Let's Bury I-5

An Urban Design Framework for Freeway Lids in Downtown Seattle

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Abstract

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The development of the American interstate highway system over the past 60 years has had a variety of negative impacts on urban neighborhoods. Where these freeways run below grade, one mitigation option and urban design strategy is to lid them over with bridge-type structures that help stitch together the urban fabric and restore connections. Seattle, Washington has lead by example with Freeway Park and the Washington State Convention Center spanning over Interstate 5 in downtown, and there are opportunities for additional lids in this area. Future lids must account for precedents, the form and characteristics of the surrounding physical realm, and the community's variety of needs. In particular, downtown Seattle has a lack of useable public open space; with little land available for new parks, lids are an option for meeting this demand. This work proposes design guidelines for new lids. The guidelines are developed through a history of freeways in Seattle, an examination of notable plans and efforts since I-5's construction, an inventory of existing and proposed lids across the country, three case studies, and a site analysis. The guidelines proposed here should be considered by the urban designers, engineers, landscape architects, architects, political leaders, and interested citizens who are involved in the design of future lids in downtown Seattle.

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1.0 Introduction

Seattle set a national precedent in the 1970s with Freeway Park, one of the first public parks built over an active interstate freeway. Over a dozen U.S. cities have since completed similar projects, and within only the last few years more than a dozen more have been proposed or are planned in others. Freeway lids (also called decks, covers, or caps) are becoming an increasingly popular urban design strategy for healing the scars created by below-grade freeways, while also mitigating social and environmental impacts and utilizing transportation airspace to create park space in increasingly dense American downtowns.

This project assumes that due to open space needs and development pressures additional freeway lids will eventually be built over Interstate 5 in downtown Seattle. The goal of this project is to provide urban design guidance on where those lids should go, what purposes they should serve, and how they should be designed in order to best serve the public and contribute to the city's economic, social, and environmental health. The guidelines take the form of policies developed from a review of existing and proposed freeway lids around the country and three case studies. Historical context and technical considerations are also discussed.

Lid projects can be used to support private development or civic buildings, as with the Washington State Convention Center adjacent to Freeway Park, but they are most commonly used for parks. This will be the main purpose for new freeway lids in downtown Seattle; the four urban centers that make up the "Center City" of Seattle fail to meet the open space goals established in the city's comprehensive plan. Lids are also called for in the 2002 Blue Ring open space plan for the Center City. Expanding Freeway Park or building new lids has been in Seattle's civic discourse for decades. When enough political momentum and citizen support is achieved to support additional lids it will be critical for their design to serve the public as well as possible for the next century or more.

1.1 Definition and study area

A freeway lid is bridge structure spanning the gap created by a sunken freeway. The gap may also be partial, such as where a freeway is below street grade on one side and faces streets or a shoreline on the other. Lids are often the "cover" in the roadway construction method of cut-and-cover, but they are typically not in the original design and are built years later. The longer a lid is the more of a tunnel it creates, possibly triggering additional engineering requirements. Because lids support more weight than a typical freeway overpass they may require a significantly deep structure.

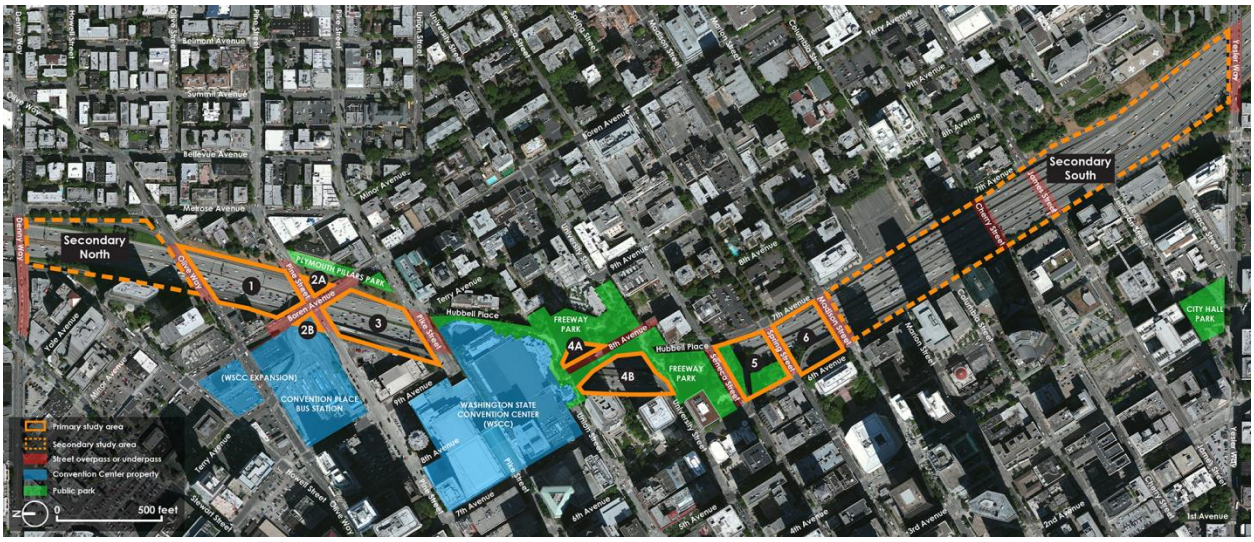


Figure 1 – The study areas. Background image from Google Earth.

Lids are most feasible where the surrounding topography is high enough above the freeway to allow adequate vertical clearance underneath the lid structure. This eliminates places where freeways run at grade or are elevated above the surrounding landscape from consideration. It also provides a starting point for identifying a study area in downtown Seattle, where Interstate 5 is below the surrounding grade. A site analysis determined the primary study area is defined as the segment of Interstate 5 between Olive Way and Madison Street (see Figure 1). The secondary study areas are those segments between Denny Way and Olive Way and between Madison Street and Yesler Way, where the freeway is partially below the surrounding grade.

1.2 The case for freeway lids

There are three reasons freeway lids are feasible for cities that desire more park space and other land uses.[1] Urban parks are desirable because of their many public health and social benefits, not to mention their tendency to increase the value of nearby properties.[2] Well-designed and programmed parks can greatly contribute to the quality of life for urban residents.

Limited urban land availability

First, many American downtowns are increasingly developed with little space left over for new parks. Many cities failed to plan ahead by acquiring land for public parks before private development built up within their downtowns during the 20th century, including Seattle. Downtown neighborhoods often do not meet local or national parks-to-population standards.[3] One solution is to incentivize the use of private land for public use, often in exchange for taller buildings, but the results of such “privately owned public space” programs have mixed results.[4] Many American downtowns do, however, have miles of freeways running through them.

Especially if below-grade, these wide swaths of land have unused airspace. Lids are a form of infill development that utilizes this airspace.

Second, the more aggressive option of publically acquiring downtown land that is already developed is expensive and controversial. Economic forces make downtown land more costly per square foot than in outlying neighborhoods, and cities may have limited funding and more pressing infrastructure priorities than new park space. And acquisition through eminent domain is rarely a straightforward process. Further, the displacement of residents and businesses is cause for community opposition.

Third, utilizing freeway airspace avoids diminishing a city's valuable downtown tax base. It also avoids the economic, social, and environmental cost of tearing down large commercial or residential buildings that pay property taxes, whose occupants generate economic activity, and which have embodied energy. State governments that own freeway air rights may be willing to lease those rights at low or no cost and may even contribute to construction funding.

Engineering and financing

Perhaps the biggest barriers to lid projects are their complex engineering requirements and costs. A nationwide inventory for this project finds that the average cost of completed park lids is about $14 million per acre. Among proposed park lids the average estimated cost is approximately double, at about $28 million per acre. However, the latter figure is likely an overestimate. Many proposed lids are tied in with other public investments, and financial estimates are typically not available for the lid portion specifically. The average is also skewed by unusually large and unofficial proposals in Los Angeles, Chicago, and Austin.

The largest existing freeway lid is in Mercer Island, Washington. Completed in 1994, it covers approximately 12.7 acres and cost $146 million[5]. Adjusted for inflation to $230.24 million, the cost is equivalent to $18 million per acre. Across all existing and proposed lids, the average cost is about $21 million per acre. This $18-21 million per acre range is reasonable and useful for cost estimates of future lids. It is comparable to the price of land in downtown Seattle, making lids cost competitive with the acquisition of land for public park purposes.

There are a number of possible strategies for funding freeway lids. Multiple government agencies, such as the local municipality, the state transportation department, and the federal government, can each share a smaller part of the cost. An emerging source is private funding. Klyde Warren Park in Dallas, a 5.2 acre lid completed in 2012 for $110 million, was 48 percent funded by private donations.[6] Nearby property owners and businesses have benefited from increased land values and retail sales.[7]

Other options include voter-approved bonds and levies, which are politically feasible in Seattle even for hyperlocal projects. In 2008 voters approved a $73 million property tax levy to renovate Pike Place Market, and in 2012 voters approved a $290 million bond for a seawall replacement in downtown. Another source is a local improvement district, which taxes a cluster of properties around public projects; such a district will be pursued to help pay the $420 million cost of Seattle's new waterfront parks.[8]

1.3 Research purpose, questions, and hypotheses

The purpose of this research project is to develop urban design guidelines for future freeway lids in downtown Seattle. The guidelines will cover where lids should be built, what they should be used for, and how they should be built. Writing the guidelines requires the context of downtown Seattle's unique development patterns and cultural influences.

There are no standards for freeway lid design, so this research project also looks to three relevant case studies for design lessons. The case studies are selected from a national inventory that is compiled to discover best practices and cost estimates. There is limited published research on the topic, but a literature review uncovered a variety of sources with useful information. Established urban design theories also provide useful guidance.

Seattle's Center City is increasing in population and employment without concurrent additions of parks and open space. With few undeveloped or underdeveloped parcels left, airspace over Interstate 5 presents an opportunity worth studying.

To that end, the main research question and sub-questions are the following:

- How will future freeway lids over Interstate 5 in downtown Seattle be designed?
    - Where will future lids be located in downtown Seattle?
    - What will the lids be used for?
    - How will the topography around I-5 in downtown affect design?
    - Will on- and off-ramps (and other freeway functions) be preserved where lids are built?

Answering the research questions will assist in confirming these research hypotheses:

- Lid designs must reflect a mix of perceived need for open space, housing, retail, civic functions, and/or other land uses in downtown Seattle.
- The grade changes in downtown Seattle will necessitate lid surfaces to be sloped, terraced, or otherwise not uniformly level.
- The lids must contribute to a planned "blue ring" of connected open spaces with design features that make a positive impact on civic life.
- Other completed and ongoing lid projects in the Seattle region can be used for design guidance, since future lids in downtown Seattle will be managed by the same state and local agencies.

1.4 Research limitations

As with any student research, this work's scope and detail is limited by resource constraints. It is being conducted by a single student within a five month period. And rather than reporting on the technical feasibility of a specific lid project, this work makes the ambitious assumption that more future lids will inevitably be built in downtown Seattle and aims to provide design guidance for them.

Background information is only from the United States, which has a distinct design profession, construction industry, and political system. There are examples of freeway lids in

other countries, but they are not necessarily comparable to how public works projects are done in the United States. Regardless, limiting the scope to only one country also places a reasonable constraint on data collection efforts.

This work contains incomplete quantitative data on existing and proposed lids. After available publications and other sources were exhausted, many local and state agencies were contacted to help provide missing data. Many of the agencies were unresponsive or uncooperative, or simply did not possess project data. However, enough data was collected to provide a reasonable view of the state of existing and proposed lids.

2.0 Urban design theory

Freeway lid design is within the professional realm of urban designers. The creation of new land for human habitation necessitates a holistic understanding of the local environmental context, the site itself, and accepted best practices. Yet, the unique individual attributes of lid design also require the expertise of architects, landscape architects, engineers, government officials, and the public. Urban designers have the responsibility to coordinate these stakeholders under a larger vision. Developing that vision requires the utilization of urban design theories which support a rationale for design decisions.

2.1 Published theory

What follows is a summary of a limited selection of commonly accepted urban design theories. These theories provide a basis for analysis, promote the comprehension of the urban environment, and can support design decisions that lead to successful outcomes for local stakeholders and the city as a whole. Urban design theories can be applied to projects at a wide range in scale, including street improvements, parks and plazas, neighborhoods, and whole cities. The study area considered for this project, stretching over a number of city blocks, is at the scale of traditional urban design considerations that most theories best apply to.

Imageability of the city

Kevin Lynch made a profound impact on designers with his mid-20th century writings on the image of the city. Lynch's early research developed the concept of "imageability" as an explanation for how people visually perceive cities and as a method to describe the legibility of a city. Imageability is defined as: "that quality in a physical object which gives it a high probability of evoking a strong image in any given observer. It is that shape, color, or arrangement which facilitates that making of vividly identified, powerfully structured, highly useful mental images of the environment".[9]

In his book "The Image of the City", Lynch explains the importance of humans' ability to mentally process their environment. A person's image of a city, at all scales, contains the recognition of key physical elements that provide important organizational clues and wayfinding devices. People gain emotional security and a sense of placed-based ownership when they can construct an internal image and memory of a place. A sharp, well-defined image helps foster the instinctual desire to be in familiar territory.

Lynch's research in environmental psychology explored how people understand and perceive their everyday environments. He found imageability is important to both newcomers and long-time residents of cities because the entire city cannot be experienced at once; there is always something unseen and sounds unheard. The city image provides orientation as one moves through the city, especially on foot. As a further step, Lynch acknowledges that no two peoples' city image is alike because images are soaked in individual memories, experiences, and meanings. A vivid physical setting plays a strong role in people's decisions to frequent a park, a restaurant, or a street corner.

Lynch argues the process of wayfinding is not a natural instinct. It is done through visual, audial, and other clues. Clues are static and part of the physical structure of a city, including whole buildings, doors, windows, streets, water, trees, and potentially many other objects. Moving parts, like freeway traffic, and chaotic organization of the clues are acceptable if they are part a larger, more connected whole with a clear way out into a more structured hierarchy.

The value of a city image is dependent on its clarity and pragmatic application. Lynch notes that Americans typically have difficulty in creating an image of their city because of the monotony and the lack of straightforward circulation that characterizes suburban, and even urban, development. He criticizes dedicated wayfinding devices, such as maps and directional signs, as inadequate because they can be damaged and outdated. The permanent physical environment itself should be designed to provide an adequate level of orientation. He notes that, by necessity, the tight and winding street grids of many European cities necessitate a clear mental image for finding one's way. Lynch lauds several American examples, though, including the public spaces of Boston, the entirety of Manhattan, and the Chicago lakefront, as imageable urban places.

Lynch defines five elements of imageability: paths, which are channels along which the observer moves; edges, which can be barriers or seams with any level of permeability; districts, mid-to-large sections of the city with a common character; nodes, being primary junctions, gathering places, or convergences of paths; and landmarks, which are like nodes but are external and may not be physically accessible to the observer.

At their most basic level these elements can be mentally paired, such as alternate paths that reach the same destination. The next step is a combination of unlike elements, such as edges defining a district which is structured by paths and nodes.

Going beyond these simple relationships enables the observer to develop a total pattern at all scales: the street; the neighborhood; the city; and even the metropolitan region. This layering of images can be psychologically daunting unless there are common elements between them; Lynch writes, "If a tall building is unmistakable in the city-wide panorama yet unrecognizable from its base, then a chance has been lost to pin together the images at two different levels of organization".[10]

Confusion and disorientation can also come from changes in the image without warning. Construction, redevelopment, and new barriers to movement can dramatically change the image and force a mental rearrangement. Designs that retain parts, like a wall, an old tree, or the trace of a path, can help ensure continuity as the city inevitably shifts and adjusts.

Kevin Lynch's theory of imageability can be applied to this project on freeway lids. Interstate 5's width, grade separation, noise, and traffic in downtown Seattle make it a highly imageable element for the people who travel along and across it. It's pairing with some of Seattle's tallest buildings, oldest neighborhoods, and most innovative public spaces (Freeway Park and the Convention Center) make it a sharply defined element.

Whether I-5 is a path, edge, landmark, or something else is dependent on the individual observer. Regardless, changing the physical appearance of the freeway by lidding it will create a dramatic shift in imageability. The entire study area can become a district of its own, with common features that are recognizable throughout. Various sections can alternatively each be their own independent nodes with distinct design and enclosed environments that become a destination. Evoking the path of the motorist that I-5 is, the lids can also become a linear

pathway for pedestrians. Following the curve of the Freeway, such a path would ensure a newly accessible and visually continuous image with the hidden freeway below.

In a discussion on the design process, Lynch notes that the final result of a large scale project may not be as imageable as the process itself. The newfound attention on a particular place may be enough to clarify peoples' view: "Although such a process can become sterile if not accompanied by increasing control and judgement, even awkward "beautification" of a city may in itself be an intensifier of civic energy and cohesion".[11]

When considering lid design, then, the final result cannot be considered timeless. Constant refinement and adjustment is to be expected as time progresses and individual observers become more aware and critical of their image of the city.

Everyday urbanism

Margaret Crawford argues that urban designers shouldn't forget the daily and spontaneous interactions that occur in urban public spaces. The concept of "everyday urbanism" is not intended to detract from larger abstract design ideals, but rather be considered in addition to them. Yet Crawford also cautions designers to not simply apply high-design styles and import spatial forms from the precedents of other cities. There must be less of an emphasis on grand events and awesome spectacle. She argues there needs to be an appreciation of the everyday activities that make up the vital links of a community and its issues.

Followers of everyday urbanism are more concerned with ensuring cities are places to live rather than be beautiful and well designed. However humble, the sidewalk, the pocket park, the bus shelter, and other small pieces of the built environment help facilitate daily life more so than the officially designated and highly planned spaces for public gathering that have proliferated in American urban downtowns. Critics say this stance erodes the stature of professional designers, while defenders argue that good designers don't disappear after their work is complete; the best designers are local and are able to help make changes as neighborhoods and populations transform over time.

Designers, philosophers, artists, political scientists, economists, and sociologists compete in explaining the human phenomena of cities. There is such a variety of overlapping and contradictory layers within "urbanism" that no theory or profession can reconcile them into a singular understanding. Everyday urbanism, however, implies that all urban residents are experts. People who commute, work, relax, shop, eat, run errands, and move along city streets share common routines that take place in public spaces. Crawford argues this is why architects and designers neglect the concept. They don't consider the daily, weekly, and yearly routines that have deep cultural significance for urban residents. She says, "Existing in between such defined and physically identifiable realms as the home, the workplace, and the institution, everyday urban space is the connective tissue that binds daily lives together".[12]

Everyday urbanists are especially concerned with the everyday routines of the types of people who have little free time and get stuck in monotonous routines: single mothers, low-level employees, immigrants, teenagers, seniors, the disabled, the homeless. While urban designers cannot alone solve vast social and economic problems, they can promote flexibility in public spaces to improve quality of life. Crawford says, "A shopping cart means very different

things to a busy mother in a supermarket and a homeless person on the sidewalk". Extending that line of thinking to the traditional realm of urban design, something as simple as a bench also has very different meanings for a mother pushing a stroller, a young jogger, a homeless person, and an elderly couple. Trees, water, light, shadow, food, furniture, signage, pavement, and other details that urban designers work with have a variety of meaning for different types of people and must be designed with this knowledge at the fore.

There is an urgent need to reconnect urban research and design with ordinary human and social values. One method is reorienting design practice as being tactical, or based on time. Time comes in a variety of conceptual forms: cyclical, like night and day, changing of the seasons, and birth and death; linear, being the daily commute, meals, shopping, leisure; and spontaneous, the fleeting moments of love, play, rest, and knowledge. This contrasts with strategic design, which is based on place and typically is inflexible to dynamic demands and preferences.

Another method to improve the relevance of urban design is through representative and communicative processes. Urban designers must foster a variety of opinions, perspectives, and issues through public meetings, the media, vocal individuals, and community interest groups. Everyday urbanism can create life changing results for people in need, but only if those marginalized people are effectively engaged during the design process. Without doing so, there is a risk of what is considered "public" becoming a more and more privatized and commercialized space.

Crawford points to examples of gentrified shopping streets, shopping malls, and festival marketplaces that draw people away from the modest public spaces that have traditionally been idealized as places for unity and equality. The result is a growing use of everyday spaces outside of city centers. Parking lots, vacant yards, alleys, and street corners are increasingly used to supplement official programming. Activities like garage sales and street vendors are popular because of their opportunity to supplement incomes even in wealthy areas, and they facilitate an exchange of commercial and social messages.

The urban design profession must turn around its conversation on public space: instead of decrying its perceived loss, opportunities for improving everyday spaces must be celebrated.

While freeway lids will be an intensive new form of public space that require significant government investment and control, they can be designed within the framework of everyday urbanism and daily urban routines. A balance must be struck between creating places for rest and casual social interactions versus spaces for large community gatherings and neighborhood-activating events. Like with the examples of garage sales and street vendors, informal and community-driven activities like markets, concerts, dances, and food truck parking can be accommodated for. The arrangement and amount of seating, the design of pathways and their convergences, the dimensions of open spaces, and other design details can also facilitate everyday use by casual passerby and local residents. With the lack of public space in downtown, as identified in the site analysis, freeway lids are an opportunity to create a mixture of dramatic and everyday urbanism.

Whose public space?

Ali Mandanipour questions the ownership, accessibility, and design process of urban public spaces in "Whose Public Space?: International Case Studies in Urban Design and Development". The titular question is at the core of an investigation into the changing nature of public spaces amid global social, economic, and political transformations. The issue is relevant to this project because it is certain that future freeway lids in Seattle will primarily host new public space.

Public spaces have always mirrored the complexity of urban societies, and today that is evident as technology has altered social bonds and cities become aggregations of individuals. Mandanipour argues cities are increasingly becoming fragments of privatization, and questions whether public spaces are serving those fragments or the city at large. Recent interest and discourse around urban public spaces has been prompted by social changes, including industrial decline, privatization of government services, reduction in the financial capacity of government, globalization, and liberalization of the economy.

From a business perspective, which governments may be tempted to adopt, public spaces are a liability. They usually can't be sold and have no direct profit. They don't create an immediate political or economic return. They incur maintenance costs, which may lead to abandonment and disrepair if not properly funded. This line of thinking can be traced to mid-20th century modernism, when architects became increasingly focused on pleasing private developers and planners dealt with social and infrastructure issues; Mandanipour says, "There was no scope for concentrating on public spaces, which would be considered as icing on the cake, a luxury rather than a necessity".[13]

The decline in value of public spaces for social means contrasts with their traditional uses. Since the beginning of permanent human settlements, public spaces have been where trade, politics, cultural performances, and socialization take place. But Mandanipour criticizes excessive historical romanticizing of public spaces; the coffeehouses of London and Paris, the piazzas of Italy, the Greek agora, and the boulevards and city squares of Europe, for instance, were created by speculative development and centralized power systems that had little concern for the common, poor citizen. As society has urbanized, public spaces have lost their personality and significance: "In the city of strangers, the meaning of public space becomes less personal, more transient, and at best merely functional or symbolic".[14] Public spaces have become more valued for their aesthetic and economic values rather than as social places.

There are two key principles that can improve the state of public spaces: accessibility and inclusivity.

Without being fully accessible to everyone, a space cannot be called public. While a simplistic analysis considers the presence of gates, walls, and guards, a larger consideration of ownership, programming, and people who actually use the space are needed to gauge publicness. Government ownership and use by a wide range of socioeconomic groups can help determine whether a space is truly public.

An inclusive design promotes openness and collaboration. It is easy for cities to fall into reliance on a narrow set of interests, but this creates tension and conflict by resulting in exclusive spaces. City-building is increasingly consolidated into fewer hands as development and design companies increase in size, technical capabilities improve, and private financial

capacity increases. This homogeneity decreases the spontaneity and diversity that vibrant places are built on.

Similarly, urban designers must be constantly wary of declaring their designs as final products. The built environment is ever shifting and dynamic. For this project, freeway lids must be designed with future adjacent redevelopment mind and flexibility as community needs evolve.

There are ultimately no simple answers in who public spaces are for. The complexity of contemporary society lives results in a mix of claims for public space. There may even be a role for the provision of public space by the private sector and its vast resources. These relationships and their impact on public space design can be resolved when democratic processes result in equitable physical social development.

These questions around public space must be critically applied to the design of freeway lids. Lids must be designed within an inclusive, public process and the end result must be spaces that are truly accessible and useable by all members of the public. The designs must have an underlying backbone but ultimately be versatile in programming. As such, this project will not attempt to make highly specific design decisions. Rather, the theory of questioning who public space belongs to will ensure that this project is limited to providing basic guidance and possible rationales for future design decisions.

The social life of small urban spaces

William H. Whyte is renown among urban designers for his research on environmental observation and social behavior in urban public spaces, including streets, parks, and plazas. His book “The Social Life of Small Urban Spaces” summarizes his theories on how and why people use urban spaces. If public spaces on future freeway lids are going to be successfully activated and useful to people, they must be designed in accordance with the many principles established by Whyte.

Whyte’s research was prompted by a proliferation of privately owned public spaces in New York in the 1960s as a result of a density bonus program. Some plazas were attracting more people than others, and the City wanted to know why. In no case was there evidence of “overcrowding”, as cites may be criticized of being, and in fact many spaces were almost empty throughout the day. But well-used public spaces are necessary for generating civic engagement and community interaction, functions of both democracy and quality of life.

A multiyear project led by Whyte studied the form and use of plazas, general street life, playgrounds, and parks in New York and other cities. Recording physical activity in the public realm was done with methods like time-lapse photography, personal interviews, and behavior mapping.

In central cities and commercial districts, Whyte found the people who most use plazas are employees from nearby office buildings. The more popular plazas are visited by people in groups of two, three, or more; this represents collective agreement on where to go or where to rendezvous. Whyte argued that despite the apparent popularity of some plazas, people don’t make acquaintances and friends there. Urban public spaces are places to sit, socialize, eat, sunbathe, read, and perhaps mostly importantly, people-watch. Whyte says that good plazas

attract people through a cascading effect: “What attracts people most, it would appear, is other people”.[15]

The most active time for plazas is during the lunch hour, when people will bring their lunch to the plaza or purchase food from nearby or within the plaza itself. Peak hours were found to be 11am to 2pm. Evening concerts could create another peak until 6pm, when office workers delay heading home.

The effective catchment area of plazas is roughly three blocks, highlighting the need for a higher number of public spaces and not necessarily singular large ones. Whyte found no relation between the size and shape of plazas in attracting people. The simple creation of open spaces creates new demand; new spaces alter peoples’ travel patterns and daily habits, an example of everyday urbanism.

Whyte did identify a singular trait that is the most effective at predicting the use of plazas: places to sit. It doesn’t matter what kind of seating it is, but small details in seating can make a large difference for social purposes. People like to have choice in their seating arrangements. Ledges, for instance, should be large enough for people to sit back-to-back, and should be dispersed so that people can sit near the street or away from it. They should be within the range of 1-3 feet high. Similarly, chairs should be movable. People can use moving furniture to move into sunlight or out it, to form groups or move away from people, to orient themselves toward the street or retire from it. Movable furniture attracts people by granting them a small degree of autonomy. Fixed furniture, on the other hand, does not give this same level of choice in movement and social arrangements. “Benches are artifacts the purpose of which is to punctuate architectural photographs”, Whyte says.[16]

The natural elements of sun, wind, trees, and water also play a role in the success of urban public spaces. People are most attracted to spaces with trees and water. Trees associated with sitting spaces help people feel sheltered and provide comfortable shade on warm days. Groves of trees, with overlapping canopies, can provide pleasing play between light and shadow. If trees are not planted flush with the ground, planter box rims must be an appropriate height and width to allow for sitting. Seating can also be arranged around water features of all types: waterfalls, water walls, rapids, brooks, pools, and fountains. People must be able to physically access water by touch and possibly wading: “It’s not right to put water before people and then keep them away from it”.[17] The sound of water is pleasant and can mask irritable urban noises like traffic.

A southern exposure is best to maximize the amount of sunlight entering a public space, but sunlight is not an absolute necessity. People can do without direct sunlight when temperatures are warm, though Whyte found some plazas are well used even in cooler months. In an urban environment tall buildings can block direct sunlight, and innovative strategies like “sun easements” could potentially preserve sun access. Relying on reflected light from surrounding buildings is also one way to improve sun access.

Wind can be a problem in urban downtowns because of the downdrafts caused by skyscrapers. Whyte encourages more research into how building design can not only resist wind, a key concern of structural engineers, but how buildings can direct wind towards or away from where it is desired. Citing rainy cities like Seattle, Whyte also notes how most urban public spaces are either completely indoors or completely outdoors: a mixture of the two, as with

glass canopies and pavilions, could provide options for people in all but the most severe weather.

The social life of small urban places is of utmost importance to cities. Attracting people to such spaces creates a rich mixture of interactions and life on the streets. Successful plazas indicate the presence of a lively and active public sphere and enjoyment of the local quality of life. While plazas are ideally active throughout the day, even their peak use during lunch periods provides economic benefits for surrounding restaurants and food vendors. Their attraction of commercial customers may also increase surrounding land values, boosting the local tax base. Cities, therefore, have a deep interest in ensuring public spaces are well designed and used.

The implications for freeway lids are numerous, especially if they contain similarly sized public spaces next to streets. Indeed, plazas and parks must be adjacent to streets to maximize the opportunity for people-watching and socializing. Generating significant amounts of street activity will require some degree of retail or other pedestrian attractions, especially in parts of the study area that currently lack active ground-floor activities.

Further, there is an inherent need for seating, water features, and trees. For some guidance on this, designers of lids in downtown Seattle need look no further than the nearby Freeway Park for examples. The design guidelines will consider lessons from Freeway Park and the essential findings from Whyte's research.

Linear park typology

The project study area is characterized by its linearity as a result of being along a transportation corridor. There are a number of similar parks worldwide built along infrastructure corridors like freeways, railroads, rivers, and utility lines. In "Thin parks / thick edges: towards a linear park typology for (post)infrastructural sites", Karl Kullman builds a set of criteria for identifying types of linear parks. These typologies are not intended for direct application, but they offer conceptual ideas on how freeway lids can be built as a system of connected public spaces in downtown Seattle.

The edge spaces created by infrastructure corridors are often ignored at the peril of leaving cultural and social barriers unresolved. Even if edge spaces are erased, differences may remain. In many communities there are stark differences in neighborhoods on different sides of railroad tracks, for instance. There are countless examples of freeways splitting cohesive communities into separate social and economic circumstances. A politically charged example is the division of Berlin for much of the 20th century; the wall has come down, but cultural and physical differences remain between the east and west parts of the city.

Landscape architects have traditionally preferred to work with spacious "chunks" rather than marginalized "strips".[18] Strips offer less flexibility and are often within or adjacent to neglected spaces that require environmental remediation or some other type of major rehabilitation to make suitable for human use. But shifts in industry and transportation have increased the number of publically owned linear properties that present an opportunity for new parks and open space.

Linear spaces require careful design, however. The activation of the edges of linear parks is critical to ensuring that they are well used. A mix of people and activities ensures linear

parks are integrated into the urban environment around them. Differing perspectives from within the parks, achieved through path design, elevation changes, and varying widths, provide views onto the adjacent land uses and visual interest to the park user.

Kullman studied 20 examples of linear parks from across Europe and North America. He identified 19 key characteristics that define the form, access, and programming of linear parks. Considerations include proportion, cross-connectivity, permeability, geometric rigidity, programming, and design continuity. Common combinations of these characteristics are grouped into seven typologies of linear parks with varying degrees of cross-street connectivity, pedestrian navigation, and programmatic intent. They are conceptually illustrated in Figure 2.

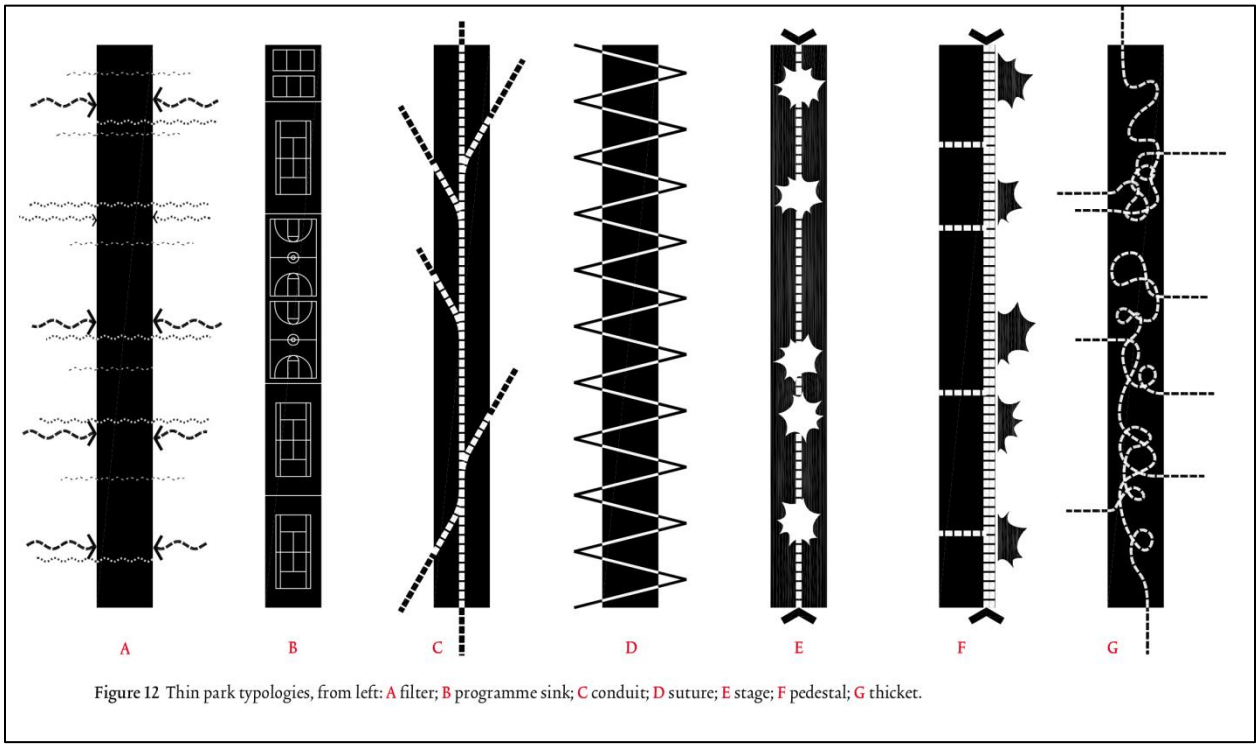


Figure 12 Thin park typologies, from left: A filter; B programme sink; C conduit; D suture; E stage; F pedestal; G thicket.

Figure 2 - Linear park typologies.[19]

The “filter” type soaks up people, traffic, and energy as they pass through the park. It may have a number of cross-streets or pedestrian paths entering it, and through alternate routes or programming people are encouraged to stay for some time or distance. It can have an ecological function, providing stormwater treatment, wildlife habitat, and reduction in the urban heat island.

The “programme sink” park has precisely defined functions with little or no room for improvising. Sport courts and fields, picnic areas, playgrounds, pools, and other hardened features are relatively permanent. There is little influence from the surrounding context, but the functions may be expressly desired by the community.

The “conduit” typology describes linear parks that are channels for rapid pedestrian movement from one end to the other. There are few cross-streets to interrupt travel and few amenities other than paths and lighting. It can be combined with the other typologies as long as quick travel times are retained.

In the “suture” typology the park is a device that heals and stiches an urban rupture. It blends into the surrounding urban blocks and may attempt to eliminate any indication of the land’s previous use. In connecting two areas that were previously separated, it may become a third place of its own.

The “stage” typology emphasizes one or more spectacles occurring within the park or seen from the park. Parks of this type may be particularly influenced by ecological interests, with special groups of plantings and trees. There may also be a stunning view from certain points within the park. Event space, such as plazas, may also become the stage. The “pedestal” typology is similar except that the park becomes a destination and landmark in its own right. It is best viewed from beyond the park boundaries.

Finally, the “thicket” typology intends for little transportation utility. It impedes passage in any direction by design with vegetation, walls, and other features. It shuts visitors in from the outside world and provides a place for quiet relaxation and wandering.

Identifying a preferred linear park typology can help guide the design of freeway lids. The typology (or typologies) employed depends on a number of factors. Adjacent land uses, neighborhood needs, lid locations, lid sizes, and order in which lids are built or planned to be completed all weight in.

Assuming the entire primary study area is developed, and considering the relatively complete street grid through the study area, the most applicable typologies may be the filter, the conduit, and the pedestal. New pedestrian connections can be exploited to create diagonal connections. A main path through the entire study area could create a rapid and recreational cross-town connection from Olive Way to Madison Street. Public squares, water features, event spaces, or similar gathering points along this main path could become the focus of each lid section.

Freeway lids as park space

With a number of independent freeway lid proposals in southern California, Clement Lau from the Los Angeles Sustainability Collaborative researched best practices for government collaboration, community engagement, and urban design. The “Urban Freeway Cap Parks Policy Briefing Paper” studies freeway lids as park space in the context of rapidly growing cities and public health. Lau says, “Cap parks offer hope and benefits that simply cannot be ignored. In particular, larger cap parks have the potential to: improve regional air quality; help reduce obesity and its associated problems; create short- and long-term jobs; raise adjacent property values; and enhance the overall quality of life.”[20]

Urban freeways are often located in neighborhoods that have a lack of park space. Lau points to other research that finds access and availability of parks and playgrounds has an important role in preventing obesity. When people have access to parks, they are more likely to exercise and reduce individual health risks.

The costs of covering freeways are high, especially for large projects. Operations and maintenance costs are also significant due to the complexity and amenities typically seen on park lids. The time and process required for developing such projects is lengthy and complicated; cooperation is required among a multitude of stakeholders and all levels of

government. There is the potential for exposing park users to air pollution. Structural failure of the park could be disastrous.

It is recommended that large park lids be built in phases to minimize traffic impacts during construction. Phasing can also help the design team and community learn lessons from previous development and spur the momentum needed for long term capital funding. The desire for continuous park surfaces can reduce traffic impacts in the long term by removing or reorganizing freeway ramps and overpasses. Lau also recommends the creation of a nonprofit entity to manage lid parks due to their complexity and uniqueness.

There is a wide range of stakeholders that need to be involved in lid park design. First and foremast are the residents who are underserved by parks, especially children. Business interests include attracting economic development, real estate value, tourism, and new jobs. Transportation officials, including transit agencies, at the local, county, state, and federal level manage the air rights and control the traffic on the freeway. Local and state politicians' support is needed to secure funding.

2.2 Synthesis and practical applications

The theories discussed here are by no means a complete catalogue of applicable urban design thought and principles. But their widespread adoption and most relevant points provide the foundation for a synthesis of ideas that can be practically applied to freeway lid design. The concepts of imageability and everyday urbanism, the questioning of who owns public space, and best practices in public space design are discussed here as a comprehensive strategy for moving forward towards design guidelines.

