



I-5 Lid Feasibility Study

Test Case Memorandum

December 2019



City of Seattle

Test Case Memorandum

I-5 Lid Feasibility Study

Contract No. PCD19002

Task 3. Existing Conditions and Context Analysis

Task 5. Economic and Financial Feasibility Analysis

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Olive Tower residents
Seattle Commission for People with disabilities
Seattle Housing Authority (SHA)
Seattle Human Rights Commission
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COVID-19 Context

Seattle will continue to grow and change in unforeseen ways, made less clear and further complicated by the COVID-19 pandemic. Employment opportunities and growth rates, existing displacement trends and lack of affordable housing, where people want to live and the transportation options they choose, and priorities for public funding will all be affected by the COVID-19 pandemic. Yet, the pandemic highlights the need for strategies to increase community resiliency and capacity to thrive. The lid would play a critical role in city and regional planning to ensure, even in a global health and economic crisis, equitable opportunity and outcomes. While this feasibility study was largely conducted in a pre COVID-19 reality, it recognizes the significant near-term economic, social, and health impacts of the pandemic. The long-term results of the COVID-19 pandemic cannot be predicted in the timeframe of this study but are addressed throughout the report and will be influential in future next steps in exploring a lid of I-5 in downtown Seattle.

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Acronyms and Abbreviations

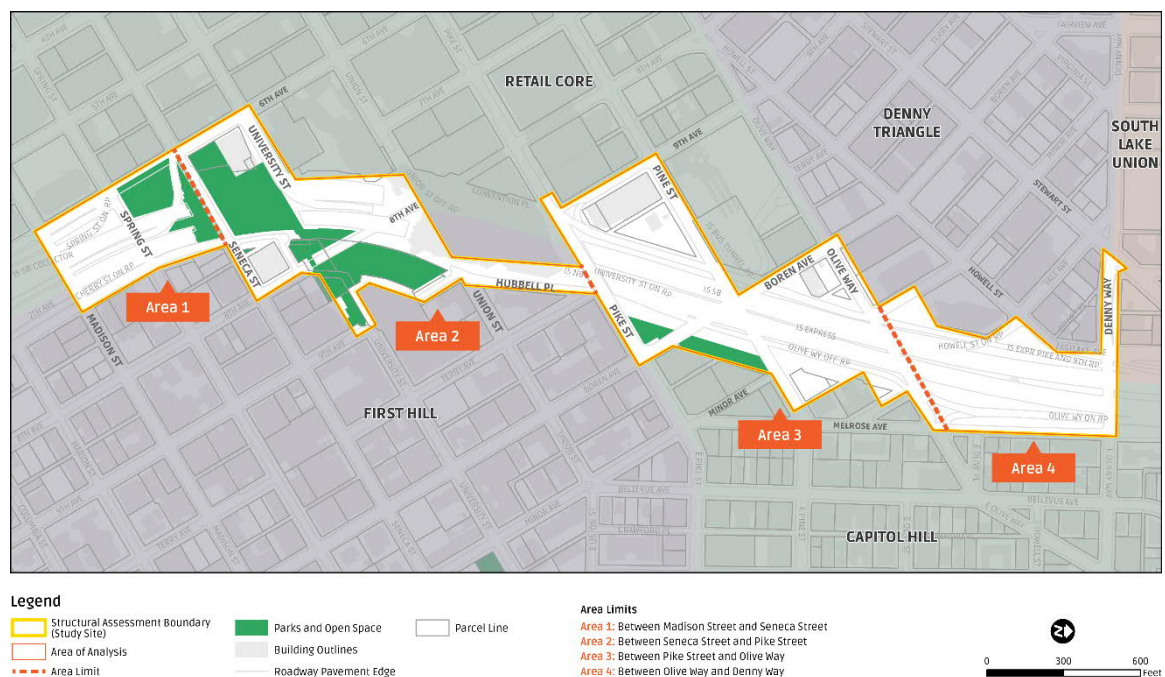
DON	Seattle Department of Neighborhoods
I-5	Interstate 5
LFS	I-5 Lid Feasibility Study
LGBTQ	Lesbian, Gay, Bisexual, Pansexual, Transgender, Genderqueer, Queer, Intersexed, Agender, Asexual, and Ally community
OPCD	Office of Planning and Community Development
WSCC	Washington State Convention Center
WSDOT	Washington State Department of Transportation

1. Introduction

A lid over I-5 presents an opportunity to tackle some of the most pressing challenges facing Seattle. Building a lid would be similar to creating new land in the heart of downtown, which could help repair the gap I-5 created between neighborhoods and make space to accommodate a vast range of uses with the public's benefit in mind. The Interstate 5 (I-5) Lid Feasibility Study (LFS) identifies key engineering, economic, urban design, and public policy considerations to inform future planning and decision-making regarding the concept to lid I-5 through downtown Seattle. The study involved understanding the existing conditions and context of the study site and the technical feasibility of lidding the freeway in order to explore the concept of a lid as a neighborhood extension. This exploration was guided by the overarching question, "How might a lid be done in a way that maximizes public benefit for all?"

Three test cases were developed to analyze the technical and financial feasibilities associated with lidding all or a portion of the study site (Figure 1-1), as well as surface key urban design and policy considerations for future decision-making. The results of test cases inform the development capacity, value creation potential, and urban character of a future lid. These hypothetical test-case development programs defined scenarios and strategies for a lid development through broad urban design guidelines in order to investigate a proof of concept. These explorations tested the lid's development intensity, urban form, mix of public to private uses, and policy assumptions. The rationale for selecting the three test cases is memorialized in this memorandum, including key assumptions and a description of the choices made for the buildings and uses included in each.

