lane in each direction. In the 2010s, the project would finally take the shape now under construction.

Under Mayor Miro Weinberger, the city voted to set the final speed at 25 MPH and made final changes to the design to align it with the city’s Complete Streets policy (City of Burlington 2025). After clearing final hurdles, the project started construction in 2022 and officially opened the first section in 2024.

Figure 4: A historic street facing structure on Shelburne Road (Google Maps)

Figure 5: P roject Area (ArcGIS Online)

EXISTING CONDITIONS

Overview

This section describes the existing conditions of the project area, including the following topics:

- Project Area and Surroundings
- Pedestrian Facilities
- Cyclist Facilities
- Transit Facilities
- Vehicular Facilities
- Current and Future Land Use

Project Area and Surroundings

The project area is located at the southern edge of Burlington, Vermont, and the northern edge of South Burlington, Vermont, centered on the US-7 (Shelburne Road)/Interstate 189 (I-189) interchange. The extent of the study area includes Shelburne Road and its adjacent parcels, reaching from Queen City Park Road in the north to just south of the I-189 interchange (Figure 5).

Dominant features include the Shelburne Road Shopping Plaza on the west and the Gateway Shopping Center on the east, both of which generate significant vehicular and pedestrian activity. Shelburne Road serves as a key north-south arterial with up to six

lanes in this segment. Transit service is provided by numerous bus routes operated by Green Mountain Transit (GMT), Tri Valley Transit (TVT), and Vermont Translines. The area is a complex interface between commercial strip development, tall multifamily structures, and suburban residential neighborhoods, with major transportation facilities, including I-189 and US-7, layered through it. This complexity is compounded by the fact that the area spans two municipal jurisdictions—Burlington and South Burlington—which influences infrastructure ownership, zoning, and planning.

The project area is quite complex in terms of ownership, as it straddles the boundaries of the municipalities of Burlington and South Burlington and involves roadway right-of-ways owned by Burlington, South Burlington, and the State of Vermont. The 189-Shelburne Road interchange is owned by the State of Vermont and operated as part of the Federal Interstate System. Vermont has a program called “Class 1 Town Highways”, which allows local communities to take over state-owned highway ROWs along with the maintenance of the facilities (apart from resurfacing). Burlington took over the portion of Shelburne Road within their boundaries as a Class 1 Town Highway, while the State of Vermont still owns and maintains the portion of Shelburne Road within South Burlington. South Burlington owns and maintains several cross streets that intersect Shelburne Road within the study area: Queen City Park Road, Swift Street, and Lindenwood Drive. A further complicating factor is the ‘intersection’ formed by the entrances to Shelburne Road Shopping Plaza (west side) and the Gateway Shopping Center (east side). Only part of the intersection is within the Burlington-owned ROW; the remainder is within each respective shopping center parcel (Figure 6).

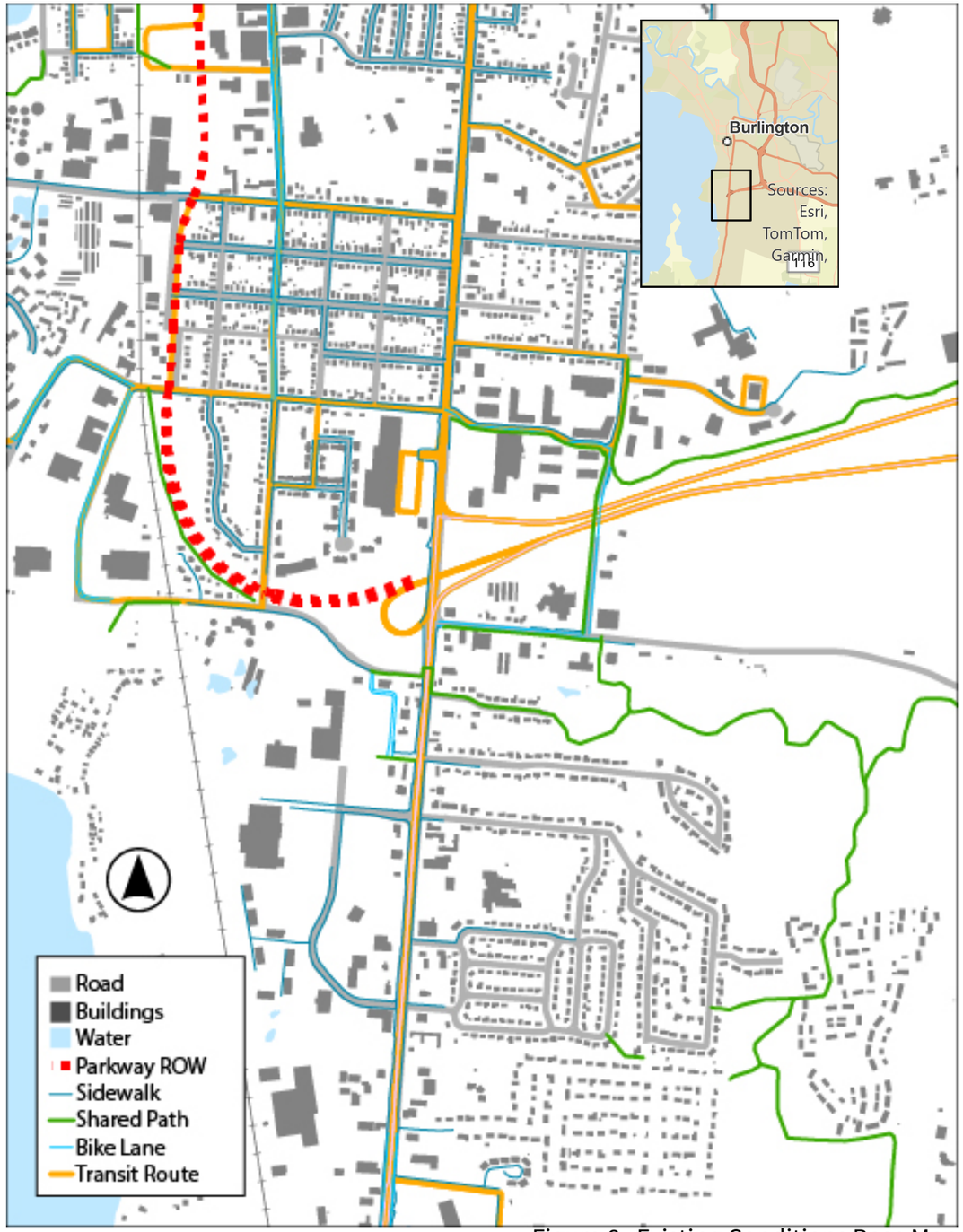

Figure 6: Existing Conditions Base Map

Pedestrian Facilities

Sidewalks are present on the Shelburne Road corridor throughout the project area. They extend north into Burlington, which has the most comprehensive sidewalk network in the State of Vermont, and over 5.5 miles south all the way to the Town of Shelburne's Village Center. While pedestrian facilities are present in the study area, Shelburne Road is primarily auto-oriented, and pedestrian safety and comfort are not prioritized. This is evident in the design of the interchange, which provides curb-tight sidewalks on the bridge that are in parts separated from high-speed auto traffic by a 1' shoulder. Crosswalks across the on- and off-ramps are unsignalized and require pedestrians to rely on drivers to yield as they enter the ramps, which are curved to allow traffic to turn without slowing down. Additionally, the intersection north of the interchange formed by the entrances to the two shopping centers has no north-south connectivity whatsoever, forcing pedestrians to make an extensive detour around the area, or cross two slip lanes and three lanes of traffic (Figure 7).

North of the interchange, almost all local streets intersecting Shelburne Road have sidewalks that connect into a more urban grid pattern. South of the interchange, some sidewalk spurs branch off from Shelburne Road to serve commercial developments, while most residential streets lack sidewalks. These residential streets operate as de facto "shared spaces" owing to their suburban design, which prevents through traffic by deliberately not connecting to a larger grid system.