A brief application of these concepts can be applied to the Freeway Park and Convention Center precedents. Depending on one's path of travel and the individual observer these two lid structures can be considered nodes, landmarks, or something else. When crossing over I-5 on Seneca Street, Freeway Park is clearly a standout feature with its rich variety of vegetation amid soaring office buildings and residential towers. But it is relatively hidden from other angles. The park and its extension on the eastside of the Convention Center provide shortcuts that the street grid does not offer. In this way the park and Convention Center promote utility and everyday urbanism in the surrounding neighborhoods, but there is not much else about them that does. Hidden entrances and elevation changes limit their usefulness for daily social interactions and economic transactions. There is movable furniture in one part of Freeway Park, but other sitting areas are infrequent and permanent with no potential for customization. The lack of sightlines onto the surrounding streets does not promote spontaneous events like markets and marches.

Though Freeway Park is legally a city-owned property, its design and programming bring into question whether the citywide public feels ownership in the park. Security guards roam the lower section of Freeway Park that is on private property. Armed Homeland Security police and canine units patrol the rest of the park on a regular basis. Signs outside the Convention Center imply the plaza there is privately owned despite the Convention Center being a public facility. Events scheduled in the park cater to surrounding residents, especially seniors, and are not widely advertised outside of the downtown area. Freeway Park is discussed later in a detailed case study.

However complex and multilayered the design problems are at Freeway Park and the Convention Center, there are opportunities for improvement and rehabilitation. Redesigns must happen concurrently with an outward expansion of freeway lids to the north and south. A conduit typology, in which the various new lid sections physically connect as a single pedestrian throughway, could potentially generate higher use and a greater sense of public ownership.

Mini-districts or stages within each lid section can become the necessary attracting force between the sections. Food vending and retail, along with abundant seating options, have the potential to better activate those spaces. Chairs, tables, and open flexible areas can facilitate both the spontaneous social gatherings celebrated by everyday urbanists and the large events needed to keep the spaces in public ownership.

Ownership is helped along by the imageability of a space and clear, well-defined design. Topography of the lid surfaces, which are likely to be sloped, can be exaggerated or celebrated with prominent circulation paths and terraces. Vertical elements like sculptural pieces, large trees, or climbable viewpoints can contrast with the horizontal surfaces that will likely be predominant in lid parks. City-sponsored and community-based programming can ensure there is no takeover, perceived or real, by private interests.

An overall theme for this project now begins to come into focus. The major use of the primary study area lids must be parks and open space to promote a vibrant public sphere within the Center City. In contrast with Freeway Park, these spaces must be truly open in terms of physical access and a participatory design process. Retail and outdoor commercial activities can draw people to the spaces throughout the day. Seating, play equipment, pools, open lawns, plazas, and a variety of other features must be spread throughout the project area to ensure that people of all ages, abilities, and socioeconomic status are welcome.

The lids can be likened to an emerald necklace. Each section must be enabled to operate independently; adjacent lid sections may not be completed at the same time, with years of separation in the construction timeline. Ultimately, though, each section must be threaded with a central pedestrian spine. The result will be a connected series of parks and plazas unique to downtown Seattle that can accommodate both the daily needs of nearby residents and the vibrant economy of a growing city.

3.0 Local history and contextual information

Freeway lids are a local response to the federal development of the American interstate highway system. The concept of a national road network dates back to President Roosevelt's economic stimulus efforts during the Great Depression of the 1930s.[21] The growing popularity of the automobile and the increasing geographic separation of home, work, school, shopping, and recreation became a symbiotic phenomenon. The idea of controlled-access freeways became an appealing way to quickly connect suburbs with downtown jobs and shopping.

State governments were reluctant to pay for the high costs of freeways. In the 1950s the federal government stepped up with a unified plan for a national freeway system. When President Eisenhower signed the 1956 National System of Interstate and Defense Highways Act he didn't anticipate that the national freeways would be routed through the center of urban cities.[22] But by the time it started happening it was too late to change their course.

3.1 Seattle's urban freeways

Seattle has a number of segments in the national interstate network. They are discussed here to provide an understanding of how the freeways were built and how lids intend to mitigate their impacts.

3.1.1 Interstate 5

A major north-south automotive route in Seattle originated with the Eastside Expressway concept in 1951.[23] The Eastside Expressway was conceived as a toll road to and from downtown, so the route was aligned through heavily populated areas to generate sufficient revenue. A 1955 authorizing act by the state legislature provided funding, but the next year the federal government promised 90 percent federal funding for state freeway projects. Federal funding was approved for the Eastside Expressway project in 1957.

Through the route no longer needed to be tolled by the state, the alignment remained the same. The official route description in 1957 stated, "With few exceptions, this area contains older and less desirable buildings and is the beginning of the separation of the apartment house, clinic and residential area from the central business district -- from Marion Street to Denny Way -- this section will traverse an area that needs improvement in appearance".[24]

The corridor needed for state right-of-way was typically two to three city blocks wide and covered by houses, apartments, businesses, and light industry. In downtown the route skirted the bases of First Hill and Capitol Hill in a natural valley. The valley was to be regraded with vertical retaining walls on both sides, creating a sunken trench for several blocks. In other areas of the city the freeway was to be at grade or elevated to respond to terrain and the street grid.

Objections by the public were limited, likely because most residents had never seen a controlled-access freeway at the time.[25] The route split neighborhoods such as Chinatown-International District and became the border between neighborhoods like Wallingford and the University District. Washington State Highway Department agents met with affected property

owners to draw up sales contracts based on two independent appraisals. Most people accepted these contracts, though about 10 percent of the 4,500 parcels were taken via condemnation proceedings.

Most notable were the objections of the First Hill Improvement Club, who organized a 100-person march against the project in June 1961. They were concerned about pollution, noise, and having their neighborhood cut off from the rest of the city. Downtown businesses were concerned about the loss of parking spaces and an increase in traffic. [26]

In September 1961 the Club brought 200 people to a heated public hearing. There were complaints about the rushed process but no formal appeals were filed. Suggestions for mitigation included putting the freeway in a tunnel, studying a mass transit route for the median, and creating landscaped buffers. Victor Steinbrueck (1911-1985), representing the Seattle American Institute of Architects chapter, urged for further study of traffic patterns and pedestrian access.

Paul Thiry (1904-1993), supervising architect of Seattle Center for the 1961 World's Fair, assisted the Club by advocating for lids between Madison and University Streets and between Pike Street and Olive Way; he cited economic development and aesthetic reasons.[27] Several years after the freeway was completed, a writer said Thiry's idea "…would have afforded an avenue of trees and parklike malls for resting, a refuge for contemplative Seattleites afoot. If the freeway does get its cover, it will be far more difficult and expensive than it would have been during the initial construction".[28]

Cost estimates varied, with higher estimates by skeptical highway engineers and lower estimates from supportive architects. Ultimately it was determined federal funds were inapplicable to lids and other improvements, and the state and city were also unwilling to support changes. After a year of debate without resolution, state officials, including Governor Albert Rosellini (1910-2011), demanded an end in construction delays.[29]

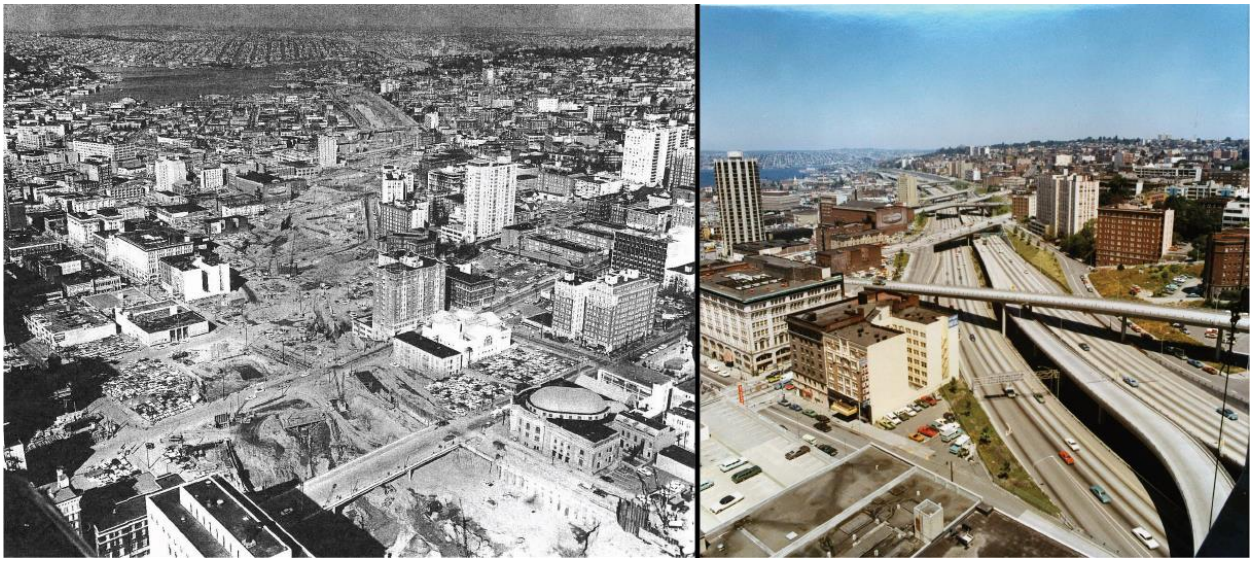


Figure 3 – Left: Demolition and construction of I-5 in downtown Seattle. The Spring Street overpass is in the foreground.[30] Right: I-5 in 1971 looking towards the future Freeway Park and Convention Center sites. The 8th Avenue overpass crosses above the University Street on-ramp.[31]

Construction of the 20 mile stretch of I-5 began in 1962 with the Ship Canal Bridge and was completed in 1967. Hundreds of buildings were demolished while many smaller homes were able to be relocated.[32] The Washington state portion of I-5 was completed in 1969 in Snohomish County.[33] Five decades later the downtown Seattle section of the freeway carries up to 200,000 vehicles daily.[34]

One mitigation the state transportation department implemented in 1966 was the construction of Boren Pike Pine Park, a small triangular park at the western corner of Pike Street and Boren Avenue and adjacent to the freeway. The park features four limestone columns from the Plymouth Congregational Church that stood on 6th Avenue and University Street; the church was demolished 1966 to make way for the freeway, and was rebuilt across the street with a modernist style.[35] In 2005 the park was renamed to Plymouth Pillars Park in conjunction with an expansion across Boren Avenue that includes an off-leash dog area. The park now totals 0.6 acres.[36]

Figure 4 - The original portion of Plymouth Pillars Park, facing the freeway. Photo by the author.

Built only some 50 years ago, the alignment of the freeway still has physical, social, and environmental impacts on Seattle's central neighborhoods. The core of downtown's street grid has remained fairly intact but the wide gap in destinations can discourage people from crossing the freeway. Noise and exhaust permeate surrounding streets. The on-off ramps deliver and

attract a high volume of automotive traffic on congested streets where other buses and bicyclists are competing for space.

Design guidelines for future lids that help mitigate these impacts must consider the history of how the freeway was designed and built, along with citizens' objections. Future lids will fulfill the spirit of the original suggestion for lidding the freeway and benefiting, rather than hurting, surrounding neighborhoods.

3.1.2 Other major routes

Interstate 90

What is now known as Interstate 90 has linked Seattle to the east side of Lake Washington since 1940. The route became a full-fledged interstate freeway in 1994, when a complete rebuild of the route was finished. In addition to two new floating bridges, the project included three lid projects: one in Seattle's Mount Baker neighborhood in combination with a bored tunnel; and two on Mercer Island.[37]

State Route 520

During the same period that I-5 was under construction in Seattle a second cross-lake route was completed and designated as State Route 520. The Evergreen Point Floating Bridge, the longest of its type in the world, opened in 1963.[38] Its western terminus is an interchange with I-5 at Roanoke Street. As of 2015 the bridge is being reconstructed and much of the route is being widened. As part of this project there are three lids completed or nearly so on the east side of the lake, and two more are planned for the Seattle portion in the Montlake and north Capitol Hill neighborhoods. One is reviewed in a case study.

State Route 99

Part of the original U.S. Highway system established in the 1920s, in 1933 Seattle's Aurora Avenue was built to carry this route on the west side of the city.[39] Today it is a state route that alternates between a controlled-access freeway and a large surface street between the cities of Fife and Everett.

The route was moved off of downtown Seattle's surface streets and onto the waterfront Alaskan Way Viaduct in 1953. The viaduct was damaged in a 2001 earthquake, prompting a replacement project. After years of debate among local activists, the Seattle City Council, and the state government, a bored tunnel option was chosen instead of surface street and transit improvements.[40] The tunneling began in July 2013 with the world's largest boring machine, but it overheated and halted work by that December. As of this writing the project is at least two years behind schedule, delaying demolition of the viaduct and work on future parks and redevelopment of the city's waterfront.

3.1.3 Incomplete freeway efforts

After I-5 was completed, additional plans for freeways that would have demolished more city blocks were blockaded by an angry citizenry. Similar "freeway revolts" occurred around the country in the protest era of the 1960s and 1970s. The protests slowed, altered, or cancelled a number of projects. Protests centered on civil rights and environmental damage. The Federal Highway Act of 1962 required states to start providing relocation assistance for affected residents.[41]

In 1960 Seattle voters approved bond measures for two significant projects. The R.H. Thompson Expressway would have connected SR-520 with the Central District and Rainier Valley neighborhoods via the 23rd Avenue East corridor, bypassing downtown and displacing 4,000 residents.[42,43] It would have also cut through the Washington Arboretum, a cherished natural area in the Montlake neighborhood. Interchange ramps were built in the Arboretum before citizen protest brought the project to a halt in 1969.[44] The City Council formally rescinded financial support in 1970, and in 1972 a citywide referendum supported the council's move.[45] The interchange ramps remained as civic symbols until 2014, when they were torn down as part of the SR-520 rebuild.[46]

The other project, the Bay Highway, would have been an elevated structure between I-5 and Seattle Center along the south edge of Lake Union. The City Council formally approved the idea in 1970.[47] But in the same 1972 election that killed the Thompson Expressway, a referendum on continuing the Bay Highway was defeated by voters. Seattle's era of new freeways had come to an end.

3.2 Existing Seattle lids

Since the physical and social toll of I-5's construction the state department of transportation has incorporated lids into its mitigation strategies for freeways. There are now numerous other lids completed and being built in the central Puget Sound region. Those outside of Seattle are briefly discussed in the lid inventory in section 4.0. The three existing lids in Seattle are summarized here, and the two that are planned are discussed in a case study.

Figure 5 – Looking north at Freeway Park and the Washington State Convention Center. Photo by the author.

3.2.1 Freeway Park

Nine years after I-5 opened to traffic in Seattle, the city and state governments cooperated on finally fulfilling part of the call for a lid over the freeway in downtown. After plans were announced in 1969, Freeway Park opened in 1976 with 5.2 acres of walkways, lawns, plantings, water features, and abundant vegetation.[48] Adjusting for inflation, it cost $94.5 million ($18 million per acre). It was designed by Lawrence Halprin and Associates, a notable landscape architecture firm. The stark juxtaposition of trees straddling a concrete canyon enamored the design professions. The park is now officially named Jim Ellis Freeway Park after a Seattle lawyer and long-time activist who had a hand in many of the city's civic achievements during this era. Ellis had successfully campaigned to pass a series of countywide bond measures in 1968 that included funding for the new park.[49]

Tall buildings and overgrowing vegetation have hidden the park from surrounding streets in recent decades. The park's jagged site plan, elevation changes, and tall concrete walls contribute to disorientation for new visitors. A number of nooks and isolated entryways have

given the park a reputation for crime and nuisance activities, including camps underneath the park and adjacent to freeway traffic.

A revitalization effort was spearheaded by the local residents in 2004 and 2005. Today Freeway Park is better managed and maintained, but some problems remain and offer important lessons for future lids in downtown. This lid park will be studied in depth in a case study to develop lessons for design guidelines on future lids.

3.2.2 Washington State Convention Center

The need for a large convention center dawned upon city and state leaders in the early 1970s. In 1982 the state legislature authorized the creation a public non-profit corporation to design, construct, and operate a state-owned convention center in Seattle.[50] The goal of the project was to attract new business to the Seattle area and provide event space for up to 10,000 attendees. After a public input process, a site over Interstate 5 and adjacent to Freeway Park was selected because it was closest to retail stores and hotels; the other options were Seattle Center and near the Kingdome stadium in Pioneer Square. Part of the site was private property that the state eventually acquired due to the owner's bankruptcy.

The Convention Center was constructed in 1985-1988 at a cost of $152 million. It contained 370,000 square feet of exhibition, meeting, and retail space, and 930 parking spaces. Along the way five lawsuits delayed the project, and voluntary compliance with the city's permit process further delayed it by a year. Jim Ellis (b. 1921), who helped oversee the project on an advisory board, wrote, "…promised civic benefits of the project, such as lidding the freeway and expanding Freeway Park, are becoming realities."[51]

Only a few years later the Convention Center was near capacity. In 1993 Ellis, then on the facility's board of directors, began discussions with business and government leaders.[52] In partnership with private developers, a 100,000 square feet, $195 million expansion was built in 1999-2001 as the fourth level of a two-block hotel, retail, and parking complex bounded by Pike and Pine Streets and Seventh and Ninth Avenues.[53,54] A large skybridge and truck ramp span over Pike Street to provide access between the two sections.

Part of the 2001 expansion was a 71,000 square feet space intended for the Museum of History and Industry, but the space was instead used to temporarily house the downtown library during its redevelopment in the early 2000s. In 2010 the space was acquired by the Convention Center and renovated for high end business meetings.[55]

A fourth expansion atop the block with the Convention Place bus station is planned. The details of this expansion and its relation to the design of future freeway lids are discussed in the site analysis.

3.2.3 Mount Baker lid

The Interstate 90 corridor between Seattle and the Eastside was completed in 1994. Moving east from the I-5 interchange, the freeway enters three one-third-mile long tunnels in the Mount Baker neighborhood instead of going over a hill. The first 1,500 feet of the tunnels are under a lid structure. In an unusual choice for highway projects, it was constructed with tower cranes. [56]

Passing across the lid are two major arterial streets, 23rd Avenue South and Martin Luther King Junior Way South. The lid is bounded approximately by South Massachusetts Street to the south and South Irving Street to the north.

The lid is about 10.3 acres and supports part of the 15.2 acre Sam Smith Park, which includes outdoor recreation areas for the adjacent Thurgood Marshall Elementary School.[57] Other park features are tennis courts, a playground, and grass playing fields. Passing along the length of the lid and through the bored tunnel is part of a 10 mile long bicycle and pedestrian trail along Interstate 90 that connects Seattle and Bellevue.

Figure 6 – The western edge of the Mount Baker lid over Interstate 90.

The western edge of the lid is publically accessible and has views towards the downtown Seattle skyline. Combined with sound walls and extensive landscaping in the area, the Mount Baker lid benefits the surrounding neighborhood by dampening the environmental impact of I-90.

3.3 Related initiatives and efforts

For decades there has been continued civic discussion of additional freeway lids in downtown Seattle, but no formal commitments or plans have resulted. In the early 1990s,

federal judges asked the Seattle City Council to consider building a new courthouse over the freeway between Marion and Spring Streets.[58] The existing courthouse, which still stands on the block bounded by Fifth and Sixth Avenues and Spring and Madison Streets, was built in 1940 and was over capacity. The council supported the lid idea in a 1991 resolution.

In 1994 Mayor Norm Rice proposed instead selling the adjacent library site, west of the courthouse, to the federal government and rebuilding the library elsewhere. [59] One suggestion was to rebuild the new library over the freeway.[60] None of the ideas moved forward. The downtown library was redeveloped on the same block and the federal government eventually built another courthouse on Stewart Street, both opening in 2004.

3.3.1 Freeway Air Rights Development master plan

Freeway Park principle designer Angela Danadjieva, now of Danadjieva & Koenig Associates, developed a master plan for the downtown Interstate 5 airspace beginning in 1983. It aimed to tie the 1984 Pigott Memorial Corridor connection to First Hill and the 1988 Convention Center into a unified design with Freeway Park. The plan envisioned partial lids on both sides of the Madison Street overpass and north of Pine Street, but those have never been constructed. They would have reinforced the concept of a gateway into downtown for freeway drivers.

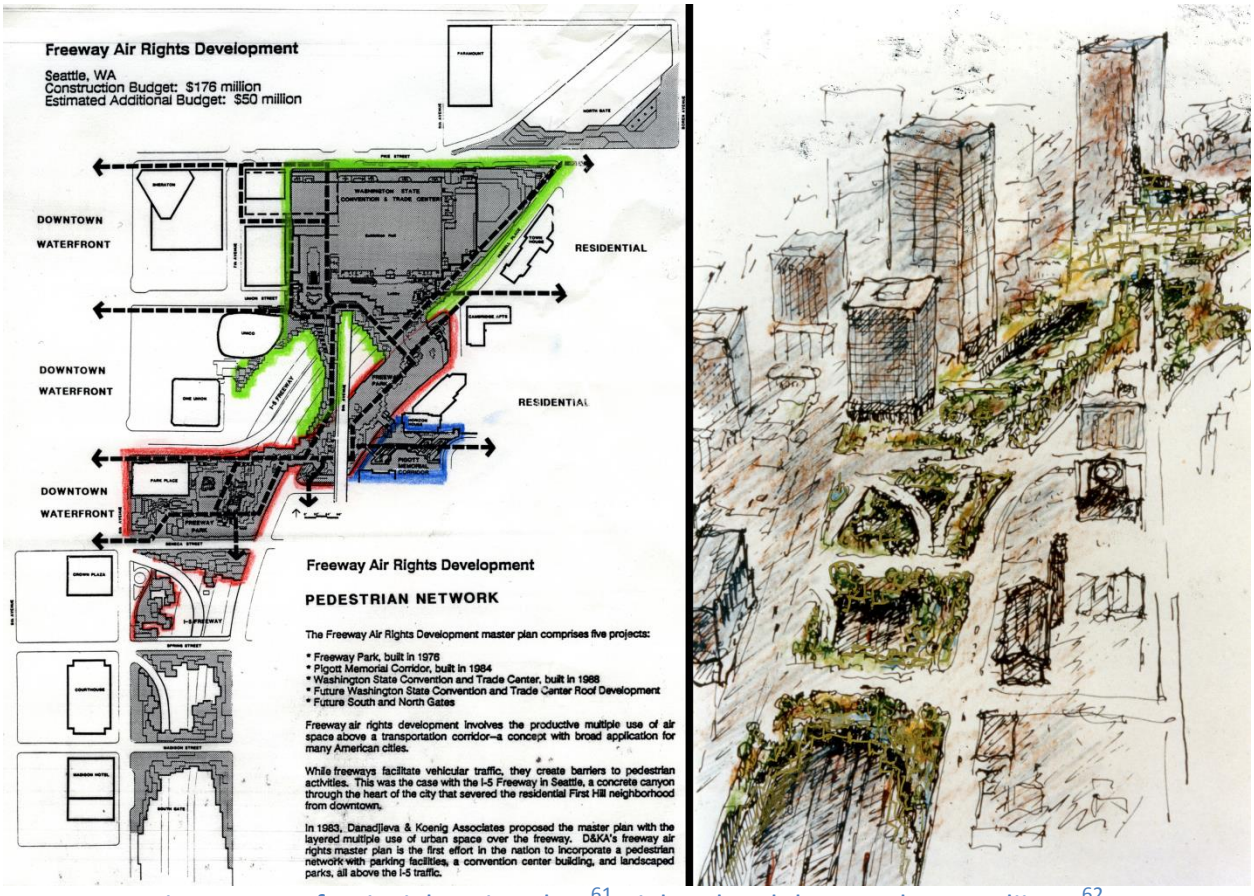


Figure 7 – Left: air rights site plan.[61] Right: sketch by Angela Danadjieva.[62]

Though a complete copy of the master plan is unavailable, from the images in Figure 7 it is clear that at some point there was momentum for expanding Freeway Park into a larger system of pedestrian paths and park spaces. The master plan appears to envision not completely covering over the freeway, but like the original park there are openings to the traffic below. A similar cascade of planter boxes would tumble towards drivers and soften the appearance of the trench's vertical walls.

This plan was proposed when Freeway Park was beginning to fall into disrepair due to lack of maintenance funding and decreasing use. This situation may have discouraged further expansion. While the idea of further covering the freeway must spur design guidelines for future lids, this master plan is likely out of date and does not necessarily reflect contemporary land use demands and urban design principles.

3.3.2 The Blue Ring strategy

In 2002 the City of Seattle published a 100 year open space strategy for the Center City, titled "The Blue Ring: Connected Places".[63] Conceptually, the "blue ring" connects the water bodies in the Center City and is within the greater citywide "green ring" of parks. The strategy seeks to coordinate the efforts of private development and public capital projects to create a ring of open spaces around the city's core as population and employment density increases. It says, "Without well-defined public open space, the Center City will become just another big city with little place for social gathering, recreation or enjoyment of an urban, or especially a Northwest, lifestyle. As growth continues in the Center City, we must be more strategic in providing the open-space amenities needed to make our neighborhoods livable."[64] The strategy won a Planning and Analysis Honor Award from the American Society of Landscape Architects in 2003.[65]

The strategy notes that 35-40 percent of the Center City land area is publically owned. Opportunities exist with street right-of-ways, Lake Union and Elliott Bay shorelines, existing and proposed public parks, and private plazas. Much of the vision's key nodes and corridors have been implemented since it was published, including South Lake Union Park, the Terry Street green street, and Olympic Sculpture Park. Part of a new linear waterfront park identified in the vision is under construction as of this writing. At least one major project, rebuilding Westlake Avenue as a green street, has not been implemented.

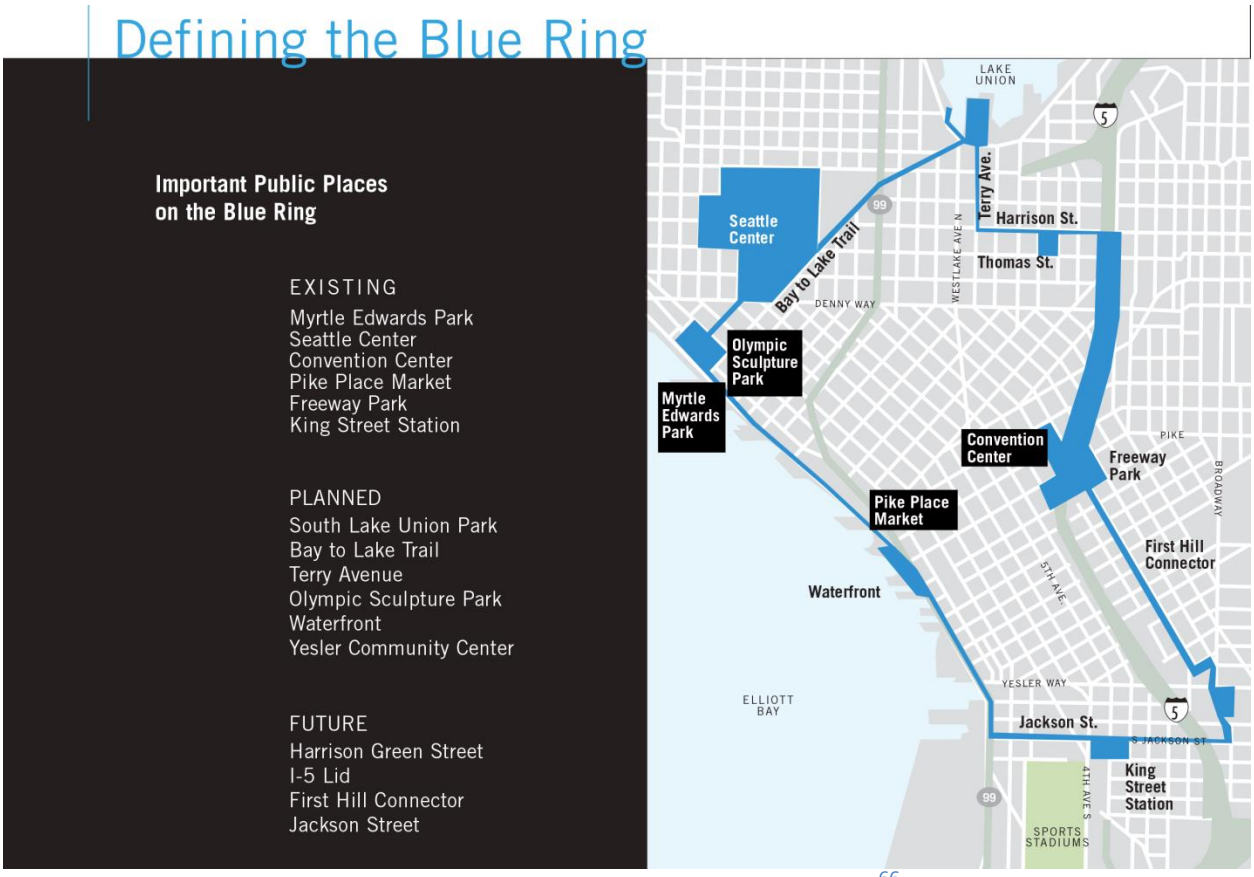


Figure 8 – Blue ring project list and map.[66]

An I-5 lid is also identified as one link in the blue ring. The project is not elaborated upon, but the conceptual map in Figure 8 envisions a lid between the Convention Center at Pike Street to Harrison Street. This extends three blocks north of this project's study area limit at Denny Way. An alternative to the lid between Denny Way and Harrison Street is completion of the Melrose Promenade, a more recent green street concept discussed below, and a new pedestrian and bicycle bridge across I-5 at Harrison Street, which is in Seattle's Bicycle Master Plan.

Additional lids will contribute to fulfilling the vision of an interconnected series of open spaces in the Center City. There was a deficit of Center City open space when this strategy was written and there remains a deficit today. Future lids will be unique spaces, but they must be thematically consistent with the blue ring vision and connect with other ring elements.

3.3.3 Madison Street to Spring Street study

In 2009 the Seattle Department of Transportation commissioned a study of a lid between Madison and Spring Streets.[67] It considered two options: building around the Spring Street southbound on-ramp or removing it. For both options, three levels of amenities were considered: a basic park with lawns; an enhanced park with more landscaping; and an enhanced park with retail buildings. The study thoroughly covers a range of engineering concerns that are summarized here.

Figure 9 – Visualization of one Madison Street to Spring Street lid option with retail buildings and preservation of the northbound on-ramp.[68]

Structurally, there is uncertainty about whether the existing retaining walls along the trench would need to be replaced to build abutments for beams. Also, all of downtown's overpasses over I-5, the elevated freeway ramps, and the structure carrying the northbound lanes over the express lanes are susceptible to earthquake damage; referring to the Madison Street overpass, the report says, "The bridge was constructed in 1962 and likely has seismic vulnerabilities due to the fact that it was constructed prior to the advent of modern seismic detailing practice".

A lid would limit headroom for construction equipment used for future replacement work, but Freeway Park and the Convention Center have already imposed this limitation. The lid would likely be built of pre-stressed concrete girders. They would be shallower than the existing Spring and Madison Street overpasses, which do not provide the standard vertical clearance of 16.5 feet.

Mechanical ventilation is typically required for freeway tunnels more than 500 feet long; this lid would be 400 feet long (including the overpasses). Air circulation modeling is needed to determine if the nearby Freeway Park and the sunken express lanes, which are under the northbound lanes, would contribute to mechanical ventilation needs. Fire suppression systems are required for lids longer than 300 feet. Emergency exits would be needed to facilitate evacuation to street level.

The report stated there would be traffic issues during construction due to lane closures and detours. Removal of the Spring Street on-ramp would alter traffic patterns. Traffic controls,

namely warning lights and message signs, would be needed to stop vehicles in case of an emergency. Lighting under the lid would need to be carefully designed for drivers' eyesight adjustment.

None of these issues are insurmountable, especially considering that the state transportation department has already developed numerous other freeway lids in the region. There is also a significant discrepancy between the study's cost estimates and the known costs of completed lid projects. The most expensive lid option in the study, which would remove the Spring Street on-ramp and include retail space, is estimated at $115.8 million for 1.5 acres. This equates to $77.2 million per acre, far higher than any of the other park lids that have been catalogued. Klyde Warren Park in Dallas, for instance, included retail space and was built for $21.5 million per acre.

The study's cost estimates are greatly overestimated. But in other respects the study provides useful and detailed engineering considerations that can be used to develop design guidelines for future lids.

3.3.4 The Lid I-5 group

In 2010 Dana Behar, President and CEO of HAL Real Estate Investments, decided to find ways to mitigate the impacts of Interstate 5 in downtown Seattle. He cold called 16 engineers, architects, landscape architects, lawyers, and other local professionals. All accepted the invitation and the group met to brainstorm solutions over the following years. They called themselves "Lid I-5" and created a website with links to resources and information about freeway lids.[69]

The group considered a number of ideas. The Yesler Way overpass, at the south end of this project's study area, is an oddity because it has on-street parking. Nearby is the Yesler Terrace public housing project on the east side of the freeway that is being redeveloped with low-income units and several commercial properties. Replacing the parking with landscaping and other amenities would greatly improve the walking experience to and from downtown for thousands of disadvantaged residents at a relatively low cost.

Similarly, many of the overpasses in this project's study area are crossed by Capitol Hill and First Hill residents commuting by foot to work in downtown and South Lake Union. Enhancements to street overpasses can be an intermediate step to fully lidding the freeway.

For complete lids the group determined the most affordable sections will be the two blocks north of the Convention Center and the two blocks south of the Freeway Park, which are also the primary study areas for this work. They figured a citywide parks levy is the most feasible way to fund lid projects.

The group has is currently inactive until it has a more concrete project to work on.

3.3.5 Waterfront Seattle

The eventual demolition of the Highway 99 Alaskan Way Viaduct, damaged in a 2001 earthquake, is enabling a complete overhaul of Seattle's downtown waterfront. The first part of a series of projects, known as Waterfront Seattle, is the reconstruction of seawall that is due to finish in June 2016.[70] A series of new parks, hill climbs, and a pedestrian-focused rebuild of

Alaskan Way are planned for completion by the early 2020s.[71] It is relevant because Interstate 5 in downtown comes as close as six to ten blocks from the waterfront.

Figure 10 - The project boundaries and conceptual plan for Waterfront Seattle.[72]

The investment of public funds and political capitol in Waterfront Seattle is significant, and its proximity to the I-5 study area likely precludes political support for freeway lids until the waterfront projects are mostly complete. With a total budget of $1.07 billion, funding sources include the state and county governments, a voter-approved bond, a local parking tax, general City of Seattle funds, donations, and a local improvement district (LID). A LID is a collection of property owners who agree to tax themselves in light of assumed property value increases as a result of nearby public investment. The waterfront LID is expected to contribute at least $200 million and be formed by 2017.[73] It is particularly relevant as a funding source because a LID is a likely source of funding for freeway lids that will benefit the same downtown properties.

Future lids over Interstate 5 on the other side of downtown have the potential to complement the waterfront redesign. The waterfront and freeway lids can form conceptual "bookends" of public space to the dense downtown. In particular, planned hill climbs and pedestrian infrastructure improvements on Seneca, Union, Pike, and Pine Streets can form a series of parallel linkages with future lids.[74] Hill climbs will take the form of new stairs and elevators. Improvements such as widened sidewalks and street trees may encourage visitors to move between the two sides of downtown and visit both the waterfront parks and parks over the freeway. Creating the incentive for this pedestrian flow can also benefit local businesses and create a more vibrant street environment.

The formation of a specialized office at the City of Seattle, the Office of the Waterfront, is one possible model for the management of freeway lid design, construction, and operations. Creating dedicated staff positions provides the opportunity for more meaningful public engagement and collaborative design processes. Freeway lids will be a large capital project and may warrant a similar office or nonprofit entity.

3.3.6 Other plans

There are a number of plans for public projects near I-5 that are relevant to future freeway lids. Lid designs must incorporate connections, both tangible and intangible, to these efforts to improve public spaces.

Melrose Promenade

Melrose Avenue borders the eastern retaining wall of Interstate 5 for one mile between Pike Street and Lakeview Boulevard in the Capitol Hill neighborhood. It is lined by multifamily buildings and offers views of the cityscape, Lake Union, and the Olympic Mountains. It is also the flattest route from north Capitol Hill to the Pike-Pine commercial district. In 2010, resident and urban planner Mike Hunt brought together neighbors, property owners, city agencies, and community organizations to develop a new vision for the street. The Melrose Promenade Advisory Committee was formed.

In collaboration with the Seattle Central Greenways bicycle and pedestrian advocacy group, in 2012 the Committee secured a $20,000 grant from the City of Seattle to hire consultants. The consultants performed community outreach and developed a conceptual plan for the corridor. The plan was published in 2013. Its main goals are to improve pedestrian and bicycle facilities, take advantage of views, and create neighborhood gathering spaces. It contains cost estimates and a flexible implementation strategy.[75]

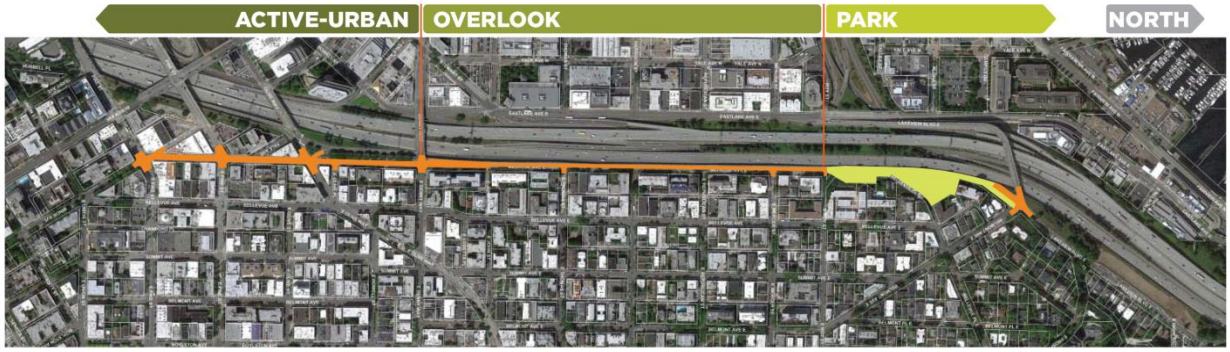


Figure 11 – The Melrose Promenade project area.[76]

As an improvement to an area highly impacted by the construction of I-5 there are potential connections to be made between the Promenade and freeway lids. Since the Promenade is mostly beyond the northern end of this project's study area there are opportunities to make a much longer, continuous pedestrian experience. Consistent signage, plantings, path designs, lighting, and other elements can tie the promenade and lids together as a larger improvement to the public realm. This will be most important with lids between Denny Way and Pine Street, where the two project areas overlap.