Figure 1-1. Study Site Areas of Analysis



Test cases were directed by the City of Seattle’s guiding questions, key assumptions, and input from the study community. The consultant team worked closely with the City of Seattle and study community on the assumptions and parameters. Test Cases 1 and 2 provide “bookends” (the lowest load and lowest capital cost case; and the highest load and highest capital cost case, but also the highest potential revenue-generating case). Test Case 3 is a mid-density (or medium-load) hybrid that mixes private investment with significant public benefit outcomes.

A test case is neither a master plan nor is it a shovel-ready project, but rather a framework—led by public priorities and assumptions—to better understand development options and their trade-offs to inform future decision-making. Although complex constraints narrow the range of options, the three test cases presented in this study are by no means the only potential scenarios. None of the test cases represent an actual or recommended site design or development proposal, and the study does not result in a “preferred alternative.” In addition, development of any new lid structure with new uses and buildings would need the full support and buy-in of the Washington State Department of Transportation (WSDOT), which owns and operates I-5.

None of the test cases represent an actual or recommended site design or development proposal, and the study does not result in a “preferred alternative.”

2. Guiding Framework to Inform Test Cases for a Lid

The I-5 LFS examines the technical feasibility of building new lid structures over I-5 in the area between Madison Street and Denny Way (Figure 1-1). As part of that assessment, the study is analyzing the financial implications of different lid options, because the amount of development (“load”) and type of development (private or public) would affect the cost of construction and financial performance over time. Based on preliminary structural analysis—which has determined where lid structures could be built, and how much load they could support—the consultant team developed three scenarios (or test cases) to assess the cost and financial feasibilities of alternative lid programs. Each test case was formulated to answer a key question and was informed by a guiding framework, described below.

2.1 I-5 LFS Guiding Principles and Value Proposition

The guiding principles and value proposition of the I-5 LFS served as guideposts for these exploratory test case scenarios. To keep the exploration of a lid aligned with the values and policy goals articulated in the Seattle 2035 Comprehensive Plan, Imagine Greater Downtown's vision, and the City of Seattle's existing policy framework at the center of the study, guiding principles were created in partnership with the I-5 Lid Feasibility Study Committee. The guiding principles helped define opportunities and a vision for the kind of community Seattle aspires to be. Those principles and the values they represent include the following:

- Equity
- Health
- Affordability
- Sustainability and Resilience
- Connectivity
- Complete Community
- Identity

A description of the LFS guiding principles and value proposition is available in the I-5 LFS Existing Conditions and Context Memorandum.

2.2 Definition of Feasibility

A goal of the I-5 LFS was to identify a set of criteria to frame feasible development of a lid from the perspectives of engineering, economics, and urban design. In addition to the guiding principles, this feasibility framework incorporated urban design criteria that prioritized place-based considerations of the surrounding communities. The urban design feasibility considered design criteria for a lid that would complement the existing adjacent neighborhoods, would create important connections, and would allow a range of uses from open space to mixed-use development. Development would be compatible with the urban context and would advance policy goals as defined by the study's guiding principles and value proposition. This approach allowed for the economic and financial analyses, which was the focus of the I-5 LFS, to be based

on lid concepts that could be well integrated into the urban context of the lid study site, at all scales of analysis.

2.3 Study Community Input

Developing any new lid structure with new uses and buildings would need an extensive public outreach effort and the full support and buy-in of the WSDOT, which owns and operates I-5. These decisions would require a broad public process and deep racial-equity analysis to have place-based outcomes that would maximize benefits for all. Acknowledging that the I-5 LFS is preliminary and pre-dates any planning, program definition, broader public engagement, and design, the development of this analysis relied on the input of the Study Community.¹ For this phase of analysis, the study was supported by community outreach efforts led by the Seattle Department of Neighborhoods (DON).

In support of the I-5 LFS, DON engaged in an outreach process to better understand community interest in the concept of lidding I-5 in downtown Seattle. DON's outreach to communities was guided by three key goals:

- Work with underrepresented community members to inform them of the feasibility study.
- Hear and document community members' visions, ideas and concerns for a lid over I-5.
- Give community members ways to keep informed and updated on the process.

With a focus on engaging people in underrepresented communities, DON conducted a five-month outreach process that included three focus groups with community liaisons representing immigrant communities, Black, Indigenous and People of Color, unhoused communities, people with disabilities; with representatives from the City of Seattle's Women's Commission, LGBTQ Commission, Commission for People with disAbilities, Human Rights Commission, and Immigrant and Refugee Commission; and with the Downtown Emergency Service Center. DON also met with residents of Horizon House and Olive Tower, the Equitable Development Initiative Advisory Board and the Central Area Collaborative. All in-person outreach was supported by an online survey available in Cantonese, Mandarin, Spanish, Somali, Vietnamese and English. Summaries of DON's outreach can be found in Office of Planning and Community Development's (OPCD) [I-5 Lid Feasibility Study Website](#). This input was incorporated in the analysis and approach of test case definitions.

2.4 City of Seattle Guiding Questions and Assumptions

Test cases were directed by the City of Seattle's guiding questions and key assumptions, and the input from the Study Community, memorialized herein. Guiding questions focused on understanding the financial feasibility associated with lidding all or a portion of the study site, but aimed to inform and to surface key urban design and policy considerations for future decision-making.

Test Case 1 assumes that the most basic lid structure would be developed as a park space, similar to precedents of lids built in the Pacific Northwest, and seeks to answer the following question: What is the lowest capital cost to achieve the core public benefit outcomes?

¹ For a description of the Study Community composition and process, please refer to the I-5 Lid Feasibility Study Summary Report.

Test Case 2 considers a heavily developed structure, asking the following question: What is the maximum potential for market-rate development to help pay for a lid?