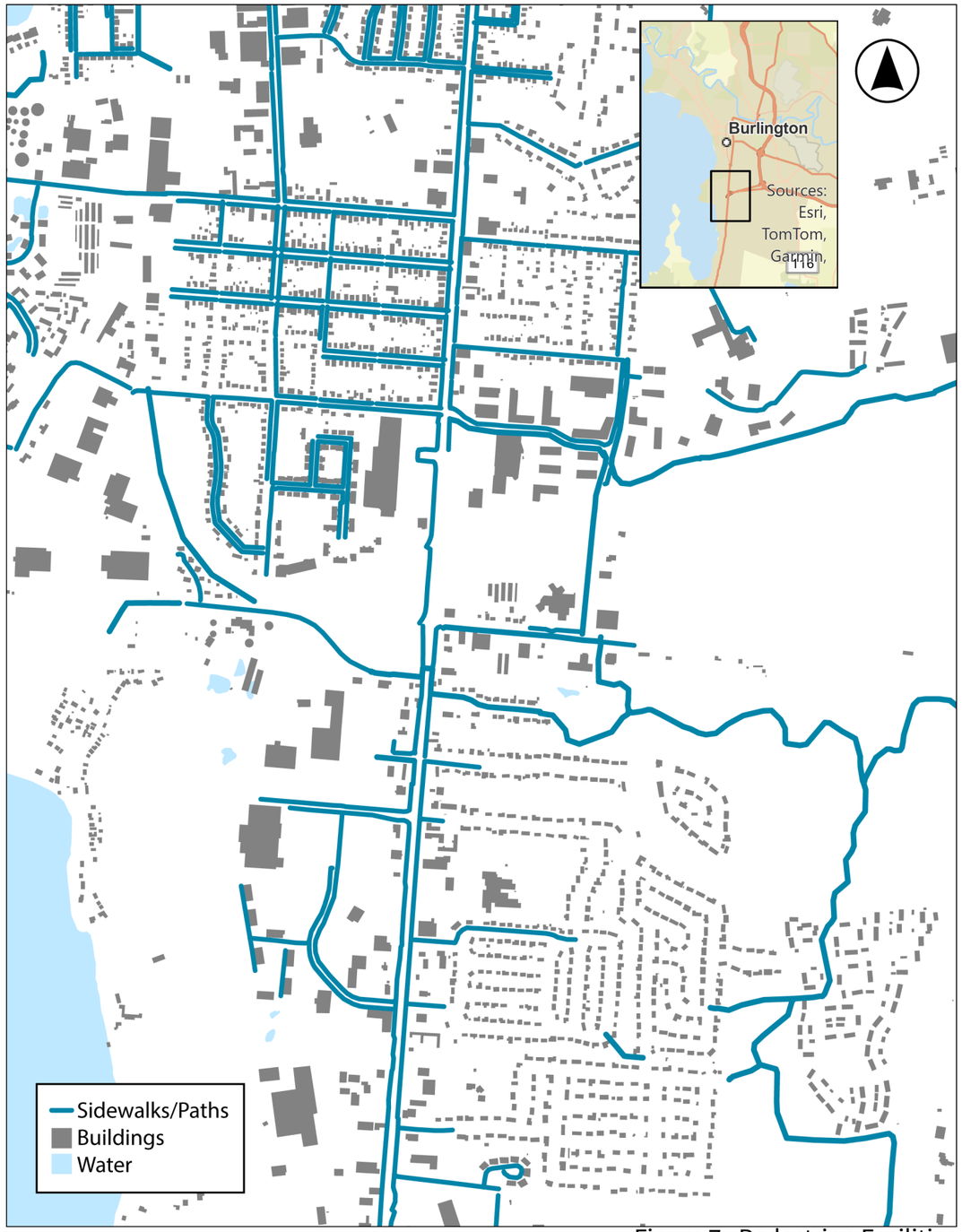

Figure 7: Pedestrian Facilities

Cylcist Facilities

Shelburne Road has on-road painted bicycle lanes that extend from the southern end of Shelburne Village all the way to Imperial Drive in South Burlington, just .86 miles south of the US-7/189 interchange (Figure 8). While there are no dedicated bicycle facilities directly within the project area, there are two short sections of road with painted bike lanes that offer lengthy detours around Shelburne Road. One is to the east of Shelburne Road, on Farrell St, which travels under 189 at an underpass. The other is located on a private road called Hannaford Drive that serves the Gateway Shopping Center. Near the project area, there are northbound bike lanes on Pine Street. A number of shared-use paths are in close proximity to the project area. These paths are either expanded sidewalks or off-street greenways. The expanded sidewalks provide access to local destinations or serve as connecting segments for greenways.

The greenways were originally developed for recreation but provide long-distance, low stress routes that rarely intersect with the street grid, making them well suited for long-distance bicycle travel. West of the interchange, the Burlington Bike Path travels north the length of Burlington and then continues into neighboring Colchester. East of the interchange, the South Burlington Recreation Paths provide connections north into South Burlington's main commercial center as well as east into predominantly single-family residential neighborhoods.

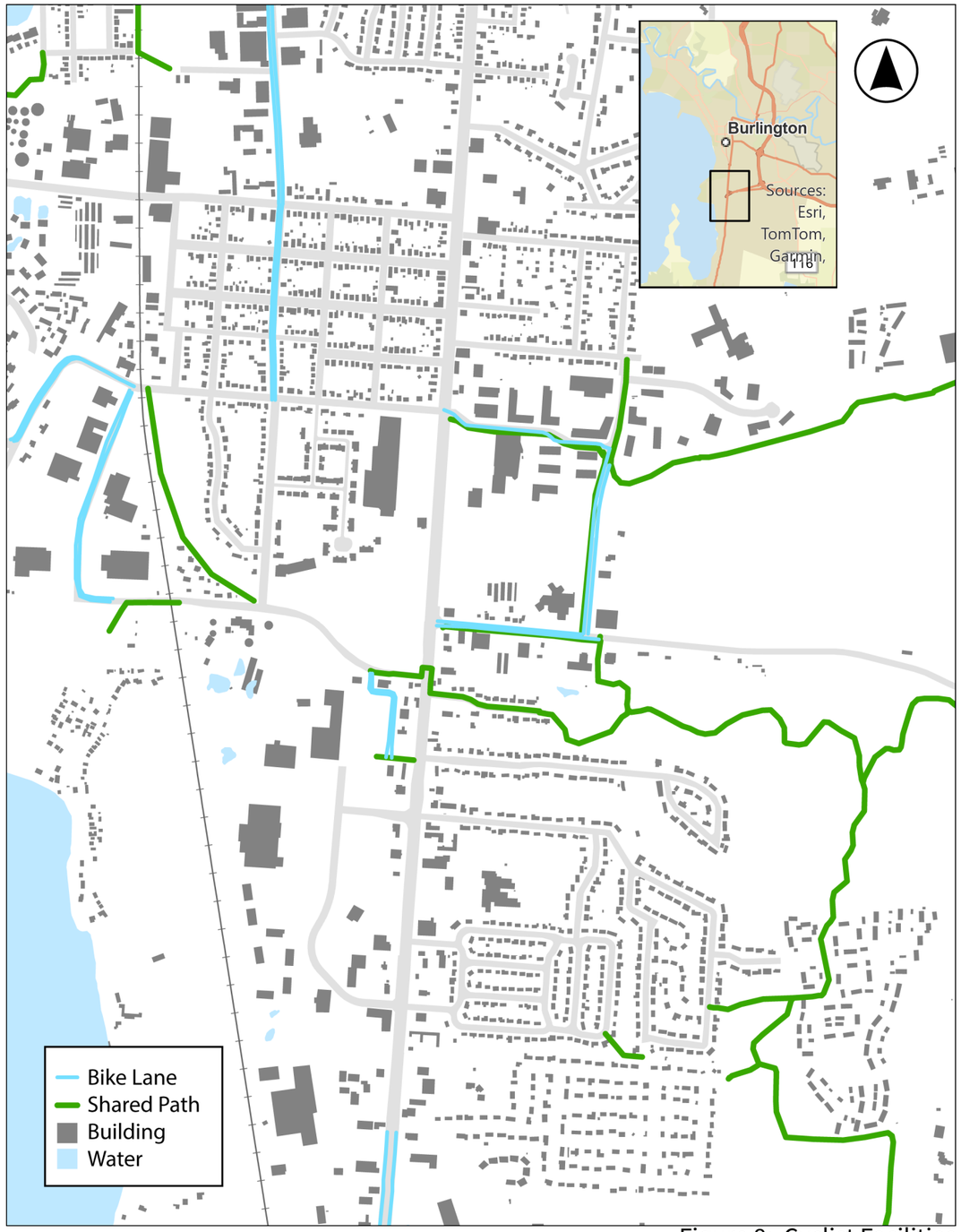

Figure 8: Cyclist Facilities

Transit Facilities

Three transit routes travel north-south on Shelburne Road, and one transit route travels east-west along I-189 and then heads north-south on Shelburne Road through Burlington. One of these routes is jointly operated by Green Mountain Transit (GMT) and Tri Valley Transit (TVT), and two others are operated exclusively by GMT and TVT, respectively. The last is operated with state subsidy by a private intercity bus company, Vermont Translines (Figure 9).

GMT Shelburne Road Route: GMT's Shelburne Road route provides service between the downtown Burlington Transit Center and the Vermont Teddy Bear factory in Shelburne, travelling primarily along Shelburne Road/US-7. It is by far the most frequent transit service through the project area. Although service varies between weekdays and weekends, as well as between peak and off-peak hours, the GMT Shelburne Road route starts operating at 6:00 AM on weekdays and ends at around 11 PM, with peak headways of 20 mins.

TVT LINK to Burlington: TVT's LINK to Burlington route provides service from Middlebury, VT to downtown Burlington, VT and travels primarily on US-7. It operates Mon day through Friday, with four northbound and four southbound trips a day, two in the morning and two in the evening each. On Saturday, it has three northbound and three southbound trips a day, spaced out evenly.

GMT/TVT 116 Commuter Route: TVT & GMT's 116 Commuter Route provides service from Middlebury, VT, to downtown Burlington, VT. The 116 Commuter Route travels primarily on Vermont Route 116 (a state highway) and connects to Shelburne Road by way of I-189. It only operates Monday through Friday, with four northbound and four southbound trips a day, two in the morning and two in the evening each.

Vermont Translines #7 Bus: The Vermont Translines #7 is an intercity long-distance bus route that connects Albany, New York, with Colchester, Vermont. It has two northbound and two southbound trips a day.