Pike Pine Renaissance

Prompted by retail competition from other neighborhoods and streetscape deterioration, in 2012 the Downtown Seattle Association convened a task force to campaign for improvements along Pike and Pine Streets from 1st Avenue to Interstate 5, the city's shopping and transit core. The project area also extends to the larger downtown, with different priorities for the east-west "hill streets" and the north-south "avenues". Their plan includes a variety of details for sidewalk materials, street trees, furniture, and pedestrian prioritization like curbless intersections.[77]

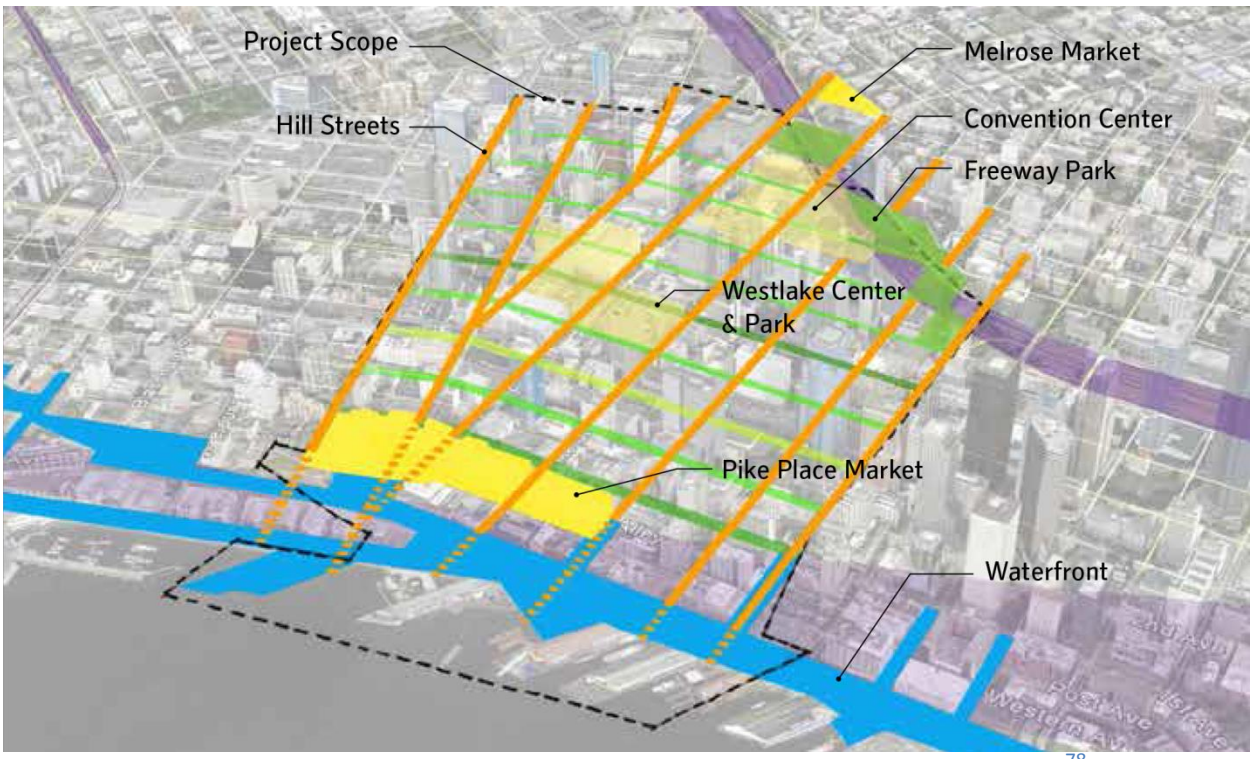


Figure 12 – The Pike Pine Renaissance project area and key locations.[78]

The concept is also arranged into three layers: the "light layer" that accommodates events and cultural changes, such as art installations or food trucks; the "middle layer" made up of the physical pavement, furniture, and other features; and the "deep layer", the distribution of right of way. Implementation will be incremental over many years and depends on the willingness of property owners to make improvements to their street frontages. Updates to the city's right of way standards are also needed.

Originally the plan stopped at I-5, but the Lid I-5 group convinced the task force to expand their scope across the freeway to the Melrose Market.[79] This creates a "market to market" corridor that intends to "…bridge the I-5 gap and brings together the hip, fun energy of Capitol Hill's Pike-Pine neighborhood with the historic richness and grandeur of the adjacent core and Pike Place Market."[80]

To tie into the vision for the Pike-Pine corridor, future lids must adopt elements of the plan both to complement the pedestrian experience and draw people into parks or commercial activities on the lids. The project's goal of creating the "best urban experience in the country" will be greatly facilitated by decreasing the environmental impact I-5 has on people crossing between the two neighborhoods.

4.0 Lid inventory

This is an inventory of existing and planned freeway lid projects. Compiling this information enables a more complete understanding of the topic because no similar inventory was located during a literature review. The inventory reveals freeway lids' increasing popularity, options for case studies, and quantitative data on construction types and cost.

Only a few types of essential information were collected for each lid in order to simplify the process: location, project name, year completed, type and use, size, freeway route, status, original cost, and inflated cost. The results of the inventory are summarized in Figure 13.

Location	Project Name	Year	Type and Use	Acres	Route	Status (2015)	2015 Adjusted Cost ($ millions)	Cost Per Acre ($ millions)
New York, NY	George Washington Bridge Bus Station	1963	Bus station with retail	3.75	I-95	Complete		
New York, NY	Bridge Apartments	1964	Four 32 story apartment towers	3	I-95	Complete		
La Cañada Flintridge, CA	Memorial Park	1966	Park, street, parking lot	2.6	I-210	Complete	5.7	2.2
Louisville, KY	Riverfront Plaza/Belvedere	1973	Park, street, parking lot	7	I-64	Complete	71.06	10.2
Philadelphia, PA	Chesnut Street over I-95	1975	Park and street	1.75	I-95	Complete		
Philadelphia, PA	Spruce and Dock Streets over I-95	1976	Park and streets	3.42	I-95	Complete		
Boston, MA	Hancock Garage-Retail	1976	Retail and parking garage	2.83	I-90	Complete		
Fall City, MA	Fall River Government Center	1976	Civic building	1.9	I-195	Complete		
Seattle, WA	Freeway Park	1976	Park	5.2	I-5	Complete	94.47	18.2
Boston, MA	Copley Place	1983	Shopping center, office towers	11	I-90	Complete		
Minneapolis, MN	ABC Ramps	1980s	Three parking garages		I-394	Complete		
Seattle, WA	Washington State Convention Center	1988	Civic building	3.3	I-5	Complete	300.28	91.0
Duluth, MN	West Tunnel	1990	Park	1.4	I-35	Complete	22.87	16.3
Duluth, MN	Jay Cooke Plaza/East Tunnel	1990	Park	1.4	I-35	Complete	12.78	9.1
Duluth, MN	Lake Place	1990	Park	2.5	I-35	Complete	17.88	7.2
Duluth, MN	Leif Erickson Tunnel/Rose Garden	1990	Park	3.1	I-35	Complete	40.84	13.2
Phoenix, AZ	Hance Park	1992	Park	15.5	I-10	Complete	174.91	11.3
Mercer Island, WA	Aubrey Davis Park	1994	Park	12.78	I-90	Complete	230.24	18.0
Mercer Island, WA	Luther Burbank lid	1994	Park	2.25	I-90	Complete		
Seattle, WA	Mount Baker Lid	1994	Park	10.33	I-90	Complete		
Kansas City, MO	Bartle Hall Convention Center	1994	Civic building	5.74	I-670	Complete	144.61	25.2
Reno, NV	Walgreens	2002	Retail building	1	I-80	Complete		
San Diego, CA	Teralta Park	2002	Park	5.4	I-15	Complete	90.94	16.8
Trenton, NJ	South River Walk Park	2004	Park	6.5	U.S. 29	Complete	185.58	28.6
Columbus, OH	Cap at Union Station	2004	Enhanced overpass, retail	1.12	I-670	Complete	9.78	8.7
Atlanta, GA	5th Street Bridge	2006	Enhanced overpass, landscaping	1.31	I-75/I-85	Complete	11.73	9.0
Minneapolis, MN	Target Plaza	2008	Plaza	2.2	I-394	Complete		
Dallas, TX	Klyde Warren Park	2012	Park	5.2	TX 366	Complete	111.97	21.5
Medina, WA	Evergreen Point Road Lid	2014	Park, transit stop	2.4	WA 520	Complete		
Hunts Point, WA	84th Avenue Northeast Lid	2015	Park, streets	1.63	WA 520	Construction		
Clyde Hill, WA	92nd Avenue Northeast Lid	2015	Park, transit top	2.07	WA 520	Construction		
St. Louis, MO	Park Over The Highway	2016	Park	0.61	I-70	Construction	26.4	43.3
Seattle, WA	Montlake Lid		Park		WA 520	Design		
Seattle, WA	Delmar Lid		Park		WA 520	Design		
Los Angeles, CA	Park 101		Park	14	U.S. 101	Design	439	31.4
Los Angeles, CA	Hollywood Central Park		Park	38	U.S. 101	Design	1000	26.3
Glendale, CA	Space 134		Park		CA 134	Design		
Santa Monica, CA	14th to 17th Streets		Park	7	I-10	Proposed		
Santa Monica, CA	Ocean Avenue to 4th Street		Park	5	I-10	Proposed	87	17.4
Ventura, CA	BEACH + TOWN		Park	5.7	U.S. 101	Proposed	154	27.0
Philadelphia, PA	Penn's Landing		Park	4	I-95	Proposed	125	31.3
Chicago, IL	Millennium Park for the West Loop		Park	15	I-94	Proposed	300	20.0
Cincinatti, OH	Connect the Blocks		Unspecified		I-71	Proposed		
Pittsburgh, PA			Park		I-579	Proposed	27	
Minneapolis, MN	35W Lid		Park, parking garage	5.5	I-35W	Proposed	60	10.9
Austin, TX	Cut and Cap		Park	30	I-35	Proposed	550	18.3

Figure 13 – A summary of the national freeway lid inventory.

In some cases public agencies did not have simple information like the cost or size of lid projects or even the year they were completed. In other cases public agencies did not respond to repeated inquiries. Regardless, many alternate sources were available.

In addition, the definition of “lid” presented difficulties in limiting the scope of the inventory. The terms “lid”, “cap”, and “deck” imply a relatively thin structure. It is unclear at what point a multi-story parking garage or convention center, for instance, ceases being a lid and is simply a building built around a freeway.

A few noteworthy “enhanced overpasses” were included in this inventory for the sake of comparison, but it is apparent that freeway overpasses that fall under that vague definition are too numerous to count. For the purposes of this inventory lids are parallel with freeway alignments while enhanced overpasses are perpendicular to the freeway.

The original cost and completion year are used to find the contemporary cost with the Bureau of Labor Statistics’ online inflation calculator. The size of lid projects was based on a standard unit, acres, to provide a consistent comparison across the various shapes and types of lids. When the cost and size are combined, a relatively reliable cost comparison can be formed for future lid projects.

The largest existing freeway lid is in Mercer Island, Washington. Completed in 1994, it covers approximately 12.7 acres and cost $146 million[81]. Adjusted for inflation to $230.24 million, the cost is equivalent to $18 million per acre. Across all existing and proposed lids, the average cost is about $21 million per acre. This $18-21 million per acre range is reasonable and useful for cost estimates of future lids.

5.0 Case studies

The intent of these case studies is to derive lessons from previous lid projects that can shape or directly apply to design guidelines for future lids in downtown Seattle. Three projects stand out from the lid inventory; additionally, all three are parks because the first stage of the site analysis found parks and open space are the most in-demand land use in Seattle's Center City.

Freeway Park was the first freeway lid in Seattle and the Puget Sound region. Its history and design decisions are well documented. It is located within the study area, so designers of future nearby lids must choose to integrate, complement, or ignore the various elements of Freeway Park.

Klyde Warren Park in Dallas, Texas is one of the most recently completed freeway lids. Its design reflects contemporary thinking on landscaping, engineering, and programming. It is managed by a non-profit organization rather than a municipal government, possibly providing guidance on how design can accommodate this style of operation. A site visit was able to be made to the park.

The Montlake Lid in northeast Seattle has not been built as of this writing. But similarly to the previous case it is relevant because it is timely. It is also overseen by the same state and city agencies that will oversee design and construction of other future freeway lids in Seattle. Finally, its designers are locally available and open to providing insight.

What follows for each case study is a brief history of each project. Based on what information is available, an analysis of relevant elements is then performed to discover lessons that will influence design guidelines.

5.1 Freeway Park, Seattle, WA (1976)

Lead design firm: Lawrence Halprin and Associates
Construction cost: $23 million ($94.5 million in 2015 dollars)
Size: 5.2 acres

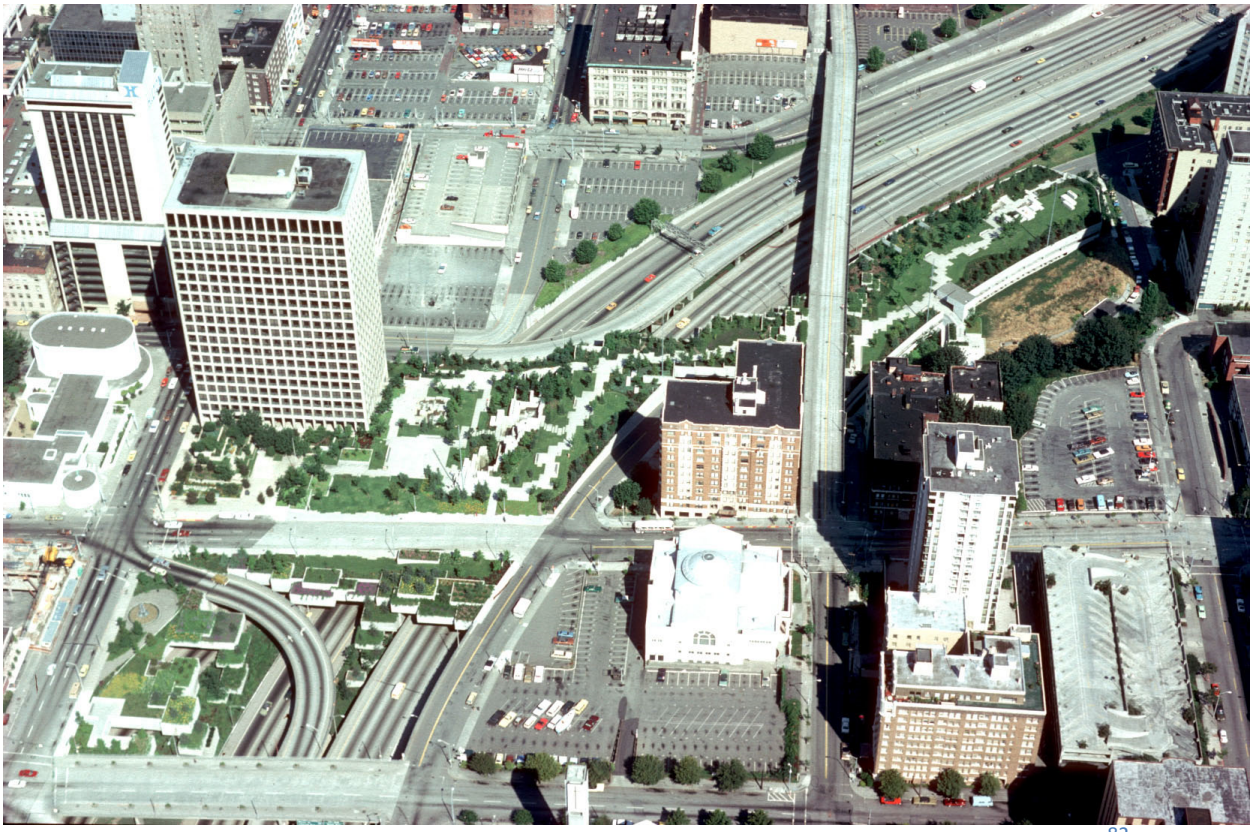


Figure 14 - Aerial view of Freeway Park shortly after opening, looking north.[82]

Freeway Park is located in downtown Seattle over a curving section of Interstate 5. Its main section is between Union and Seneca Streets and 6th and 9th Avenues. The main section is also built on top of two parking garages, one at the corner of 6th Avenue and Seneca and another east of 8th Avenue. A "southern annex", part of the original park, partially covers the freeway south of Seneca Street. A "northern annex", built later, runs along the eastern edge of the Washington State Convention Center north of the main section.

Contrary to some statements in the literature Freeway Park was not the first of its kind. Development of airspace above roadways dates back decades before the interstate system was built. And when Freeway Park was completed in 1976 it didn't immediately spur similar projects across the country. But its modernist style and dramatic landscaping caught the attention of cities and design professionals. And because it is an existing freeway lid within the study area it is the most relevant candidate for a thorough case study.

Freeway Park proper is located in downtown Seattle above a curving part of Interstate 5. It lies between Seneca Street to the south and Union Street to the north. To the west is 6th Avenue, and as the park follows the freeway curve it is bordered by Hubbell Place and 9th

Avenue to the east. 8th Avenue passes over the park and the freeway. There is a gap in coverage of the freeway around the University Street on-ramp. The park has multiple entrances. It features a variety of paved areas, vegetation, paths, stairs, benches, water features, and views of the city.

Figure 15 – Visitor map of Freeway Park and surroundings.[83]

Origins and design intent

As noted in the brief review of Seattle's history, a lid over Interstate 5 in downtown was envisioned before the freeway was built. In 1967 Floyd Naramore of the NBBJ architecture firmed donated $75,000 for a small plaza and fountain on the east side of 6th Avenue to soften the edge of the freeway. Shortly after architect Perry Johnson, also of NBBJ, proposed extending the park across the freeway.[84]

Seattle mayor Floyd Miller, the city council, parks commission, and planning commission all quickly signed on to the idea. Even Governor Dan Evans offered support, but it was his highway director, George Andrews, who secured both federal and state funding. Like the freeway itself, the federal government pledged 90 percent of funding and the state provided 10 percent.

In 1968 King County voters approved $344 million in bonds for a number of projects as part of the Forward Thrust initiative pioneered by civic leader James Ellis, including $65 million for parks in Seattle and $2.8 million specifically for Freeway Park. Ellis had observed I-5's construction from his office in the IBM Building at 5th Avenue and Seneca Street. Other funding sources included federal Housing and Urban Development block grants and open space grants, federal urban-arterial improvement funds, federal interstate highway funds, the newly formed King County Metro transit agency, the State Interagency Committee for Outdoor Recreation, and the American Legion.[85]

The cost of the park itself came to $45 per square foot at a time downtown land cost $50 per square foot. The state contributed the air space at no cost.

As support was built among public agencies a private developer was finalizing plans for Park Place, a 21 story office tower with a garage directly adjacent to the project site. The developer was convinced to shift the tower to the northwest and build the garage underground with a private portion of the park above it. The project was completed in 1971 and had 95 percent occupancy throughout the decade despite a sluggish economy.

By 1970 Lawrence Halprin's design team was selected along with a number of subcontracted consultants, consisting of other landscape architects, horticulturalists, irrigation specialists, and structural, mechanical, and electrical engineers. Angela Danadjieva was the principal designer and would return to consult on future work for the park. The team was charged with first studying the impacts of air pollution, acoustics, weather, and shadows on the site. Analysis was also done on topography, access, pedestrian and vehicle traffic, and surrounding land uses.

Using national air quality standards established only in 1971, a 1973 evaluation determined visitors' exposure to pollutants would rarely be exceeded. It determined the park itself would not generate significant pollution because almost all users would arrive by foot.[86]

Surveys were sent to neighboring office buildings, retirement homes, schools and hotels. Respondents said they favored the characteristics of Seattle's Green Lake Park, Volunteer Park, and the Washington Arboretum. Those parks contain a mix of forest, lawns, and water. A central water feature became one of the key ideas. The designers also referenced an earlier Olmstead parks plan for Seattle and envisioned Freeway Park as one of many parts of a terraced green space leading to the Elliot Bay waterfront. Such a vision would eventually be incorporated into the 2002 Center City "blue ring" plan.

A major design theme was contrast: Cars versus strollers, traffic noise versus water and wind, and hard concrete edges versus soft vegetative outlines. Ivy now overhangs the edges of the park and a "box garden" of trees cascades toward the freeway to enhance the perspective of the park from freeway motorists. With a 90 foot elevation difference between the lowest and highest points in the park, many stairways were required. Hundreds of trees and nearly 2,000 plants were incorporated. The city agreed to construct a public parking garage with the park as its roof between 8th and 9th Avenues.

The park opened in 1976 to great fanfare. A parade of office workers, apartment residents, hospital visitors, families, and tourists regularly visited. "Out to Lunch" concerts encouraged people to eat outside in pleasant weather. It was a success, Ellis said, "…because it did not become a casualty of the war between freeway fighters and freeway lovers. This project did not suffer the attrition of lengthy lawsuits between environmentalists and developers."[87]

The original design did not significantly connect downtown with the First Hill neighborhood, the impetus for the project, because a key land parcel was not available. By 1984 the parcel was acquired and extension of the park was created along the line of University Street between 8th and 9th Avenues. Rising another 40 feet, the Pigott Memorial Corridor contains additional trees and a long water feature along its entire length of stairs and ramps.[88]

In 1988 the Washington State Convention Center was completed next to Freeway Park. The facility's upper lobby opens directly onto a plaza in the park. Along the east side of the

building is a skinny extension of Freeway Park to Pike Street. Emergency buttons that called security guards were installed at the same time.[89]

Maintenance and crime issues

Freeway Park enjoyed heavy use in its early years. By the mid-1980s, though, a lack of maintenance was becoming evident. Overgrowing vegetation began obscuring views in and out of the park and at night created deep shadows cast by 100 foot tall lights.[90] The irrigation system was renovated in the early part of the decade, but it wasn't until 1992 that water leakage onto the freeway below was mostly repaired. Even then, some irreparable leaks remain today due to structural shifting.[91]

Tree thinning was done in 1985 and again in 1995, and then 100 of the original trees were removed entirely in 1999. The designers had anticipated their removal, having originally overplanted to create a more dramatic forest effect in the middle of the city.[92]

The Freeway Park Neighborhood Association (FPNA) was formed in 1993 and made up of neighboring residents and businesses. Their mission is to enrich the community through improved amenities and programming for the park.

To reduce shadows FPNA funded the installation of shorter 20 foot tall lights in 1994. The same year FPNA raised funds for restarting the park's fountains after they were shut off in the early 1990s. In 1995 the association contributed funding to widening the passageway under the 8th Avenue overpass. The group hired private security and partnered with a downtown business improvement area in the late 1990s to make additional improvements.[93]

Several high profile incidents in Freeway Park gave it a negative reputation over the same period: In 1984 a woman vanished from the park was found dead four years later in nearby Tacoma; in 1997 a man was stabbed to death; in 1998 a woman was raped at gunpoint; in 2001 one man was fatally injured after falling down stairs and a second man was killed after falling onto the freeway; and in 2002 a murdered woman was discovered in a park bathroom. In the last instance, police with tracking dogs were unable to hunt down a reported suspect because, the police reported, "…the park's 'maze of pathways' hindered their search."[94]

Seattle's other parks are not immune from violent crime, but Freeway Park is distinct in that its design helps facilitate it. The park also developed a poor reputation because of a number of drug users and homeless people using the park. A police officer who patrolled the park said, "The environmental design of the park lends itself to the kind of activity that can't be and doesn't want to be detected."[95] Its complex design provides cover for getaways and the waterfalls muffle environmental awareness.[96]

A new vision for Freeway Park

After the 2002 murder the City of Seattle contracted with Project for Public Spaces to develop a renewed vision for Freeway Park. Their community outreach-based process resulted in a document that recognizes the historical design of the park but recommends a number of physical and programmatic changes needed to improve its liveliness and safety for users. It aimed to show how Freeway Park can become a great place to visit in downtown.

Along with overgrowth and nuisance activities, a number of issues were identified: lack of social activity; poor connection to adjacent properties; hidden entrances, inadequate signage; and the lack of a broad management strategy. General objectives then became the following: ensure the park is well managed and funded; improve the park while respecting its original design; make it a regional destination; make it more active more often; improve access; expand the park over the freeway more; and implement a number of cheap, short term changes to improve its use.[97] Meetings with surrounding business owners, residents, and other stakeholders produced many ideas for short and long term improvements.

At the Convention Center plaza it is recommended to create a seasonal vending area with outdoor seating and an overhead canopy for weather protection. With the Convention Center's many visitors the underused plaza has the potential to be a vibrant hub of activity. It was recommended that the Pigott Corridor, one of the park's most heavily used paths, have some sort of vendor presence and that walls be removed to make the stairways more open. Suggestions for Park Place Plaza, which is actually private property, include an amphitheater along Seneca Street, building a café into the corner of the Park Place office building, and removing planters along 6th Avenue to provide a better view into this main entrance of the park. There are longer term ideas for relocating Naramore Fountain and exploring concepts for an office building or hotel as a lid between the Seneca and Spring Street overpasses.

A conceptual site plan showing some of the long term recommendations is illustrated in Figure 16. In this view the park is expanded across the University Street ramp to the Union Square office buildings, the 8th Avenue overpass is removed, the Pigott Corridor is reconfigured, and a large central gathering space connects all corners of the park.

Figure 16 - Site plan of envisioned long term improvements to Freeway Park, including extending its coverage over I-5.[98]

A visit to the park reveals that some of the vision has been implemented. From 2006 to 2010 the city embarked on extensive landscape renovations throughout the entire park that included additional tree removal. When the Exeter House site was developed as an apartment building a private plaza was built to connect Seneca Street with the southeast corner of the park. Additional pedestrian-scale lighting was installed. Programmed events have brought activity back to the park in recent years, especially in summer months, including dances, concerts, gardening classes, and used book sales.[99]

Most of the vision has not been fulfilled. Additional amenities to support a variety of social and commercial activities are not in place. Except for the eastern end of the park sight lines remain poor, with many blind corners and unsigned entries and exits. And perhaps most critically, a nonprofit has not been formed to coordinate management and funding. However, permanent citywide parks funding was secured in 2014 with the establishment of the Seattle Parks District. Funding from this more stable source, rather than general city funds, could be used to eventually implement many of the plan's visions.

Critique of Freeway Park

The most prevalent problem today is still access. While Freeway Park has about ten entrances, only two of them are clearly marked with standard municipal parks signage. Most of the entries do not clearly lead into the park and are narrow staircases that wind up a vertical face. Walls and vegetation obscure the final destination when viewed from the street, and in some cases within the entry pathway itself. Likewise, from inside the park many of the exits are around blind corners and none are clearly marked as exits. The technological reaction to this is a series of "emergency guard call" buttons installed on walls throughout the park. It is not clear who the devices connect to, whether it is the Seattle Police Department or Homeland Security officers seen patrolling the park, and how fast response times are.

Figure 17 – Examples of Freeway Park's entries and exits. Photos by the author.

Much of the park does not meet accessibility standards. Almost all of the entries are staircases, and a number of stairs on the interior also block travel by people with mobility handicaps. If people with disabilities are welcome to use Convention Center elevators and escalators to it is not made obvious by signage or other means. There only a few accessible

entries, namely from Seneca Street and Pigott Memorial Corridor, that provide access to upper level of the park's main section.

There are other barriers on city streets in the area. A lack of crosswalks and sidewalks limit pedestrians' movement options. The northeast tip of the park, for instance, is at a three-way intersection with no crosswalk on Pike Street; the nearest crossings are several hundred feet away. The west side of 7th Avenue has no sidewalk, necessitating walking around three sides of its intersections. The Seneca Street off-ramp creates a five-way intersection at 6th Avenue that necessitates long signal phases.

Safety problems also remain. Throughout the main section of Freeway Park are a number of nooks behind walls and planter boxes that can hide people. The area around the Canyon Fountain has a series of tall terraces that create similar hideouts without any other apparent function. There is evidence of human habitation of the planter boxes that cascade down towards the freeway. In the southern annex there are ladders built into walls to allow maintenance access, but a clear lack of pruning has allowed for overgrown ivy and blackberry bushes that conceal camps and, crucially, blur the edge of the park and the drop to I-5 below. Indeed, there is at least one known instance of a person falling off the park into traffic. And using the park as a weather shelter, below it in the freeway median are homeless encampments amid the speeding traffic, intense noise, and air pollution.

The physical connection with the Convention Center is limited. Among the dozen or so doors facing the Convention Center Plaza, only two in a corner away from the plaza allow free movement between the facility and the park. The plaza's lack of amenities, besides lush landscaping and perimeter seating, make it a place for moving through rather than visiting.

Figure 18 – The east side of Freeway Park faces the neighborhood with large, blank walls. Their monumental effect is softened by trees and shrubs. Photos by the author.

The east side of the Convention Center fronts the northern annex of Freeway Park with concrete walls and air intakes. Below this area on Hubbell Place the lid towers some 50 feet above the street level. Indeed, the entire east side of the park consists of blank walls facing alleyways and apartment buildings. While the walls do benefit local residents by muffling the noise of the freeway, its lack of clear connections into and across the park and disregard of surrounding properties diminish its utility for the neighborhood.

Opportunities to integrate with future lids

While Freeway Park has a long set of challenges, a number of its design elements, large and small, are worth considering for inclusion into future lids in the area. Common design themes between old and new lids are one way to promote a unified experience for the visitor and to establish a cohesive identity for such unique public spaces above the freeway.

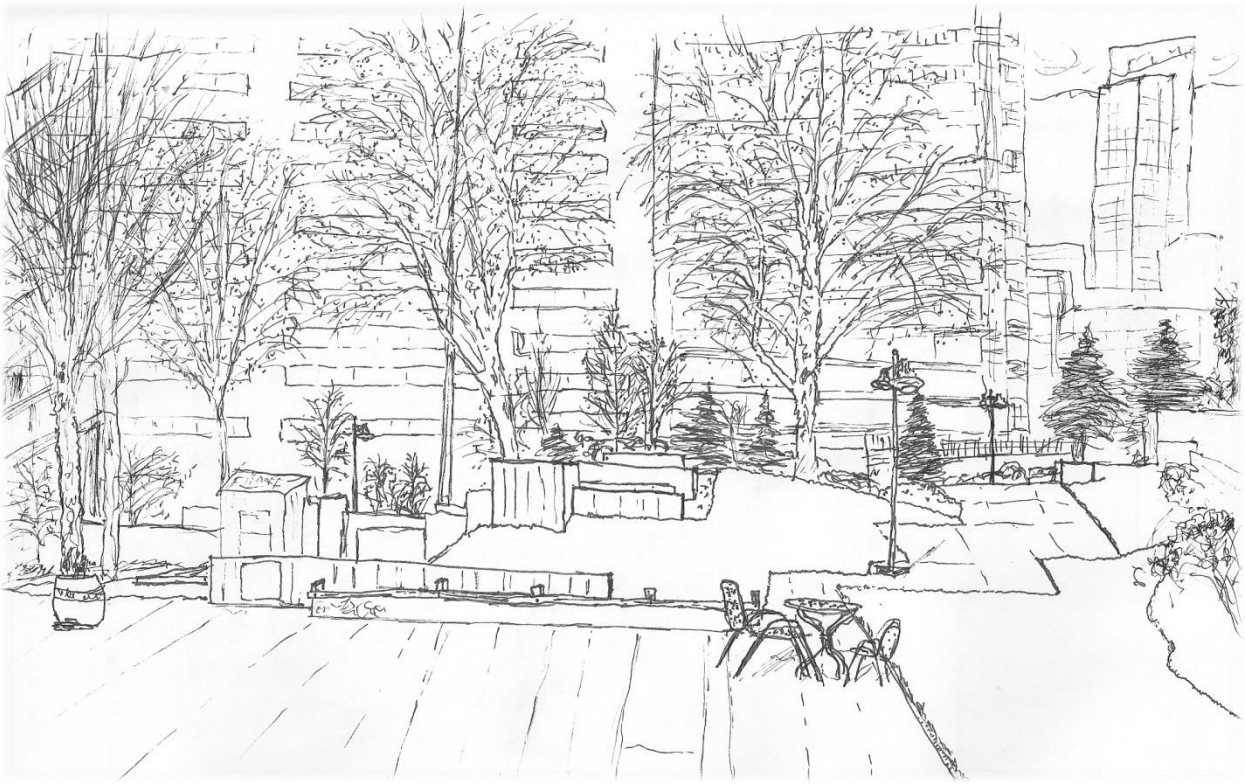


Figure 19 – A sketch of the Freeway Park's Central Plaza and Cascade Fountain.

The larger, flatter open spaces characterized by the Central Plaza, West Plaza, and East Plaza are relatively comfortable to be in and are visually intriguing. The length of the pathways in these areas can be easily discerned from all angles, providing a sense of orientation and direction. Entries and exits are also more visible in this area and offer views of surrounding streets. Future lids should have similar open spaces and incorporate the same combination of wide lawns, compact plazas, and northwest meadow ecology.

Figure 20 – Freeway Park around the University Street on-ramp (study area 4B). Left: looking north. Right: looking south. Photos by the author.

The exposed section of freeway around the University Street on-ramp (study area 4B) can potentially be left open in a future system of lids along the corridor. The muffled traffic noise adds to the park's namesake ambience. The sinuous curves of the mainline and the on-ramp are unique features that can be viewed from a variety of angles. A dynamic mixture of trees, traffic, and skyscrapers from a low perspective gives the area an imageable sense of place.

Additionally, lidding the area may create enough of a tunnel effect to warrant costly mechanical systems; alternatively, leaving the area open will provide natural ventilation for the tunnels created by additional lid sections to the south and north.

The same principle applies to the smaller gap (study area 4B) to the east. Freeway Park's revitalization plan ambitiously calls for this area to be filled in to expand the Convention Center plaza, but the plaza is already fairly large and can instead be better programmed.

Figure 21 – Left: Detail of concrete pattern used throughout Freeway Park. Right: Low planter walls are one way to accommodate grade changes in future lids. Photos by the author.

The blocky forms of Freeway Park's planters and exterior walls are an iconic symbol and exemplify the modernism period in which it was designed. Their integration into part of the Convention Center's upper lobby show how the park's landscape concepts can be incorporated into architectural forms. Future lids can repeat this style for fountains, terraces, and even the massing of buildings to create a clear connection to the legacy of Freeway Park. Serious care needs to be taken to avoid the same types of nooks and hidden spaces that typify Freeway Park. The board-formed patterns on the concrete walls and the walls' undulating indentations are a recognizable feature that can be repeated throughout future lids as a nod to local precedent; the same style of concrete has already been repeated at the nearby Convention Place bus station.

Freeway Park's physical connections with surrounding private properties are examples of how public space can seamlessly bleed into the rest of the urban landscape. On the lower level adjacent to Union Street the park connects directly with the upper lobby of the Union Square office tower complex. A coffee shop is visible through glazing from the park. Office workers commonly use the space to enter the building, make a phone call, or take a smoke break. Wrapping around the same level of the office tower is a privately owned public space which leads into a retail-lined courtyard with trees and a large waterfall. Though this connection is a later add-on to the park, it is an example of how future freeway lids can integrate with their surroundings.

Figure 22 – Left: connection with Union Square. Right: connection with Cielo apartment building. Photos by the author.

On the upper level, a recent addition to the park is another connection to a privately owned public space outside the ground floor of a new apartment building. The connection provides pedestrian access to the corner of 8th Avenue and Seneca Street. With furniture and vegetation, it is a more pleasant walk than the alternate route on the 8th Avenue sidewalk.

A future lid in the area south of Seneca Street (study area 5) will have a direct physical connection with the southern annex of the existing Freeway Park. Some redesign of the annex will be needed to accommodate a transition onto the new lid structure. As found during the second case, it will be preferable for future lids to have level connections with surrounding

pathways and streets. The planter boxes on the annex can spill out into the new lid to create a gateway between the two.

Freeway Park is a critical case study for the design of future lids in downtown Seattle over I-5. Its historical significance, design challenges, and opportunities for improvement must be considered in the design of future lids that connect to it.

5.2 Klyde Warren Park, Dallas, Texas (2012)

Lead design firm: The Office of James Burnett
Construction cost: $110 million ($112 million in 2015 dollars)
Size: 5.2 acres

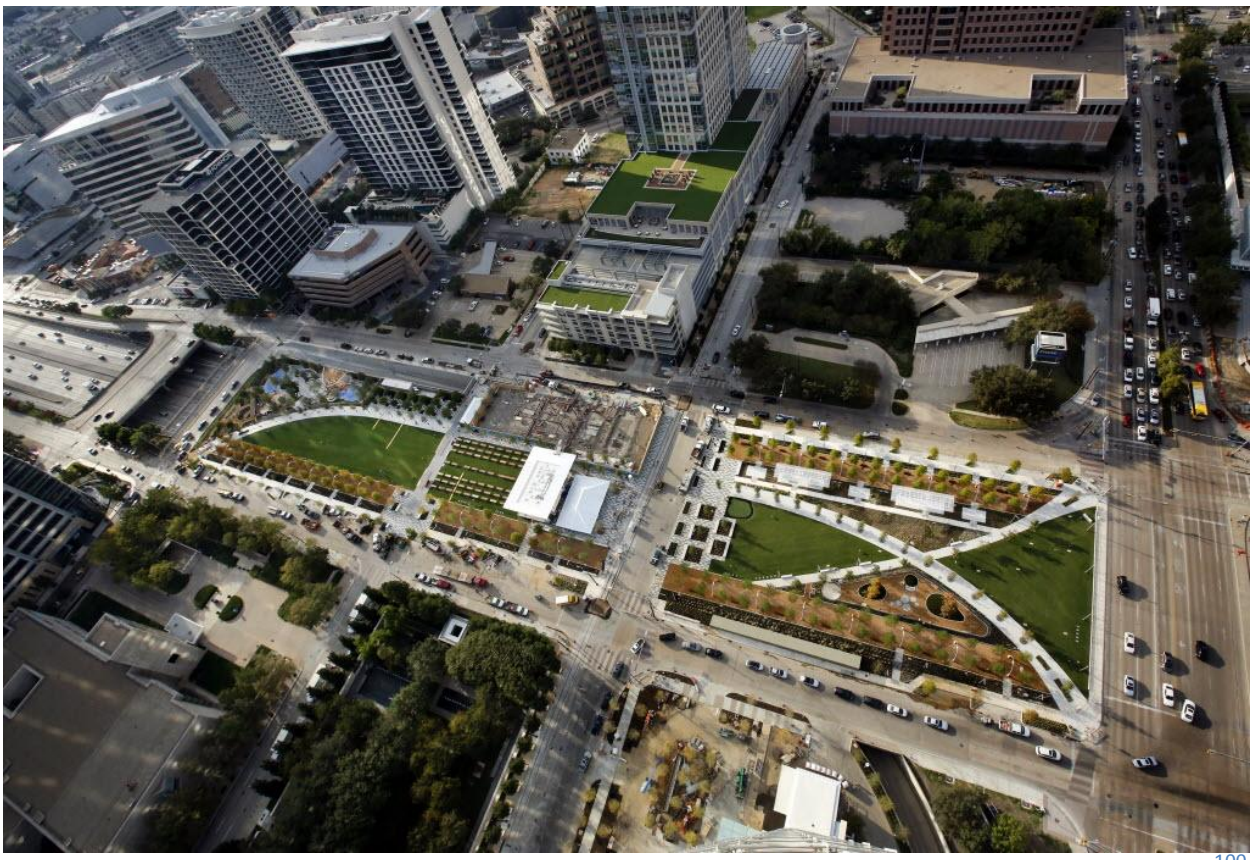


Figure 23 - Aerial view of Klyde Warren Park with the restaurant building under construction.[100]

Klyde Warren Park is the most recent freeway lid completed in a major city's downtown. It stretches between North Pearl Street to the east and North St. Paul Street to the west, and between the Woodall Rodgers Freeway couplet. It is in Dallas' Uptown and Arts District neighborhoods. It is surrounded by a mix of civic, residential, office, and retail buildings. The park is public and city-owned while management is contracted out to the 501(c)(3) nonprofit Woodall Rodgers Park Foundation. This case study has potential lessons in both design and operations of freeway lids.