In Test Case 3, development intensity lies in between the first two test cases and considers the following question: How would a context-sensitive public-private mix of development affect financial performance?

2.5 Public Benefit as a Basis for Test Cases for a Lid

The construction of the lid is based on achieving a number of desired public benefits. Public benefits correspond to a number of public policy documents, among them are Seattle's Comprehensive Plan, Climate Action Plan, Parks and Open Space Plan, Pedestrian Master Plan, and neighborhood plans such as Imagine Greater Downtown. Public benefits also stem from regional documents such as the Puget Sound Regional Council's Vision 2050.

All three test cases seek to achieve the following core set of these benefits:

- Improved pedestrian, bike and transit connectivity between adjacent neighborhoods, including new and improved vertical connectivity through the site and new high-quality streetscapes
- Increased seismic resilience
- Noise mitigation in certain sections
- Reduced direct exposure to pollutants
- Reduced visual impacts and other environmental benefits

The following other core public benefits could also be achieved, but vary based on the scale and specifics of each test cases:

- Public open space (including public park space and privately owned public spaces)
- New civic and community space, in addition to new public open space
- Affordable housing and/or payments to the affordable housing fund

3. General Considerations and Approach for Developing Test Cases

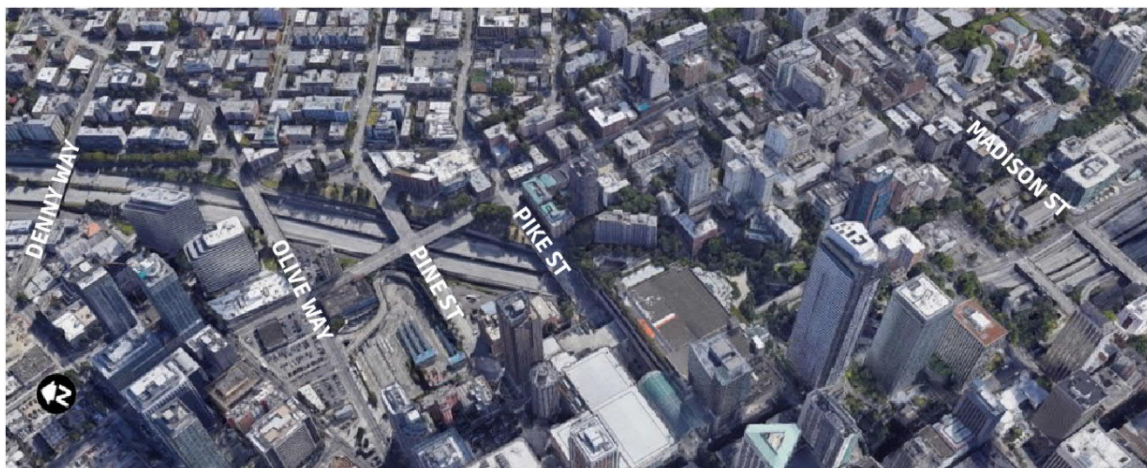
The design of the lid would be required to support the uses above it while seamlessly integrating with the daily I-5 operations below. The lid would also need to be physically accessible from the areas around it, connecting the new “land” with existing neighborhoods. Test cases were developed for proof of concept with theoretical uses and building layouts. Although representations do not have definitive technical accuracy, a detailed constructability analysis was performed in order to create viable development scenarios.

Performed through an iterative and interdisciplinary approach, the exercise unveiled the following key issues that would need to be addressed in future phases of planning and design, if a lid concept were to be implemented:

- Areas of the study site that would be included as lids in each test case
- Lid areas that would be functional and accessible based on grade separation
- Necessary heights and thickness of the lid over I-5
- Locations of columns and foundations and where lanes would require realignment to maintain I-5 operations
- How and where future buildings could interface with the lid and the site edge conditions

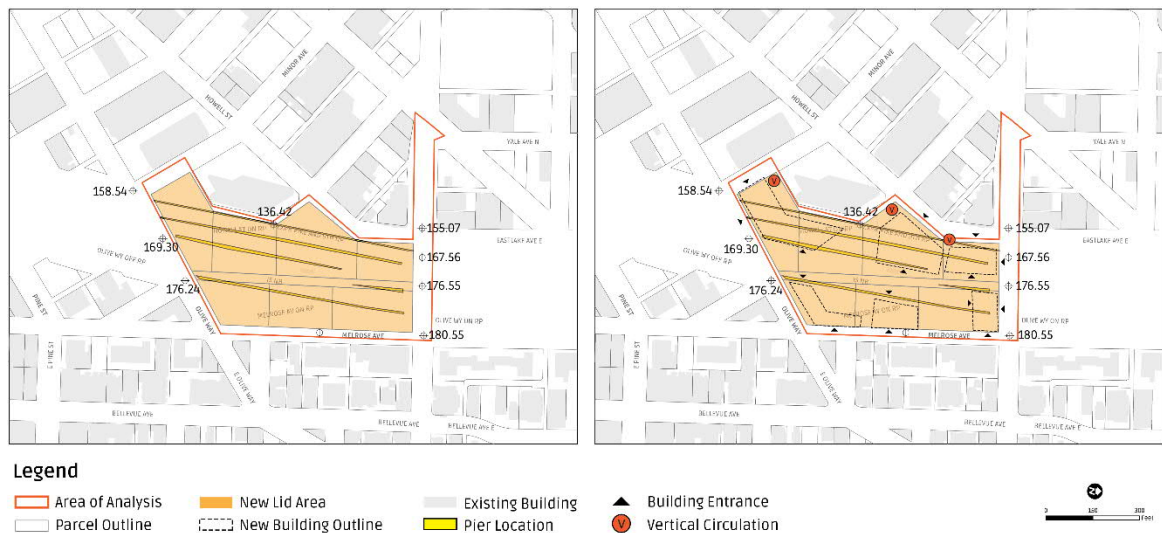
All test cases reflect explorations of what it would mean to lid I-5 from Madison Street to Denny Way (Figure 3-1). Although key takeaways can be derived from looking at a section-by-section analysis for each of the four lid areas, the I-5 LFS scope was to test the potential of a full lid over the study site. Analysis for all test cases assumed retention of all existing overpasses and on- and off-ramps, with the exception of looking at a variation in Test Cases 2 and 3 that considered removing the Olive Way on- and off-ramps.