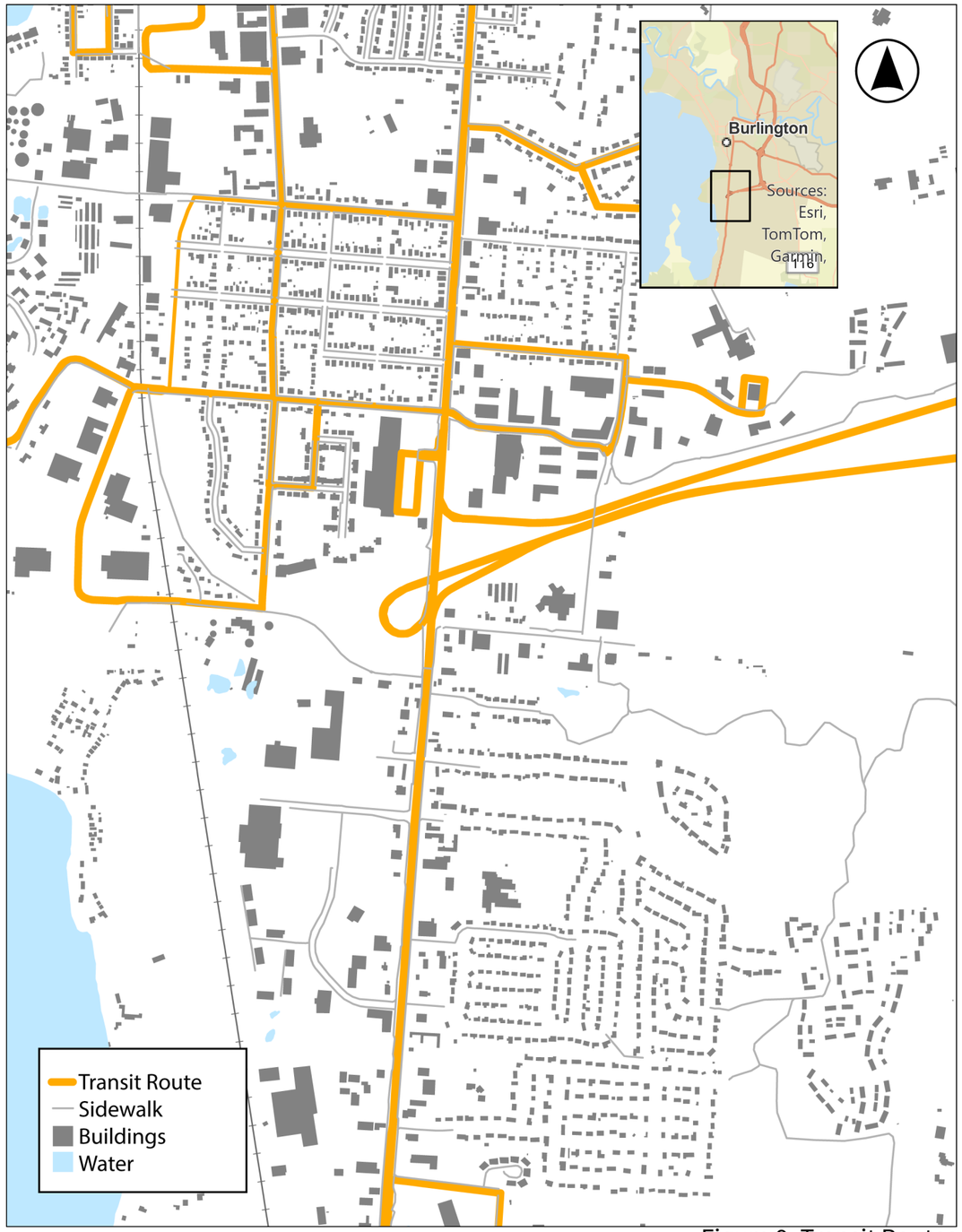

Figure 9: Transit Routes

Vehicular Facilities

The project area itself focuses on the currently unfinished Shelburne Road Interchange. The interchange is a 'Partial Cloverleaf' with half of its ramps out of commission. Compared to a Cloverleaf Interchange, this design has two fewer ramps and features traffic lights at off-ramps. It also occupies less land area than a full Cloverleaf Interchange. To the east of the project, the short Interstate 189 (a two-lane limited-access freeway) connects to both South Burlington and Interstate 89, one of Vermont's main Interstates. To the west, I-189 is planned to change to a single lane and slow down to 25 MPH as it transitions into the 'Champlain Parkway'. Running north-south through the project area is Shelburne Road, which is designated as US Route 7, a major highway for the western half of Vermont. Directly in the project area, Shelburne Road is mostly six lanes wide to accommodate traffic turning off the Interstate. To the south, Shelburne Road transitions into a five-lane road with a center left turn lane and two travel lanes on either side. To the north, Shelburne Road transitions into a four-lane road with two travel lanes on either side (Figure 10).

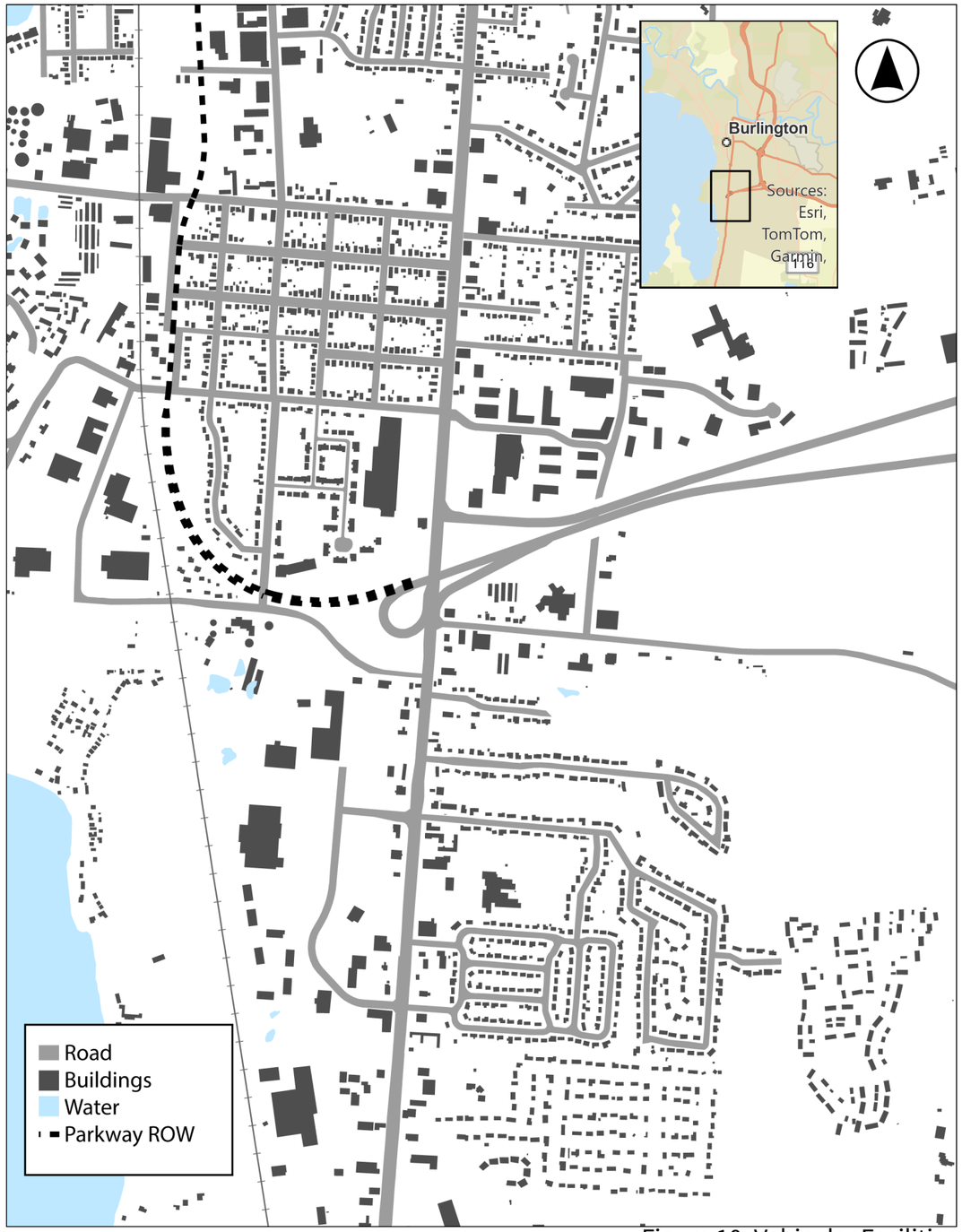

Figure 10: Vehicular Facilities

Current & Future Land Use

CURRENT LAND USE

Land use immediately surrounding the project area is primarily low-density commercial strip de streets intersecting Shelburne Road. South of the project area is predominantly auto-dependent sprawl. North of the area, the land use diverges depending on which half of the street it occupies. The western side is located in Burlington and is entirely residential, predominantly single-family, with some multifamily properties as well. Conversely, the east is located in South Burlington and is predominantly mixed-use with large office buildings, large multi-family apartments, commercial strip developments, and other uses sprinkled in, with the tallest structure reaching six stories.

ZONING

Though the project area straddles the boundary between two municipalities, planning for the area has been coordinated between the communities, in part with help from the Chittenden County Regional Planning Commission. As a result, although the zoning districts differ in content, they are largely aligned in encouraging mixed-use development and multifamily housing. However, it is interesting to note that

Figure 11: Image of new mixed use development on Shelburne Road (Google Streetview)

South Burlington, which developed mostly after World War II in a suburban sprawl pattern, actually has more permissive mixed-use zoning compared to Burlington. Additionally, Vermont's signature statewide land use Law, Act 250, saw a massive overhaul through Act 181. Although the final boundaries are subject to change and will not be fixed until the State Land Use Review Board approves them, Act 181 imposes a lot of hard requirements around districts, meaning the final map in the study area will likely not change in any substantive way.

This section discusses the Land Use districts in each respective

community, followed by a discussion of the Act 181 Future Land Use districts and their implications for the study area, as well as alignment and areas of mismatch between the separate land use regulations. The map presents a simplified view of existing zoning, combining districts into general land use categories (Figure 12).

CITY OF BURLINGTON

MIXED USE

Neighborhood Activity Center: This zoning district encompasses the Shelburne Shopping Center Plaza, "intended to provide convenient neighborhood and city-wide-oriented goods and services and employment opportunities within walking or biking distance of many of the city's residential areas" (City of Burlington 2024). Ground-floor residential is banned within 25 feet of a public ROW to encourage an active streetscape, while single-story commercial is also banned with two-story developments marking the minimum allowable. Though the district doesn't set a maximum for stories, it sets a maximum height of 35', effectively banning anything over three stories tall. Commercial and Residential are the only two allowable uses in the district. An 80% lot coverage is allowed with a FAR of 2.0.

RESIDENTIAL

Residential Corridor: This zoning district covers the west side of Shelburne Road, north of the Neighborhood Activity

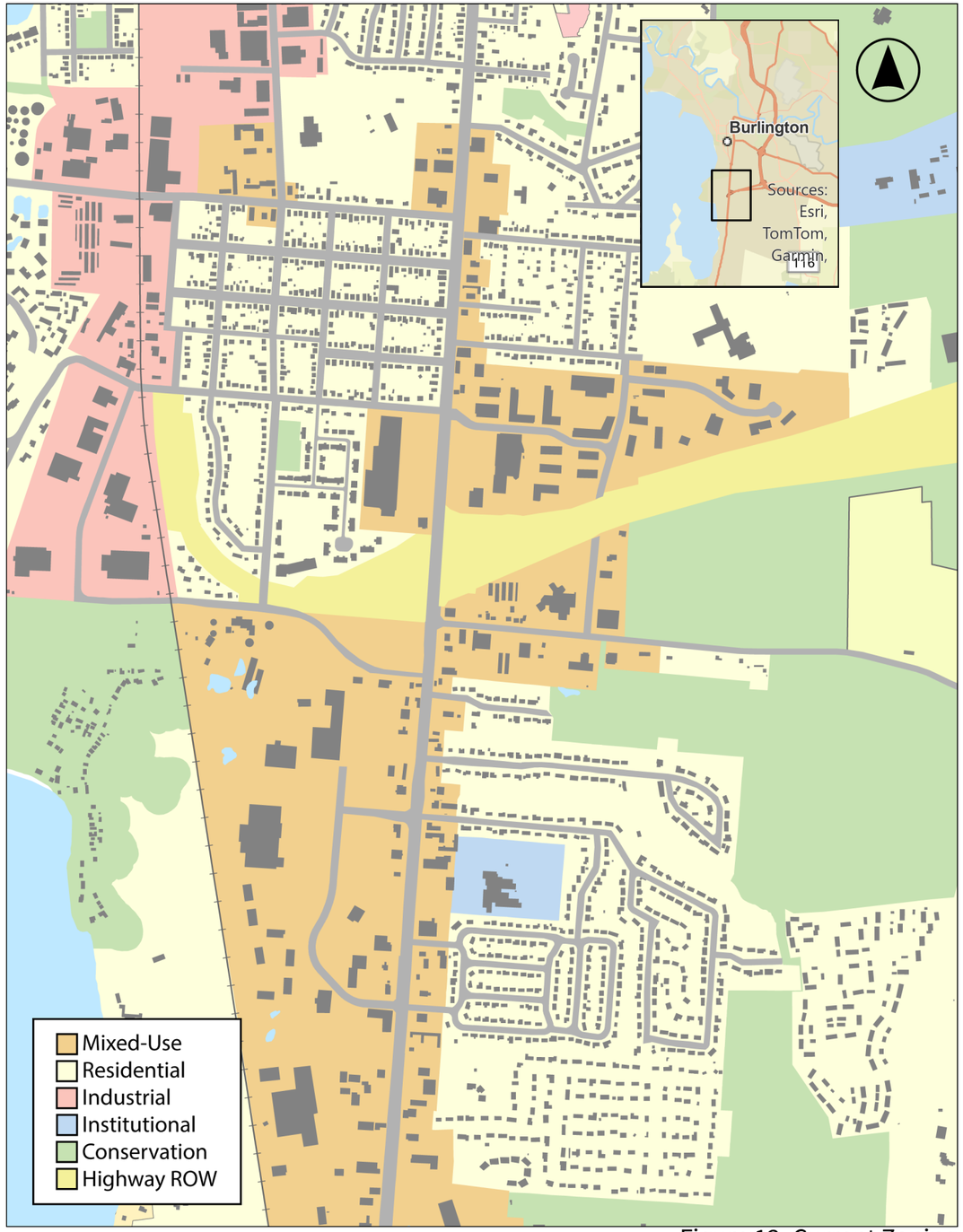

Figure 12: Current Zoning

Center district, and “is intended for residential development that includes a mix of housing types such as duplex, triplex, quadplex, townhouse, and mid-sized, multi-unit and mixed-use buildings along a major multi-modal transportation corridor” (City of Burlington 2024). The district allows for a max height of 50’ with development up to four stories tall with 80% lot coverage. While the district does allow for an ‘Exception for Commercial Use,’ it is restricted to “Historic Buildings” and commercial uses already in existence, meaning it effectively bans new commercial uses but grandfathers in existing commercial uses.