The Foundation manages an annual $3 million operating and capital budget. It receives no funding from the city government; instead the Foundation earns revenue from renting a pavilion on the lid to restaurants and collecting 10 percent of the restaurants' gross sales. The Foundation also rents out a performance stage for various public events. Finally, it receives property tax revenue from three "public improvement districts" (similar to local improvement districts in Washington state) in the area.[101]

The park is highly popular and has over one million visitors per year, half of whom are from outside the city. It has been critically acclaimed and won the Urban Land Institute's 2014 Open Space Award.[102] The park's outstanding success and similar urban setting to Seattle make it a highly relevant project for a case study.

Origins and design features

The eight lanes of Texas State Highway Spur 366, also named the Woodall Rodgers Freeway after a former Dallas mayor, were completed in 1962 through downtown Dallas. At the time Mayor Erik Johnson insisted the freeway run below surface streets, sparking lore that he had foresight of decking over the freeway.[103] The contemporary idea was launched by a group of Dallas business interests in 2005, noting downtown Dallas had no major central park. A feasibility study determined the project was possible, and a partnership was formed between the Texas Department of Transportation, the City of Dallas, and the new Woodall Rodgers Park Foundation.

A conceptual design was released in 2006 by landscape architect James Burnett. The vision was plain and largely a green space with lawns. However, the project was soon faced with a number of additional design requests when donors began making private contributions. The park's budget increased along with its structural load.

The park's structure had to balance a number of engineering factors. The load from amenities, especially soil, had to be minimized to avoid excessive beam size. The minimum vertical traffic clearance of 16.5 feet wouldn't have been met by standard concrete beams without raising the edge of the park above surrounding streets, and designers wanted the edge of the park to be accessible and flush with the sidewalks. One engineer said, "The reason for doing the park was to eliminate the barrier of the highway trench and to connect Uptown and downtown. We wanted it to be seamless so you can walk in the park from any direction."[104]

Figure 24 - Construction of Klyde Warren Park's structure. The dark rectangular holes are where trees were planted.[105]

Pre-stressed 54-inch deep concrete box beams were aligned side by side in groups of three or more with concrete troughs in-between. The troughs were filled with lightweight geo-foam in the bottom half, and in the top half is either engineered lightweight fill soil or planting soil for trees. (As a comparison, regular soil weighs 120 pounds per cubic foot, the engineered soil weighs 65 pounds per cubic foot, and the geo-foam weighs 1.8 pounds per cubic foot.) The troughs allow root ball growth and the placement of utility lines. The troughs required the trees to be planted in grids; curving walkways were designed to partially disguise the effect from the eye-level view.[106]

The beams are supported by columns built into the freeway's median and retaining walls. They facilitate the park's slight southward slope so that water is drained to the municipal stormwater system. The park acts as a water filter, whereas before stormwater landing on the freeway collected pollutants before draining. All of the concrete structures are protected with waterproofing.

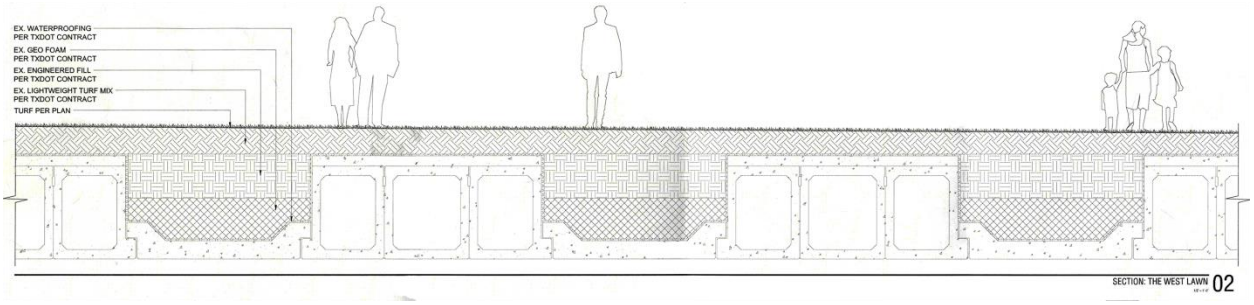


Figure 25 – Section drawing of Klyde Warren Park's deck structure. Courtesy of Michael Gaffney. Edited by the author.

The park is divided into two sections by Olive Street; the Harwood Street overpass was closed and demolished to make room for the larger section of the park, though the street's datum is marked by a paved path designed to support vehicles if the need arises.[107] The large section has most of the amenities, and the smaller section has somewhat less activity. An engineering study found closing Olive Street to make the park one continuous piece will have negative traffic effects, but the Dallas City Council is open to options.[108]

Construction began in October 2010 and lasted two years. The state transportation department allowed only 20 freeway closures on nights and weekends, complicating the construction schedule. During construction a code change by the National Fire Protection Association required the underside of the park, which is a 1,200 feet long tunnel, to be protected with a 1.5 inch fireproofing layer. The tunnel also required fire suppression sprinklers and exhaust fans. A backup generator for these systems and the park lighting is hidden among trees and vegetation in the park.[109]

Ultimately a number of features were included in the design: An 11,000 square feet restaurant building, a performance stage, a children's play area, newspaper and used book stands, an off-leash dog area, botanical gardens, water jets, large lawns, and elaborate landscaping.[110] Walkways are made of both crushed gravel and pavers.

The total cost came to $110 million. Funding sources were: private donors and sponsors ($52.3 million); City of Dallas bonds ($20 million); Texas Statewide Transportation Enhancement Program ($20 million); American Recovery and Reinvestment Act of 2009 ($16.7 million); and various grants ($1 million). The private funding contributed 48 percent of the project cost and is reflected in subtle sponsorship signage throughout the park; the name of the park itself is the son of a private donor.

The park's structural design, variety of amenities, and funding sources provide potential lessons for contemporary freeway lids built in Seattle.

Maintenance and programming

The park has been faced with a number of aesthetic and functional maintenance challenges since its opening. Michael Gaffney, Vice President of Operations for the Woodall Rodgers Park Foundation, provided extensive insight that can be applied to future freeway lids in Seattle, especially if they are used for parks.

In a phone interview Gaffney said, “the food truck revolution occurred while we were under construction”. There was no place for food trucks in the park itself, so they were lining up in on-street parking spaces on the edge. The Foundation worked with the City of Dallas to reconfigure street parking around the park. Eight spaces are rented out to food trucks, generating about $100,000 per year for the Foundation. Other spaces are reserved for service vehicles and deliveries. Additional bike parking was added due to higher than expected demand.

The park has become an eating and drinking destination for the many nearby residents, office workers, and visitors to the neighboring museums and cultural centers. In response the Foundation has custodians on duty during operating hours to keep the park clean of food waste and litter. Open top waste bins were replaced with closed solar-powered compactor bins.

Figure 26 - The southern edge of Klyde Warren Park is flush with surrounding streets. It is activated with food truck parking, seating, and clear sight lines. Photo by the author.

Security staff patrol the park at all times to enforce park rules and operating hours. The homeless often visit the park without issue. More than two dozen cameras marked with the Dallas Police logo are scattered throughout the park, but they are only monitored during high profile events from a control room within the park. Three emergency call boxes, like those found on college campuses, are located in the park but they have presented more technical

glitches than usefulness. The many surrounding buildings provide plenty of “eyes on the street” and frequent foot traffic helps deter crime. None of the park’s movable furniture, which includes simple metal tables and chairs, has been stolen.

Programming includes many events that are free to the public, such as lunchtime and evening concerts, story reading for children, exercise lessons, and athletic races that start and end at the park. Concerts and other performances can face in one of two directions from the park’s covered stage, depending on the size of the audience. Large festivals or events with outdoor vendors are limited by the park’s electrical capacity.

The live load limit of 100 pounds per square foot allows no practical constraint to the park’s visitor capacity; events such as church concerts can draw up to 9,000 or more people. But heavy use has compacted the lightweight soil of the lawns, requiring periodic closures to allow regrowth of the grass.

The park is planted in a xeriscape style with native drought-tolerant trees and shrubs that require little irrigation. Some plants had to be replaced because they ended up not being compatible with the engineered soil. The park’s original cypress trees often turned brown and gave the park an uneven appearance, so they were replaced with genetically identical trident maples. The size of the structural troughs limits tree calipers to 3 to 4 inches.

The Foundation’s management of the park has benefited with the leasing of private office space overlooking the extent of the park from across the street. However, operations are hampered by lack of storage space at the park itself. The storage shed and systems control room are limited in size by their location above a freeway off-ramp. Storage is used for tools, materials, and the park’s two game carts that rent out equipment for activities like ping pong, backgammon, and croquet. Space for dumpsters was acquired in an on-street parking space that is protected with bollards and screened by shrubs.

While many of these maintenance and programming considerations are also applicable to traditional urban downtown parks, Klyde Warren Park’s locational constraints and opportunities provide many relevant lessons that can be applied to other parks built over freeways.

Site observation

A brief site visit was made during the morning and afternoon of Thursday, March 26, 2015 for the purpose of observing how park visitors use the park’s many features. The temperature was in the upper 50s to the low 60s, skies were partly cloudy to clear, and the wind was breezing at 5 to 10 miles per hour.

At 9:00 the park was mostly empty except for staff beginning their rounds. People using the park at this time were mostly individuals using it to walk through, not stopping within the park itself. Joggers also occasionally ran through. Restaurant staff handled several deliveries. Food trucks began parking at the park’s edge around 10:30; it’s a one-way street, so park staff help stop traffic to allow the trucks to turn around and so their serving windows can face the sidewalk.

Figure 27 - Families and individuals alike used the park. Seating and rows of deciduous trees are arranged along walkways. Photos by the author.

More and more people entered the park as the morning went on and temperatures rose. People were variously sitting and strolling along the paths. One group of middle aged men was seen walking multiple loops through the park. People in the park were also of all ages and ethnicities, with a balanced mix between men and women. By noon upwards of 100 people were visibly in the park, many in groups of two or three or more. At one point a large group of school children and chaperones, possibly visitors to the museum across the street, sat down in the park for lunch.

As the food trucks opened for lunch a constant stream of people purchased food over the next several hours. People also purchased food at the burger and fries kiosk on the north side of the restaurant. Several dozen people were inside the restaurant itself. The park's smaller section was less busy but was also frequented by people purchasing from two food trucks located there. People also rented equipment from the game carts; one couple played putt-putt on a miniature green and a pair of young men played ping pong at one of the fixed tables.

The dog park was not visibly used during the visit, but the children's play area was highly active. When the outdoor temperature reached 60 degrees the park's water features automatically turned on, drawing an even larger crowd of families to the children's area. Nearby a handful people were reading at the outdoor reading room, but the breeze made holding newspapers difficult.

At the end of the site visit there were at least 150 people in the park, which is impressive given the relatively mild temperature and the closure of the park's large central lawns at the time. Even so, it was clear that the large variety of activities, attractions, and amenities contributed to the large number and diversity of people using the park.

5.3 Montlake Lid, Seattle, WA (unbuilt)

Lead design firm: VIA Architecture
Construction cost: N/A
Size: N/A

The planned Montlake Lid will be above Washington State Route 520. It will be located between E Lake Washington Boulevard and E Hamlin Street, and between 24th Avenue East and Montlake Boulevard East.

A reconstruction of SR-520 has been in the works since 1997 and is currently in various stages of competition. The project includes replacing the floating bridge across Lake Washington and adding two High Occupancy Vehicle (HOV) lanes along the corridor, for a total of six lanes. During a community design process facilitated by WSDOT in 2011 and 2012 Seattle residents expressed the desire for two lids over the expanded freeway: at the interchange with Montlake Boulevard, which is the subject of this case study, and between Delmar Drive East and 10th Avenue East. [111] The lids are intended for use as new parks to mitigate the impacts of the expanded freeway through residential neighborhoods. As of this writing the project is not yet funded.

Design process

The preliminary Montlake Lid design was 1,400 feet long, which required large ventilation stacks and a maintenance facility that raised the edge of the lid over the surrounding land. Public comment during the design process suggested changes, including: better bicycle and pedestrian connectivity; developing a mobility hub and connections to transit; and better space for active recreation.

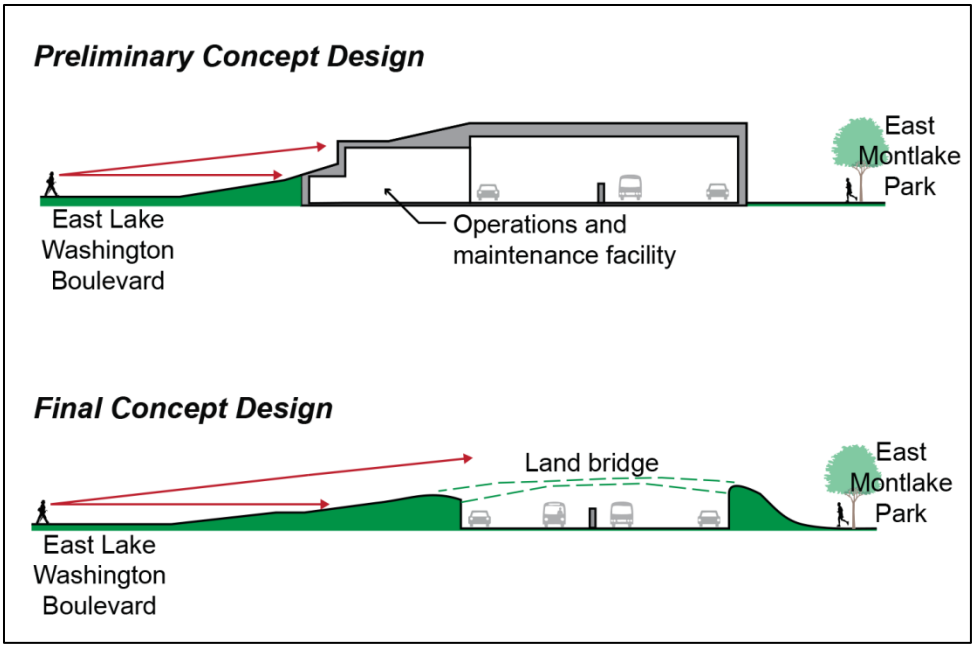


Figure 28 – Conceptual section views of the Montlake Lid, looking west.[112]

The revised Montlake Lid design is 800 feet long, beyond which mechanical ventilation would be required for the traffic tunnel. The ventilation stacks are thus no longer needed, providing more useable space. The surface of the lid is lowered by about 15 feet.[113] In exchange for the shortened lid is a landscaped pedestrian and bicycle bridge to the east of the lid that provides an accessible crossing. Retained from the preliminary design is a regional bus stop that connects to the HOV lanes.

The Seattle Design Commission gave its approval to the changes in September 2014, saying the "smarter" lid design achieves the following benefits: enhanced regional connectivity; more useable open space; enhanced view corridors; improved transit, bicycle, and pedestrian experiences; and improved integration within the Montlake neighborhood fabric.

In addition, the Seattle Design Commission made recommendations for design refinements: strengthen environmental efforts by addressing stormwater, construction materials, and wildlife habitat details; create a gateway experience for people traveling through the SR-520 corridor; develop a clearer hierarchy of paths and trails on the lid and in the lid area; and make the land bridge a unique structure.[114]

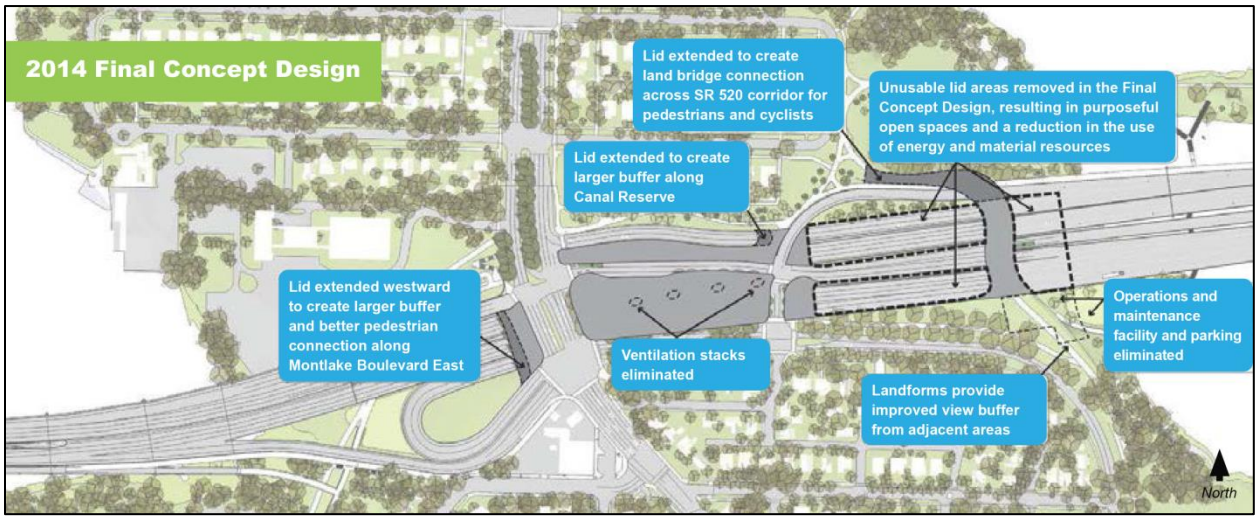


Figure 29 – Concept plan for the Montlake Lid, which will be bisected by multiple roadways.[115]

The "SR-520 West Side Final Concept Design" was released in 2015. The document has a variety of illustrations but has few details on engineering or park design. There is no discussion on what types of features the Montlake Lid might support except for a paved plaza that will serve as a trailhead for walkers and bicyclists. The lid will actually be several structures broken up by multiple roadways, potentially limiting its usefulness for active recreation. There is also no discussion of park programming, alternative uses like retail space, or who will use the lid. It is unclear which agency will be responsible for management and maintenance. There is no cost estimate or summary of the total lid area available.

The need to redo the lid's design, and a still unfulfilled gap in design details, offer lessons for the design of future lids in downtown. The process should include a thorough and open public engagement effort early on. Details related to programming, layout, and connections should be conceptualized early on and refined as needed.

5.4 Lessons learned

Freeway Park

The problems and recent upswings experienced by Freeway Park offer a number of lessons that can be applied to future freeway lids in the area.

- Long sight lines and simplicity in navigation are important for drawing visitors and creating a safe environment.
- Lack of views into the park from the street and surrounding buildings encourages criminal activity and decreases the sense of security.
- Large elevation changes, impermeable walls, and unmaintained vegetation obscure sight lines in such a way that inhibits orientation and safety.
- Designs that do not consider maintenance needs, such as for water systems and plant trimming, will create avoidable issues in the long term.

- Water features are a good draw, but they must be operated throughout the year and during operating hours. Empty water features create a sense of desolation and will collect trash.
- Compact open plazas are one of the best ways to enable a variety of activities and events.
- Interagency cooperation and public engagement during design can help reduce costs and speed up the design process. It can also reveal the park characteristics and amenities that are most in demand.
- Openings onto the freeway should be discouraged to prevent falls that result in injury and death.

Klyde Warren Park

Klyde Warren Park offers a successful model for future parks and retail space built over Interstate 5 in downtown Seattle. The following lessons must be incorporated into design.

- Flat spaces and permeable vegetation allows excellent line of sight from one side of the park to another, creating a sense of direction and security.
- Limiting vehicle crossings forms more cohesive and useable spaces. Demolishing street crossings, converting them to non-vehicular use, or limiting their use during major events or off-peak times are all options.
- Signage with maps, event schedules, and customer service contacts located at each entrance can greatly enhance orientation. Regularly updating the signage ensures that the space is perceived as well managed.
- Orienting retail uses to street frontages simplifies deliveries and customer access.
- The freeway site doesn't need to be overtly acknowledged by the design, such as with openings to the traffic below. Completely closing off the sight and sound of the freeway is beneficial.
- Nonprofit management of planning, funding, designing, building, and operating is beneficial because it enables dedicated staff to concentrate their efforts on the many demands that lid parks create. Establishing management positions while the park is still being designed will resolve potential operational problems before construction starts.
- If municipal financial capacity is limited, private, state, and federal sources can provide capital funding. Steady funding of operations is critical to ongoing success and programming.
- The presence of custodial staff and security staff provides a clear impression of management while also assuring cleanliness and safety.
- More visitors will be drawn by a mixture of amenities that cater to all ages, abilities, and activity levels. Features as varied as upscale restaurant spaces and children's climbing toys can help ensure a healthy and diverse stream of visitors.

Montlake Lid

The Montlake Lid is in a single family residential neighborhood, a vastly different context from downtown Seattle. Nonetheless, the conceptual design process and official design recommendations provide key lessons for future lid design. The Montlake Lid is also relevant simply because it is one of two new freeway lids being built in Seattle for the first time in two decades. It reflects contemporary design practices and community values, though many design details are still unresolved.

- Including lid design as part of a greater project, such as a possible reconstruction of Interstate 5, will help ensure consistency between infrastructure elements and possibly reduce costs.
- Community members will likely want to avoid vertical walls on the downhill sides of lids, which present yet another physical barrier and will require additional stairs or ramps to navigate.
- Integrating pedestrian, bicycle, and transit facilities into lids will improve their use as neighborhood and citywide connection points.
- In addition to exhaust fumes and traffic noise, environmental concerns that may need to be addressed include wildlife habitat, stormwater management, the heat island effect, and the type or amount of construction materials.
- Any combination of freeway lids in downtown Seattle that creates a tunnel over 800 feet long will likely trigger WSDOT's tunnel requirements, which include large ventilation stacks and control facilities. Considering this factor earlier in the design process can mitigate problems that interfere with park space and other uses on the lids, such as parking.
- Determining the ownership and management of lids, along with who will be using them, will help guide design intent and decisions early on in the process.
- It's possible the state government will be willing to entirely fund future lids over Interstate 5, but alternative funding must also be explored before making this assumption.

6.0 Site analysis

This site analysis identifies the study area referenced throughout the rest of this work and details the many characteristics of the urban environment around the study area. It includes a discussion of potential land uses and possible impacts to freeway and street functions. Both quantitative and qualitative elements are considered in order to build a comprehensive understanding of the way the site functions now and how it may function in the future with one or more additional freeway lids.

6.1 Study area definition

A limit needs to be placed on the study area to form a boundary for site analysis and limit the extent of where design guidelines are applicable. The study area defined here has been referenced throughout the rest of this project.

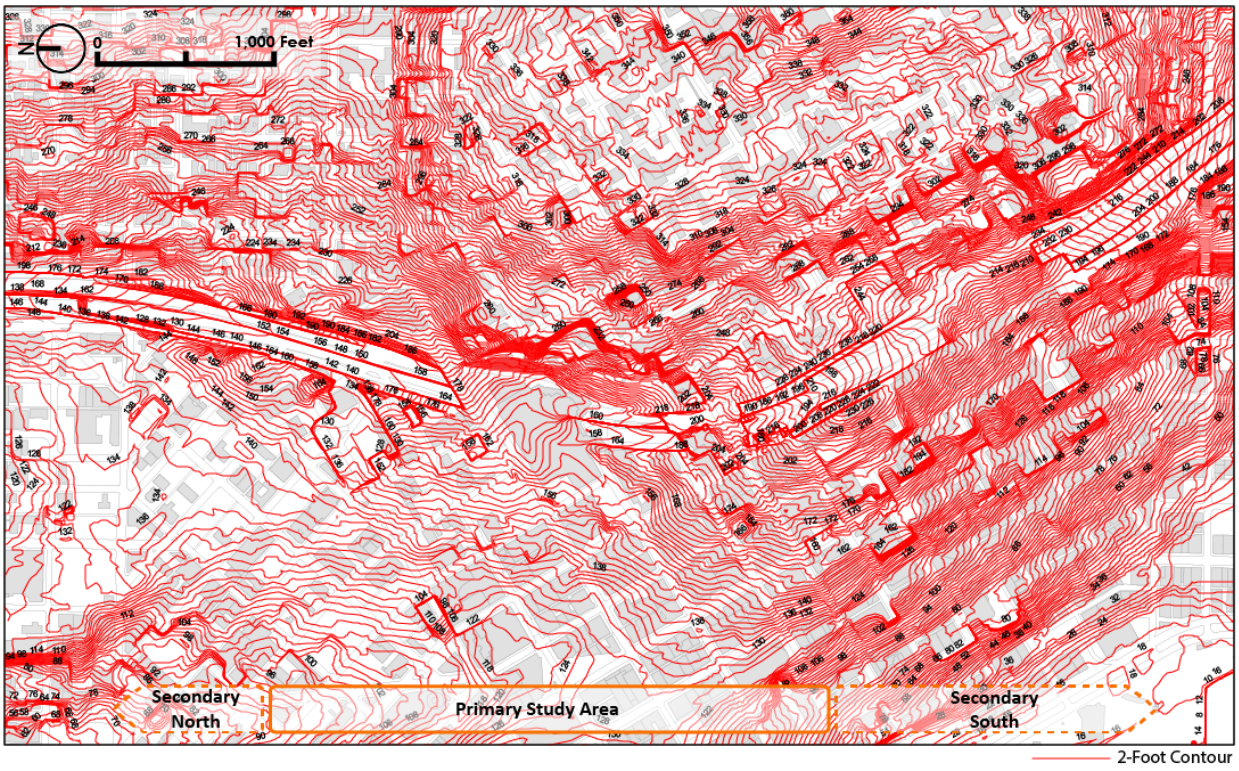


Figure 30 – Topography.

Freeway lids are most feasible and preferable where the surrounding topography is high enough above the freeway to allow adequate vertical clearance underneath the lid structure; this eliminates from consideration places where the freeway is at grade or elevated above the surrounding landscape. A visual analysis from a site visit identifies a starting point for where this criteria is met. Interstate 5 runs below the predominant grade between Olive Way and Madison Street. This becomes the primary study area and is broken into smaller numbered

areas, divided by existing crossings over the freeway, for identification. The dimensions of these areas are listed in Figure 39.

The dimensions of the overpasses in the study area are a proxy for quantifying the topography of the freeway and future lids. WSDOT drawings of the Spring Street and Madison Street overpasses provide detailed measurements for that area. Elevation data from Seattle's GIS database and measurements from the King County Parcel Viewer provide a starting point for identifying the constraints elsewhere.

Overpass	West Elevation	East Elevation	Elevation Change	Bridge Length	Slope
Denny Way	136	190	54	600	1:11
Olive Way	168	186	18	330	1:18
Pine Street	182	208	26	465	1:18
Boren Avenue	164	206	42	500	1:12
Pike Street	178	198	20	315	1:16
8th Avenue	164	234	70	1050	1:15
Seneca Street	198	218	20	315	1:16
Spring Street	206	226	20	280	1:14
Madison Street	224	240	16	290	1:18
Yesler Way	108	132	24	470	1:20

Figure 31 – Overpass measurements. All measurements are in feet. Spring Street and Madison Street overpass measurements are from WSDOT drawings included in an SDOT study. Elsewhere, elevation data is from Seattle's GIS database and length measurements are from the King County Parcel Viewer.

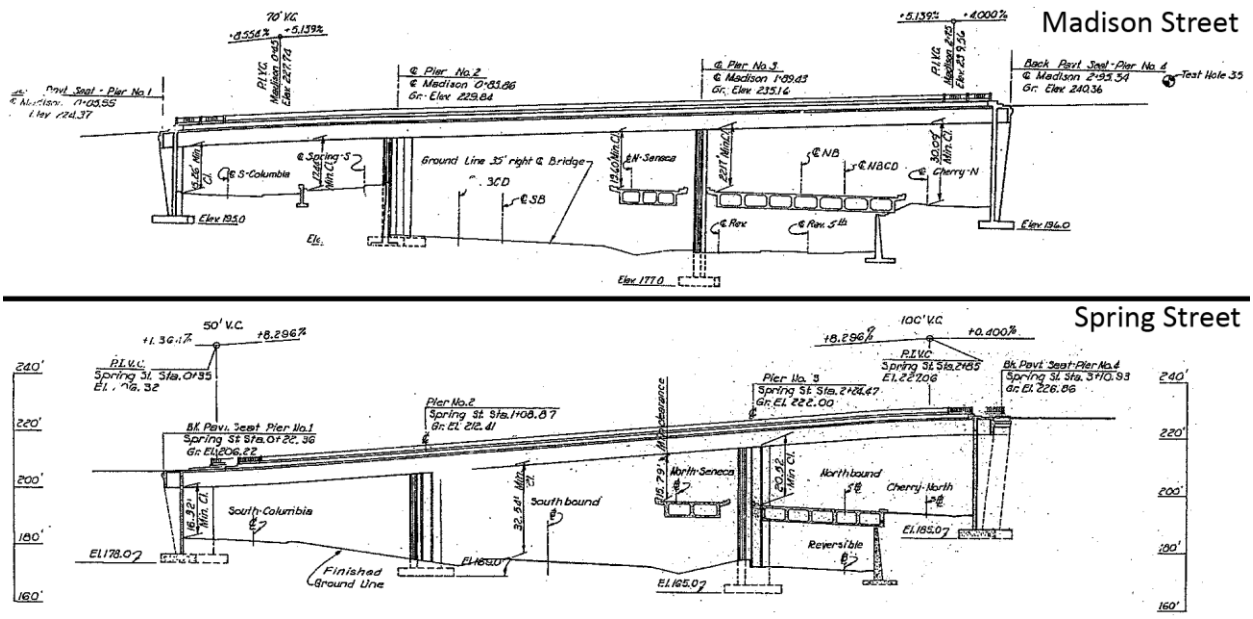


Figure 32 - Top: south elevations of the Madison Street and Spring Street overpasses.

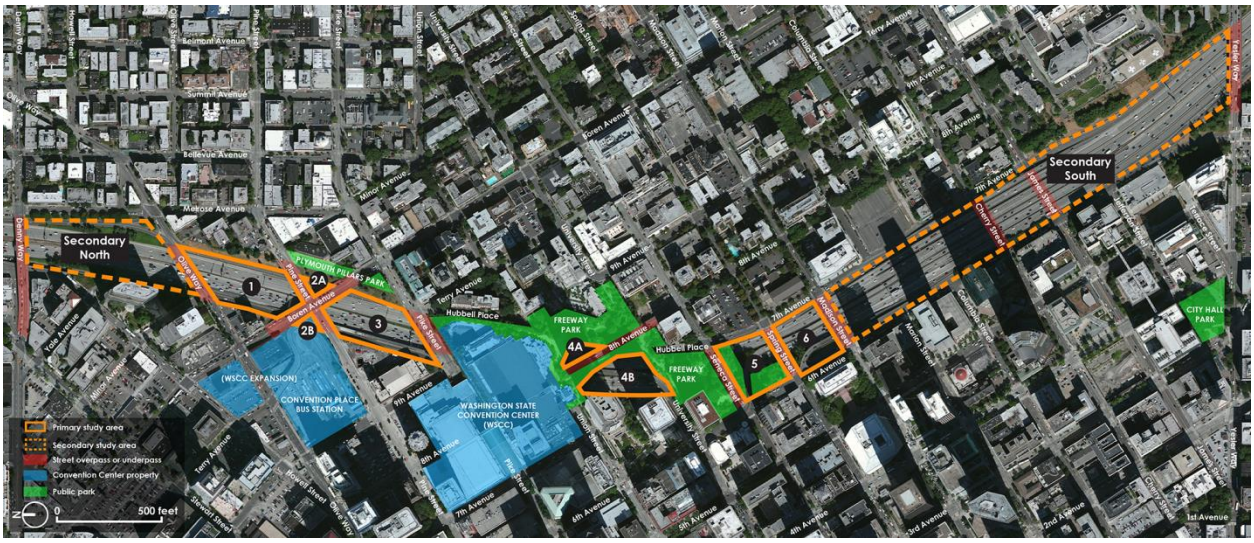


Figure 33 – The study areas. Background image from Google Earth.

Primary study subareas

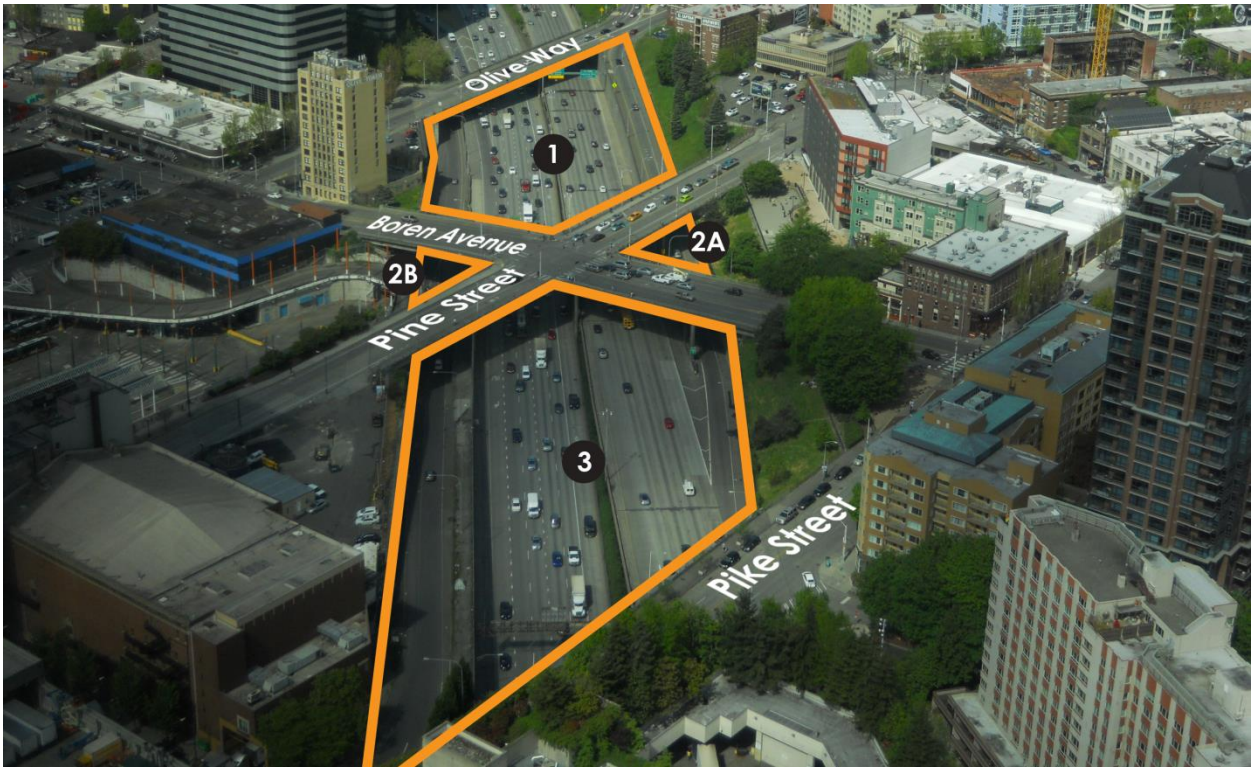


Figure 34 – Study areas 1, 2A, 2B, and 3, looking north from Pike Street to Olive Way. The four areas are divided by the elevated intersection of Pine Street and Boren Avenue. At center left is the Convention Place transit center. Photo by the author.

Section 1 is between the Olive Way and Pine Street overpasses. At roughly 2.6 acres in size it is the largest of the primary study subareas. With a vertical rise in the range of 18 and 26 feet, it has a steep slope of 1:18. Possible constraints include the rising northbound off-ramp to Olive Street and the sunken express lane reversible on-off ramp. Adjacent to this section are parking lots, dead open spaces, and mid-rise residential buildings.

Sections 2A and 2B are, respectively, the east and west corners of the elevated intersection of Pine Street and Boren Avenue. Section 2A is on the upper side of the slope and a likely candidate for lidding; it is approximately 0.3 acres. Section 2B, 0.1 acres in size, overlaps with the planned Convention Center expansion and is therefore unavailable for use as a freeway lid. The Convention Center will benefit the otherwise desolate intersection, though, by being at grade with Pine and Boren with a pedestrian entrance.[116] This access point must be exploited to create connections with future lids in sections 1, 2A, and 3.

Section 3 is between the Pine Street and Pike Street overpasses and bounded by 9th Avenue and Boren Avenue. It is approximately 2.5 acres. It has an elevation change in the range of 20 to 26 feet, making for an average slope of 1:17. Like Section 1, lid design here is constrained by the express lane reversible ramp that connects with Pike Street. A design opportunity is Plymouth Pillars Park on the east side of the section.

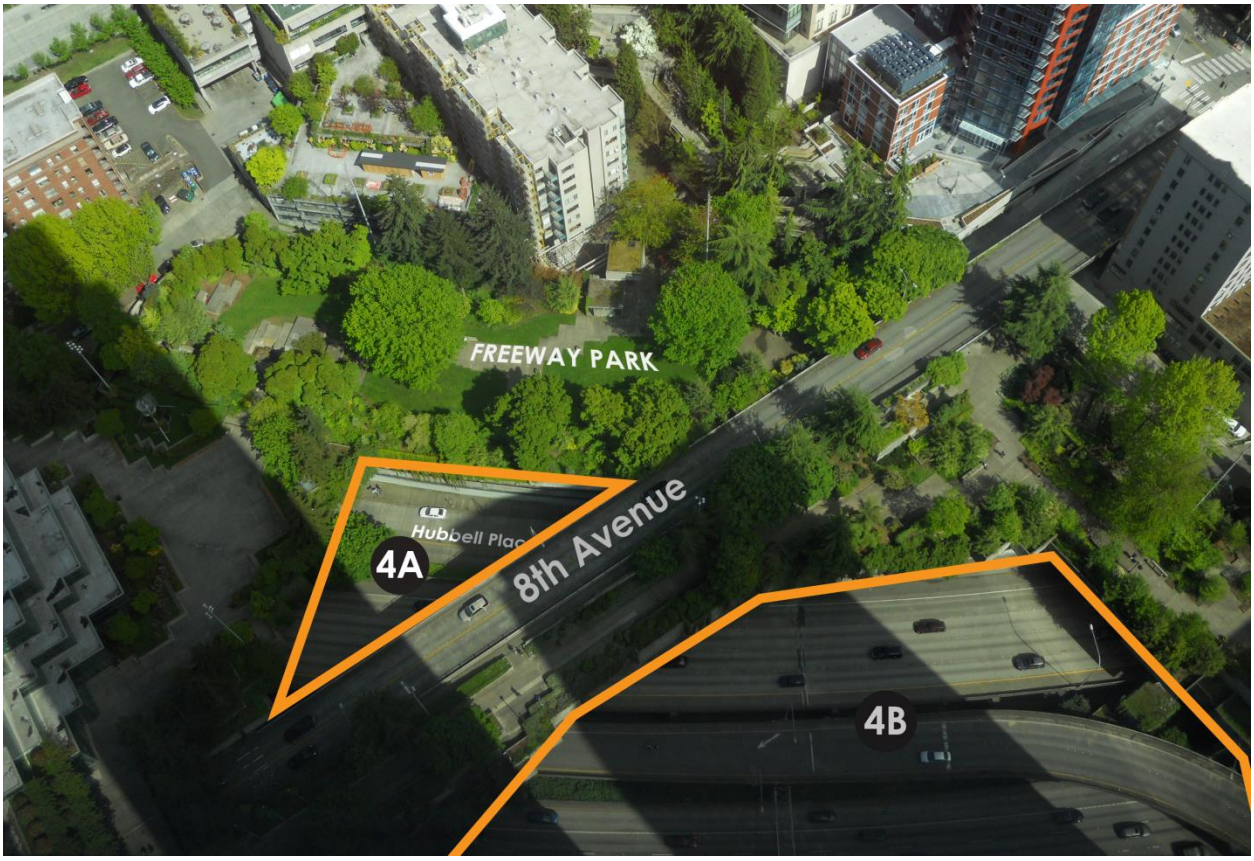


Figure 35 – Study areas 4A (left) and 4B (right), looking almost directly down on Freeway Park. 8th Avenue separates 4A and 4B. The University Street on-ramp is visible at lower right. At center left is the Convention Center and plaza. Photo by the author.