Figure 3-1. Aerial View of the Study Site



Aerial view of I-5 through the study site from Denny Way (north) to Madison Street (south). The urban form west of I-5 is characterized by high-rise buildings, while east of I-5 buildings are low-to mid-rise buildings, within shorter urban blocks.

Figure 3-2. Constructability Test for Proof of Concept, Area 4



Constructability test exercise for Area 4 (Olive Way to Denny Way). Hypothetical parcel development sites (left) and building footprint siting with access points (right). Removal of existing buildings or placement of new structures on private parcels in the study site was not considered as part of the feasibility analysis.

3.1 Structural Systems

Location of columns and foundations (e.g., Figure 3-4), size and geometry of the lid area, as well as load capacity, corresponding to four load levels (Figure 3-3) were considered. Infrastructure impacts on ramps, overpasses, existing structures, and their historic designation was also assessed. Buildings or any vertical development structure were considered to be conventionally framed (Figure 3-5) as described in the technical feasibility assessment.

Constructability Test for Proof of Concept

1. Develop lid geometrical layouts with understanding of site constraints.
2. Calculate load capacity.
3. Define development sites (parcels).
 - Consider access to parcels (pedestrians, parking/service, vehicular)
4. Test building sites by aligning building footprints and lid structure to develop Proof of Concept (see Figure 3-2).
 - Potential building footprints considered over lines of structure and access points (building-to-lid integration)
 - Building-to-edge integration
 - Establish allowable height with building footprint (function of tentative use and maximizing development potential)
5. Iterate to refine use and maximize vertical development potential.

Figure 3-3. Load Levels Considered in Feasibility Assessment

	 Open Space Landscaping and pavilions (up to 3 stories)	 Low-rise Residential 7 story (5 over 2) Structures	 Mid-rise Residential/Commercial 15 to 20 story Structures	 High-rise Residential/Commercial 45 story Structures
Dead Load (PSF)	1,000	600	2,650	6,815
Live Load (PSF)	250	430	1,150	2,100

Figure 3-4. New Lid Structure Potential Pier Locations for a Robust Lid Project

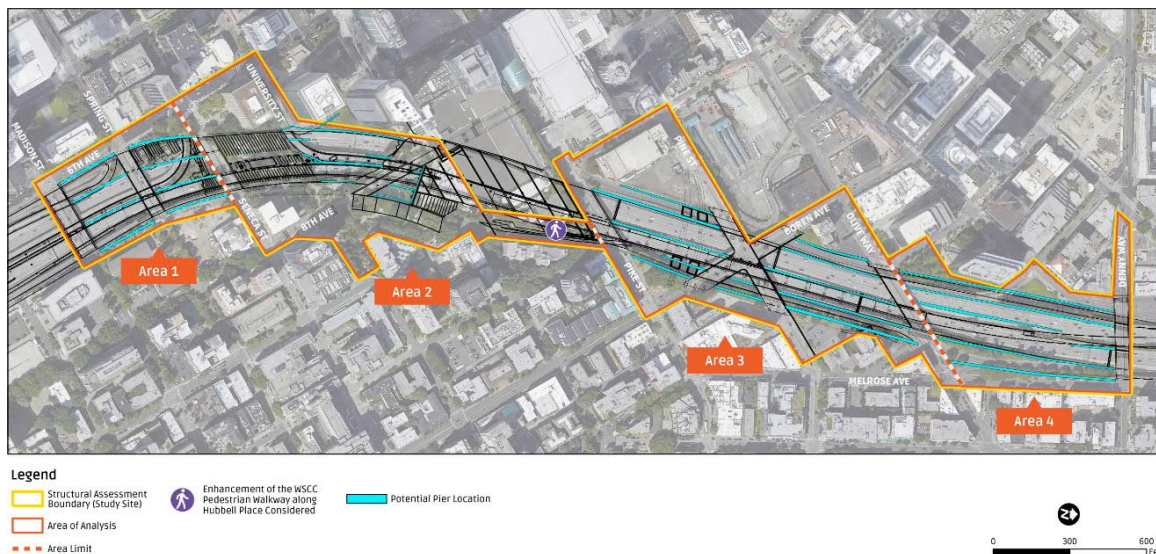
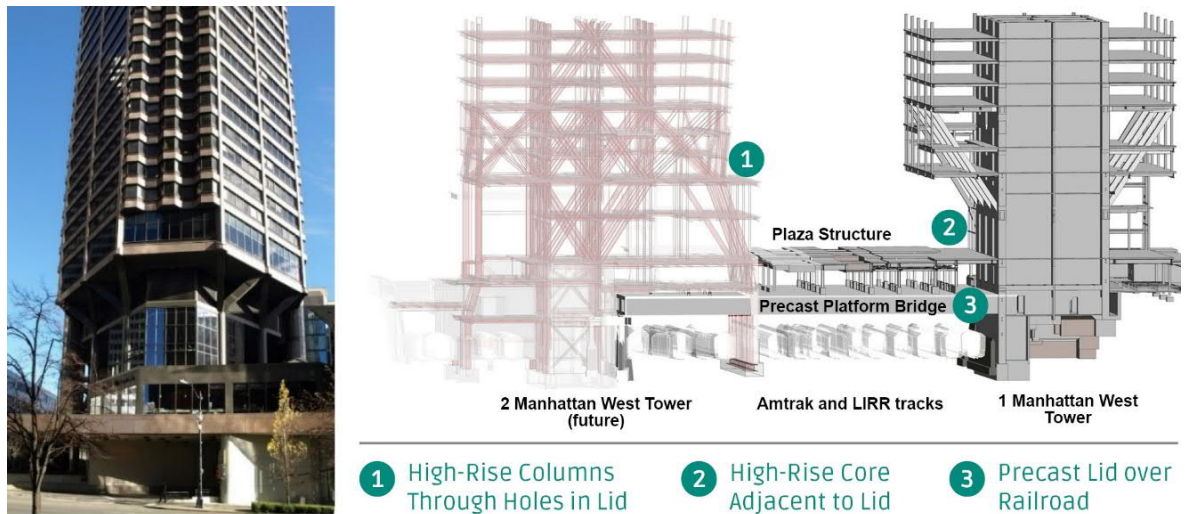