Residential Low Intensity: This zoning district covers the residential areas in Burlington to the northwest of the I-189 interchange that are off Shelburne Road and is “is intended primarily for residential development that includes a mix of housing types such as single detached dwellings, with or without accessory dwelling units, duplexes, triplexes and quadplex organized in a compact neighborhood-scale” (City of Burlington 2024). It allows up to four dwelling units with a max height of 35’ and three stories with 45% lot coverage.

GREENSPACE

RCO – Recreation/Green Space: The large parcel of land owned by the City of Burlington, on which the Champlain Parkway is being constructed, is currently zoned for Green Space, although this largely served to preserve the land while the project was in limbo, so the requirements of the district are not discussed here in detail. This district is represented on the map as “Highway ROW”.

CITY OF SOUTH BURLINGTON

MIXED USE

Higher Scale Mixed Use: Most of the land around the project area in South Burlington is zoned for dense mixed-use development in order to encourage “higher-intensity residential, retail, office, and vertically mixed uses to serve or enhance a compact central business area” (City of South Burlington 2024 p. 82). This district has a variety of allowed uses, only prohibiting major industrial uses and some specific commercial uses, like auto dealerships. Any residential housing below three dwelling units is banned, and the district allows up to 5 stories covering up to 70% of the lot.

Commercial 1 Automotive: There are several parcels of land south of the Study Area that are occupied by auto dealerships and zoned to maintain this current use. This district is identical to Higher Scale Mixed Use, while allowing automotive commercial uses, like automotive rental services and auto dealerships. Nonetheless, major multifamily mixed-use development remains permitted.

RESIDENTIAL

Low-Scale Neighborhood: The suburban residential areas that

are off Shelburne Road are zoned for residential in order to "encourage primarily residential use in smaller building types (single-family, duplex, and small-multifamily homes) within existing neighborhoods" (City of South Burlington 2024 p. 80). Building heights are capped at no more than one story higher than abutting structures.

GREENSPACE
Institutional & Agricultural/Parks & Recreation: There are two districts to the East/Southeast of the project area, which represent Farrel Parks and Conserved Forests. Since these districts largely serve to conserve existing green space, they are not discussed in detail.

ACT 181 (Figure 13)
GROWTH AREA
DESIGNATED VILLAGE CENTER: Two sections of the area surrounding the project have been identified as a 'Designated Village Center', which is intended to represent a mixed-use center at a smaller scale than a 'Downtown'. While it does not prescribe specific uses, which is left to local zoning, Act 181 sets housing targets for each municipality, and requires them to submit plans to accommodate this much housing growth primarily in Designated Centers, as well as the larger planned growth areas. As a result, the previously described zoning districts may be amended to accommodate even larger housing developments. Additionally, this district allows for tax reductions and priority access to affordable housing funds.

PLANNED GROWTH AREA: Very similar to the Designated Village Center, but without access to the same tax breaks and housing funds.

CONSERVATION
Rural Conservation: This designation is meant to put strict protections on existing conserved areas, as well as river corridors. This covers a buffer around Potash Brook, which passes through the I-189 interchange.

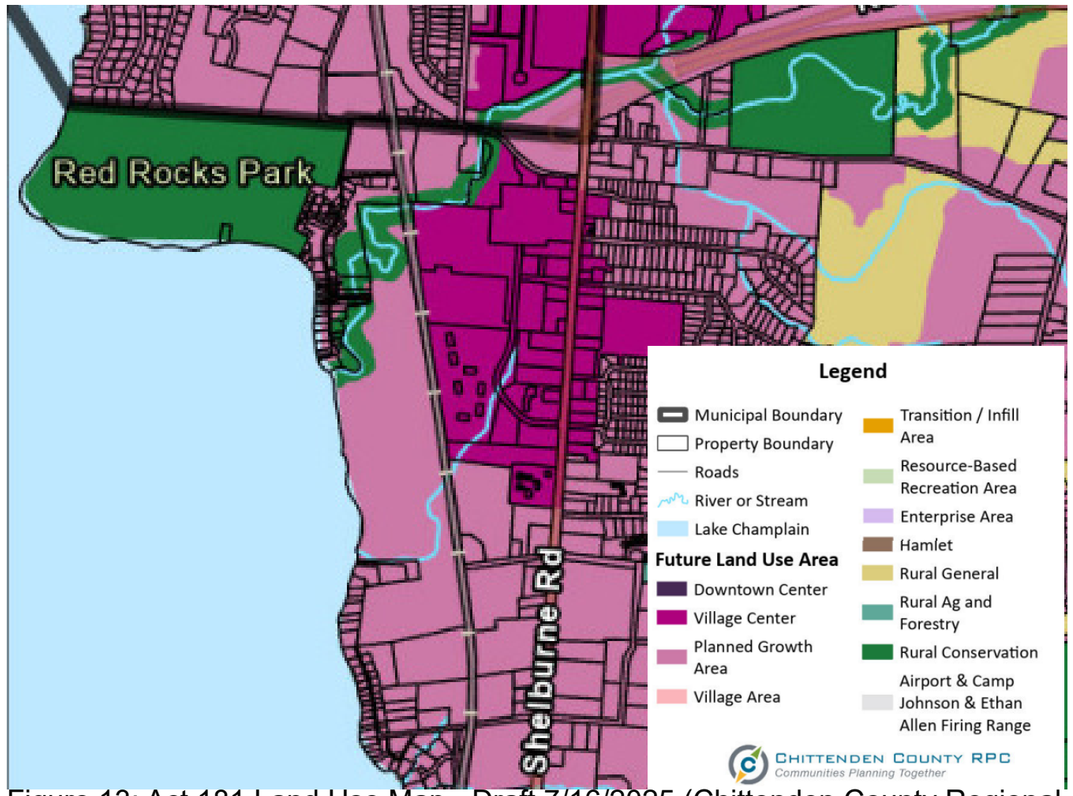

Figure 13: Act 181 Land Use Map - Draft 7/16/2025 (Chittenden County Regional Planning Commission

Challenges & Issues

The main circulation challenge in the study area from a pedestrian perspective is the large volume of unsignalized crossings that need to be made (Figure 14). Unsignalized crossings are pedestrian crosswalks that have no light or signal system. Pedestrians have the right-of-way at these crossings, and vehicles are expected to yield. However, in reality, driver yielding rates are below 100%, and the actual chance a driver will stop for you is largely determined by speed, and therefore, predominantly by roadway design. Roadway designs that favor higher speeds are characterized by curves as opposed to right angles.

Curves allow for turning to be done without slowing down. The closer to a right angle a turn is, the slower a vehicle will have to turn. Curves are best suited for high-speed limited-access highways, where vehicles slowing down to make sharp turns or turning onto the road at a sharp turn could create a collision with the existing free-flowing traffic. Curves also generally increase traffic flow by allowing high-speed turning movements. However, when curves and highway design meet pedestrian crossings, the result is generally low compliance, creating friction between a pedestrian who has a right to cross and a driver who is piloting a multi-ton vehicle that would suffer little to no damage in a collision with a pedestrian. Furthermore, the lack of signal systems means that these crossings lack auditory signals to pedestrians with vision disabilities, creating a situation so dangerous that many would likely avoid it entirely.

In the study area, the interchange creates nine separate unsignalized pedestrian crossings, five on the west and four on the east (Figure 15). These create a barrier to safe pedestrian travel. Conversely, if the area were configured as an at-grade intersection, the number of north-south crossings would drop to one signalized crossing on each side.

Figure 14: Uncontrolled pedestrian crossing across off ramp (Google Streetview)

Unsignalized crossing

Sidewalk

Figure 15: Crosswalks Current Conditions

DESIGN OPTIONS

Summary of Design Options

This design study evaluates three progressively transformative alternatives to improve the safety, accessibility, and land-use efficiency of the Shelburne Road interchange area. Each scenario reflects a different level of intervention, balancing feasibility, safety, multimodal connectivity, and long-term community goals.

1. Small-Scale Improvements

Focus: Immediate, low-cost safety enhancements within the existing roadway configuration. The area remains fundamentally auto-oriented.

- No changes to the current interchange geometry or vehicular flow.
- RRFBs (Rectangular Rapid Flashing Beacons) would be installed at nine unsignalized crossings to increase driver yielding and pedestrian visibility.
- Pedestrian-scale lighting added at all crossings to address night-time visibility concerns.
- Improvements enhance crossing safety but do not address geometric barriers that limit walkability and bikeability.

2. Minor Modifications

Focus: Mid-range interventions to simplify the interchange and enhance multimodal safety, while maintaining grade separation.

- Modifies existing ramps to meet Shelburne Road at 90-degree angles, reducing crossing conflicts and speeds.
- Redundant ramps removed, and modal filters (a transportation corridor that restricts vehicle traffic but allows cyclists and pedestrians) implemented to reduce vehicle complexity and prioritize active modes of walking and cycling.
- Signalized intersections replace uncontrolled slip lane crossings (curved lanes that allow vehicles to change roads without passing through a controlled intersection), consolidating pedestrian/bike crossings and improving control.
- Shared-use paths (10’ wide) added on Shelburne Road for safe bike/ped connectivity with existing and planned networks.

3. Full Reconstruction

Focus: Long-term vision for a fully integrated, multimodal, mixed-use district. Represents a transformative opportunity to address regional housing needs and promote a more connected, sustainable urban form.