Sections 4A and 4B are areas left open over I-5 after the construction of Freeway Park on both sides of 8th Avenue. Section 4A is 0.3 acres. Section 4B is the larger of the two, at 1.2 acres, and is around the University Street northbound on-ramp. As determined in the case study of Freeway Park, neither of these areas should be lidded. The spirit of the park's original design may be significantly altered by lidding these areas. Practically, these areas may be large enough to provide natural ventilation for the tunnels under future freeway lids. The University Street on-ramp will also be a considerable constraint in Section 4B.

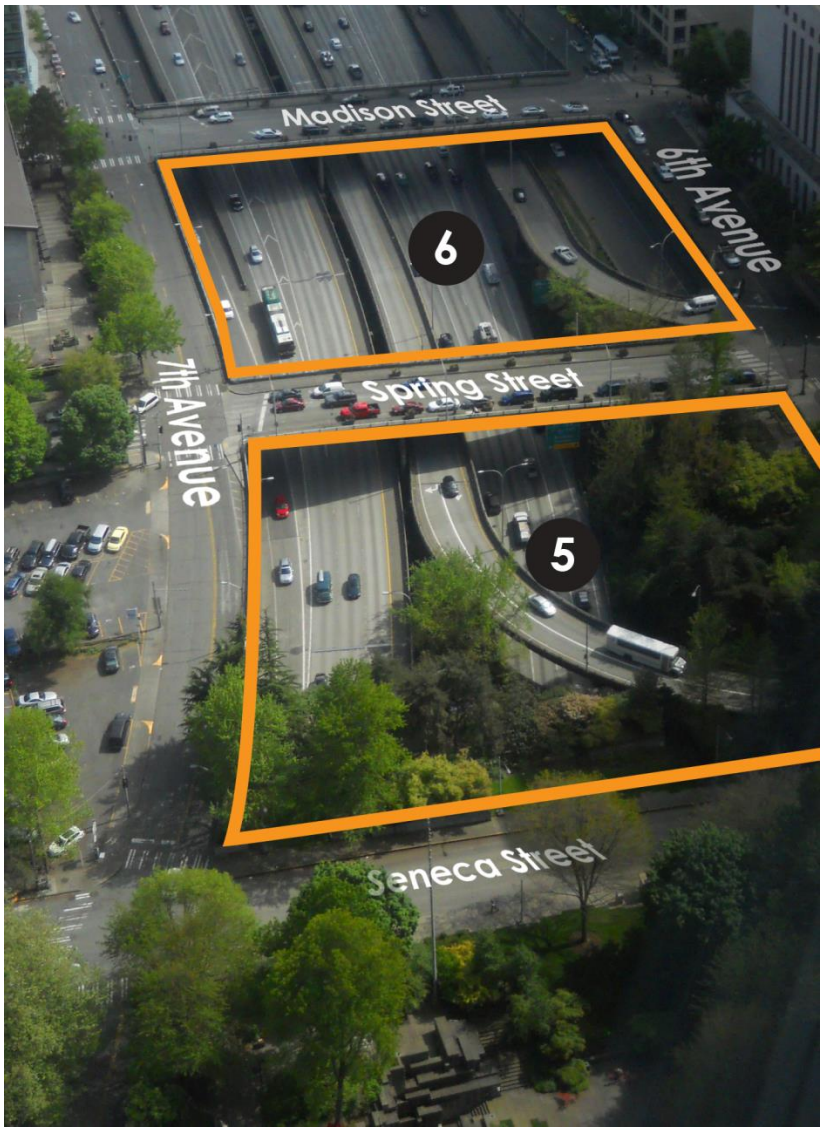


Figure 36 – Study areas 5 and 6, looking north from Seneca Street to Madison Street. At center is the Seneca Street off-ramp, and at upper right is the Spring Street on-ramp. Photo by the author.

Section 5 is between the Seneca Street and Spring Street overpasses and is bounded by 6th and 7th Avenues. It is 1.5 acres. It overlaps with the two parts of the southern annex of Freeway Park and contains the Seneca Street northbound on-ramp, all of which are design constraints and opportunities. Future lids here can act as an extension of Freeway Park while transitioning into a new, more contemporary design.

Section 6 is between the Spring Street and Madison Street overpasses and bounded by 6th and 7th Avenues. It is 1.5 acres. Vertical clearances between the bottom of the overpasses and the freeway are 15-16 feet, which is below the standard minimum of 16.5 feet. Considering that the deck structure of future lids may be similar in depth to the existing overpasses, a lid in this area may not be able to sit flush with 6th Avenue. As explored in a previous study by SDOT,

the biggest design constraint in this area will be the Spring Street southbound on-ramp that runs through this section.

Secondary study areas

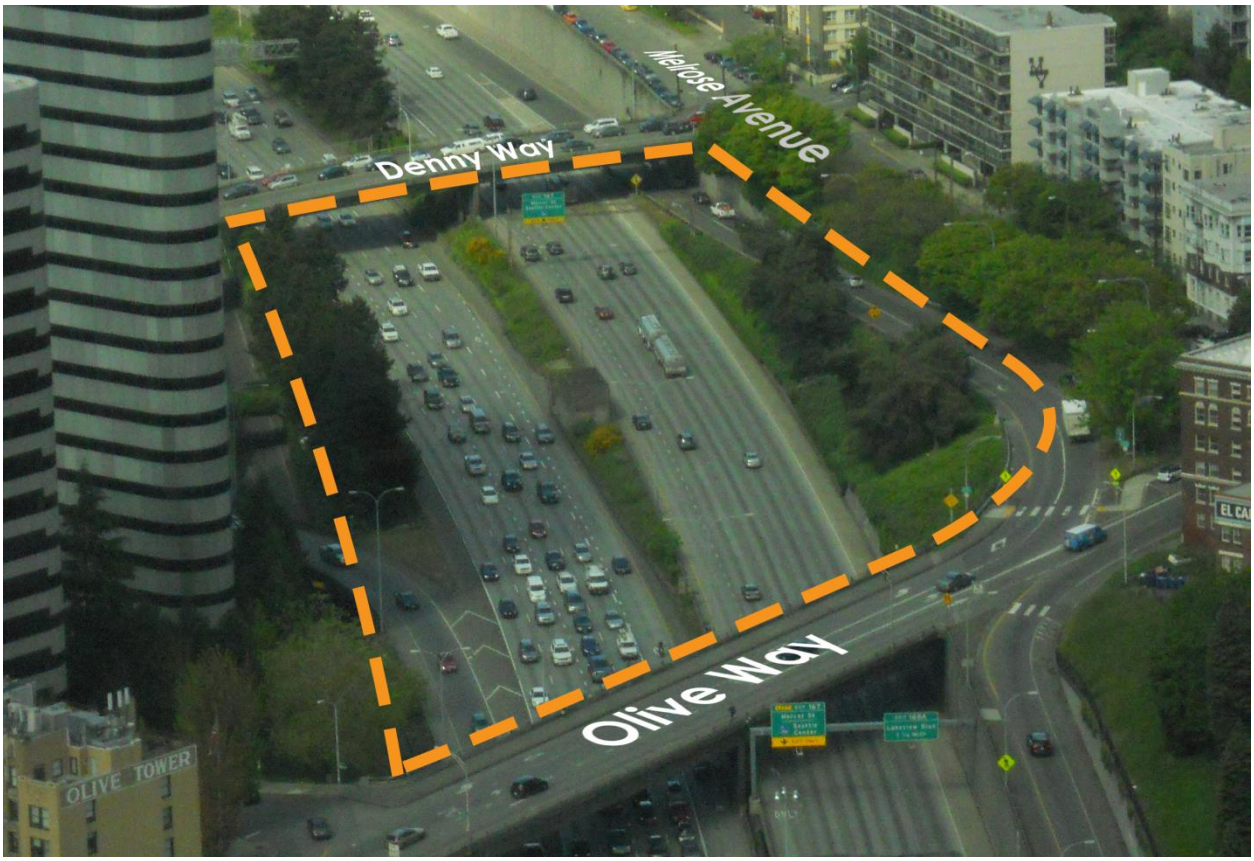


Figure 37 – The northern secondary study area, looking north from Olive Way to Denny Way. Photo by the author.

Extending north from Olive Way to Denny Way is one of the secondary study areas. It is approximately 4.2 acres. It is worth considering because it will be a relatively large addition and Denny Way is the last of the downtown overpasses moving northward. This stretch is below grade to the east and at grade at the west. One constraint is the sunken reversible express on-off ramp on the western side.

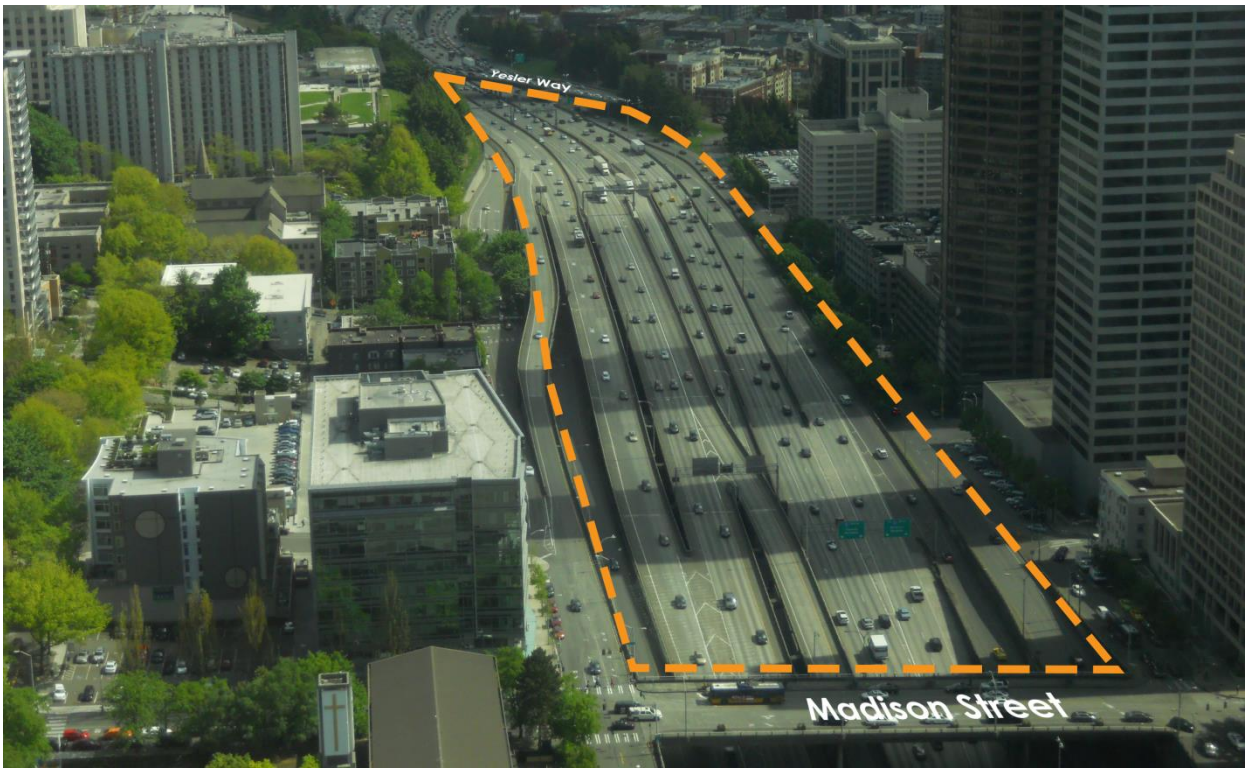


Figure 38 – The southern secondary study area, looking south from Madison Street to Yesler Way. Photo by the author.

Extending south from Madison Street to Yesler Way is the other, larger secondary study area. It is about 15.5 acres. It is included in the study area because it is faced by a number of office and residential buildings, including the Yesler Terrace public housing site. However, between Madison Street and James Street the freeway becomes elevated above the surrounding streets and is not a candidate for a lid. The eastern side of the area between James Street and Yesler Way is below grade, making that area more suitable for a lid.

Study Area	Freeway Alignment Length (FT)	Freeway or Right-of-Way Width (FT)*	Area (Acres)**
North	775	250-320	4.2
1	550	200-285	2.6
2A	150	60-120	0.3
2B	120	50	0.1
3	495	220-300	2.5
4A	100	130	0.3
4B	300	180	1.2
5	240	280	1.5
6	245	265	1.5
South	2,350	275-480	15.5
*Varies depending on shape and boundary used			
**Approximate estimation			

Figure 39 - Study area dimensions.

6.2 Site characteristics

This section summarizes the physical attributes of the study areas. Topics include land use, transportation, vegetation, views, and other important variables that affect design at the urban scale.

Imageability

The imageability analysis is useful for quickly sorting out the form of a site at the urban scale from the perspective of a person on the street. Five features are identified in Figure 40: landmarks, districts, barriers, nodes, and paths. These are not based on official landmark, neighborhood, or traffic designations, but rather their perceived importance and visibility to the author. These features provide a sense of orientation and orderliness to the dynamic urban environment that is downtown Seattle.

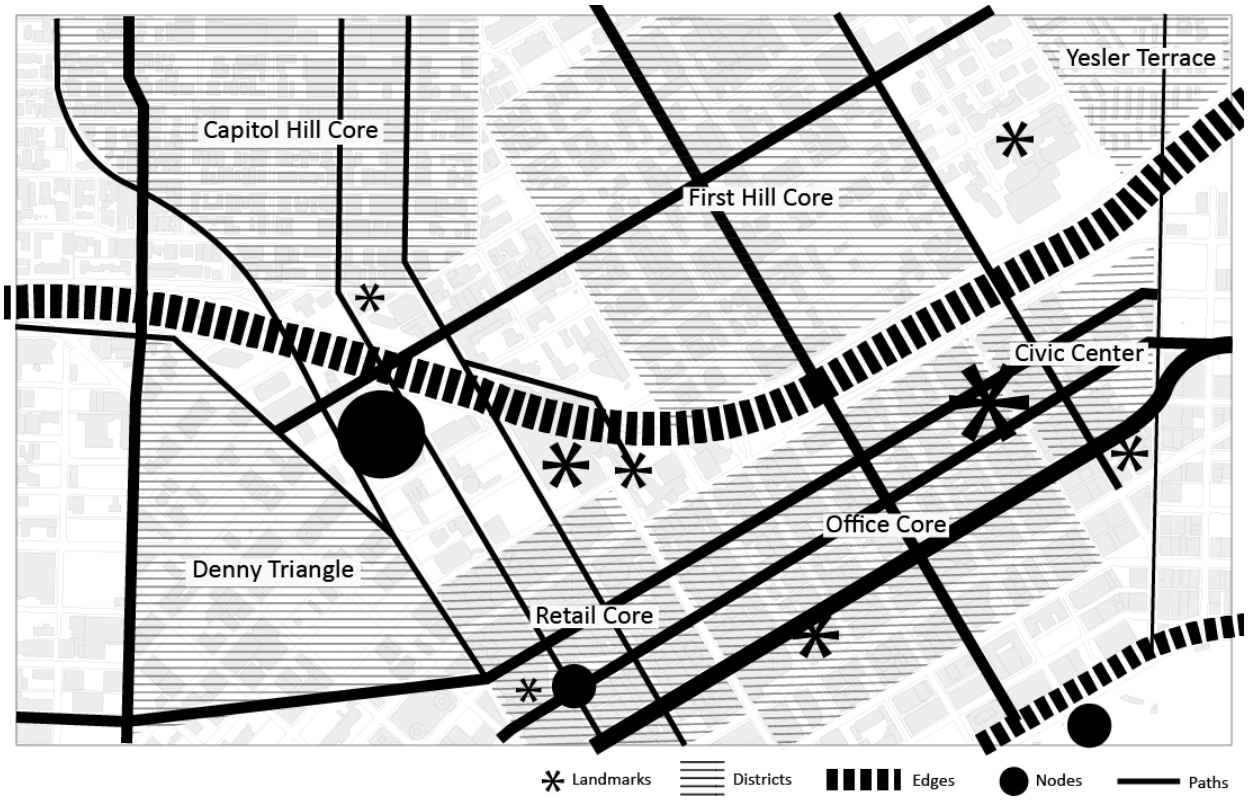


Figure 40 - Imageability diagram.

Rammed through the Center City is Interstate 5, not only a physical edge but also a visual and audial barrier. In reality there are more paths across I-5 than illustrated, but routes like Madison Street and the Pike-Pine corridor connect with nodes like the ferry terminal and Pike Place Market. Sandwiching the commercial and retail core on the other side is the Alaskan Way Viaduct, an edge between most of downtown and the Elliot Bay waterfront.

The most prominent landmark is Columbia Center, the tallest building in Seattle. It marks the south end of the office core and the transition to the civic center district. Nearby is another landmark, Smith Tower, one of the city's first skyscrapers. Union Square and 1201 Third Avenue are as identified as landmarks due to their height and distinctive architecture. Smaller landmarks that are more programmatic in nature are the Westlake shopping center, the Melrose Market, the Convention Center, and Harborview Medical Center.

Nodes are where paths converge or there are transportation connections. The largest node shown here is the Convention Place bus station, the north end of the downtown transit tunnel. Though it doesn't have as much passenger activity as the other tunnel stations, the large number of bus layover spaces and its location below street level makes it distinct. The other two nodes shown are Westlake Park, one of the downtown's only public parks, and the Colman Dock ferry terminal with regional marine transit links.

In addition to the districts already identified, the Denny Triangle is notable for its recent development. It is marked by a large collection of surface parking lots, which are otherwise scarce in downtown. On the other side of the freeway are the neighborhoods of Capitol Hill and First Hill. To the south is the Yesler Terrace public housing site.

Though this imageability map is unique to the author, it likely shares many common elements with other residents, workers, and visitors in downtown Seattle.

Land uses and landmarks

The study area is surrounded by a range of land uses characteristic of a major urban downtown. It also includes a number of important civic buildings that must be integrated into any new connections across the I-5 corridor.

The most intensive land uses in the vicinity are skyscrapers with offices, including several of the city's tallest buildings. The Seattle Municipal Tower and Two Union Square front the freeway. The Seattle Municipal Tower also sits above reversible on-off ramps for the Interstate 5 express lanes. The city's tallest building, the Columbia Center, is one block from the freeway.

Figure 41 – Land uses. Data sourced from the King County GIS.

There are a number of hotels clustered in proximity to the Convention Center. A few pockets of industrial land and parking lots remain in the Denny Triangle and South Lake Union area north of downtown.

On the east side of the freeway the majority of parcels are residential with mid-rise and high-rise multi-family buildings. In keeping with First Hill's nickname of "Pill Hill", there are also a number of healthcare facilities and offices there. First Hill also a number of buildings associated with religious groups.

The Pike-Pine retail corridor is most distinct on the east side of I-5. Retail uses are most predominant on the north side of downtown. Retail is also scattered throughout much of the Center City and is not wholly represented in Figure 41 due to the way King County categorizes land uses.

Most clearly lacking from the land use map is public parks. There are a number of small private parks built as part of development bonus programs. An analysis of potential land uses will confirm whether public parks and other land uses are a viable program for freeway lids.

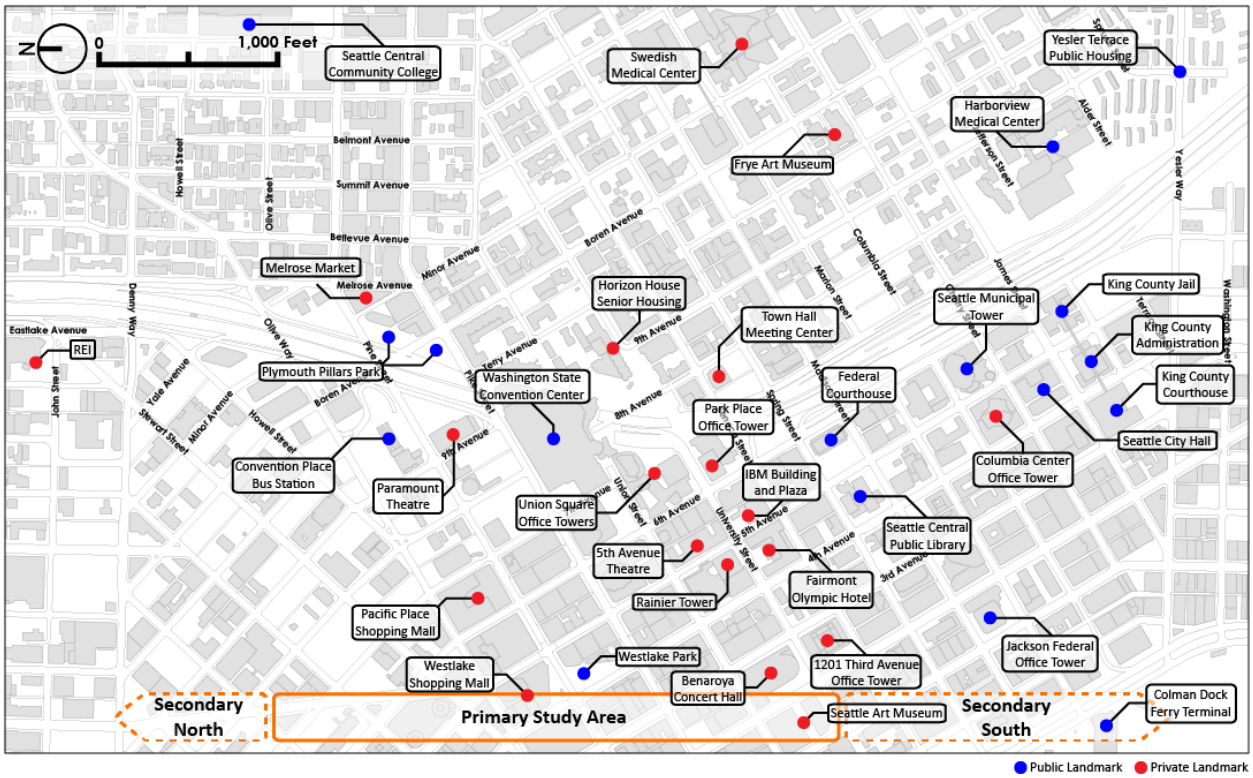


Figure 42 - Notable public and private landmarks.

Near the freeway in the south are institutional and civic uses, including Seattle City Hall, the King County Jail, the Seattle Central Public Library, a federal courthouse, and Harborview Medical Center. The Washington State Convention Center, the largest facility of its kind in the state, bridges directly over the freeway.

Zoning

The current zoning around the study area shapes what form future redevelopment may take. Zoning limits on height and other building dimensions are also the underlying legal framework behind urban form, which is discussed below. The land uses identified above generally match the types of zoning in the study area. Interstate 5 is a clear edge between the zoning in Downtown and First Hill/Capitol Hill. These are illustrated in Figure 43.

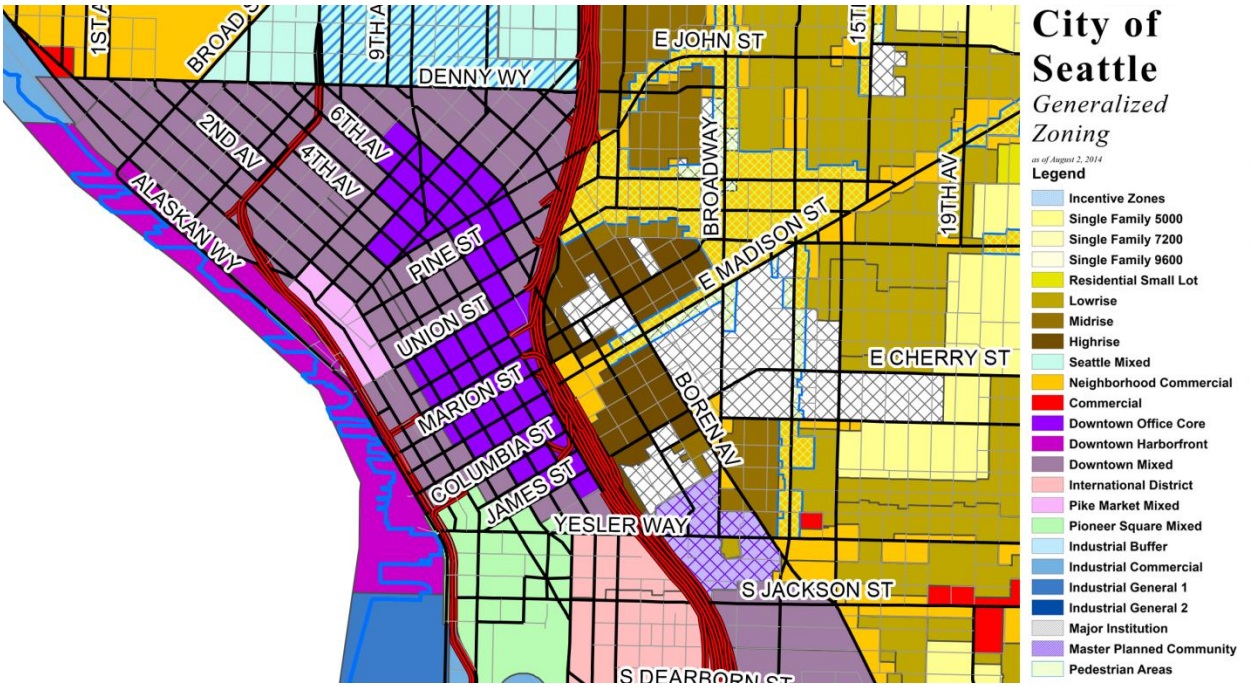


Figure 43 - General zoning in the downtown area.[117]

There are basic differences in permitted uses and building bulk between the zones fronting the study area. These are applicable to lids because some of the zoning boundaries are aligned with the centerline of the freeway right-of-way. However, the unique nature of lids and building within the airspace may warrant departure from zoning requirements.

- Downtown Office Core: 500 feet or unlimited base height; 300, 450, or 500 feet height limit for residential uses; all uses are permitted except for high impact uses like manufacturing, drive-in businesses, and outdoor storage; requirements for street level spaces include pedestrian-generating uses like retail, cultural centers, and health offices.
- Downtown Mixed Commercial: 240 or 340 base height limit; 290 or 400 feet height limit when certain incentives or use arrangements are met; all uses are permitted except for high impact uses like manufacturing, drive-in businesses, and outdoor storage; requirements for street level spaces include pedestrian-generating uses like retail, cultural centers, and health offices.
- Midrise: 85 feet base height limit; permitted uses are primarily residential and ground floor commercial.
- Highrise: 160 feet base height limit; 240 or 300 feet height limit when certain incentives are met; permitted uses are primarily residential and ground floor commercial.
- Neighborhood Commercial (NC-3 in the project area): 65 and 85 feet height limits in the project area; permitted uses are primarily residential, bars and restaurants, offices, major institutions, religious facilities, auto sales, and auto repair.[118]

The more detailed zoning map in Figure 44 shows individual parcels, parcel and right-of-way dimensions, and zoning subtypes.

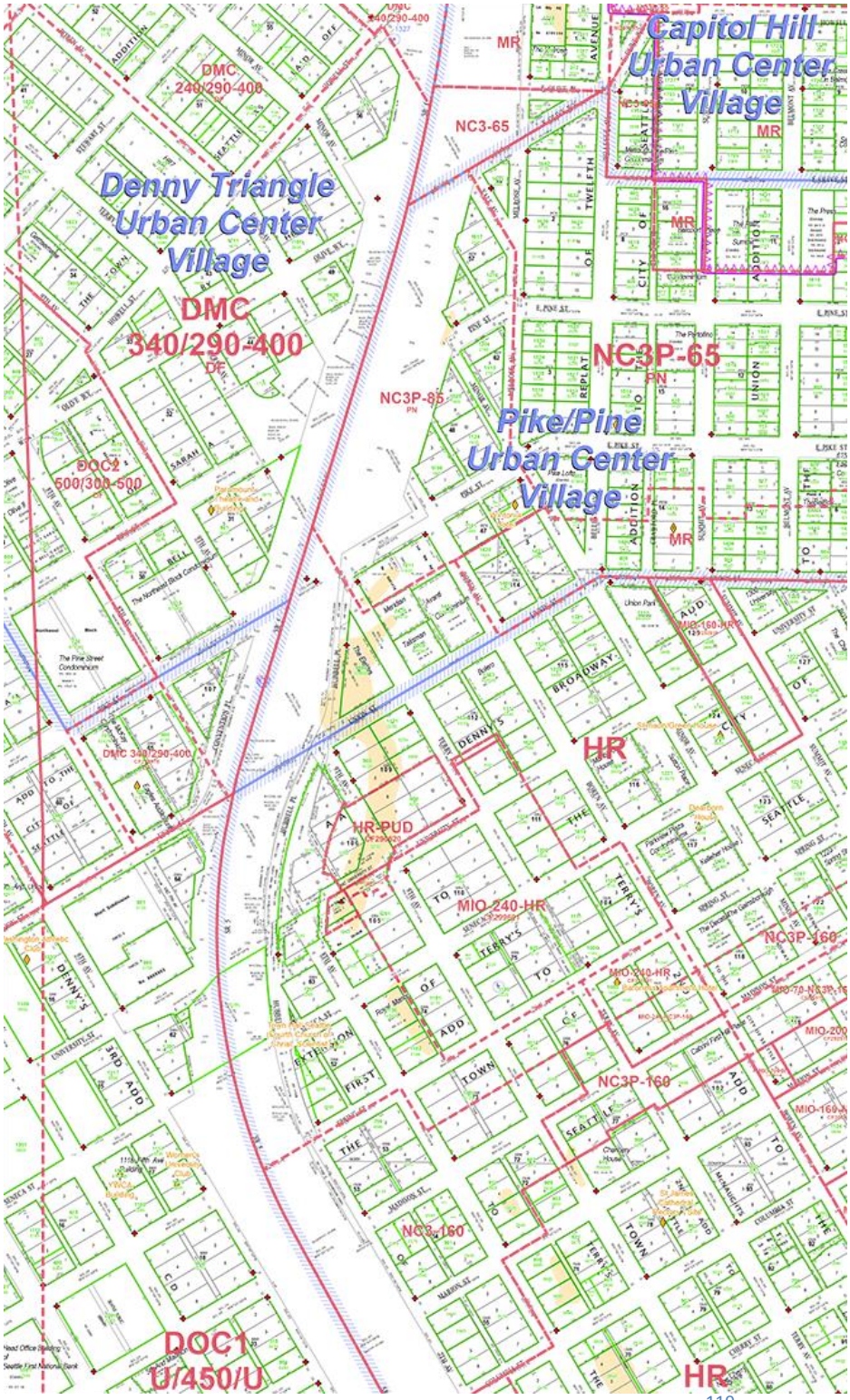


Figure 44 - Detailed zoning around the study area.[119]

Urban form

The area around the project study area is characterized by perhaps the largest variety of building types and sizes in Seattle. It is heavily urbanized, with few open spaces and many tall or bulky buildings.

To the west, newer skyscrapers take up full blocks and visually dominate the downtown area. Between them are a variety of older, smaller buildings, with many blocks having multiple buildings. The shape of buildings is relatively consistent, with most having rectangular footprints, flat exteriors, and flat roofs. This reflects many of the buildings' use as office space. Buildings' exteriors that break this pattern are notable and are often architectural landmarks, including the rounded roof of the Seattle Municipal Tower, the curving eastern side of One Union Square, the tapered base of Rainier Tower, and the triangular footprint of the Sheraton Hotel. The low bulk of the Convention Center, with its large windowless facades, is also unique.

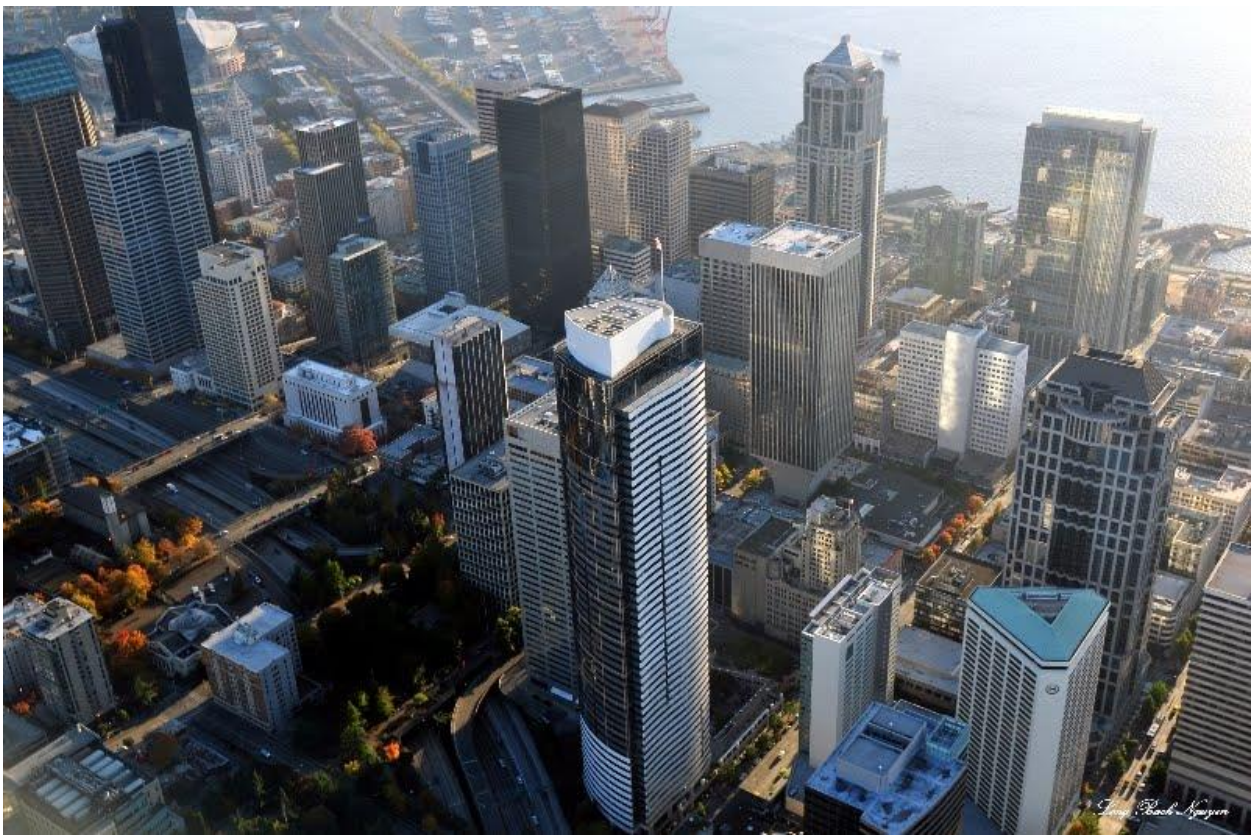


Figure 45 - Aerial view looking southwest at the downtown core. Interstate 5 and Freeway Park are at lower left.[120]

Thin or elongated buildings are typically residential buildings, including hotels. To the east, buildings in the First Hill and Capitol Hill neighborhoods fit this pattern and are markedly smaller but of a more consistent size. Few are taller than 10 stories and most are clearly residential, having more rectangular footprints. There are some office buildings and retail buildings. The finer form of these buildings is clearly a result of parcel size and zoning, as discussed above.

Across both sides of I-5 the building arrangements are decidedly urban, with limited or no setbacks from streets. Parking lots are few, though there is a larger concentration of them in the Denny Triangle neighborhood.

Figure 46 - Looking north at areas on both sides of Interstate 5. Photo by the author.

What follows is a brief description of the properties and structures that directly face each of the primary study areas. Lids built within these study areas must respond appropriately to neighboring structures. This can be done through the design of the shape and form of any buildings on the lids, the selection of building and landscaping materials, and the routes of pathways. However, designs must also be aware of the potential for redevelopment and potential incompatibility with future buildings that may be dramatically different than what current exists.

- Section 1 (Pine Street to Olive Way): To the west is Olive Tower, an 86 unit, 13 story apartment tower restricted to low-income residents.[121] It is accompanied by a small surface parking lot. To the east are two six story apartment buildings and a three story office building with surface parking lots.
- Section 2A and 2B (Pine Street and Boren Avenue intersection): To the west is the Convention Place bus station, which consumes nearly an entire block and is

below the surrounding street grade, and a two story office building. Both will be demolished with the Convention Center expansion. To the east is the dog park portion of Plymouth Pillars Park. On the same block behind the park are a three story mixed-use building, a two story commercial building, and a seven story residential building.

- Section 3 (Pike Street to Pine Street): To the west is the eight story, 2,800-seat Paramount Theater, an officially designated historic landmark. On the same triangular block is a staging area, ventilation stack, and emergency exit for Sound Transit light rail. To the east is the original portion of Plymouth Pillars Park.
- Section 4A and 4B (Freeway Park): To the west is Union Square, a pair of glass and aluminum-clad office towers and low-rise retail complex. One Union Square, to the south, is 36 floors and 456 feet tall. Two Union Square, to the north, is 56 floors, 797 feet tall, and the second tallest building in Seattle. Freeway Park makes a direct connection to Two Union Square and a privately owned public space above the street level. To the east most directly, on the other side of Freeway Park, is Horizon House, a 19 story residential building restricted to senior residents. A number of other mid-rise residential buildings are on the same block.
- Section 5 (Spring Street to Seneca Street): To the west, across 6th Avenue, is a collection of four buildings. The largest is the 28 floor, 551 room Renaissance Hotel. On the opposite corner of the block is the 11 story Vintage Hotel and its adjacent three story parking garage. The block also has the three story Women's University Club and a six story, mixed-use building with the YWCA and 125 single room occupancy units for low-income women.[122] To the east is, across 7th Avenue, is a commercial parking lot surrounding Town Hall, a small two story building housing a civic organization and which was originally a church.
- Section 6 (Madison Street to Spring Street): To the west, across 6th Avenue, is the 10 story William Kenzo Nakamura United States Courthouse that houses the United States Court of Appeals for the Ninth Circuit. The building occupies half the block, with the other half being a grassy open space. To the east, across 7th Avenue, is Seattle First Presbyterian Church that is often used for public meetings and has a noticeable lantern-type steeple separate from the main building.