Figure 3-5. Conventional Vertical Development Framing



Examples of conventional building framing considered: Seattle Municipal Tower (left) and the West Towers in Hudson Yards in Manhattan (right) (Petrov, Biswas, Johnson, & Seblani, 2019).

3.2 I-5 Ramps

The developable lid area in each area of analysis would be significantly affected by whether ramps are retained. The feasibility test shows that the ramps to I-5 are a major factor in using the lid and establishing the desired connectivity between neighborhoods. Strictly from an urban design perspective, removing ramps would allow better connections between the lid and the adjacent neighborhoods, but would affect the ability for local traffic to access the freeway. All on- and off-ramps were deemed necessary to serve existing and projected vehicular access needs for I-5 in downtown. Any ramp modification or removal would require significant future analysis (and ultimately an interchange justification report) to identify viable mitigation investments to maintain or improve I-5 and downtown street network operations and to address impacts to upstream and downstream communities. Detailed traffic analysis was outside of the scope of work. The impact ramps have on lid design was analyzed, but only Test Cases 2 and 3 explored removing the Olive Way ramps in detail.

Olive Way Ramps

Olive Way was chosen as the one freeway connection to test removal because the removing the ramps would allow for additional terra firma (i.e., dry land or ground) for buildings, would improve open space availability, and would reduce noise and air pollution in the vicinity of the lid. The ramps' current design present safety risks for pedestrians and cyclists because they cross the on- and off-ramps, and because to the length of the ramp and their shallow grade have a large impact on connectivity across I-5, especially along Melrose Avenue.

Seneca/Spring Ramps

The ramps at Seneca Street and Spring Street would also affect the ability for connectivity and buildable space. The ramp at Seneca Street is in the only place that a column line for a new building could be located. However, it would be possible to locate a building on the site with a footprint that is narrower than a typical footprint and to create an overhang on upper floors.

University Street Ramp

University Street becomes a northbound on-ramp east of 6th Avenue. It appears to be possible to build over the ramp by keeping the structure sufficiently high for clearance.

Reversible Lane Ramp

The reversible lane ramp connects to Pike Street and runs behind the Paramount Theater along the west edge of the freeway. In the test case studies, most of this ramp would be unlidded to maintain clearance. Approximately 100 feet on the north end could be lidded as the ramp descends, which would connect the freeway lid to Pine Street. There would be an abrupt edge of the lid along the east side of the reversible lane ramp.

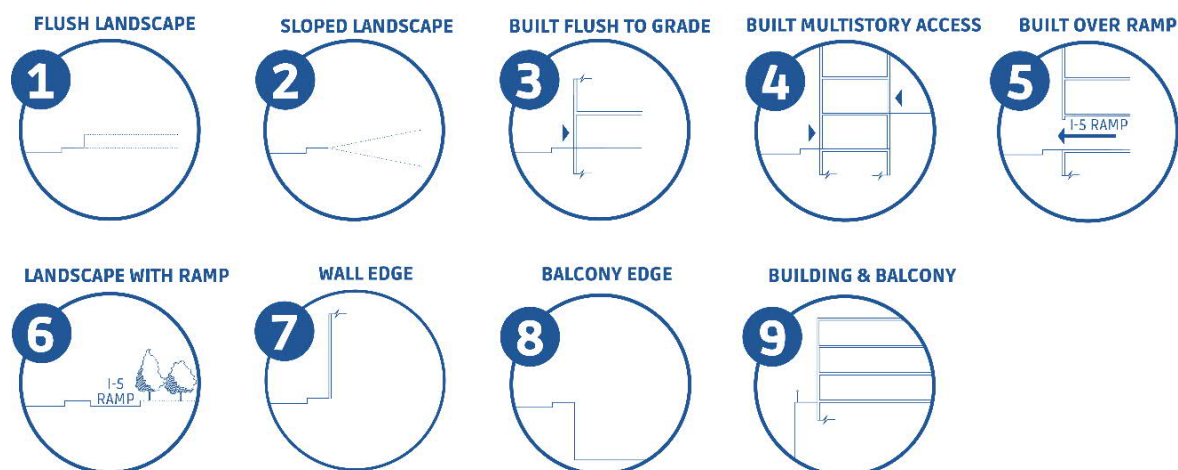
Yale Avenue On-Ramp

The on-ramp at Yale Avenue would allow access along the west side of the lid. This area has a major topographic drop from east to west across the lid, and the on-ramp could be accommodated by keeping the lid high as the on-ramp connects to the freeway.