- Replaces grade-separated interchange with at-grade intersection to free up substantial urban land acreage
- Repurposes interchange land for green spaces, paths, stormwater restoration, and mixed-use housing development.
- Introduces Dutch-style bike infrastructure with grade-separated bike paths through a park-like network.
- Realigns Queen City Park Road to meet Swift Street, forming a new rectilinear street grid.
- Envisions restoration of Champlain Flyer commuter rail, transit signal prioritization, and broader corridor transit improvements.

Small Scale Improvments

The Small Scale Improvements Scenario assumes that there are no changes to the current interchange footprint or flow. As such, this scenario focuses on small-scale improvements to the unsignalized crossings.

The first improvement is the installation of nine Rectangular Rapid Flashing Beacons (Figure 16) at every unsignalized crossing through the project area (Figure 17). The Rectangular Rapid Flashing Beacon (RRFB) is a traffic control device first granted interim approval by the Federal Highway Administration (FHWA) in 2008 (FHWA 2019). Since then, it has been adopted across the United States, and often cited as a useful tool for increasing pedestrian safety at unsignalized crossings (Blackburn et al. 2018), especially in the context of free-flowing highway ramps (CalDOT 2010, Delaware Valley Regional Planning Commission 2019). RRFBs are a modified version of the Manual on Uniform Traffic Control Devices (MUTCD) pedestrian yield signage, which adds a rapid flashing light beacon activated by a crossing button. Although typically installed at pedestrian crossings, RRFBs can also be located at shared bike/pedestrian crossings. Though the exact efficacy of RRFBs at increasing yielding by drivers varies depending on the context studied, research has shown a marked improvement in safety and yielding (Fitzpatrick 2016).

Figure 16: Rectangular Rapid Flashing Beacon at crosswalk (Carmanah)

The second improvement is the addition of proper crosswalk lighting directly above all the crossings. At night, low visibility combined with geometry favoring high-speed vehicle traffic creates a potential hazard for crossing pedestrians. Existing lighting is not placed directly at crossings and is not pedestrian-scaled. Research strongly suggests that appropriate lighting combined with RRFBs contributes to significantly higher visibility of pedestrians for drivers at uncontrolled crossings (Bhagavathula 2023).

However, it should be noted that without making any changes to existing geometry, the area will remain auto-oriented and generally hostile to bicycle or pedestrian travel.

Rapid Flashing Beacon

Sidewalk

Figure 17: Small Scale Improvements

Minor Modifications

The Minor Modifications scenario assumes that the existing bridge structure would be modified within the existing footprint, and that the overall grade separation would be maintained. This represents a practical compromise that addresses the biggest active transportation safety issue, frequent uncontrolled crossings (New Jersey Bicycle and Pedestrian Research Center 2008), by forcing the interchange ramps to meet Shelburne Road at normal 90-degree angles (CalDOT 2010).This allows for combining the ramps into signalized intersections, reducing the number of bike/ped crossings from one signalized and two unsignalized slip lane crossings to one signalized crossing. However, while the intersection remains grade separated, the larger gap in the urban fabric created by an interchange remains. The key improvements are highlighted below and keyed to the map on Figure 18.

1. Installation of 10’ bicycle/pedestrian shared-use paths
Creates protected routes for bikes to travel through the area along Shelburne Road. These paths would connect to paths under construction, which connect west into residential Burlington neighborhoods.

2. Removal of redundant ramps
These two on-ramps help facilitate traffic flow, but are redundant and can be removed. As slip lanes, they create high-speed, uncontrolled bicycle/pedestrian crossings, which creates the potential for accidents.

3. T-ing up on-ramps and creating signalized intersections.
The remaining on-ramp slip lanes are removed by aligning them with the off-ramps to create 90-degree intersections (t-ing up). This creates slower speed turning movements and reduces crosswalk length. Additionally, this allows the on- and off-ramps to be combined into one signalized intersection, allowing bikes and pedestrians to just make a single crossing at one intersection.

4. Creating a modal filter
Currently, Queen City Park Road connects to the eastbound off-ramp, creating several intersections and ramps. In order to simplify traffic flow, the connection to the ramp is severed, with vehicle traffic able to link up to Shelburne Road just under 700 feet south. The existing shared-use path is extended all the way to the intersection to maintain the current connection for bikes and pedestrians.

Figure 18: Minor Modications

Full Reconstruction

The Full Reconstruction option operates under the framework of imagining how to configure this key intersection in order to best meet the goals of Burlington and South Burlington: to see Shelburne Road transition into a mixed-use urban extension of Burlington's traditional development patterns. As such, it is uninhibited by the practicality of implementation. Nonetheless, imagining what could be is a critical first step in changing perspectives on what is possible.

While the minor modifications scenario would improve existing safety for bicycles and pedestrians and move the needle in a meaningful way towards a truly multimodal network, it does not address one of the fundamental problems with the interchange. Grade-separated roads, while having some safety benefits and improving vehicular flow, are far more land-intensive than at-grade intersections. This, combined with the awkward intersections with Queen City Park Road, creates a large gap in the urban fabric, which is generally unpleasant and uncomfortable to traverse. On the western side of Shelburne Road, the interchange creates a gap of over 1,200 feet between buildings. Not only does it create a gap that is very noticeable on foot or by bike, but it also creates an opportunity cost in that it uses land that could be put to more productive uses, such as housing.

Figure 19: Bicycle Underpass - Netherlands.

As such, the full reconstruction scenario imagines the creation of an at-grade intersection, and the repurposing of the excess interchange land for a new network of grade-separated bike paths traveling through green spaces and potential mixed-use development. However, such a massive change would have implications far outside the direct area of study, so several other improvements to the larger area are discussed, although not in detail. Those are larger bike network improvements, changes to Shelburne Road to implement a median U-turn design, and the re-establishment of the Champlain Flyer commuter rail service.

Figure 20: Project Area in Context

CONCEPTUAL RECONSTRUCTION

The full reconstruction concept focuses on freeing up the existing land used by the interchange to create a network of green spaces sewn together with walking and biking paths. It flips the existing grade separation on its head, reframing it from a design technique to maximize vehicle free flow into a technique to maximize cyclist free flow. It is inspired by Dutch bicycle network design, which prioritizes the separation of modes at high-volume intersections and roads (Figure 21).

1. As shown in the existing conditions, this intersection marks the meeting point between three off-street shared-use paths that travel primarily through wooded gr een spaces. The reconstruction option continues this concept by tying all three paths together into a connected network. “Interstate 189” would cease to exist, with the entire segment redesignated as the Champlain Parkway with a lower design speed, creating a gentler transition to the new at-grade intersection.

2. The portion of the project area north of the new Champlain Parkway intersection would become a protected river park. The current sections, which are buried, would be daylighted, restoring the river’s ability to handle greater stormwater flows. Vermont has experienced significant flooding in recent decades, and with increasingly erratic weather patterns, stormwater resilience is critical. Park space is a natural use of this area given the need to restrict development.

3. The area southwest of the new intersection would be reimagined as an entirely new neighborhood, seeking to maximize developable space to create what would be one of the largest greenfield sites in Burlington. Burlington has lots of medium-density residential neighborhoods, which, due to their historic character and small lot sizes, are challenging to densify in a cost-effective way. This has contributed, along with other factors, to an extreme housing crisis that ripples throughout the area. By creating multiple large-scale sites under public control, there is an enormous opportunity for these areas to not just provide housing, but provide non-marketized housing through either community land trusts or even public housing (assuming the Faircloth Amendment is repealed (NCH 2022)).

Rough massing is provided to give a sense of the development potential, with the focus on creating an active commercial street frontage with residential units on upper floors. Backyard/courtyard spaces could have ground-floor residential units that open directly onto pedestrian paths, allowing for flexible home/office setups where visitors/clients could go directly to a front door rather than dealing with an apartment building lobby/internal circulation. Interior sections of development parcels could be a combination of green space

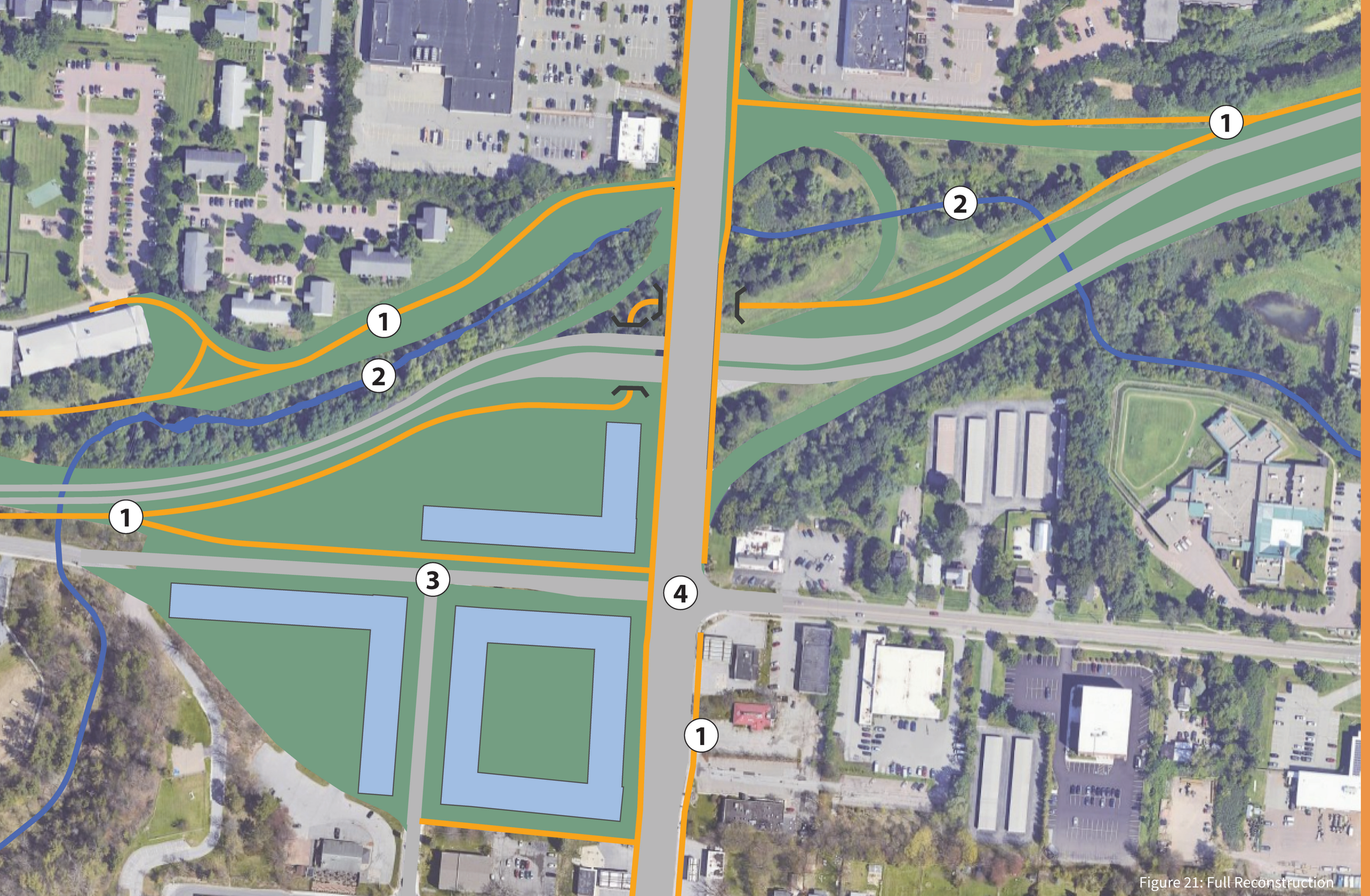

Figure 21: Full Reconstruction

and cottage/row house clusters.