There are clear opportunities to connect these many structures with future lids. Many of them are of historical significance, even if they do not have an official historical designation. Many are also relatively large or provide affordable housing, which provide benefits of urban density and social diversity. Structures such as the Paramount Theatre, Horizon House, Town Hall, YWCA, and Renaissance Hotel will likely still be standing as lids are designed and built. The variety of users is also an opportunity, with many low-income residents, senior residents, hotel visitors, women's services, and office workers. This sampling is a microcosm of the diverse population, businesses, and organizations present in the greater Central City.

Other buildings are smaller and may be subject to redevelopment pressures as the downtown area grows. There will be opportunities for new buildings to either directly front

new lids or be visually integrated through pedestrian connections, viewpoints, transparent facades, and other means.

Another critical aspect of urban form is the layout of blocks and streets. The streets throughout the study area are arranged in a grid system. In the core of downtown the streets are oriented about 30 degrees off the cardinal directions. To the north, past Stewart Street and Olive Way, the grid is aligned differently and creates a meshing of two different grids. South of Yesler Way is another angling of the grid that is more aligned with the cardinal directions. The result is a unique set of streets and intersections in the downtown core.

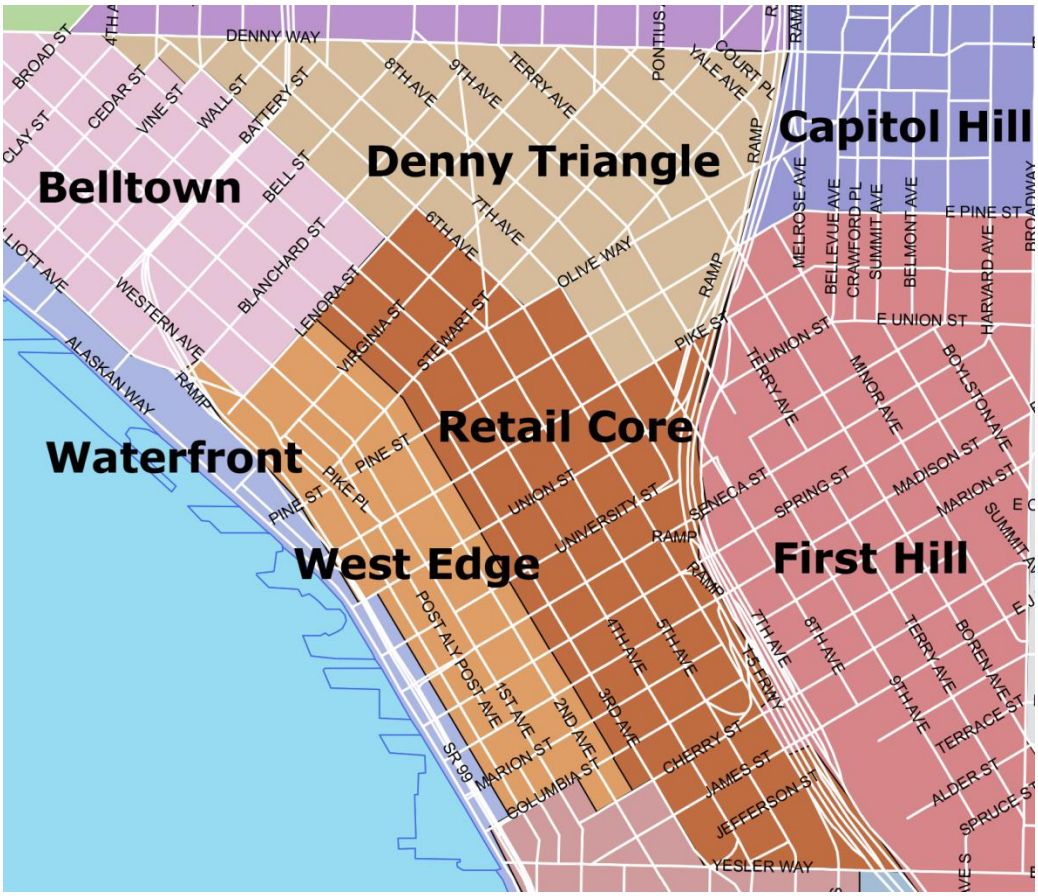


Figure 47 - The downtown street grid.[123]

Within the core grid the block sizes also differ. Between University Street and Yesler Way the blocks are roughly square, being about 240 to 250 feet long on each side. North of University Street and in the Denny Triangle the blocks are more rectangular, about 250 feet wide and 340 to 360 feet long.

Streets in the study area vary greatly in width. Specific right-of-way width is identified on the zoning map, but generally the north-south avenues are 66 feet wide and the east-west streets are 66 to 80 feet wide.

Block sizes and street widths are important for detailed design considerations and will affect the size and layout of specific lid sections. Alterations of right-of-way configurations, such as widened sidewalks or pedestrian streets, bike lanes, and vehicle lanes will depend on the

availability of space. In study areas 1 and 3, the diagonal alignment of Interstate 5 through the larger blocks will create particularly long lids that may hamper visual and physical connections with the surrounding street grid. But they also present an opportunity for larger open spaces and a variety of development.

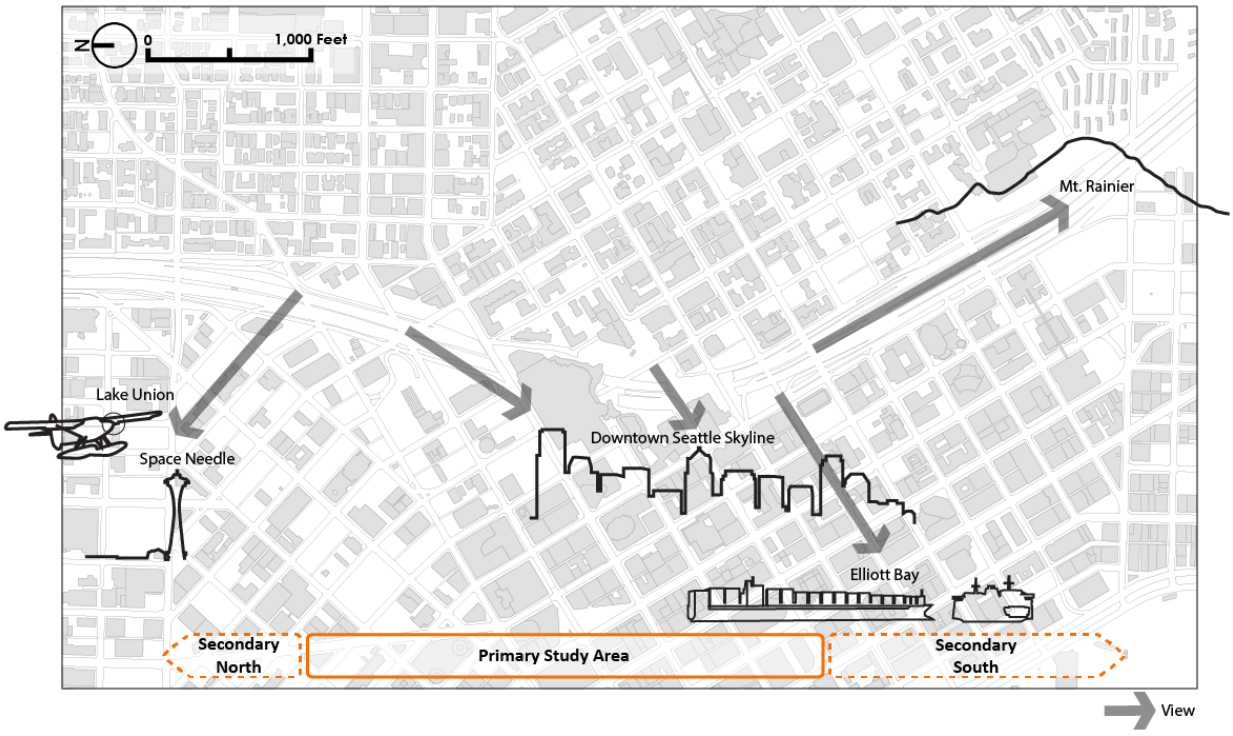
Views

There are views of many natural and artificial features from the study area. To the south is Mount Rainier, visible from the Madison, Spring, and Seneca Street overpasses. The mountain is most visible on sunny days.

To the west is Elliot Bay, a major maritime channel for passengers and cargo throughout the region and the world. Views of Elliot Bay from freeway lids will mostly be impeded by the downtown skyline, which is also an iconic view in itself. Closing an overpass to vehicle traffic would potentially enhance the view of Elliot Bay.

To the northwest is Lake Union, with has frequent float plane flights, and the Space Needle. As Seattle goes through a construction boom, also visible in this direction are a multitude of construction cranes.

Future lids can exploit these views to provide an experience that was previously unattainable. Trees, retail buildings, and walkways can be arranged to provide viewpoints. Elevated features like towers or pavilions could potentially enhance these views while also serving as imageable landmarks.



Trees and open spaces

There is moderate tree canopy coverage within two to three blocks of the freeway corridor on both private and public land. The densest tree coverage in the study area is at Freeway Park and the Convention Center. Elsewhere coverage is sporadic except along a few select streets. Future freeway lids can increase tree canopy coverage in the Center City and contribute to the city's urban forest, providing shade and wildlife habitat. Trees on lids can also integrate with the existing tree species' that are used on city streets, at least some of which include: Little Leaf Linden, Gingko, Northern Red Oak, Norway Maple, and Japanese Zelkova.[124]

There also a number of vegetated, open "dead spaces" along the freeway edges. These spaces are mostly owned by the state government and are portions of the freeway right-of-way that have remained undeveloped. They are primarily covered by grass, ivy, and mature trees. They are oddly shaped, being mostly thin and linear or triangular. Most border the freeway above retaining walls. In the south study area there is large parcel owned by King County that is vacant and forested. Nearby is a long strip of dead space along the western edge of the Harborview Medical Center property.

The local homeless population makes heavy use of these dead spaces. They offer isolation from the surrounding streets and have barriers to entry, including fences and walls. Camps, trash, and personal belongings were observed during a site visit. The lack of protection from vertical drops, traffic fumes and noise, and steep grade changes make them unsafe but an apparent refuge.

Improving these spaces for use by formal homeless camps, which the City of Seattle supports, or the general public can be one of several interim improvements to the freeway area ahead of future lids. They may lessen the Center City open space deficit by becoming pocket parks. Leveling slopes, constructing sound walls, and formal vegetation management could improve the public realm at a relatively low cost. Depending on the local topography, some of these dead spaces can be either integrated or eliminated with future lids. They may also provide construction staging areas for lids.

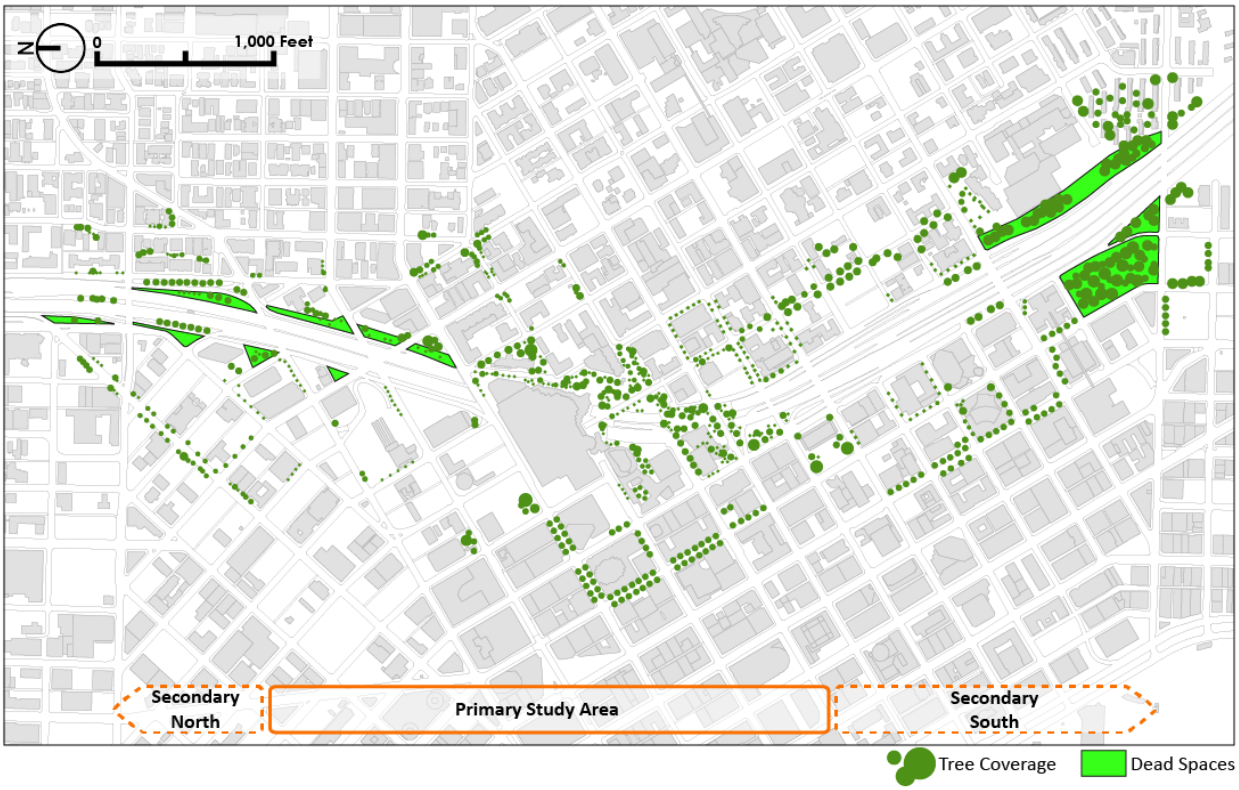


Figure 48 – Trees and dead open spaces.

Noise

The ambient noise generated by freeway traffic is 75-80 decibels when heard from the overpasses. Freeway Park both compounds and muffles traffic noise; within the park, the traffic is still audible but is reduced to the 50-60 decibel range.

Below Freeway Park on Hubbell Place the noise is upwards of 85 decibels; prolonged exposure to these noise levels (8 hours or more) can damage hearing.[125] Future lids must not create tunnels that are accessible by people walking or bicycling, or that generate traffic noise that can be heard from within residential and commercial buildings. This issue alone will discourage development of lids in the secondary study areas.

Stepping away from the edge of the freeway or underneath the elevated portions in the southern study area, the ambient noise is reduced to 60-70 decibels but peaks with larger vehicles.

Additional lids in the primary study area will likely contribute to a reduction of ambient noise in the downtown area.

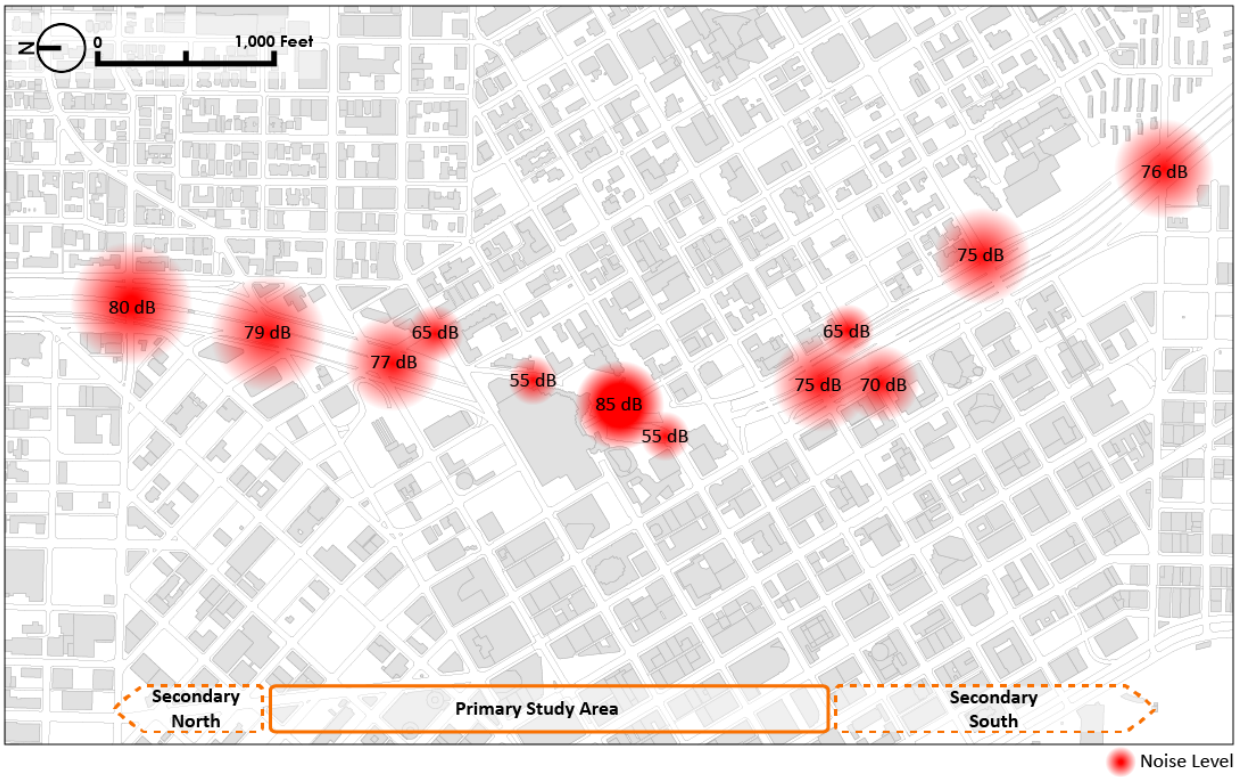


Figure 49 – Noise levels.

Freeway functions

The configuration of Interstate 5 through the downtown is a complex weave of splitting lanes, merging lanes, off-ramps, on-ramps, overpasses, underpasses, surface streets, sub-structures, and elevated structures. The freeway's footprint is relatively compact compared to freeway interchanges and access routes in other cities. There are several features of note.

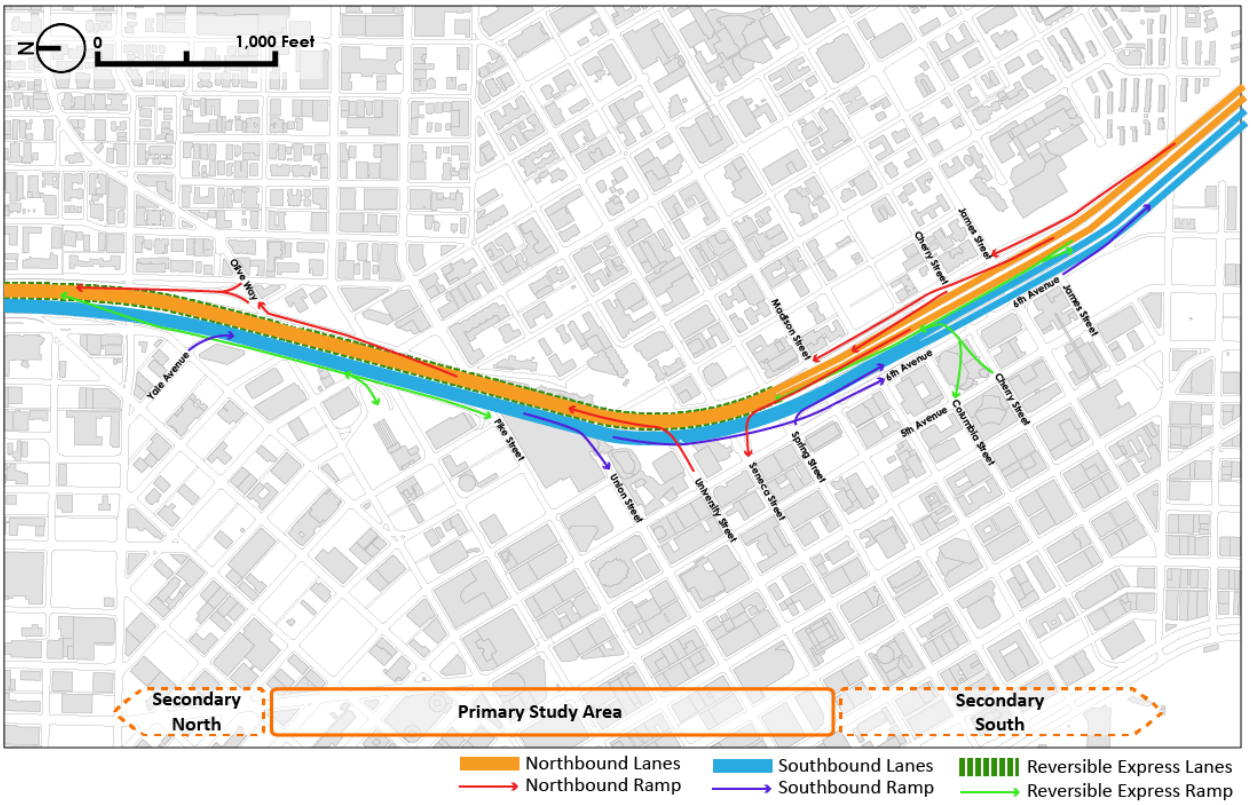


Figure 50 – Freeway functions.

In the southern study area there are four separate sets of freeway lanes. The outer lanes connect with the Interstate 90 interchange south of downtown, while the central lanes carry through traffic on the mainline.

A set of reversible express lanes with limited access run beneath the northbound lanes. On weekday mornings the express lanes are open to southbound traffic, and in the afternoon they are reversed to carry northbound traffic. In the study area there is a single on-off ramp at the southernmost end of the express lanes, on-off ramps connecting to 5th Avenue, and an on-off ramp connecting with Pike Street and the Convention Place bus station.

The set of four on-off ramps at Union, University, Seneca, and Spring Streets are the core of access and egress for downtown freeway traffic. The Union Street southbound off-ramp passes underneath the Convention Center and the University Street northbound on-ramp passes below Freeway Park. The Spring and Seneca Street ramps create five-way intersections and have relatively tight turning radii.

Along with the Pike Street express lane on-off ramp, these core ramps are of primary concern to future freeway lids in the study area. They are all curving ramps and visually distinct infrastructure. As recommended by the Freeway Park analysis, the University Street ramp must be retained; it carries 8,300 vehicles on weekdays and the nearest alternate route is some ten blocks away at Olive Way. The Union Street ramp is already lidded.

If a full lid between Seneca and Street Streets is considered, the Seneca Street northbound off-ramp can be removed with limited traffic impacts and will simplify a five-way

intersection. The nearest alternate is an off-ramp that merges with 7th Avenue at the Madison Street intersection, three blocks away

As considered in the SDOT study, the Spring Street southbound off-ramp can also be removed. It will likely have minimal traffic impact, as the alternate route, 6th Avenue, carries relatively modest traffic. To accommodate new traffic flows, 6th Avenue's one-way direction may need to be reversed between Spring Street and Columbia Street, with alternate southbound access provided via the Yesler Way on-ramp eight blocks away; though some distance, 6th Avenue provides a straight route to it.

The Pike Street reversible express ramp carries the least amount of traffic among the study area's freeway ramps and its removal would likely have the least impact on local traffic patterns.

Traffic and connections

Interstate 5's slicing of downtown Seattle's street grid was partially healed with a number of overpasses and underpasses built during the freeway's original construction. Depending on how freeway lids are built in this area, including whether on-off ramps are removed or relocated, traffic patterns may be altered. This analysis focuses on the connections across I-5 and along adjacent streets for people walking, bicycling, taking transit, and driving.

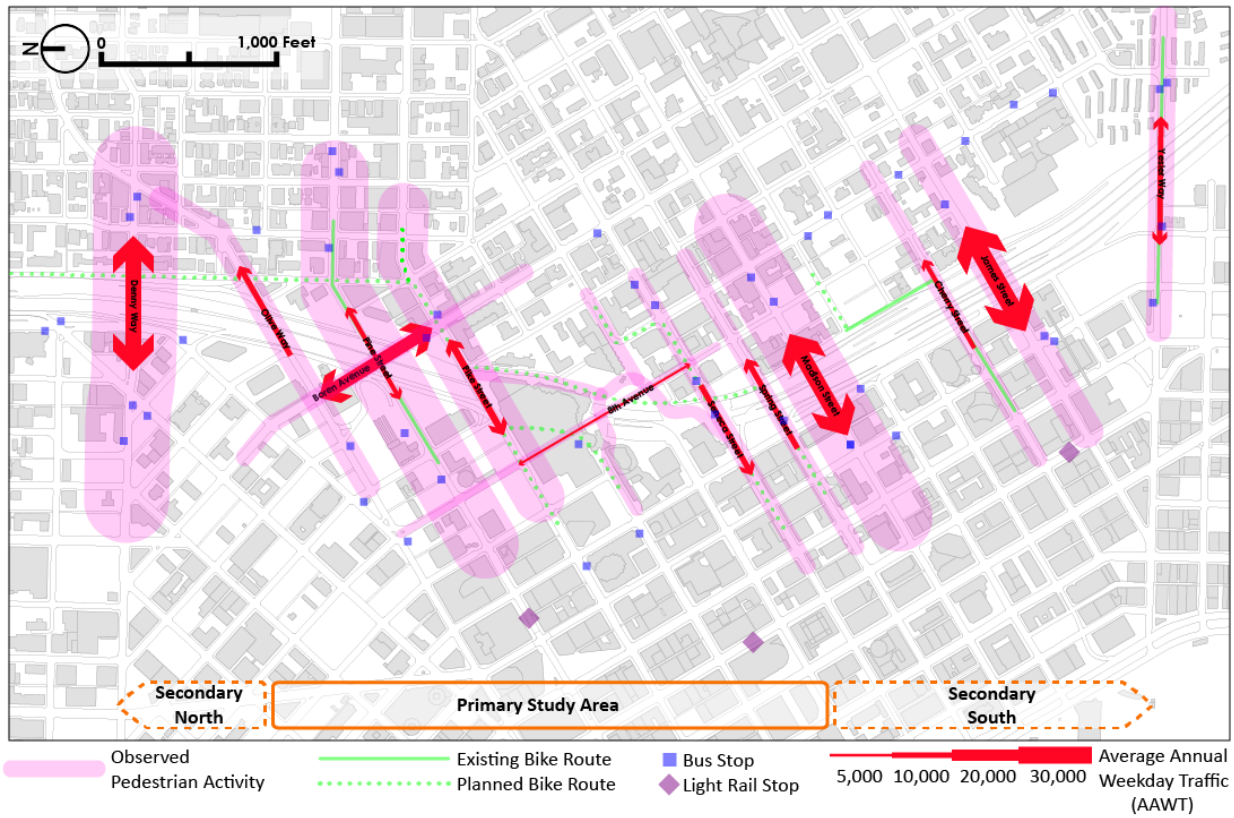


Figure 51 –Traffic flow and facilities. Bike, transit, and traffic volume data are sourced from the Seattle Department of Transportation and Google Maps.

Figure 51 illustrates these multi-modal traffic facilities and their relative intensity of use; the City of Seattle annually collects data citywide for vehicle traffic on select street segments (see Figure 52), but not for pedestrians and bicyclists. It shows that the most heavily used connections are Denny Way, the Pike-Pine corridor, and Madison Street. Freeway Park also has a notable share of pedestrian cross-traffic. Pine Street has the only bicycle lane connection between downtown and Capitol Hill. Transit connections are well distributed throughout the study area.

In keeping with the value of lids as connector spaces, modifying or closing some of these vehicle connections will improve mobility for people not driving. That the City does not collect traffic data for Seneca Street and Spring Streets, which are not insignificant cross-streets in the Downtown area, possibly indicates they are examples of where modifications can be made without adverse impacts.

Freeway	AAWT
Interstate 5	200,000
Yale Street SB On	19,000
Olive Way NB On	15,200
Olive Way NB Off	9,100
Pike Street EX On-Off	2,900
Union Street SB Off	9,600
University Street NB On	8,300
Seneca Street NB Off	13,200
Spring Street SB On	18,800
Madison Street NB Off	15,500
Cherry Street NB On	11,600
6th Avenue SB Off	15,500
Columbia Street EX On-Off	1,100
Cherry Street EX On-Off	3,200
6th Avenue SB On	21,200
James Street NB Off	11,400

City Streets	AAWT
Denny Way	28,600
Olive Way	9,000
Pine Street	7,700
Boren Avenue	20,800
Pike Street	12,200
8th Avenue	4,600
Seneca Street	n/a
Spring Street	n/a
Madison Street	27,400
6th Avenue	14,300
7th Avenue	n/a
Yesler Way	n/a

Figure 52 – Selected counts of annual weekday traffic (AAWT).[126]

The freeway on-off ramps carry mixed levels of traffic. Within the primary study area the most heavily used are the Seneca Street off-ramp and the Spring Street on-ramp. However, these two ramps also present the most challenges to lid design. They prevent a full covering of the freeway in study areas 5 and 6 and create barriers to pedestrian travel along the edges of the freeway.

Even accounting for demolition, the removal of the Spring and Seneca ramps may lower overall costs by simplifying lid design. Their high traffic volumes may merit some level of mitigation. Two options are considered here.

The first is to remove both ramps and rebuild them as a T-intersection on the south side of the Madison Street overpass. Madison is a two-way street. The overpass has parking that, if not permanently replaced by landscaping in an interim step, can be converted to travel lanes to provide extra capacity and accommodate new traffic. The construction of new ramps will

improve earthquake safety and provide impetus for rehabilitating the rest of the Madison Street overpass to meet current seismic codes.

The second option is to remove one or both of the Seneca and Spring ramps and do nothing else. Instead of exiting at Seneca, northbound traffic will exit two blocks away at the east side of the Madison Street overpass. And instead of entering at Spring, southbound traffic will enter the freeway six blocks away at Jefferson Street.

The University and Union Street ramps in the primary study area do not present similar problems. There are no pedestrian barriers because the ramps are direct extensions of the street grid. As recommend in the Freeway Park case study, the University Street on-ramp must remain because study area 4B is not recommended for lidding. The Union Street off-ramp is already lidded by the Convention Center.

Similarly, the northbound Olive Way on and off ramps do not present significant impediments to lid design. They hug the east side of the freeway and can be accommodated like how Klyde Warren Park in Dallas wraps around an off-ramp. There are no nearby alternates to Olive Way for northbound traffic entering and exiting the freeway. Further, creating openings around the ramps will provide some level of ventilation that may be required by a large lid in study area 1.

In study area 3 is the least trafficked ramp, the reversible express lane ramp at Pike Street. It carries only 2,900 vehicles on an average weekday. However, if closed, alternate routes for express lane traffic will be Mercer Street or Cherry and Columbia Streets, some distance away. The ramp also carries bus traffic to and from Pike Street. In any case the ramp's stub connection with the Convention Place bus station may need to be maintained for the direct connection it provides buses to the express lanes. And like in study area 1, retaining the Pike Street ramp will help provide ventilation for the underside of a lid without the need for mechanical systems.

As mentioned previously, there are incomplete links in the pedestrian network around the freeway. All of the overpasses have sidewalks, but missing sidewalks on some blocks, a lack of crosswalks at intersections and midblocks, and high traffic volumes are barriers to pedestrian movement. These barriers are illustrated in Figure 53. Lid design must mitigate these barriers through new sidewalks, pathways, and crossings for people walking.

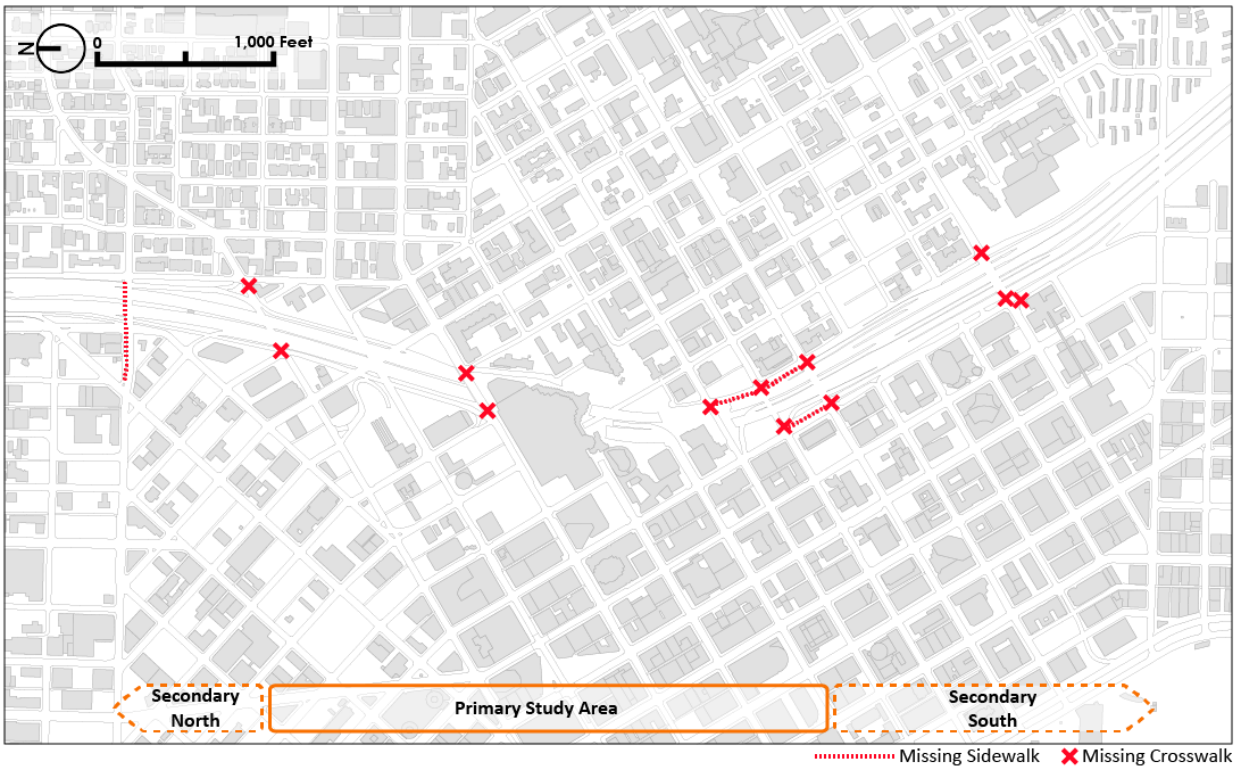


Figure 53 – Pedestrian barriers.

And in particular, modification or closure of some of the overpasses to vehicle traffic will help improve pedestrian circulation. The most likely candidate for this is Spring Street. It is between two study areas, 5 and 6, and has minimal vehicle traffic. Once both study areas 5 and 6 are developed, the overpass can be closed to vehicle traffic or demolished; in conjunction, and because Spring Street is a one-way eastbound street, the one-way Seneca Street overpass can be converted into a two-way street. Seneca is already a two-way street east of the freeway. Eastbound vehicles on Spring Street will turn left onto 6th Avenue for one block and turn right onto Seneca.

Like at Klyde Warren Park in Dallas, the datum of Spring Street must be designed to support vehicle traffic for events or emergencies. But it has the potential to become a primary pedestrian and bicycle route between First Hill and Downtown. Spring Street is planned to be a bicycle route.

None of the other overpasses in the study area merit such dramatic change. In the case of Pine Street and Boren Avenue, their X-shaped intersection elevated above the freeway is a unique feature of Interstate 5's construction. The Convention Center expansion through study area 2B will have an entrance at the intersection that will be key to activating this otherwise hostile street environment.

The Olive Way overpass can be converted to a two-way street if both study area 1 and the northern extension are developed. This will facilitate the implementation of a midblock pedestrian crossing. Olive Way is already a two-way street on both sides of the overpass, so this will not significantly alter traffic patterns.

6.3 Potential land uses

One of the research hypotheses posits that the new "land" on top of future lids must be based upon community needs. Options include: parks and open space; residential, office, retail, or industrial development; and transportation facilities, schools, and other civic buildings. What follows is an analysis of land use demands and capacity.

A Journal of Urban Design article, "Regenerating urban space: putting highway airspace to work" by Andreas Savvides includes a brief discussion and table of feasible land uses (see Figure 54) that is useful as a reference point for this analysis. [127] While this table provides a place to start, lid projects are certainly dependent on their local context. But most of the downtown land uses Savvides categorizes as medium or high feasibility (retail, office, hotel, residential, institutional, and parking) will be analyzed; entertainment can be considered part of the retail category. Industrial uses will not be considered due to its low desirability and the lack of industrial zones in Seattle's Downtown and First Hill/Capitol Hill urban centers.

	Down-Town			Outer-Bound		
	Land Use	Structure	Schedule	Land Use	Structure	Schedule
Low Feasibility	Industrial	M	H	Hotel	M	L
	Storage	M	L	Parking	L	L
	-	-	-	Residential	M	L
	-	-	-	-	-	-
Medium Feasibility	Entertainment	M	H	Office	M	M
	Institutional	M	M	Retail	M	L
	Residential	H	H	-	-	-
	-	-	-	-	-	-
High Feasibility	Hotel	H	H	Entertainment	L	M
	Office	H	H	Industrial	L	M
	Parking	M	L	Institutional	M	M
	Retail	H	H	Storage	L	L

Figure 54 - Feasibility of uses for freeway air space.[128]

Seattle's urban village strategy

The Washington state government began requiring its urban cities and counties to comprehensively plan in 1990 with the Growth Management Act. In 1994, Seattle adopted "Seattle's Comprehensive Plan: Towards a Sustainable Seattle".[129] This plan went beyond state requirements and established 30 "urban villages" around the city in which future population and employment growth were to be focused. All of the villages were defined by formalized boundaries around established neighborhoods, commercial centers, and employment hubs. The updated 2004 plan explains, "Urban villages are community resources that enable the City to: deliver services more equitably, pursue a development pattern that is environmentally and

economically sound, and provide a better means of managing growth and change through collaboration with the community in planning for the future of these areas."

The urban village strategy is relevant because much of the city's formal planning and data collection efforts are divided by these urban village boundaries. This allows for focused analysis of potential land uses of future freeway lids.

There are four types of villages: manufacturing/industrial centers, residential urban villages (predominantly single family areas), hub urban villages (freestanding mixed-used neighborhoods), and urban center villages. The last category is of most concern to this project. Urban center villages are groups of small villages clustered within Seattle's six larger "urban centers" designated by King County and the Puget Sound Regional Council. They are intended to see the bulk of employment and residential growth and are prioritized for transit service.

Four urban centers make up Seattle's core: Downtown, First Hill/Capitol Hill, South Lake Union, and Uptown. Collectively they are known as the "Center City" for planning purposes. Downtown contains five urban villages, and First Hill/Capitol Hill contains four urban villages. South Lake Union and Uptown are not divided into urban villages. Figure 55 illustrates the division of Seattle's Center City.