3.3 Edge Integration

Edge integration between the lid and the immediate surrounding area was evaluated to allow for lid access and enhance the human-scale experience around the study site. Section analysis was performed—considering site topography, grade changes and the resulting implications of vertical clearance requirements over I-5 structures on lid design—to ensure functionality and spatial accuracy in test case representation. Understanding the site's topography is critical to successful reweaving of the neighborhoods. The drop from east to west runs from roughly 20 feet to over 40 feet, and grade changes also occur to varying degrees from north to south. Edge conditions can be treated in a variety of ways, as shown in the nine edge treatments considered for the purpose of this exercise (Figure 3-6). For low slopes, landscaped edges could be flush to the sidewalk with low terraced planters to take up grade, as shown in the image of the Freeway Park edge along Seneca Street (Edge Treatments 1 and 2). The depth of the beams required to hold up the lid would also need to be taken into account in terms of the edges between grade and the lid.

Figure 3-6. Typology of Edge Considered Treatments



For low slopes, landscaped edges could be flush to the sidewalk with low terraced planters. For more significant grade differences (approximately 10 feet or more), pavilions or buildings could be used where possible to allow for access along the edge (Typology 4, Figure 3-6),

For larger grade differential, buildings can mitigate grade, with entries at both an upper and lower level connected to grade. Fisher Pavilion at Seattle Center is a good example of this strategy (Edge Treatment 4), with a roof terrace at the upper level and a gathering space with large operable doors opening to the adjacent lawn. Edge Treatment 5 occurs where a building is constructed over a freeway ramp, such as the Seattle Municipal Tower. This strategy would allow development where ramp removal may not be feasible.



Fischer Pavilion Seattle Center



Street Edge at Seneca



Seattle Municipal Tower with Ramp Opening



Rainier Tower with cantilevered upper floors

3.4 Connections and Access

Opportunities to reconnect neighborhoods surrounding the site and to create easy access to and across the lid were explored. Test cases attempted to establish pedestrian and bicycle connections across I-5 every 300 feet when possible, in line with the historical street grid. Vertical circulation needs were identified to allow for access to the lid and/or to buildings.

Adding vertical circulation to the lid development would be a major benefit to those who find moving up and down the hills difficult. This could take the form of stairs, escalators or elevators either in an exterior open space or in the interior of new buildings. There are good examples of each of these directions. In Seattle, outdoor escalators are found on the west side of the Wells Fargo Center; public escalators are in the Fourth and Madison Building and the nearby Seattle Public Library. Outdoor elevators are found on Marion Street at Post Alley, connecting the bridge to the ferries and street level.



Urban Escalator



Bridge Connection on the Seattle Waterfront

All test cases considered widening the Washington State Convention Center (WSCC) pedestrian walkway along Hubble Place. Vehicular connections were assumed unaffected. A 10-foot setback along streets for landscape, amenities and physical integration with the lid structure were given where possible. Detailed design solutions for each lid area were not developed; representations are only schematic.

3.5 Building Typology

Building typologies considered are associated with the structural load capacity categories (Figure 3-7). The images shown in Figure 3-7 are representative examples of each typology. The high-rise building could be a very high tower up to 680 feet tall (more appropriate to downtown), or a more moderate 400-foot tower. High-rise construction was considered only on terra firma locations (Figure 3-8).

Figure 3-7. Building Typology for Test Cases



Figure 3-8. Land Use and Land Ownership in the Study Site



Land within the study site is primarily WSDOT right-of-way. For the purpose of the I-5 LFS, privately owned parcels were not considered for the structural assessment of a lid. Structural systems rely on having foundations built on terra firma (i.e., dry land or ground). This figure shows sections within the study site that allow building a lid over terra firma (red hash) and areas that would be feasible to lid over I-5 that are not over terra firma (purple hash)—in WSDOT right-of-way. Source: (City of Seattle. 2019. [Land Use Shapefile]. Unpublished raw data)

From an urban design standpoint, the eventual success of the lid would be the quality of the “plinth,” or the area where buildings and the street level or open space integrate. With the grade changes at the site, some buildings may actually have more than one “plinth” level, with at-grade access from an adjacent street at one level and a second at-grade access at a level on the lid. A “podium” is defined as a lower (i.e., three-story) base of a building with a taller, slender tower. The podium may or may not have access to multiple grade levels.

While the I-5 LFS did not examine building design (including that of plinth levels), the footprints of the buildings shown in Test Cases 2 and 3 were assumed to be part of a well-designed, well-landscaped human-scale set of levels. Space is available within the plinths of each building for street-level retail, cultural and civic space, and other amenities that are understood over time.