4. Queen City Park Road is realigned with Swift Street to create a new four-way right-angle intersection, helping to create a more urban feel.

The former Champlain Valley Commuter Rail Line, which was established during a major construction project on Shelburne, would be restored and implemented as part of the full reconstruction, which would involve major disruptions to the existing traffic flow at the interchange.

Transit signal prioritization, a signalization technology that allows lights to favor whichever flow of traffic a transit bus is trying to use, would be installed throughout the Shelburne Road Corridor to ensure convenient bus service.

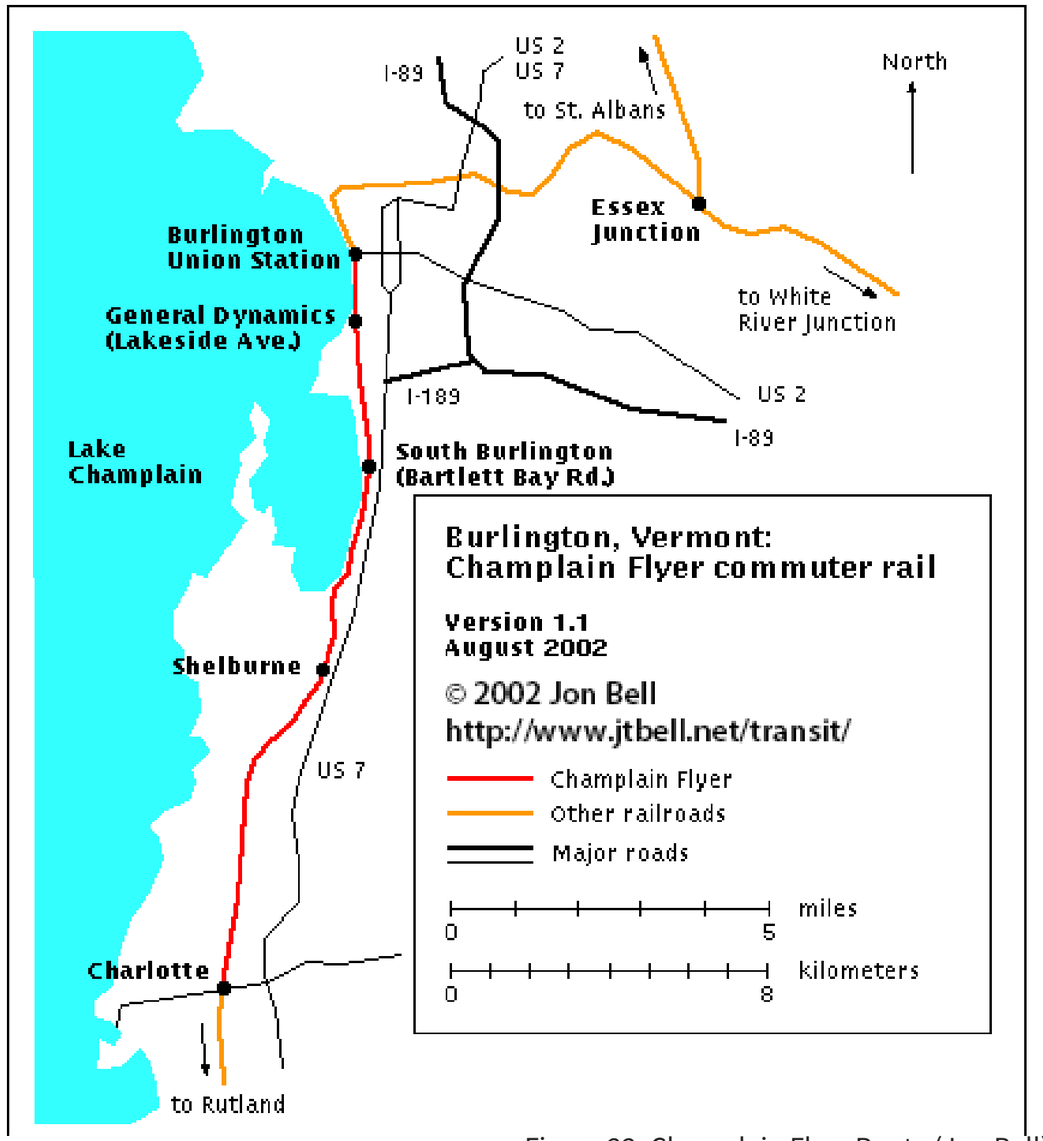

Figure 22: Champlain Flyer Route (Jon Bell)

Bike Network Expansion

To truly grasp the impacts of this reconstruction on the larger bike network, it is helpful to see it in a larger context. This proposed larger network largely draws on the existing Burlington Walk Bike Masterplan and the Chittenden County Regional Active Transportation Plan. Bike facilities are defined by two main conceptual categories.

'Separate Bike Facility' represents a facility that is completely separated from motor vehicle traffic. This generally comes in the form of either one-way protected bike lanes on either side of the street, a two-way cycleway on one side of the street, or a path shared with pedestrians in areas with lower bicycle and pedestrian volumes. Separate bicycle facilities generally are implemented along high-stress routes featuring heavy traffic and speed limits higher than 25 MPH, or as a modal filter.

'Bike Lane/Shared Street' represents a facility that is not separated from motor vehicle traffic. This generally comes in the form of either painted bicycle lanes next to vehicle lanes, a traffic-calmed or naturally low-traffic (due to cul-de-sac) neighborhood greenway, or advisory bike lanes with a shared center vehicle lane. These facilities are generally implemented on lower traffic roads with speeds of 25 MPH or less.

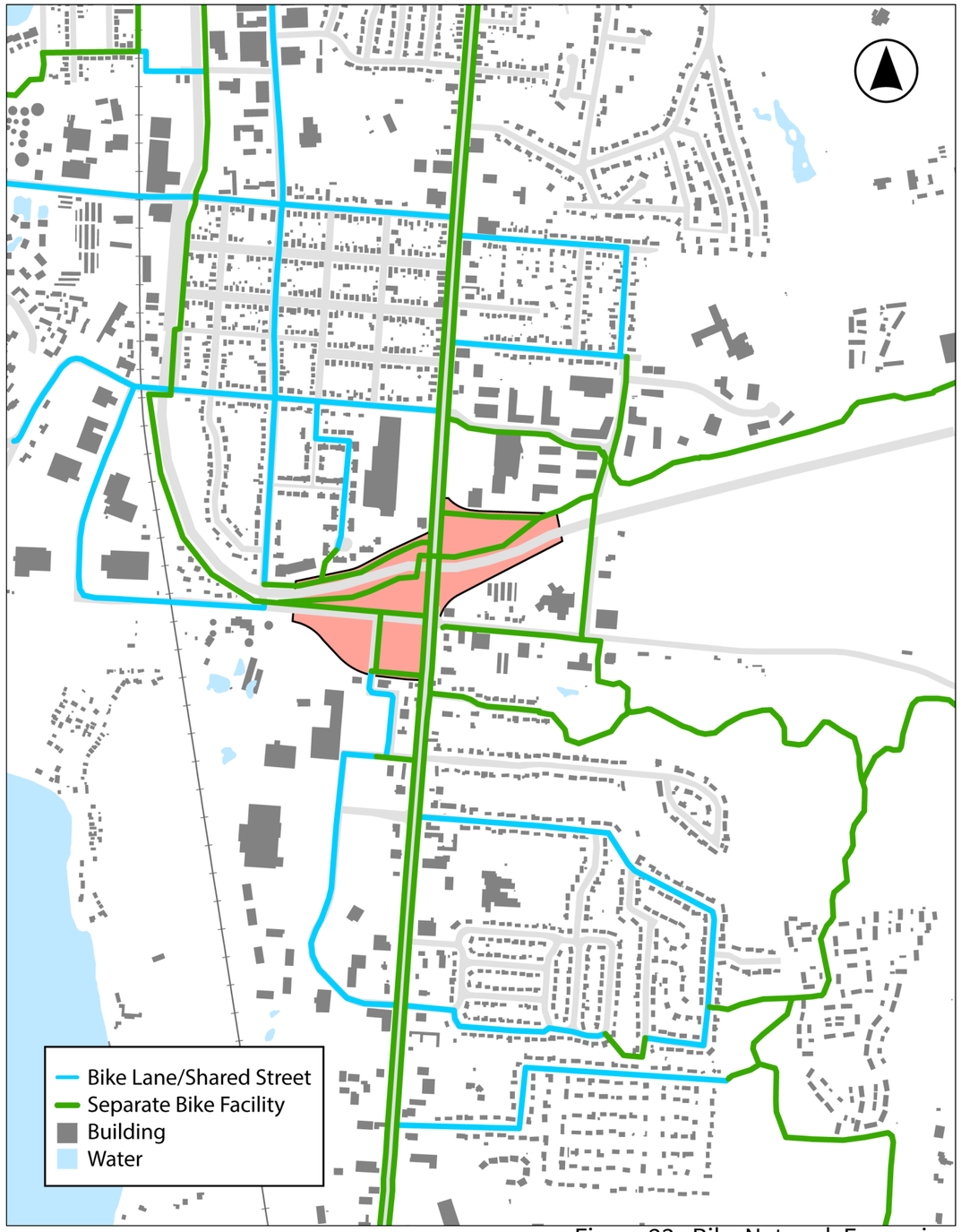

Figure 23: Bike Network Expansion

LITERATURE REVIEW

Introduction

As discussed throughout, this project is deeply informed by history, in both its inspiration from and opposition to thinkers and planning policies of the past. It is largely in opposition to auto-oriented transportation and land use planning, which have created a whole host of negative externalities from worsened air quality, to traffic violence, to reduced childhood independence. It is inspired by sprawl repair and pedestrian and cyclist-focused transportation planning theory and practice. Interstate I-189 represents the border that marks the dissolution of the historical walkable, bikeable, mixed-use urban fabric and the beginning of Euclidean sprawl. By applying new urbanist sprawl repair principles, integrated with a larger active transportation network and vision, this project takes the larger lessons of history and modern practice and focuses them on a location where a new future can be considered

Pedestrian planning

The practice of planning urban areas and streets for pedestrian use is one of, if not the, oldest practices in the field of urban planning. The first cities in Mesopotamia (7,500 BC) were developed almost entirely with the pedestrian as the primary user, although Urban Planning as a distinct vocation would not emerge until the 19th century. The need to develop ways of mitigating conflicts between pedestrians, horses, and carriages has long been a factor in designing streets and setting public policy. Sidewalks were initially developed as a means of providing a clean and dry place for pedestrians to walk, out of and above the muck and manure of the street. Haussman's famous and much-contested renovation of Paris marks a key example of how the narrow and winding human-scale pedestrian streets of medieval cities were replaced with wide boulevards where defined space for pedestrians and carriages facilitated the rapid movement of vehicles.