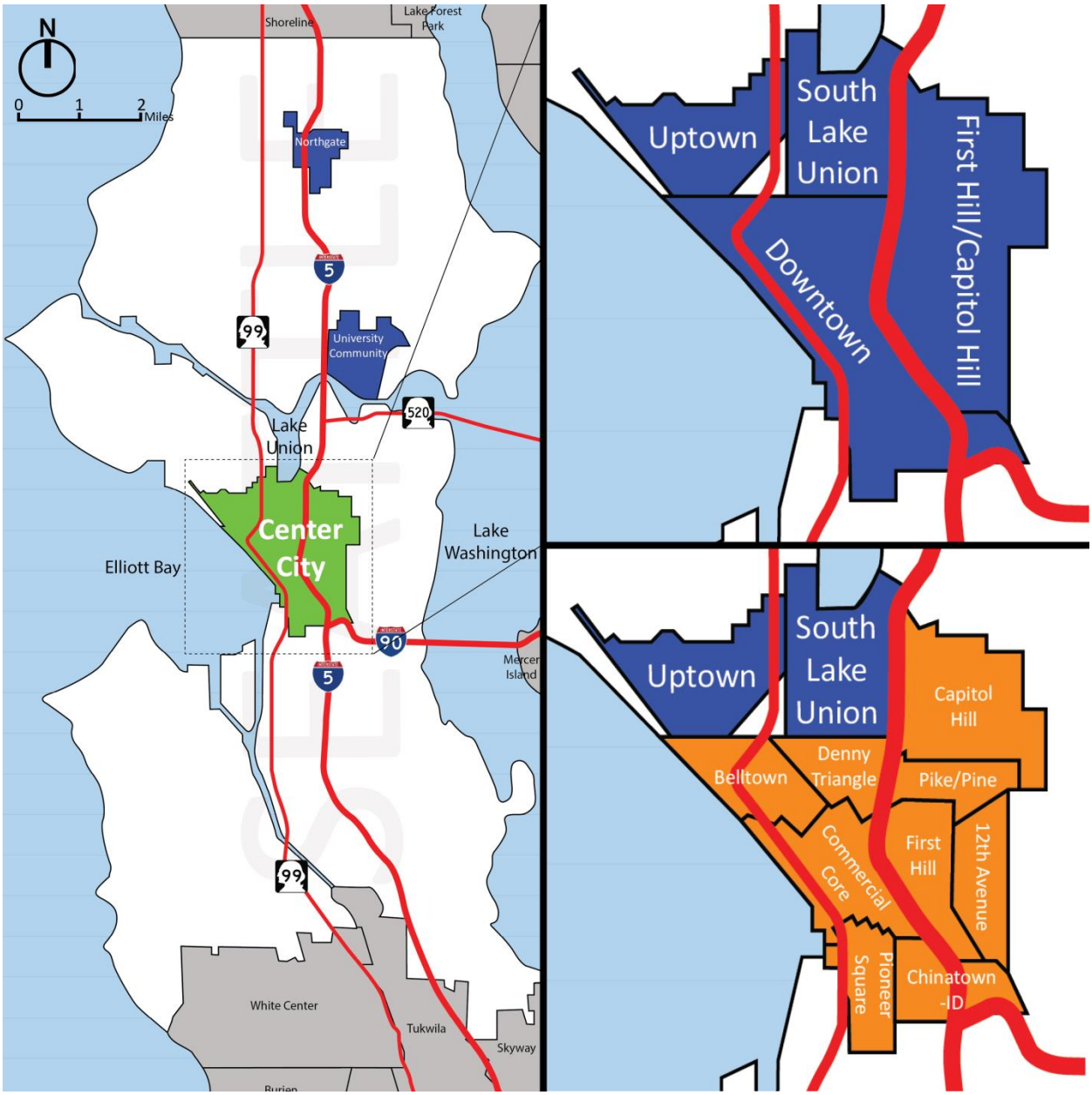


Figure 55 – Seattle's Center City (green), urban centers (blue), and urban villages (orange).

Interstate 5 is the dividing line between several urban centers and urban villages. Collectively, the Downtown and First Hill/Capitol Hill urban centers have over 45,000 households and 190,000 jobs. The city is planning for these areas to add another 17,000 households and 34,000 jobs over the next two decades.

6.3.1 Parks and open space

The Seattle Comprehensive Plan establishes quantitative and spatial goals for useable open space citywide and for the various types of urban villages. "Useable" open space is defined as: "Dedicated open spaces of at least 10,000 square feet in size, publicly accessible,

and usable for recreation and social activities."[130] This includes outdoor public parks, plazas, and privately owned public spaces.

The two relevant goals for this analysis are the following:

- Urban Centers: 1 Acre of Useable Open Space per 1,000 Households, plus 1 Acre of Useable Open Space per 10,000 Jobs
- Urban Villages: 1 Acre per 1,000 Households

The Seattle Parks and Recreation department publishes a gap analysis every five years to check the progress on these goals. The results of the latest analysis, from 2011, are summarized in Figure 56.

2024 Seattle Open Space Goals				
Citywide: 1 Acre per 100 Residents				
Urban Centers: 1 Acre per 1,000 Households + 1 Acre per 10,000 Jobs				
Urban Villages: 1 Acre per 1,000 Households				
	Needed acreage	Existing acreage	Surplus or deficit acreage	Jobs-adjusted surplus or deficit acreage
Citywide Breathing Space (2004)	5,726	6,187	461	
Seattle Center City	**94.58**	**85.02**	**-9.56**	
Downtown Urban Center	**44.3**	**29.49**	**-14.81**	
Belltown	13.34	9.19	-4.15	-6.10
Denny Triangle	4.29	4.63	0.34	-1.70
Commercial Core	3.37	11.91	8.54	-1.56
Pioneer Square	1.79	1.87	0.08	-1.22
Chinatown-ID	2.91	1.88	-1.03	-1.83
First Hill/Capitol Hill Urban Center	**30.25**	**23.75**	**-6.5**	
Capitol Hill	13.25	8.51	-4.74	-5.36
Pike/Pine	3.4	8.06	4.66	3.94
First Hill	7.22	6.89	-0.33	-2.63
12th Avenue	2.15	0.29	-1.86	-2.41
South Lake Union Urban Center	**12.78**	**15.7**	**2.92**	
Uptown Urban Center	**7.25**	**54.28**	**47.03**	

Figure 56 - Seattle Center City open space performance.

Using the City's metrics, the Center City has a gap of 9.56 acres. The two urban centers that border Interstate 5, Downtown and First Hill/Capitol Hill, also do not meet goals for quantities of open space, lacking 14.81 acres and 6.5 acres, respectively (the four urban centers do not add up to the Center City numbers because they are calculated differently). Further, five of their nine internal urban villages have open space deficits, ranging from 0.33 acres to 4.74 acres.

The City's gap analysis does not consider an employment-related goal for open space in the smaller urban villages, but it is worth considering the needs of not only residents but also employees. The last column in Figure 56 estimates the open space gap if the jobs goal is also included, assuming the same proportion of jobs in 2024. In this estimate, eight of the nine urban villages lack adequate areas of open space, ranging from 1.22 acres to 6.1 acres. Five of the six Center City urban villages bordering Interstate 5 have open space deficits totaling 13.08 acres.

Park space over Interstate 5 in downtown would be relatively large and unique, serving not only the social and recreation needs of adjacent neighborhoods but also the larger Center City, greater Seattle, and the region at large. Parks and open space on freeway lids will be a productive use of air rights and meet demonstrated demand.

The actual area of park space that can be built over I-5 to meet is dependent on many factors, including available funding, site selection, and competing land use demands. This will be explored further in a conceptual plan.

6.3.2 Residential

Residential land uses are a possible use of freeway lids. To create any significant capacity, though, requires significant expense to support the structure of tall enough apartment, condominium, or hotel buildings to create an economic return (single-family housing is not considered in any scenario). Along with design and cost issues, the increased presence of ambient air pollution around the freeway is cause for concern. The issue of air quality is discussed in detail under the discussion on schools.

Housing

Seattle's 2014 Development Capacity Report has detailed data on current numbers of households and capacity for new households under current zoning. It reports that Downtown and First Hill/Capitol Hill have plenty of capacity for new households, with a total surplus of over 30,000 new units. The results are summarized in Figure 57.

2035 Household Capacity Estimates				
	Current HH	HH Growth Capacity	2035 Targeted HH Growth*	2035 Surplus or Deficit
Citywide	308,057	223,713	70,000	153,713
Belltown	10,187	9,588		
Denny Triangle	2,806	9,993		
Commercial Core	2,988	3,378		
Pioneer Square	1,046	1,027		
Chinatown-International District	1,832	9,526		
Downtown Urban Center Total	**18,859**	**33,512**	**10,000**	**23,512**
Capitol Hill	14,219	5,431		
Pike/Pine	3,828	2,627		
First Hill	6,631	9,336		
12th Avenue	1,957	1,615		
First Hill/Capitol Hill Urban Center Total	**26,635**	**19,009**	**7,000**	**12,009**
* Official urban village targets were not available at time of publication.				

Figure 57 - Seattle Center City housing capacity.

The estimated growth for urban centers is established by the City, while the individual estimates for urban villages were not available at the time of publication. Still, there is clearly no pressing need for new land or upzoning to support residential growth in these two urban centers bordering I-5.

There is at least one example of housing built over an active freeway. In New York City above I-95 are the Bridge Apartments, four 32-story towers with 240 units each.[131] They were completed in 1964 as part of a middle-income housing program. Parts of the complex are open to the freeway below and there are significant environmental impacts. A New York Times article says, "If the windows are open, the noise is most deafening on the middle floors, and people inside find that they need to raise their voices to hold a conversation or talk on the phone. The winds carry vehicle exhaust upward, which is especially noticeable on the terraces. And on most floors, the vibrations of trucks can clearly be felt, along with those of any construction equipment."[132]

While there is not a pressing need for housing capacity in the Center City, if residences are built on future freeway lids serious care must be taken to minimize impacts from noise, vibration, and pollution from freeway traffic.

Lodging

The Development Capacity Report does not specifically consider hotels, a subtype of residential land use. However, the Downtown Seattle Association's (DSA) 2015 economic report provides some insight. As of 2015, downtown has over 14,000 hotel rooms with peak seasonal

occupancy (the month of August) of 95.7 percent.[133] Based on available permit data, by 2019 another 2,000 rooms are expected to be constructed. It appears there is no shortage of capacity for hotel rooms in the Center City. Major hotels should not be considered as land use options for future freeway lids.

There may be some justification for tying in very small hotel developments as a tourism generator; public space above a freeway would be an innovative rooming location and may appeal to some types of visitors. One or two stories of high-end or bed-and-breakfast type lodging is most appropriate in lid buildings that contain ground floor retail. As discussed below, however, these hotel rooms could not have any on-site parking. Limiting the number of rooms will also reduce economic feasibility for hotel operators.

6.3.3 Commercial

The city's 2014 Development Capacity Report also has data on current numbers of jobs and capacity for new jobs under current zoning. The brief analysis is shown in Figure 58. It reports that the Downtown urban center has a significant surplus of employment capacity, while First Hill/Capitol Hill has a deficit capacity. However, the report is not able to make job growth assumptions for the major institutions that have their own master plans in First Hill/Capitol Hill; this includes a number of hospitals and colleges. [134] The deficit is likely to be covered by those institutions. However, as discussed below, retail is one promising option for freeway lids and can best contribute to a reduction in the First Hill/Capitol Hill jobs deficit.

2035 Employment Capacity Estimates

	Current Jobs	Jobs Growth Capacity	2035 Targeted Jobs Growth*	Surplus or Deficit
Citywide	483,318	231,745	115,000	116,745
Belltown	18,298	6,773		
Denny Triangle	19,097	21,352		
Commercial Core	94,742	13,799		
Pioneer Square	12,177	2,697		
Chinatown-International District	7,507	7,143		
Downtown Urban Center Total	**151,821**	**51,764**	**30,000**	**21,764**
Capitol Hill	5,962	629		
Pike/Pine	6,857	603		
First Hill	22,029	1,005		
12th Avenue	5,242	949		
First Hill/Capitol Hill Urban Center Total	**40,090**	**3,186**	**4,000**	**-814**
* Official urban village targets were not available at time of publication.				

Figure 58 - Seattle Center City jobs capacity.

Office

By the DSA's count, as of 2015 downtown has 44 million square feet of office space and another 15 million square feet is permitted or in the planning stages.[135] Similarly to the residential situation, there is no pressing for additional office space. Like with residential uses, office buildings would need to be large to create an economic return, especially on a technically complex freeway site.

One possible exception is office space occupied by maintenance, operations, and programming staff. Giving staff a base on the lids will create better opportunities to address problems and keep eyes on park and retail spaces. Space could also be leased to vendors and other contractors operating shops, events, or other commercial activities on the lid. Any office space with lid buildings must be above ground floor retail spaces, which have a greater potential to generate pedestrian activity.

Retail

There is precedent for creating retail space above freeways. Notably, Klyde Warren Park has restaurant spaces that generate revenue for park operations and maintenance. In Reno, Nevada, a drug store and parking is built over Interstate 80 on one block.[136] In Boston, Massachusetts, a complex of office towers, retail space, and parking garages are built around Interstate 90.[137]

In combination with park space, certain uses will draw a high level of pedestrian traffic to keep the lids well used, active, and safe. Retail spaces should not take up large footprints but instead be arranged to draw people into parks or along streets. Ideal small businesses are those that can both draw people in off the street and creatively utilize outdoor space, such as restaurants or pubs that are open throughout the day, markets, coffee shops, bakeries, arcades, nurseries and gardens, theatres, and art galleries. Less desirable may be large businesses that sell consumer goods and have little capacity or need to activate outdoor spaces, such as clothing stores, supermarkets, and traditional big box retailers that sell durable goods. Nonetheless, all possible retail tenants can be considered in the future at the direction of community desires and City of Seattle policy.

Retail uses do not need to be entirely indoors. Arranging for food carts, food trucks, kiosks, and similar activities will allow for a mix of outdoor commercial experiences throughout the day or year. New open space in the Center City can also be used for festivals and farmer's markets that are common throughout Seattle's many other neighborhoods.

If a nonprofit management model is used, retail spaces rented out to businesses will generate funding for managing the lids. Alternatively, local or state sales tax revenue from retail spaces can be dedicated to a local fund for maintenance and programming.

6.3.4 Civic

Schools

Downtown Seattle currently does not have a public elementary school (kindergarten through fifth grade) despite a growing need for one. The DSA reports 19 percent of downtown households have children and the fastest growing age group in downtown is 5-9 year olds. [138] (The DSA defines "downtown" differently than the Center City boundaries.[139]) Between 2009 and 2013, the Seattle Public Schools (SPS) district saw greater increases in K-12 enrollment from downtown children (30 percent) than district-wide (11 percent).[140]

In 2012 SPS and the DSA partnered on studying the establishment of a downtown elementary school. There are few vacant or undeveloped parcels remaining. There is little opportunity to purchase a building; in February 2015 the school district lost the bid for a shuttered Federal Reserve building in the heart of downtown.[141] SPS's other options include leasing floors in an existing office building or partnering with a developer to secure space in a future mixed-use facility.

Because of these difficulties it is worth briefly considering the merits of building an elementary school over the freeway as an additional, if costly, option. Based on the lid inventory, such a use would be unprecedented. It would require detailed study of cost, safety, access, and environmental quality issues. Indeed, similarly to residential uses, traffic-generated air pollution is one of the bigger obstacles. Children will be exposed to pollutants both indoors and outdoors.

Published research on traffic-generated pollution varies greatly in methodology. Distances studied range 50 meters (164 feet) to 400 meters (1,312 feet) from roadways, but research has generally established that degradation of air quality is greatest for residents within 300 feet of high volume roadways.[142] There are particularly negative potential health impacts for children, whose developing respiratory systems are more sensitive to pollutants and asthma exacerbation than adults.[143] Washington State does not have a policy on locating schools near major roadways. California, for example, requires a declaration of negative environmental impact for new school sites within 500 feet of a freeway.[144,145]

Seattle Public Schools has several schools located close to freeways and has managed to adequately control indoor air quality. Parents raised concerns about John Marshall middle school, which is directly adjacent to Interstate 5 in the Green Lake neighborhood, before it reopened in 2014.[146] An indoor air quality study was conducted by the school district and found there are no issues.[147] Both indoors and outdoors, microclimate conditions such as topography and wind patterns can affect the range and stagnation of air pollution.

In addition, future fuel economy requirements and the ongoing adoption of electric vehicles will likely lower the level of air pollutants in the coming decades. In the unlikely case a downtown school site is not acquired by the time air quality significantly improves, a freeway lid site may be considered if the higher cost can be justified.

Washington State Convention Center

Completed in 1988, the Washington State Convention Center is an existing lid structure over I-5 in downtown Seattle adjacent to Freeway Park. It is a managed by an independent Public Facilities District (PFD) with the same name. As described earlier, the facility has already expanded twice on solid ground and is now looking to nearly double its size with a fourth expansion. The Convention Center has reportedly turned away 300 events over the last five years because of space constraints.[148]

The expansion site is physically separated from the existing facilities. It is located on both sides of Olive Way between Ninth Avenue and Boren Avenue. The PFD plans to acquire the site of the Convention Place bus station, which is currently used for bus layovers and stops outside the Downtown Seattle Transit Tunnel (DSTT). Construction is expected to begin in 2017 and finish by 2021.

WSCC published a feasibility study for the new facility's configuration and access options. One option for freight access is a $37.5 million extension of Terry Street between Pike and Pine Streets, necessitating a new overpass over the freeway. However, WSCC is no longer considering this because of its technical and political complexity.[149]

A park lid in study area 3 is mentioned several times in the study as a possible public amenity. It is not included in any of the development options but detailed cost estimates and a conceptual site plan are included. Like SDOT's Madison Street to Spring Street study, the cost estimates are exorbitant compared to actual lid projects. The higher cost estimate is $102 million per acre, over three times the most expensive project inventoried. Although such a project would extend the tunnel effect of Interstate 5 in this area, ventilation and exhaust systems make up only a small part of the estimate. More refined analysis of the cost is needed.

Future lids over Interstate 5 in this vicinity, between Olive Way and Pike Street, must be designed to complement the Convention Center expansion. The original facility is boldly positioned above the freeway, so future lids have the potential to build upon this unique stance and create a unified public realm for both convention attendees and local residents.

Similarly, the Convention Center itself can be designed to facilitate connections with future lids. It is already planned and will be built, but adjusting the design now will ensure ease of lid design and construction after it is complete. In particular, the entrance at the intersection of Pine Street and Boren Avenue is critical. Both indoors and out, this entrance needs to be iconic and a place to gather. Transparent facades and a lobby or plaza could create the outdoor association with adjacent lids.

A lid in study area 3 could become the preferred route between the existing and expanded Convention Center buildings. With the current pedestrian network, visitors will reach the new facility via either 8th Avenue or 9th Avenue, neither of which have particularly attractive street environments. 8th Avenue passes under a large bridge structure that shades the street and 9th Avenue is hampered by a lack of crosswalks with Pike Street and frequent truck deliveries to the Paramount Theatre.

An alternative route lined with retail, trees, water, and other pedestrian enhancements could provide a pleasant and vibrant experience for visitors traveling between the Convention Center facilities. This would be ideal for study area 3 between Pike and Pine Streets, which also presents an opportunity to conceptually integrate a lid with the Pike-Pine Renaissance vision.

In general, the Convention Center expansion should also build upon its location within and between urban neighborhoods. Street-facing retail, transparent facades, and the reduction of large blank exterior walls that characterize the original facility must be considered. It should add to the experience of walking between downtown and Capitol Hill, not detract from it. Increasing the pedestrian activity in this area also has the potential to reduce crime and drug use and discourage homeless encampments, which have been cited by visitors as reasons not to return to the facility.[150] A successful Convention Center is essential for the social and economic health of these neighborhoods and Seattle.

Government buildings

There is at least one example of a municipal building over a freeway: the Fall River Government Center in Fall River, Massachusetts was built over I-195 in 1976.

The perceived security risk of building government facilities above freeways will almost certainly prevent any such use from being considered for lids in downtown Seattle. They would be potential targets from the freeway below. This is one issue that arose during the debate on where to build a new federal courthouse in the early 2000s. Sensitive functions such as government offices, post offices, police stations, correctional facilities, fire stations, and hospitals cannot be considered for future freeway lids.

Less sensitive facilities may be appropriate. A library is one option, though the downtown library is only two blocks from the study area. Another option is a community center with social services and event spaces; in Seattle these types of buildings are often co-located with public parks.

6.3.5 Transportation facilities

Parking

The lid inventory found existing and proposed lid structures supporting public parking lots and multi-story garages. To determine if a similar use is appropriate, data on parking supply and demand in the Seattle Center City can be consulted. The Puget Sound Regional Council publishes regular reports on parking in the region's urban centers, including Downtown and First Hill/Capitol Hill.

The latest data, from 2013, shows there is an abundance of off-street parking in the Seattle Center City. Private lots and garages only reach 50 to 70 percent occupancy during the morning and afternoon peaks, resulting in an excess of some 30,000 parking spaces in the Center City.[151] The Commute Seattle organization reports less than one-third of downtown workers commute by driving alone.[152]

Also, assuming that lids are likely to be best suited for parks and retail space, the surrounding neighborhoods are sufficiently walkable and well served by transit that parking will not be needed for site access. Nearby street parking and other off-street garages are available. Further, building parking above a freeway will not fit the spirit of mitigating the impact of automobile infrastructure. Future freeway lids must not include public parking for private vehicles.

Mass transit

The retention of Convention Place as a bus layover facility means a local transit facility in freeway airspace will not be needed. There is at least one instance of such a facility: The George Washington Bus Station in New York City was built above I-95 in 1963 with direct bus access to and from the freeway.[153]

King County Metro and the City of Seattle are studying options for a bus rapid transit line on Madison Street between the downtown waterfront and eastern neighborhoods.[154] The proposed stations are widely spaced and none are proposed closer than two blocks to the Madison Street overpass. A future station on the overpass serving parks, retail, or other activities on lids is unlikely if it hinders transit speeds and reliability. However, wayfinding systems directing visitors to and from the nearest transit stops need to be considered during lid development.

Freeway airspace will not be needed for light rail transit purposes. Sound Transit's central light rail line crosses beneath Interstate 5 starting in 2016 on its way to Capitol Hill and neighborhoods north. Studies for a future connection from downtown to Ballard or West Seattle also assume underground alignments.

The federal government has designated a high speed rail corridor between Eugene, Oregon and Vancouver, British Columbia, running through Seattle.[155] While work is ongoing to improve passenger rail service for Sounder commuter rail and Amtrak interstate service, there are no currently no plans for construction of actual high speed rail. The Interstate 5 corridor, with its wide right-of-way in Seattle, is one alignment option through the downtown. The use of freeway airspace for a rail station is too speculative for this work, but it needs to be explored in more detail if a high speed rail project moves forward.

7.0 Design guidelines for future I-5 lids in the Seattle Center City

Based on the literature review, review of existing and proposed lid projects, case studies, and a site analysis, the following guidelines are offered for future freeway lids over Interstate 5 in downtown Seattle. These guidelines are applicable to the study area between Denny Way and Yesler Way. They are intended for use by professionals in any design practice related to urban design, elected and appointed officials, and the interested public.

7.1 Interim design solutions

- Continue design and programming changes to Freeway Park and the Convention Center. Seattle's original freeway lid must be an attractive and lively space in order to build support for additional lids. Look to the 2005 "A New Vision for Freeway Park" for ideas developed through a community-driven process for specific guidance. The following sub-points highlight the main strategies for improvement.
    - Establish a nonprofit entity to manage the park's operation and maintenance.
    - Schedule year-round public events that are advertised citywide. Events should include concerts, farmer's markets, holiday-specific festivals, fairs, and other activities that appeal to broad groups of people.
    - Allow and encourage mobile food vendors to sell in the Central Plaza and Convention Center plaza, especially during the spring and summer months.
    - Eliminate hidden spaces behind planter boxes and walls. Lower walls that block views of entrances, exits, and pathway destinations.
    - Continue regular trimming of trees and shrubs. Focus on improving the view into the park from Seneca Street.
    - Provide additional moveable chairs and tables in the park's plazas.
    - Provide overhead shelters and stages at key locations throughout the park for casual or programmed use.
    - Run the park's water features when the temperature is at least 60 degrees.
    - In the long term, install pedestrian ramps at the Pike Street, Union Street, and University Street entrances to make the park more accessible. Integrate these ramps with existing or new staircases while preserving the integrity of the park's original design. Preserve the street trees on Hubbell Place as much as possible. Refer to the Piggott Memorial Corridor for design inspiration.
- Ensure the Convention Center expansion, on the Convention Place bus station site, is designed to conceptually and structurally connect with future lids in study areas 1, 2A, and 3. This includes creating an attractive and central gathering place at the pedestrian entrance to the facility at Pike Street and Boren Avenue and adjusting the floor levels of the facility to match the eastern upper slope of the freeway right-of-way. The facility should also incorporate a mixed of uses that benefit the community and activate the area when events are not taking place. Community centers, workshops, retail, and similar uses may be appropriate.

- Activate the “dead” open spaces adjacent to Interstate 5 identified in the site analysis. Begin with the largest and flattest spaces nearest streets. Improvement of these spaces will promote the use of freeway right-of-way for public use. Activation of these spaces will be cost-efficient and could likely utilize state funding. Noise, safety, cleanliness, and access are of prime concern for these marginalized areas. Mitigation must be made for overgrown vegetation, steep slopes, and proximity to fast-moving freeway traffic. Opportunities include:
    - Converting these spaces into pocket parks with varying degrees of landscaping and amenities.
    - Creating additional pedestrian pathways that offer shortcuts across and between blocks.
    - Creating formalized and maintained spaces for homeless encampments and tent cities.
- Remove the parking lanes on the Yesler Way, Madison Street, Spring Street, and Pike Street overpasses. Replace them with widened sidewalks, parklets, bicycle parking, transit lanes, or landscaping as needed and appropriate on a case-by-case basis. Consider the adjacency of commercial and residential land uses in determining what improvements should be made. Enhancing the overpasses is a low-cost solution to improving public use of the freeway right-of-way and will be a promotional strategy ahead of lid design and construction.
- Enhance the pedestrian environment between the downtown waterfront and Interstate 5. Focus first on Pike and Pine Streets and then on Seneca, Spring, Union, and University Streets. Plan streetscape improvements in conjunction with the completion of Waterfront Seattle improvements. Consistent landscaping, signage, and lighting, can help create a unified experience between these two major public spaces. Updated or new zoning requirements and urban design guidelines for buildings facing these streets can also improve the pedestrian realm related to commercial activities, façade treatments, and architectural form. People should be encouraged to travel between the freeway lids and the waterfront in a comfortable and lively street environment, and have choices for which route to take.

7.2 Design principles

These design principles apply broadly to all future lids in the Seattle Center City. The next section lists specific guidelines for each study area.

While these guidelines have been developed with the best of intentions for benefiting the public and city at large, they are not meant for strict adherence without deviation or flexibility. As noted in the discussion on urban design and theory, lid design must be an all-inclusive and democratic process that engages a wide range of socioeconomic groups. And as with all public works projects, considerations of costs and political jurisdiction will shape design beyond what this work can cover.

Primary urban design concepts

Three primary urban design concepts can guide the development of lids. These concepts are developed from a comprehensive analysis of the site and its context as they exist today and what they may look like in the future. Figure 59 illustrates these concepts together.

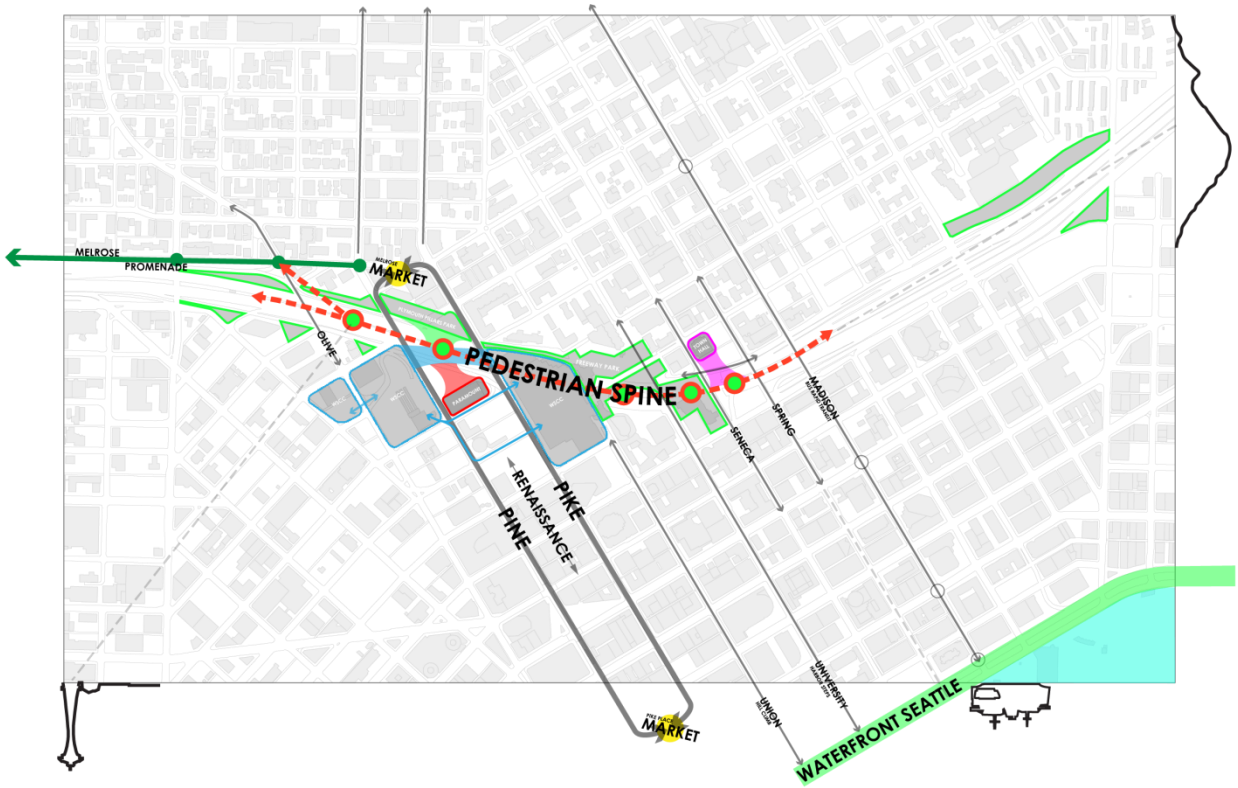


Figure 59 –Diagram of the three primary urban design concepts, related public projects, and views to key landmarks.

- **Cross-freeway connections**

Lids can facilitate new and enhanced connections across the freeway. They can integrate multiple public projects that are underway or planned for the downtown area. Most promising is the great mixing space that a lid between Pike and Pine Streets (study area 3) could facilitate: the Convention Center expansion will lead to great flows of people between two parts of the facility; the historic Paramount Theatre is a renown cultural and entertainment anchor; and Plymouth Pillars Park is currently sparsely used but its adjacency is an opportunity to expand existing park space outward. Study area 3 can accommodate this multi-directional flow of people with spacious plazas, combination of desire-line based walkways, and places to sit and gather.

On either end of study area 3 are the routes of the planned Pike-Pine Renaissance, an initiative to improve streetscape design between two popular and festive markets in downtown and Capitol Hill. Once implemented through wider sidewalks, landscaping, lighting, programming, and other strategies, these two commercial streets can expect to see a greater

flow of cross-freeway pedestrian traffic. This will make a Pike-Pine lid even more of a potential mixing zone and filter that draws people in or redirects them on new, unexpected paths.

Another off-site connection that can be made is at Town Hall adjacent to study area 6, between Spring and Seneca Streets. The Town Hall civic center occupies only a corner of a block to the east of the freeway and is surrounded by a parking lot that has opportunities for activation. After closing the adjacent segment of 7th Avenue, there is an opportunity for a flow between a lid and any activities that take place in the parking lot. The managing entity of lids can partner with the property owner on joint-use activities like markets and festivals, or use the lot as spillover space for concert events.

More broadly, the slicing of the study area by numerous east-west streets can be capitalized upon. Most of these streets end at the Elliot Bay waterfront, which will soon have a variety of new parks and a lengthy pedestrian promenade. In particular, a new hill climb from the waterfront on Union Street and the existing Harbor Steps at University Street can be integrated with additional streetscape improvements that draw people through downtown to and from the freeway lids. To succeed in this effort the lids must become a destination on par with the waterfront redevelopment.

- **Emerald chain**

Each lid must be an independent unit of public space within a chain of public spaces. Practically, this is due to the fact that lids will likely be built in phases over a period of many years. But in the long term, this will help distinguish each lid section as a unique individual park space that can be experienced from a single vantage point or a short walk. Merging the lids into a single, unified space could possibly cause disorientation and frustration due to the streets and Convention Center that actually separate them. Focusing inward on each section also enables more flexible design approaches so that each lid best responds to adjacent development and emerging community needs.

- **Pedestrian spine**

A central pedestrian spine should be run through the project area, one lid section at a time. This spine can vary in width, elevation, materials, linearity, and adjacency to buildings. But it must be clearly visible, well-signed, and fully accessible to people of all ages and abilities. Through the lid sections it will be a multi-use path, while at street crossings it can be composed of different types of enhanced pedestrian infrastructure.

In combination with the other two urban design principles, a pedestrian spine can create a unified experience as one moves through each lid section. Aligned with the freeway below, it is a symbolic gesture that shows how a right-of-way for speeding cars can also accommodate slow and quiet travel by people on foot or bicycles. The spine can be a useful path, speeding travel times from the middle of downtown to lower Capitol Hill, while also being a casual walking route. It also has the potential to become a place to jog for leisure or formal racing events.

Within Freeway Park there are existing paths that, conceptually, already form part of the spine but require major upgrades to fully fit into this vision. From the park entrance at 7th

Avenue and Seneca Street there are two routes around the 8th Avenue overpass to Pike Street. The largest obstacle is the Pike Street entrance itself, which is a set of stairs; completion of the spine will require a reconstruction of this entrance with ramps. Lowering the pedestrian walkway along Hubbell Place closer to the street level can also reduce the monotony of the large wall there.

There are several side entrances that can also be improved to build out the spine as a more useful and versatile connector into downtown. The Piggott Memorial Corridor is one example, connecting the eastern side of the park to University Street and 9th Avenue with a cascading series of ramps and stairways. On the west side of the park, the entrances at University Street and Union Street should be redesigned with similar features. Currently these two entrances are set far back from the closest major street activity, on 6th Avenue, and located adjacent to freeway ramps. New pedestrian ramps can extend these entrances closer to 6th Avenue and create larger, more iconic, and accessible portals into Freeway Park.

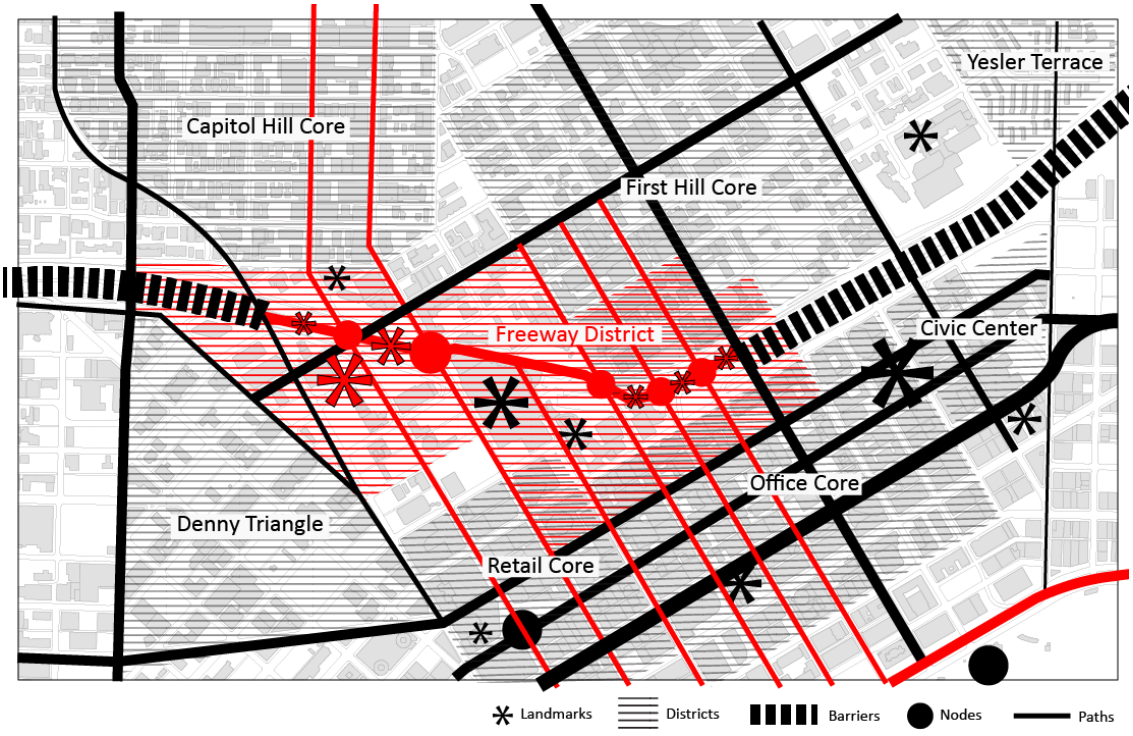


Figure 60 - Diagram of potential imageability after lid construction.

In combination, these three themes have the potential to formulate a “freeway district” where lids will have the strongest effect on private development. See Figure 60 for an illustration of this concept.

General urban design guidelines

- Acknowledge that lids are 100-year infrastructure. They must be planned and designed to enable routine maintenance and programmatic changes over time. Be bold and forward-looking with final design proposals, funding strategies, and stakeholder

collaboration. Continuously account for the context of future infill and redevelopment around the project area, coordination with later phases of lid construction, changes in transportation technology, and the ever- evolving needs of the local community.

- Embrace the values of simplicity and minimalism. Flat topography eases engineering requirements and enables the most versatility for passive and active recreation and event programming. A limited variety of materials reduces costs and clarifies imagery. Straight lines and clear views along pathways enable orientation.
- The lids must be considered not as an island of public space, but as integral to the surrounding properties, streets, neighborhoods, and city. Through a parallel but separate process, urban design and zoning codes for properties adjacent to the freeway must be developed. Transparent ground floors, retail and residential land uses, outdoor seating or vending, and direct connections to the lids (where feasible) must be required. Blank walls, parking lots and garages, and auto-oriented land uses must be prohibited. Possible pedestrian, bicycle, and transit network improvements must be prioritized along and across streets that provide access to the lids.
- The design of the lids must be done through an inclusive and transparent public process. Visioning workshops, public briefings, community meetings, a project website, and similar activities must be a core part of the design process. Marginalized members of the community, including seniors, the disabled, immigrants, low-income people, the homeless, and youth must be specifically consulted on their daily needs of public space. An effort to turn feedback from all participants into concrete design decisions is a necessity. However, professional considerations, including engineering restraints and these design guidelines, must also be accounted for and explained to members of the public ahead of their input.
- Any buildings on the lids should be on the edges of streets and paths to complement adjacent park spaces and the surrounding neighborhoods.
- Bolster safety and security through an “eyes on the street” approach. Ensure the sidewalks, roadways, residences, and businesses surrounding the lids have clear views into public spaces. Limit the size and number of large trees and shrubs around the perimeter of the lids. Ensure buildings on the lid are visually and physically permeable, with public through-access during operating hours.
- Public spaces must allow for a number of seasonal and permanent commercial activities like food carts and outdoor cafes. In addition to quality park amenities, retail activities can help ensure public spaces are lively and attractive. Outdoor retail activities must be provided with seating areas, power supply, and overhead shelter.