Figure 3-9. Representative Examples of a Building Plinth and Podium

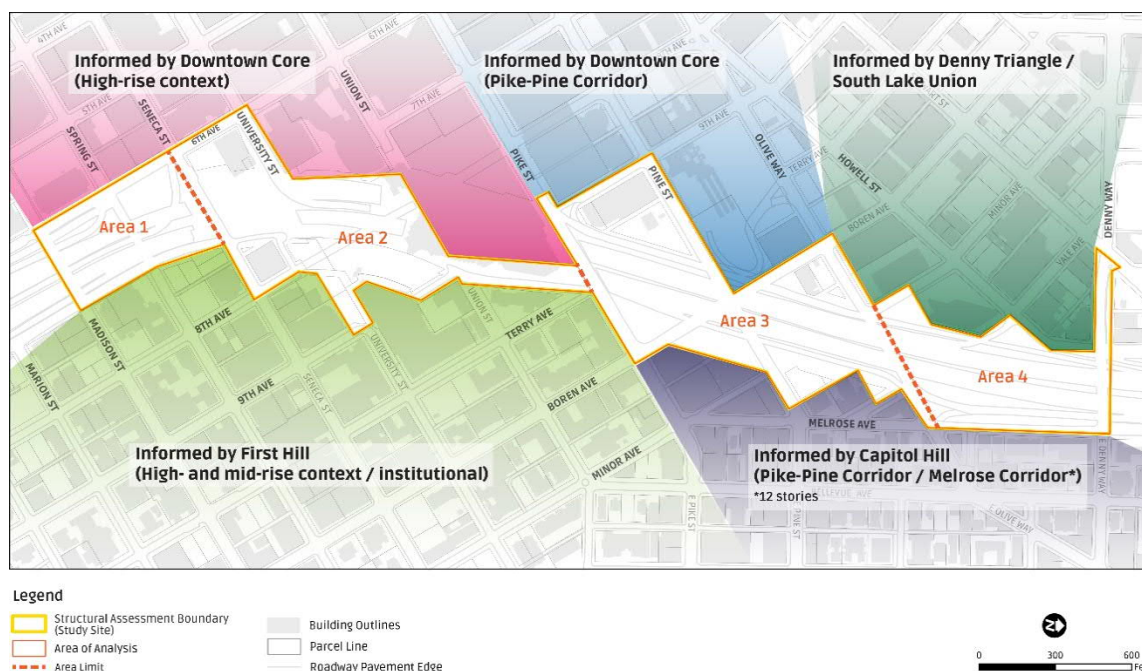


Representative examples of a plinth (2 Union Square) (left), and a podium (First Light) (right).

3.6 Urban Form and Neighborhood Context

Building heights, zoning, and current land use were considered to inform test cases through a context-sensitive approach. The urban character on the west side of I-5 differs from the east side, with Capitol Hill having shorter and smaller buildings and block sizes than downtown. Urban character informed the test case development program (Figure 3-10). Consideration for the impact on the surrounding environment regarding noise, views, building orientation and shadows shaped the resulting test cases.

Figure 3-10. Urban Character Informing Test Case Development



3.7 Mix of Uses

Ranging from public to private uses, the test case development programs were dictated by the assumptions provided by the City of Seattle's [test case workbook](#). The private development uses on Test Cases 2 and 3 were established using the real estate market scan, showcasing use types according to the lid's potential market capture estimated for 2035 (Table 3-1). Test cases favored locating residential uses to the east and office/hotel to the west of the study site. Policy assumptions around parking, affordable housing, and civic space influenced test case outcomes. For public uses in built spaces (i.e., "civic uses") a specific program was not defined. These would be spaces considered to host uses such as community centers, cultural space or schools, among other civic uses

Table 3-1. Estimates of Real Estate Market Scan Development Program Ranges

Potential Development Program	Low-end Range of Market Capture	High-end Range of Market Capture
Residential (market-rate rental)	800 units	1,200 units
Office	1.2 million square feet	1.8 million square feet
Retail	130,000 square feet	200,000 square feet
Hospitality	400 hotel rooms	600 hotel rooms

Source: I-5 Lid Feasibility Study Real Estate Market Scan (HR&A Advisors).

Estimates reflect market capture ranges for 2035. All numbers are not adjusted to account for the existing pipeline. Future pipeline and churn would also meet a share of demand. These estimates do not include affordable housing units.

4. Test Case Definitions

The definition of the three test cases developed by the City of Seattle in collaboration with the consultant team, and input from the I-5 Lid Feasibility Study Committee, are described in the following sections.

4.1 Test Case 1: The Park Lid

Guiding Question

What is the lowest capital cost to achieve the core public benefit outcomes?

4.1.1 Description

This test case assumed the most basic lid structure would be developed as “standard” park space (landscaping, lighting, seating, pathways). Its purpose was to establish a baseline cost. More amenity-rich open spaces (e.g., active recreation spaces, programmable spaces, etc.) or the addition of structures for civic or other uses would require additional investment.

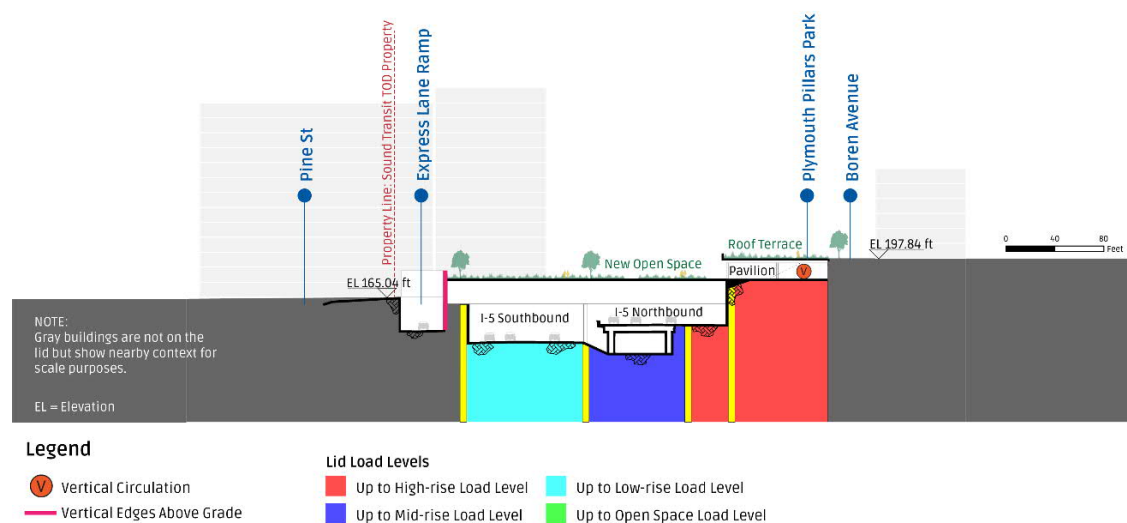
4.1.2 Assumptions

Test Case 1 assumed the most basic (though still complex) lid structure to meet safety, seismic, and operational requirements, including fire and life safety requirements for the underlying tunnel and modifications to support the lid while maintaining or improving safe operation of I-5.