Haussmann's boulevards presaged one of the core issues in pedestrian planning that remains to this day. These new arterials "were from the start burdened with a dual function: to carry the main streams of traffic across the city and to serve as major shopping and business streets; and as the volume of traffic increased, the two proved to be ill-compatible."(Behrman 1983 p. 158) With the advent of the automobile, the basic incompatibility between streets' function providing local access and streets' function as facilitating high-speed through traffic would come into sharp focus. This would lead, as Berhman

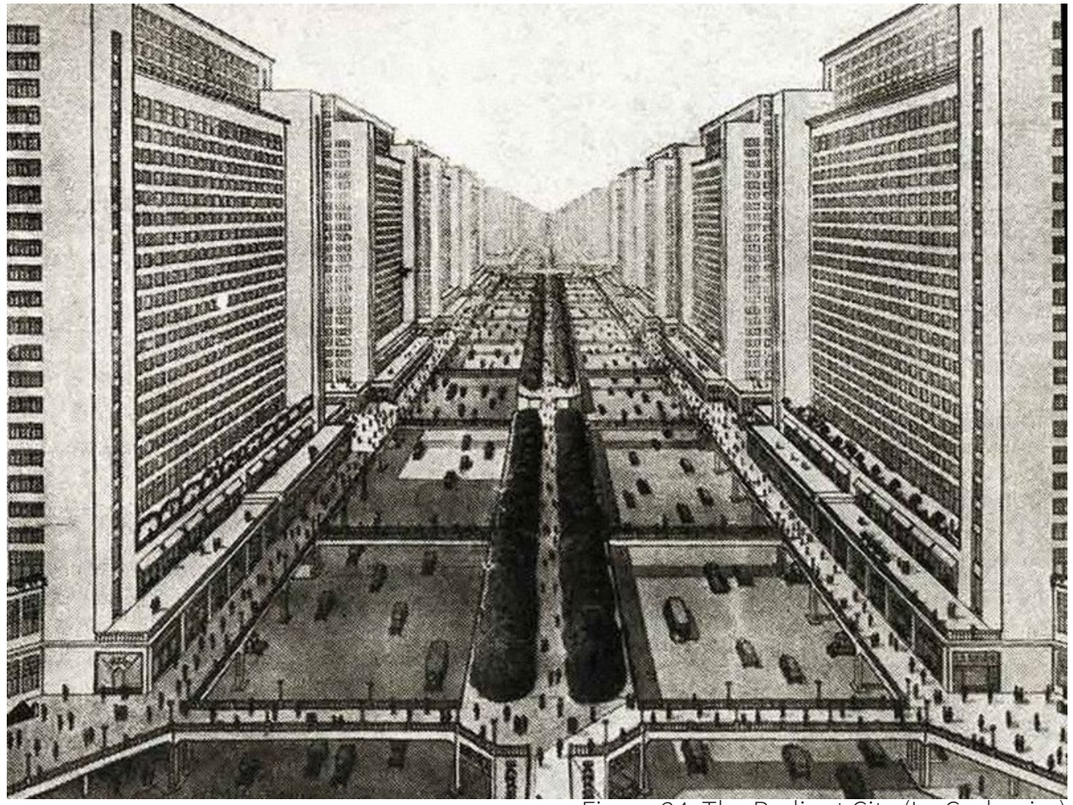

Figure 24: The Radiant City (Le Corbusier)

recounts, to the 20th-century desire to "kill the street" (Behrman 1983 p. 168)exemplified by the Swiss-French architect, Le Corbusier (Corbu). Corbu's prescription for the vehicle/pedestrian conflict was a complete annihilation of the city as historically constituted, and its replacement with a new city built of 'towers in the park' connected with vertically separated dedicated routes for cyclists, transit, and pedestrians.

Corbu's tower in the park and pedestrian-free expressways would find significant purchase in mid-20th-century American urban planning, through the triumvirate of slum clearance, public housing, and urban freeways. Hacking apart American cities with Moses' famous "meat axe" to facilitate their 'modernization'(Caro 1974). However, while many historical street grids and human-scale neighborhoods and districts were destroyed en masse following WWII , many still remained. These existing neighborhoods were retrofit in order to conform to the needs of the new apex predator of the street, the car, with pedestrians relegated to the edges, forced to either cross at defined points when given proper

signals, or risk crossing wherever they could and facing potential traffic violence or consequences from a legal system which increasingly defined this as a crime called “jaywalking” (Stromberg 2015).

Throughout this process, there was resistance both from citizens and within professional educated circles, although this resistance mostly failed to influence public policy. One early example is that of ‘Play Streets, which emerged in New York City in the early 20th century as primarily women’s groups organized to have streets closed to traffic to facilitate children’s play (Ephemeral New York 2019). Jane Jacobs’ takedown of top-down mid-century planning, The Death and Life of Great American Cities (1961), provided a strong case for bottom-up urbanism that favored walking and human-scale neighborhoods and cautioned planners to enhance what was there, rather than wholly wipe it away for some grand vision. Although initially rejected by many of her contemporaries, like Lewis Mumford, Jacobs’ ideas had percolated through the planning profession and the academy by the 1980s. One key figure in the Urban Planning profession was Donald Appleyard, who published the seminal work Livable Streets in 1981, which laid out a convincing case that the streets of the day no longer served pedestrians and human needs as they increasingly were designed and engineered to facilitate vehicle traffic flow (Appleyard 1981).

Growing concerns around the mid-century automobile paradigm would manifest in a major federal policy shift, with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991 (Horan et al. 1999). ISTEA expressed clearly that bikeways and pedestrian walkways were both a core part of the nation’s multi-modal transportation system, while including new funding for the planning and construction of such projects. In Vermont, this act resulted in the first statewide Bicycle Pedestrian Plan, as well as the first statewide design guidance for the building of pedestrian and bicycle facilities (National Center for Walking and Biking 2002).

In 2012, Jeff Speck wrote in Walkable City that “We’ve known for three decades how to make livable cities—after forgetting for four—yet we’ve somehow not been able to pull it off” (Speck 2012 p. 3). While there has been extensive literature since the 80s and 90s that furthered our understanding of best practices in design and planning, largely the question has shifted from “what to do” to “how to do it”. Today, it is largely a question of political will, and that is built only from creating a coherent narrative of how we got here and how we can fix it. A century ago, Le Corbusier’s vision of a brave new world of gleaming towers and high-speed expressways must have seemed totally unachievable. Yet as the modernist narrative of faith in technological progress and the ability to fundamentally do away with the dirty, old, congested city took hold, the world was remade. Today, we must

Figure 25: The Unrestrained Demon of the Wheel (Judge Magazine)

provide visions of a potential future on a grand scale, and “make no little plans” in order to bring the potential world identified in planning literature to life. In the words of the late David Graeber, “The ultimate hidden truth of the world is that it is something that we make, and could just as easily make differently” (Graeber 2015 p. 102).

Bicycle planning

Bicycle planning has had a curious history. Emerging on the scene in the late 1800s as a new vehicle for both transportation and recreation, early bicycle advocates were some of the first to promote paved roadways in service of facilitating faster bicycle travel. Some early cyclists, seen as behaving in a reckless manner, were dubbed “scorchers” and treated in much the same way as vehicles would be soon, as high-speed invaders into slow streets that created public safety hazards (Herhily 2004).

In Los Angeles in 1900, today the poster child for American mid-century sprawl and urban highway construction, a grand ‘cycleway’ was opened, which was a nine-mile elevated track connecting Pasadena and Los Angeles (Haddad 2021). However, just as quickly as cycling boomed in the 1890s, it increasingly fell out of fashion as automobiles became more widespread and affordable. The bicycle was seen as the first ‘mechanical horse’, and while it continued to be a popular source of recreation, its use as a mode of transportation declined precipitously. Recreational bicycle paths continued to be built throughout the 20th century, although they were typically limited to parks and did not provide any connection to bicycle-specific infrastructure on larger transportation networks (Verhily 2004).

However, bicycle infrastructure planning would re-emerge in the 1960s and take a strangely and uniquely American turn. Though bicycling declined overall in the previous decades as automobiles became more available, it remained popular with college students who generally had less disposable income and were traveling shorter distances. Particularly in California, there were attempts to build early bicycle infrastructure, most notably in Berkeley, which developed a network of bicycle lanes, which were inspired by design standards from the Netherlands.
These efforts would lead the California Department of Transportation to look into the development of engineering guidance for the construction of standardized bicycle facilities, which was developed in 1971 (Schultheiss et al. 2018).

However, this guidance was never published, and in 1975, California convened a State commission to review the existing document and develop a final proposal that could be adopted. At this time, John Forester appeared, an idiosyncratic traffic engineer and cyclist who would shift the development of bicycle planning in the US in an entirely new direction. Forester was an avid proponent of ‘Vehicular Cycling’, which argued that bicycles are safest when they act and are treated like vehicles, taking the entire lane and not being relegated to a side path. Thus, there was little need to plan for bicycles, as existing roads were sufficient.

Forester developed and published Bicycle Transportation: A Handbook for Cycling Transportation Engineers (1977), which sharply criticized existing research, such as the 1971 CalDOT guide. Forester’s handbook became incredibly influential on the California State Bicycle Commission, which codified vehicular cycling as the proper way to accommodate bicycles in the 1978 Caltrans Bicycle Guide. In 1981, the American Association of State Transportation and Highway Officials (AASHTO) developed new engineering guidance for bicycles under the direction of Richard Lemieux. Lemieux would model this largely on the 1978 Caltrans Guide, which affirmed that separated infrastructure was neither safe nor desirable. (Schultheiss et al. 2018)

This engineering guidance, though wrapped in the veneer of objectivity and rationality, was in fact reflective of a deeply political perspective. It was the merging of Forester’s deep philosophical objections to being relegated to a side path and the perspective of FHWA officials who, in the words of Lemieux, believed “that highway users pay highway taxes and nobody else has a right to use that money” (Schultheiss et al. 2018 p. 10). Protected bikeways were banned completely and barred from using federal funding. Funding for bicycle planning and infrastructure largely dried up at the federal level, and the engineering prohibition against separated bike lanes made such planning at the local level difficult. During this period, painted on-street bicycle lanes were some of the only dedicated infrastructure constructed along with off-street recreational paths.