Land use

- The primary land use of new lids must be public open space. This will reduce the deficit of open space in the Seattle Center City. Freeway lids are most commonly used to create park space.

- The secondary land use of new lids must be retail. This will draw users to the open spaces, create an all-day activity center, and increase employment opportunities. Any buildings on the lids must have retail as the primary ground floor use.
- The tertiary uses of new lids may be office space (limited to use by park management and contractors), lodging, and a public community center.
- There are several land uses that should not be considered for lids:
    - Institutional and civic uses, as discussed in the site analysis, due to security and health concerns and the likely increased cost of supporting such structures.
    - Residential uses, as discussed in the site analysis, due to air quality concerns and the likely increased cost of supporting residential structures large enough to generate an economic return.
    - Commercial office uses, as discussed in the site analysis, due its limited ability to generate pedestrian traffic and the cost of supporting commercial structures large enough to generate an economic return.
    - Vehicle parking. As discussed in the site analysis, the Center City already has an oversupply of parking.

Engineering

- Traffic and connectivity
    - Create mid-block crossings on the street overpasses between completed lids as part of the central pedestrian spine. Consider treatments like flashing beacons, raised crosswalks, and curbless roadways as traffic calming features. Prioritize the movement of pedestrians and bicyclists.
    - Relocate the Spring Street on-ramp and Seneca Street off-ramp to the south side of Madison Street as a three-way intersection. If found necessary by a traffic study, remove on-street parking and interim design features from the Madison Street overpass to create additional travel lanes.
    - Close the Spring Street overpass to vehicle traffic when both study areas 5 and 6 are developed. Consider demolishing the bridge or converting it to park and retail uses. Convert the Seneca Street overpass to two-way traffic.
    - Convert the Olive Way overpass to two-way traffic when study areas 1 and 3 are developed. Add a pedestrian scramble to the signal phasing at the intersection of Pike Street and Boren Avenue.
- Structural design and loading
    - Lids must use materials that limit the depth of the structure. Pre-stressed concrete box beams, lightweight soil, and geofoam are recommended as structural components.
    - Lids must maintain a vertical clearance of at least 16.5 feet for freeway traffic.
    - As much as possible, the edges of lids must be flush with bordering streets and overpasses. Enable people to walk onto the lids from any direction. Where the edges of lids must be raised above the surrounding grade, provide ramps and staircases.

    - Use freeway medians for the placement of vertical structural elements. Minimize alterations to freeway traffic flow and prevent decreases in mainline freeway traffic capacity.
    - Ensure lids can support vehicles used for maintenance, programming, and emergencies. For example, one or two areas may need to accommodate a line of food trucks or trucks carrying concert equipment.
- Mechanical systems
    - Minimize the amount of mechanical ventilation needed for the traffic tunnels that additional lids will create. Explore natural ventilation options that use moving traffic to facilitate airflows.
    - If ventilation stacks are required, minimize their size and number. Locate them as unobtrusively as possible to public spaces, pedestrian circulation, and retail building placement. Do not locate stacks along street edges.
    - Do not include elevators or escalators for outdoor pedestrian circulation. Grade changes must be accommodated with stairs and ramps.
- Electrical systems
    - Provide adequate power supply for special events, especially for heavy loads like concerts and markets that serve food.
    - Provide publically accessible power outlets throughout the lids, especially in seating areas and where mobile vendors are designated for set up. Ensure power supply is adaptable for food trucks.
    - Provide emergency backup generators for the lids' lighting, mechanical, and indoor building systems.
- Water systems
    - Adopt low-impact stormwater management standards. Minimize the use of pumps and other mechanical devices by using the slope of lids as a natural drainage system.
    - Treat stormwater on site before releasing it to the municipal stormwater system, possibly making use of the lid's soil systems as a natural filter.
    - Water features must minimize or eliminate standing water, but be accessible to human touch.

Landscaping, paving, and water features

- Trees must be a defining feature of the lids. Like Freeway Park, they must embellish their unique location above an active freeway. Trees should be abundant but widely spaced to maintain sightlines within and onto the lids.
- Similarly, trees should be amenable to pruning of lower branches. Trees should also be limited in potential height to promote sunlight access, views into and out of the park, and a sense of openness.
- Tree species must be locally-sourced, adapted to an urban environment, and be pollution-tolerant to minimize maintenance needs.

- Pathways should be developed as a hierarchy of major and minor paths. The major paths should fulfill the role of the pedestrian spine concept, and be the widest. The major paths should extend the full length of lids and be adjacent to the major activity centers, including larger plazas and any buildings on the lids. Minor paths must be narrower and connect lid visitors to other destinations like secondary lid entries, street corners, and smaller plazas.
- Large open spaces, paved or unpaved, should be broken up with paths, trees, water features, or other interventions that reduce the experience of open spaces to a human scale.
- Artificial turf should be considered for lawns that are intended for heavy use, such as for concert seating and vendor tents at festivals or athletic activities.
- Shrubs, bushes, hedges, ivy, and similar plantings must be limited to those species that can be easily maintained. Such plantings must be restricted to use as aesthetic displays, botanical gardens, or wildlife habitat due to their limited utility for active park uses.
- Paved plazas must be compact and located at the intersections of pathways.
- Formal paved athletic courts, such as for tennis and basketball, should be limited due to their focus on a highly select group of park users. Athletic courts should be designed for multiple sports and be useable for non-athletic activities.
- Areas designated for paving, including minor walkways and plazas, can consider crushed gravel as an alternate surface cover.

Standard public space amenities

- Path lighting must be of a consistent design through all of the lids to promote visual continuity. Lights should be limited to 10-15 feet above the ground.
- Wayfinding and information signage must be abundant and located at all formal entrances and key nodes. Signage must be of a consistent design that is repeated throughout all of the lids to ensure orientation and navigation.
- Public restrooms should be conveniently sized and located throughout the lids. They must be in highly visible locations adjacent to main pedestrian paths and near retail spaces. Sinks and drinking fountains should be located on the outside of restrooms to promote a limited duration of use and nuisance activity.
- The majority of seating must be moveable by users and should be accompanied by tables. Seating must be provided outside of restaurants and locations intended for mobile food vending. Fixed seating should be limited to locations at path intersections and the perimeter of plazas.

Operations, programming, and maintenance

- The new lids must be managed by a nonprofit entity or a specialized office at the City of Seattle. The need for special attention to maintenance, operations, and programming requires dedicated staff.

- Space must be set aside for practical operational needs. Indoor storage rooms, waste collection areas, backup generators, and mechanical/electrical/plumbing control rooms must be sized to deal with a high level of activity and demand. They must be easily accessible to staff and service vehicles. These facilities should be inconspicuous to lid users and located away from main pathways; alternatively, these spaces may blend in with programmatic structures like stages and retail buildings.
- Park spaces must be open all day and all week, with area-specific closures limited to heavy maintenance or event setup. The pedestrian spine must remain accessible at all times.

7.3 Site selection and lid design

Future freeway lids over Interstate 5 in Seattle must be located where any land use will serve the greatest number of people in order to maximize return on public investment. This prioritizes the densely populated Center City neighborhoods that Interstate 5 runs through: Downtown and First Hill/Capitol Hill.

Locations should be prioritized where: lids' visual and land use benefits will be the greatest and their impacts will be the least; construction will be simplest; and design will require the least amount of materials. Therefore, the study areas identified in this project must be developed in the following order with associated recommendations:

1. **Section 2A** (east of the intersection of Pike Street and Boren Avenue)
   - This lid should be built first because it would be relatively small (0.3 acres) and can serve as a prototype for the design and construction techniques of future lids in the area. It is also adjacent to the Convention Center expansion, which is soon relative to this writing.
   - The primary use of this lid needs to be public park space. Successful use of this space can help build public support and promote the construction of additional lids.
   - The main feature of this lid should be a small plaza that is used for frequent programming, including concerts, markets, and fairs. A pavilion, stage, or similar covered space should be included to enable year-round use in all weather conditions.
   - The plaza should be buffered from the noise and exhaust of surrounding vehicle traffic with a low layer of shrubs and street trees, but views in and out of the plaza must be clear and unobstructed.
   - The surface of the lid should be flat and flush with surrounding streets. It should also have a level connection with the dog park at Plymouth Pillars Park, including walking paths or an extension of the dog park.
   - The previous guideline requires that any interim activation of the adjacent open space in the freeway right-of-way will be built over by a lid. Therefore, any design intervention in that space should be considered temporary.
   - Once both this lid and the Convention Center expansion are developed, a stronger pedestrian connection can be made between the two. Options for the intersection of Pine Street and Boren Avenue might include a table intersection, a pedestrian scramble

signal phase, and shared design elements and materials between the lid and the Convention Center entrance.

2. **Section 3** (Pike Street to Pine Street)
    - This lid should be built second and conceptually connect the Convention Center facilities, Plymouth Pillars Park, and the Paramount Theatre.
    - The primary feature should be a retail street built around a segment of the pedestrian spine. Design guidance should be adopted from the vision of the Pike-Pine Renaissance. Both indoor and outdoor retail space must be included. The street should follow the length of the lid, parallel to Interstate 5.
    - Buildings on the lid should front both the internal retail street and the adjacent Pike and Pine Streets.
    - The edges of the lid should be flush with surrounding streets. The retail street and paved areas must be as level as possible, while landscaped areas may be sloped.
    - The upper, east side of the lid must be a conceptual extension of Plymouth Pillars Park, which is part of I-5's original construction. Similar materials and design can visually extend the park onto the lid. Integrate park spaces onto the roofs of buildings facing the central retail street. These spaces should be publically accessible but also available for activities like restaurant table service.
    - From the Paramount Theatre to Plymouth Pillars Park must be a perpendicular connection that also serves as a hill climb. This will necessitate a break in the buildings facing the central retail street.
    - The lower, west side of the lid should provide a gathering space for employees and guests of the Paramount Theatre. This space should be oriented towards the building's entries. The space should be enhanced with public art that references the theatre and its history, or the space itself can be designed in a similar style of the theatre. Brick should be a dominant material in this space.
    - Future development on the triangular parcel adjacent to the Paramount Theatre, which is surplus Sound Transit property with an emergency tunnel exit, must be designed to integrate with the lid. A direct pedestrian connection or outdoor space adjacent to the freeway can be implemented before the lid is built.

3. **Section 6** (Madison Street to Spring Street)
    - This lid should be built third and primarily used for park space, with secondary uses being indoor and outdoor retail.
    - As described in the traffic engineering guidelines, the Spring Street southbound on-ramp must be demolished to maximize the amount of developable space and increase the value of public investment. Its traffic function can be replaced with a ramp from the Madison Street overpass.
    - The surface of the lid should be as flat as possible and flush with surrounding streets.
    - New sidewalks must be built on the street frontages with 6th Avenue and 7th Avenue.
    - New crosswalks must be implemented at all four corners of the lid where they are missing.

- The main feature of the lid's park should be landscaped or paved open spaces. The open spaces must be designed to accommodate a variety of public events. Similar to study area 2A, there can be a covered pavilion or similar structure for year-round outdoor activities.
- Buildings on the lid should be limited to the east and north edges of the lid to provide a southerly view towards Mount Rainer and to promote southern sunlight exposure. The buildings should have zero setbacks from the surrounding streets, except for sidewalk-activating uses like outdoor seating.
- There is an opportunity to connect the park on the lid with the public activities that take place at Seattle First Presbyterian Church. 7th Avenue between Madison and Spring Streets should be closed to general all-day traffic. There are several options for doing so:
    - Convert the street into a curbless shared street.
    - Close the street to general vehicle traffic with bollards during off-peak times.
    - Completely close the street to general traffic and convert it into a full time public park space.

4. **Section 5** (Spring Street to Seneca Street)
    - This lid should be built fourth and conceptually connect with the Town Hall civic building and its surrounding parking lot. It should be primarily used for park space, with secondary uses being indoor and outdoor retail.
    - As described in the traffic engineering guidelines, the Seneca Street northbound off-ramp must be demolished to maximize the amount of developable space and increase the value of public investment. Its traffic function can be replaced with a ramp at the Madison Street overpass.
    - This lid must be integrated into the previously developed lid in study area 6 to create a larger, more useable open space. This will require changes to the Spring Street overpass, which has several options:
        - Convert the overpass into a curbless shared street.
        - Close the overpass to general vehicle traffic with bollards during off-peak times.
        - Demolish the bridge and create a pedestrian pathway along the datum of Spring Street which can support vehicles for event deliveries, heavy maintenance, and emergencies.
- There is also an opportunity to connect the park on the lid with the public activities that take place at Town Hall. 7th Avenue between Spring and Seneca Streets should be closed to general all-day traffic. There are several options for doing so:
    - Convert the street into a curbless shared street.
    - Close the street to general vehicle traffic with bollards during off-peak times.
    - Completely close the street to general traffic and convert it into a full time public park space.
    - Food truck access can be accommodated through on-street parking spaces, a path along the Spring Street datum, or on the new pedestrian-focused stretch of 7th Avenue between Madison and Seneca Streets.

- The lid should be integrated into the existing Freeway Park annexes fronting Seneca Street and 6th Avenue. Naramore Fountain should be the priority for preservation, but modifications are appropriate elsewhere. Pedestrian pathways from Seneca Street and 6th Avenue should be punched through to the new park space. Similarly shaped and sized planter boxes characteristic of Freeway Park can "spill" into the new park and transition to a flatter open space.
- The central feature of this lid can be a water feature surrounded by a plaza. The forms of the water feature can evoke the Canyon Fountain and Cascade Fountain nearby in Freeway Park. The water feature should be accessible to people for wading and climbing.

5. **Section 1** (Pine Street to Olive Way)
   - This lid should be built fifth and connect with private residential development on both the east and west sides of the freeway. It should primarily be used for park space, with secondary uses being indoor and outdoor retail.
   - The lid should be terraced due to the relatively steep grade change across the freeway. Vertical rises should be limited to 3 to 4 feet to be useful for sitting upon. Stairs and ADA-compliant ramps should weave from the bottom (west) to the top (east) of the lid's surface. The edges of the lid should be as flush as possible with surrounding streets.
   - Concentrate the placement of trees and seating areas at ramp switchbacks, leaving open the westerly view looking downslope towards Lake Union and the Space Needle.
   - Create a long water feature from the top to the bottom of the lid's slope down the center, consisting of falls, pools, rapids, and sluices. The water should be shallow and accessible to people, and the feature should be operated as often as possible.
   - Limit buildings to the top of lid slope on the eastern side to take advantage of the views and complement the existing development to the east.
   - At the lower, western side of the lid, anticipate redevelopment of Olive Tower or its adjacent parking lot. This site should have a direct pedestrian connection to the lid. Part of the site may also be considered for a privately owned public space as part of new development.

Secondary study areas to the north (Olive Way to Denny Way) and south (Madison Street to Yesler Way) must only be considered for development after the primary study areas are built out. In these areas the freeway is either elevated or at-grade on the west side, presenting technical challenges and reducing the likely utility of lids. Additionally, it may be decades before the primary study area is fully developed and these secondary areas are considered, lessening the applicability of design guidelines written in 2015. Nonetheless, some general ideas include the following:

- Primary uses will likely continue to be open space with limited amounts of indoor retail.
- The greater cost of downslope support at-grade, which will include columns or walls, can be balanced through simplifying the surface of the lids. Open fields, meadows, or groves of trees with little programming are a possibility.

- Walls on the downslope sides will be preferred, as columns will leave open the noise of freeway traffic which will be amplified like under Freeway Park. This amount of traffic noise, which is damaging to hearing after prolonged exposure, should not be exposed to adjacent residential and commercial properties.
- In the north, the heavy pedestrian traffic on Denny Way between Capitol Hill and South Lake Union can promote a similar level of retail focus as the guidelines for study area 3.
- In the south, physical and programmatic connections with Harborview Medical and Yesler Terrace will be critical. These could include meditative walking paths for patients and gathering spaces for community meetings and events. Activation of the long strip of dead open space between I-5 and Harborview will be an interim solution; it also presents an opportunity to simply expand that area into a greater amount of vegetated open space over the freeway.

Lids must not be built in several of the study areas:

- Section 2B (west of the intersection of Pike Street and Boren Avenue)
    - This area is planned for development by the Washington State Convention Center. It will contain a corner of the expanded facilities that has an entrance onto the Pike Street/Boren Avenue intersection.
- Section 4A and 4B (Freeway Park)
    - These areas are part of the original design of Freeway Park. They provide a view onto the curving freeway mainline and University Street on-ramp from multiple angles. These areas also provide natural exhaust ventilation and prevent the need for costly mechanical ventilation systems that would also take up useable space on new lids.

7.4 Example of guidelines application

Figure 61 illustrates one set of possible designs for the primary study area between Madison Street and Olive Way. The site plan, section drawings, and description are intended only as examples of guideline application. The merits of these examples must be critically examined during a future community engagement process and technical review.

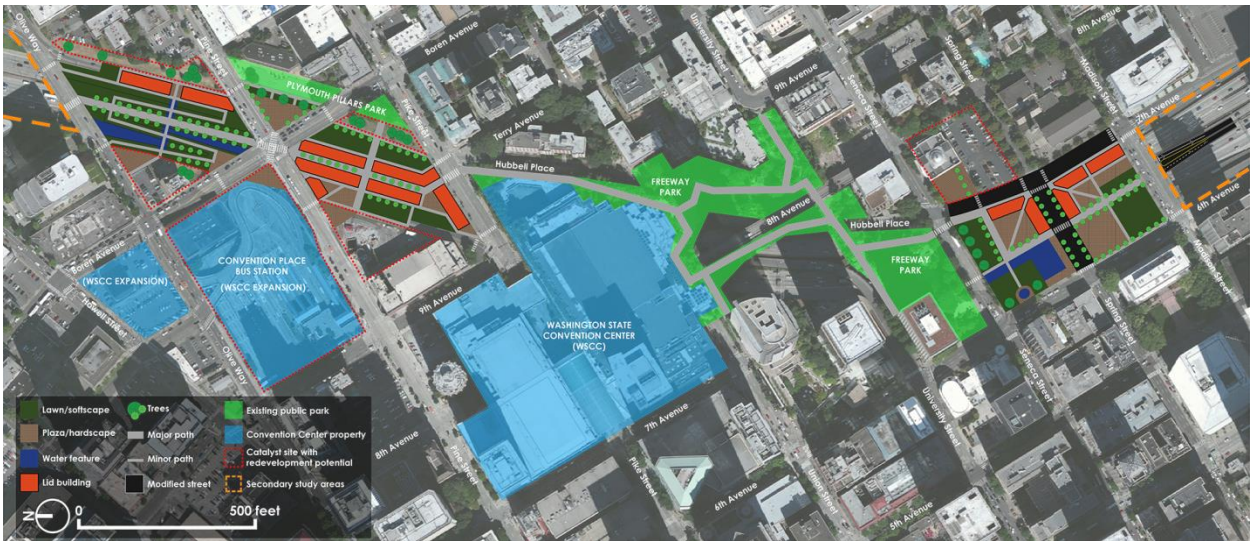


Figure 61 – Examples of site plans for the primary study area.

Starting in the south, a new pair of freeway ramps connects both northbound and southbound traffic with Madison Street. This enables the removal of the Spring Street and Seneca Street ramps, allowing for more complete lid coverage and more useable space. The resulting pair of lids between Madison Street and Seneca Street (study areas 5 and 6) are intended to work together as a unified public space. They are anchored by a set of retail buildings fronting Seneca Street and 7th Avenue; both streets are closed to general traffic and available for use as new public space.

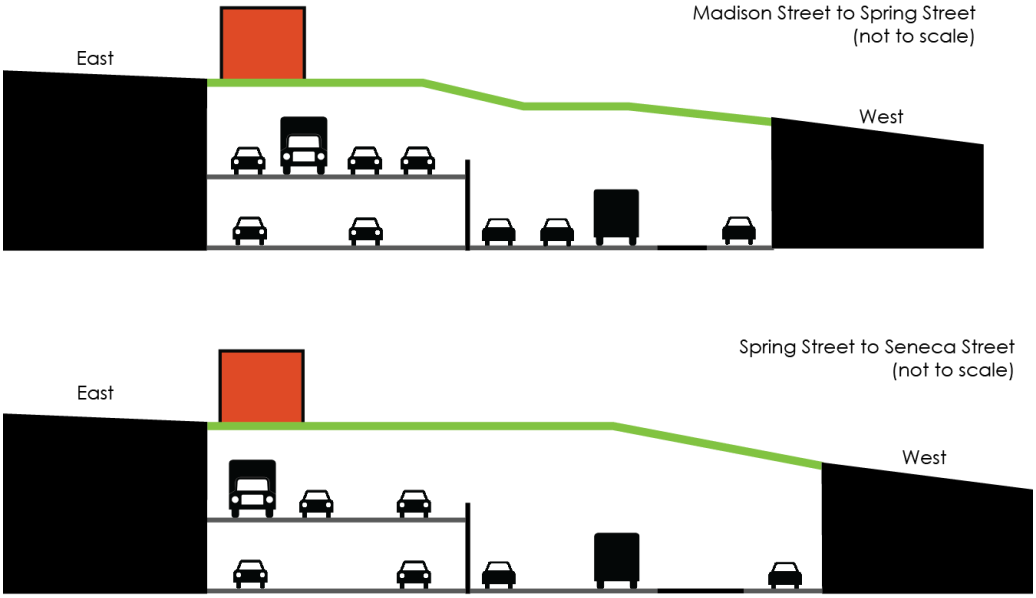


Figure 62 - Conceptual section drawings for study areas 5 and 6.

By locating the buildings on the east side, a long view corridor towards the south is preserved for views of Mt. Rainier on sunny days. It also enables courtyard-type plazas that will be attractive for outdoor retail uses, like food carts, and outdoor seating. Lawns, plazas, and

walkways make up the rest of this pair of lids. By closing 7th Avenue to traffic, a seamless connection is made to Town Hall and its parking lot that has the potential for new public uses.

Freeway Park's legacy is preserved, with only two minor pathways punching through the southern annexes into the lid between Seneca and Spring Streets. Naramore Fountain and some of the large planter boxes facing Seneca Street can remain. A new, larger water feature in the style of the Canyon Fountain can also further draw people into the park from multiple directions.

The central spine is realized with a large central walkway. It bends to meet the entrance to Freeway Park at the corner of Seneca Street and 7th Avenue. Moving north through Freeway Park, the central spine continues as a series of improved walkways and ADA-compliant ramps. It branches into four other corners of the park to promote choice and connections with the variety of surrounding destinations. At Pike Street, the spine crosses the street onto the next lid.

Figure 63 - An alternative park concept for a lid between Pike and Pine Streets.[156]

The lid between Pike Street and Pine Street (study area 3) embraces the vision of the Pike-Pine Renaissance and a new route between the Convention Center facilities. The main walkway is fronted with a row of retail buildings and marked by a line of trees, making this corridor a shopping and festival street that will be active through the day and year. Buildings also front Pike Street and Pine Street, easing the transition across the freeway and between the

retail districts of Capitol Hill and downtown. The Pike Street reversible express on-off ramp is preserved by wrapping around the southwest corner of the lid around it.

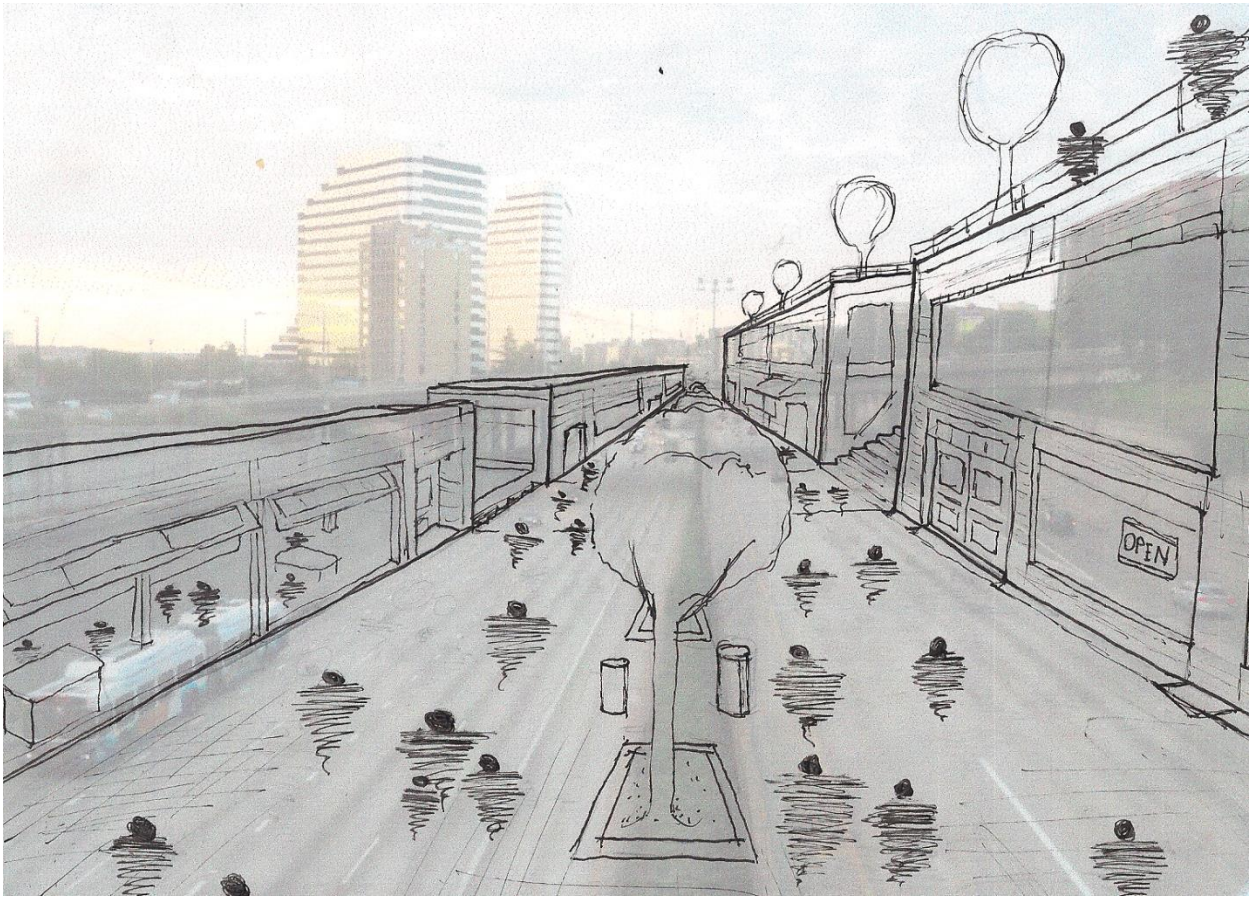


Figure 64 - Sketch of retail concept for the lid between Pike and Pine Streets.

A break in the row of buildings is made for a central hill climb between the Paramount Theatre and Plymouth Pillars Park, which can be extended into the adjacent open space that is part of the freeway right-of-way. Though plans for the Sound Transit parcel adjacent to the theatre are unknown, the space can conceivably contain a public amenity that directly transitions into the hill climb on one side and Pine Street on the other.

The intersection of Pine Street and Boren Avenue is a critical junction of pedestrian paths and the meeting point of three lids and the Convention Center expansion. In this example, the intersection's signal phasing is converted to an all-way pedestrian scramble that allows free movement between the four destinations. The intersection could also be raised to eliminate curb ramps and prioritize pedestrian movements over vehicle movements in what will likely be a busy area.

To the east of this intersection (study area 2A) is the first lid recommended for construction. Its design is simple, and has a triangular plaza matching the shape of the site bounded by rows of trees. Walkways directly connect to the dog park portion of Plymouth Pillars Park, enabling a possible extension of the dog park. This lid can conceptually become an

addition to Plymouth Pillars Park itself, which was originally built as a mitigation measure during the freeway's original construction.

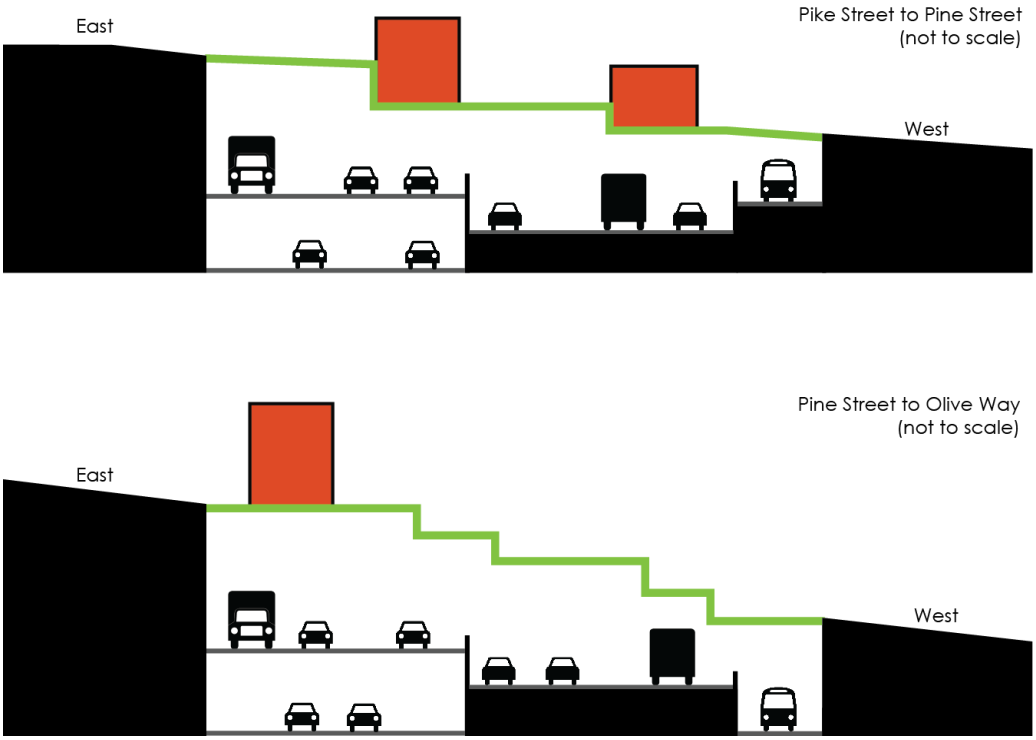


Figure 65 - Conceptual section drawings for study areas 1 and 3.

Moving north, the pedestrian spine continues through the largest lid between Pine Street and Olive Way (study area 1). The lid preserves the Olive Way off-ramp by wrapping around it. This lid is a terraced park space with a recreational path that switchbacks from top to bottom. The path is integrated with cascading water features. There is limited commercial activity intended for this space, with retail buildings placed at the top of the lid to exploit views towards Lake Union and the Space Needle. A perpendicular hill climb reaches both the adjacent dead space to the east, which can be activated as a similar park environment, and the affordable housing development to the west. Similar to the Paramount Theatre, this development has open space in the form of a parking lot that could be improved with a public amenity or may be subject to redevelopment in the future.

Throughout the primary study area are multiple new pedestrian crossings, including new crosswalks at intersections and at midblocks, in order to create a high level of pedestrian mobility between the lids and adjacent properties. Features like these are nearly as important as the lid designs themselves in order to ensure people are comfortable accessing the new parks and retail spaces. Not illustrated in these concepts are changes to street configurations, which may include revised bus stop spacing, removed on-street parking, and new bicycle lanes.

8.0 Conclusion and implementation

Additional freeway lids in Seattle have the potential to radically transform the public realm at the same time the city's residential and employment population grows beyond the goals of parks and open space. The information contained with this work aims to provide guidance on where future lids should go, what they should be used for, and how they should be designed.

Research questions and hypotheses

This project also sought to answer a number of research questions and sub-questions that are reviewed here:

- How will future freeway lids over Interstate 5 in downtown Seattle be designed?
    - Where will future lids be located in downtown Seattle?

This question was answered with the site analysis and definition of the study area. The downtown Seattle segment of Interstate 5 has a prime lidding opportunity between Olive Way and Madison Street. The Freeway Park coverage gaps should not be resolved due to their potential use for natural ventilation and preservation of the park's original design intent. Potential secondary study areas extend north to Denny Way and south to Yesler Way; however, they present issues with grading and environmental impacts that may exceed their utility.

Alongside their identified areas (but especially in the secondary areas) are a number of unused vegetated areas that are ripe for activation with public access. Other interim steps can include removing parking lanes from overpasses in the area.

    - What will the lids be used for?

The analysis of potential land uses confirmed that the primary use of freeway lids will be public parks and open space. Secondary uses can include indoor and outdoor retail. Limited tertiary uses might include office space for park management, small hotel operations, and a public community center. All other uses were found to be inappropriate or infeasible due to cost, security, or incompatibility with local context and design principles.

    - How will the topography around I-5 in downtown affect design?

Topography limits the extent of the primary study area and requires lid surfaces to be sloped or terraced. The slopes are not extreme and will not inhibit park and retail uses. Topography does present technical challenges for any future development in the secondary study areas, which are not below grade on both sides of the freeway.

    - Will on- and off-ramps (and other freeway functions) be preserved where lids are built?

An analysis of traffic conditions found there will be no impact to freeway mainline traffic as the result of lids, except perhaps during construction. Two downtown off-ramps merit removal and relocation, so overall traffic functions will be preserved where lids are built.

Answering the research questions also assisted in refuting or confirming the following research hypotheses:

- Lid designs must reflect a mix of perceived need for open space, housing, retail, civic functions, and/or other land uses in downtown Seattle.

The site analysis confirmed the significant demand for public parks and open space in downtown. Housing was found to not be an appropriate land use for lids. Retail was found to be favorable as a secondary use that activates park spaces. Civic functions must be limited to non-sensitive functions like a public community center. Other land uses that may be needed or feasible include office space for park management and limited tourism-oriented hotel rooming.

- The grade changes in downtown Seattle will necessitate lid surfaces to be, sloped, terraced, or otherwise not uniformly level.

This was confirmed with an analysis of topography. Within the primary study area the two edges of the freeway are at different elevations. Of the five study areas recommended for lidding, four can have sloped surfaces while the fifth will likely require terracing due to a steeper slope.

- The lids must contribute to a planned “blue ring” of connected open spaces with design features that make a positive impact on civic life.

The lids were considered within the context of not only the 2002 Blue Ring plan but also the Pike-Pine Renaissance, the Melrose Promenade, and other civic projects planned for the downtown area. The design guidelines recommend creating a partial fulfillment of the Blue Ring vision with a series of interconnected lid parks, but not to the northern extent of Harrison Street. Between Denny Way and Harrison Street, that vision could potentially be fulfilled by the Melrose Promenade and a pedestrian and bicycle bridge over I-5 at Harrison Street. Other improvements were outside of the scope of this project.

- Other completed and ongoing lid projects in the Seattle region can be used for design guidance, since future lids in downtown Seattle will be managed by the same state and local agencies.

Freeway Park and the unbuilt Montlake Lid, both in Seattle, were selected for detailed case studies. Their history and government roles were examined, but more design guidance was gained from critiques of design details. Discussion of the role of state and local agencies is discussed next.

Implementation

The complex design challenges and opportunities of lids will require years of planning in cooperation with many stakeholders. As an early step, a coalition of these stakeholders must be formed as early as possible. They may include, but are not limited to:

- Seattle City Council
- Washington State legislators
- King County Council
- Seattle Planning Commission
- Seattle Design Commission
- Seattle Departments of Parks and Transportation
- King County Metro
- Sound Transit
- Washington State Department of Transportation
- Federal Highway Administration
- Washington State Convention Center
- Downtown Seattle Association
- Tourism agencies
- Freeway-adjacent property owners
- Freeway-adjacent businesses and residents
- Local neighborhood councils and community groups
- Interested citizens from throughout Seattle and the greater region

The coalition may wish to brand itself early on to gain public support and followers. Possible names for the group or the lid project itself may include: “Seattle Commons”; “Space Five”; “5/I-5”; “Seattle Central Park”; or similar names that reference the location above I-5 and the principle that lids should be open to all. A website and social media outreach will be essential to engaging lay people and gaining public support.

The process of design must be established early on with key milestones made clear. These milestones will include:

- Public visioning workshops and setting the scope of work
- Signals of support from legislative bodies and jurisdictional authorities
- Stakeholder agency partnerships and development agreements
- Formation of managing nonprofit or City of Seattle office
- Formation of design team
- Conceptual design and refinement with public review
- Schematic design and engineering approvals
- Funding securement
- Construction in phases over a period of several years
- Opening days and ongoing programming

One of the most important milestones will be securing funding. A cost estimate is required. The five study areas recommended for lidding total 8.4 acres; using the higher of the $18-21 million per acre cost estimate from the lid inventory, a starting estimate for this project is $176.4 million. That can be rounded up to $200 million in case of contingencies and the likely technical challenges of local topography and traffic impacts.

Raising $200 million over a period of five or more years will require multiple funding sources. Potential sources include the following:

- Citywide property tax levy
- Local improvement district (LID)
- General obligation bonds
- Washington state government grants and appropriation
- Federal government grants and appropriation
- Private donations and sponsorships

Funding for ongoing maintenance and programming are also critical and need to be secured before construction begins. Sources for operating funding may include:

- Business improvement area (BIA)
- Local improvement district (LID)
- Leasing lid commercial space to tenants
- Leasing parking spaces to food trucks
- Ongoing private sponsorships
- Event management and space reservation fees
- Local property and sales tax appropriations

Closing

This goal of this work is to provide relevant background information and guidance to the designers and stakeholders of future freeway lids in downtown Seattle. That objective was met through a thorough examination of the study area's history, related plans and projects in the immediate area, an inventory of existing lid projects and three case studies, a site analysis and examination of land use demands, a proposal for interim design solutions, and the development of both general and lid-specific urban design guidelines.

The next steps are political engagement and the gain of public support. A grassroots effort of local designers and residents can form an action committee that organizes around the goal of building freeway lids. Once political, and possibly financial, support is gained, the effort must start by implementing the interim design solutions. Freeway Park and the overpasses in particular should be focused on due to their relative visibility. At the same, the buy-in of elected officials will enable movement on the larger lid projects.

The design of freeway lids is not the end goal of this effort in itself. Rather, they are an urban design strategy for reconnecting vibrant urban neighborhoods that have been severed by the massive canyon of Interstate 5 and its crush of traffic. They are also a means to build new

park space in the Center City, which has a clear demand for more places for residents and employees alike to gather, relax, and celebrate. New park space in such a central location will be attractive citywide and the greater region, drawing visitors and enhancing the freeway's relationship with Freeway Park and the Washington State Convention Center. Freeway lids will build upon Seattle's legacy as a leader in the design of innovative public spaces, but only if they are first designed to benefit adjacent neighborhoods and the local community.

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