During the 1990s, with the passage of ISTEA, federal funding was once again unlocked, and a new wave of bicycle planning, planners, and academics advanced new research that challenged the Vehicular Cycling model. One major author of this period was John Pucher, who, like the planners and engineers of the early 1970s, turned to northern Europe and their methods of planning for bicycles and pedestrians. Pucher argued that traffic calming, and road narrowing to support safer pedestrian crossings as well as separated bicycle lanes provided far greater safety benefits than the American model, which prioritized motorists as the highest and most important road user (Pucher et al. 2000).

In 2006, City of Portland Bicycle Pedestrian Coordinator Roger Geller developed a typology that sorted cyclists into four main categories: The Strong and the Fearless, The Enthused and Confident, The Interested but Concerned, or No Way No How (Geller 2006). These categories identified what type of infrastructure these cyclists would be comfortable riding on. The Strong and Fearless represented cyclists who preferred to ride on the road and preferred it to separate infrastructure. Geller posited that Strong and Fearless represented just 1% of Portland’s population, Enthused and Confident represented 7% of the population, and interested and concerned represented 60%. The purpose of these categories was to make the case, as Pucher did, that the way to make cycling safer and more accessible to the larger population meant developing safe, separated infrastructure. Pucher and Geller, along with others, advanced the argument that the philosophy of ‘Vehicular cycling’ advanced by Forester was one that was only relevant to 1% of the population.

Peter G. Furth further developed this argument through the concept of ‘traffic stress’, find-

ing that current methods of bicycle network design that favored cycling in the street or in painted bicycle lanes did not serve the needs of all cyclists. Furth suggested that separated bike lanes were necessary to serve all users (Furth 2008). Furth further developed this point with Nixon and Mekuria into the notion of low-stress networks, creating methodologies of classifying streets according to traffic stress level. In order to develop proper bicycle transportation networks, a combination of low-traffic streets, lanes, and paths completely separated from vehicle traffic into a combined 'low stress network' (Furth et al. 2012)

The evolution of bicycle planning in the United States reveals a uniquely conflicted trajectory shaped by shifting cultural values, infrastructural priorities, and ideological battles over the role of bicycles in the transportation network. From early enthusiasm and innovation at the turn of the 20th century to the mid-century dominance of automobility and the rise of vehicular cycling dogma, the development of dedicated bicycle infrastructure was long stalled by both philosophical opposition and institutional inertia. However, the resurgence of interest in active transportation in the 1990s, fueled by new federal funding and comparative research into European planning practices, catalyzed a paradigm shift. Contemporary frameworks—such as Geller's cyclist typology and Furth's low-stress network methodology—have emphasized the need for infrastructure that serves a broader and more diverse population. This renewed focus on comfort, safety, and inclusivity signals an important turn in the field: one that acknowledges the political and social dimensions of infrastructure design and aspires to create environments where cycling is not just possible for the fearless few, but practical and appealing for the many.

Sprawl

Sprawl in the U.S., though typically most associated with the 20th century, has its main roots in 19th-century railway suburbs. Sprawl, which is at its core the expansion of an existing urban area into surrounding undeveloped land, has existed as long as cities have, but took on a radically new dimension in the face of urbanization and industrialization. What we think of today as sprawl is the result of rapid developments in transportation technologies, which opened up land and created conditions for real estate development (Hayden 2004). First, it was the commuter rail and interurban rail that enabled railroad suburbs to be purposely built outside of cities (1840 – 1900). Passenger heavy rail was expensive and ensured that these new communities were accessible only to the upper class.

Next came streetcar suburbs (1870 – 1920), which extended existing streets with considerably cheaper light rail technology, expanding cities contiguously, and making housing along its lines affordable to the working class. This phase of expansion was largely reflective of the existing city fabric, but on a lower density scale. Streetcar suburbs were built around the pedestrian, featuring quiet residential streets generally arrayed along commercial corridors. Still, they established important fixtures that would define future sprawl, such as a need for cheap housing as well as a desire to escape the 'congested' city center into a place seen as more suitable for middle family life (Jackson 1985), or to put it another way, 'bourgeois utopia' (Fishman 1987).

While both types of 19th century suburbs carried on into the 20th century, the rise of the automobile as a mass consumer product would radically reshape the form that sprawl development took. As Jackson puts it, "Automotive families had neither to wait nor to walk". The first major suburban sprawl expansion occurred in the 1920s, as public highways started to extend out of major cities, paid for by general tax revenue. Typically, the non-railroad suburbs of this time were 'auto-oriented' but not wholly 'auto-dependent'. With the economic collapse of the late 1920s and the Great Depression of the 1930s, suburban development slowed substantially, although there were several innovative suburban projects that would emerge from the laboratory of the New Deal (1933-1941). However, during the New Deal, the Federal Government established the Federal Housing Administration, which would guarantee low-income mortgages. This, along with the Homeowners Loan Corporation and other programs, would create a massive government subsidy program that would warp housing markets towards the production of single-family housing (Rothstein 2018). Demand for which could only truly be satisfied by sprawling out into verdant, undeveloped land on the periphery.

After WWII, these New Deal programs combined with further federal programs like the GI Bill and the Interstate Highway Act would facilitate suburban sprawl on a scale never before seen in human history. It would also facilitate a new era of segregation, with FHA mortgages and GI Bill mortgages restricted exclusively to white buyers (Rothstein 2018). Early post-war sprawl maintained some semblance of the old urban neighborhoods with partial grid patterns and sidewalks, although Euclidean zoning, which strictly separates residential from commercial areas, severely limited their walkability. Levittown, New York, built in the late 1940s and the first of several Levittowns, was archetypal of this period of sprawl.

The 1950s would see further innovations in auto-dependent sprawl design. Victor Gruen pioneered the first fully enclosed shopping mall in Minnesota (Southdale Center, 1956), which sought to make the old urban shopping district obsolete with new enclosed, climate-controlled interior and copious parking supply on the exterior. Concurrently, the Interstate Highway Act and Urban Renewal set in motion a monumental public works

Figure 26: Black Panther Stoplight Plaque (Read the Plaque)

program that would see the old urban centers made newly accessible for the mobile suburban class, and enabled the redevelopment of the old city centers with gleaming glass and steel office towers. The new suburban life was one in which automobiles whisked this newly mobile white middle class from enclosed destination to enclosed destination, with foot travel relegated largely to short trips from car to building, or for pure recreation.

Those who remained in the old city centers, primarily non-whites who were barred through a web of official and unofficial segregation, typically lacked access to the new world of automotive freedom. As pedestrians, they sometimes paid with their lives for the reconfiguration of urban streets to serve high-speed auto through-traffic (Bungee 1971). In an often forgotten story of the civil rights struggle of the 1960s, members of the Black Panther Party in Oakland staged a protest against dangerous road conditions outside a local school, and armed with high-caliber weaponry, blocked the road to allow children to walk to school safely. The city, eager to avoid continued confrontation, installed a stoplight (Murch 2007).

Sprawl would continue to accelerate throughout the 1960s, 70s, and 80s, with new developments becoming even more car-dependent. Connectivity was eschewed almost entirely in favor of dendritic street patterns and cul-de-sacs, with sidewalks often seen as a relic of the past. However, during the 1980s and 1990s, a new movement grew towards a return to the older, pre-WWII models of urban design. Most famous of these was New Urbanism, advocated for by key figures such as Andres Duany, Elizabeth Plater-Zyberk, and Leon Krier. Seaside, Florida, designed by Duany and Plater-Zyberk's architecture firm DPZ, was one of the earliest examples of these principles being put into practice (Silver 2006). While New Urbanism provided a guide to developing new greenfield 'sprawl' that resembled more the old streetcar suburbs, it was not sufficiently adopted to counteract prevailing patterns and auto-oriented sprawl continued to proliferate as the dominant mode of suburban development.

During the 2000s, a new generation of New Urbanists turned their attention to the question of how to begin to repair the oceans of existing auto-oriented sprawl. To be sure, 'Sprawl repair' projects existed prior, such as the Mashpee Commons redevelopment of a strip mall into a 'new town center' on Cape Cod, but these early projects were few and far between. Suburban retrofits rely primarily on market forces to drive changes, so despite all of the arguments advanced by planners, architects, and designers, it required a shift in consumer preferences that favored walkability. Though design manuals, like the "Sprawl Repair Manual", often show renderings of entirely auto-oriented sprawl being redeveloped incrementally into New Urbanist neighborhoods, implementation so far has been on a

much smaller scale.

Although the implementation of Sprawl Repair has been limited, it is vital to help create visions of a future where the vast negative externalities of sprawl can begin to be wound down. Putnam famously identified Sprawl as one of the drivers in the decline of the American community in Bowling Alone (Putnam 2000). Sprawl has been identified as a key driver of increased vehicle miles traveled, and of course, all of the negative externalities that accompany that, such as increased greenhouse gas emissions and traffic congestion (Sentoff 2024). From a politically conservative perspective, sprawl has been critiqued heavily by former engineer Charles Marohn, who, with others, demonstrated that sprawl math often does not add up, with the low-density development patterns creating a larger infrastructure burden than the tax revenue generated can afford to maintain in the long term (Marohn 2019). Sprawl has also been linked to the ongoing housing crisis in the U.S., as decades of zoning that locked in sprawl left areas unable to easily grow and adapt to meet the needs of current generations (Infranca 2010).

Many academics, planners, and public policy specialists of varying political ideologies have come to associate sprawl with a whole host of negative outcomes. We know that sprawl is one of the core problems that is at the root of many of today's overlapping crises, environmental, economic, and social. The question now is how to start to repair the damage?

Conclusion

Although transportation and land use planning theory have changed quite drastically since the high modernist 1950s, there remains a large amount of infrastructure and development from these eras that still structure daily life for vast swathes of the population. A renewed focus on bicycle and pedestrian planning has seen the most success in existing urban areas where street grids and land use patterns already support non-automotive transportation modes. Similarly, sprawl repair has been most successful in these same areas, where the previous urban form has eroded, as opposed to sprawlscapes that were built entirely on greenfields. By focusing on the edge of a traditional walkable area, this thesis provides a means of removing the freeway wall separating auto-oriented sprawl from traditional walkable neighborhoods and allowing the old development patterns to slowly grow outwards.

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