4.1.3 Development

There would be no development on the lid apart from some “pavilion” (Figure 4-1) structures needed to address edge conditions (i.e., provide for access to the lid in areas with significant grade change).

Figure 4-1. Pavilions for Vertical Circulation and Edge Treatment



Schematic cross section of Area 3 for Test Case 1, showing the use of pavilions as a strategy for edge integration and vertical circulation to the lid level. Pink vertical lines represent vertical edges of the lid that would be above-grade and experienced as “balconies” from the lid.

4.1.4 Ramps

Analysis for this test case assumed retention of all on- and off-ramps, consistent with establishing a baseline lid cost. Removing, reconfiguring, or relocating ramps would enhance the lid's functionality and expand the amount of park space, but would also add considerable capital cost (not only for construction but also for providing alternative I-5 access and modifications to the street network elsewhere). Further studies and cost-benefit analysis related to ramp modifications would be required to inform future decision-making.

4.1.5 Comparable

A lid may be the only way to find space for a large, relatively flat, open park space in the downtown neighborhoods. This space could allow for community cohesion and act as a gathering space for residents of all four neighborhoods. Aubrey Davis Park on the existing lid over I-90 on Mercer Island is roughly comparable, though it contains more amenities than what is assumed for this baseline test case (Figure 4-2).

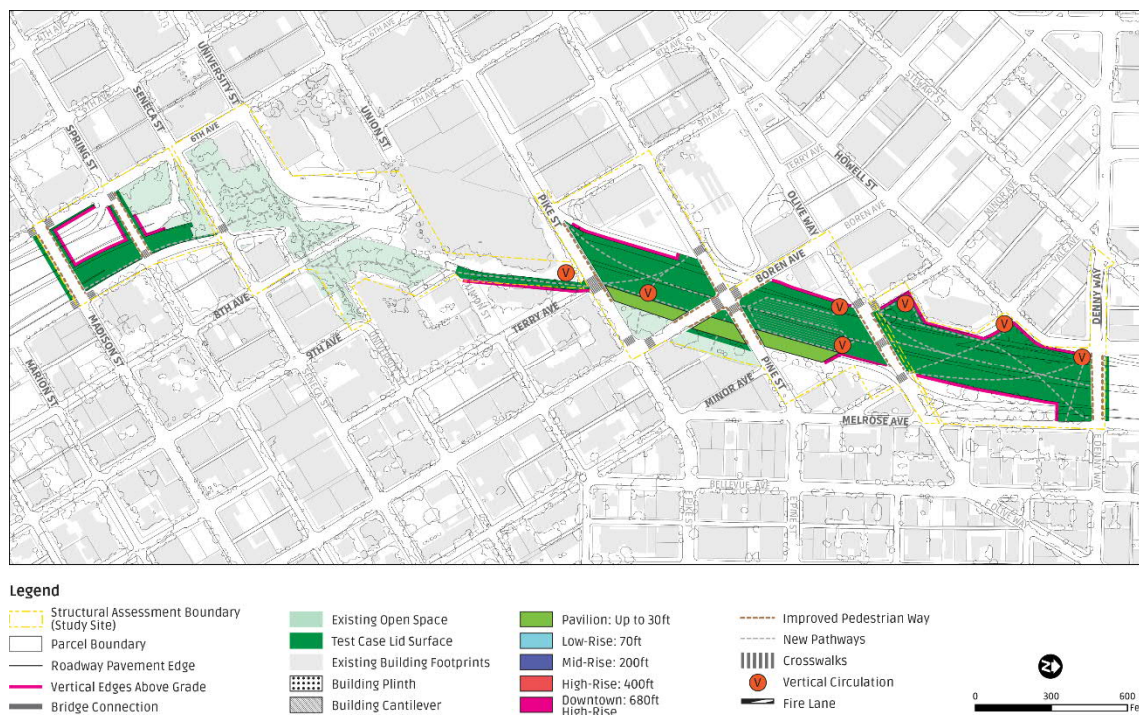
Figure 4-2. Aubrey Davis “Lid Park” on I-90 (Mercer Island, WA)



Source: Google Earth, 2019

Test Case 1 would create large open spaces on the north end of the study site, but the challenging areas south of Union Street near Freeway Park would have minimal improvements. Given that the goal of this test case was to establish a baseline cost with sufficient public benefit, and to retain all existing ramps, this test case did not consider a full lid over Area 1 (in order to preserve the Spring Street and Seneca Street ramps) or Area 2 (due to cost and low usability of a lid with significant slope). The Olive Way ramps significantly limit access and connectivity across I-5 between Pike Street and Denny Way, and would create above-grade lid edges from the surrounding context (i.e., it would not create a flat lid that would seamlessly connect each side of I-5). Although it would create 5 acres of new open space, it would be accessible only on its edges or via vertical circulation on the west side, with elevated balconies on both east and west edges (see Figure 4-3).

Figure 4-3. Test Case 1 – The Park Lid



4.2 Test Case 2: Maximum Private Investment

Guiding Question

What is the maximum potential for market-rate development to help pay for a lid?

4.2.1 Description

This test case assumed the maximum development on the lid based on its structural capacity and application of standard development requirements for low-, mid- and high-rise development, generally based on prevailing “downtown” densities. All development would be market-rate in order to maximize revenue-generation that could offset the lid structure’s capital costs.

4.2.2 Assumptions

The structural requirements related to safety, seismic resilience, and operations were similar to Test Case 1. Additionally, standard development requirements would be applied to private development:

- Privately Owned Public Space – 20 square feet per 1,000 square feet of office; and 15 percent of residential parcels.
- Parking – 25 percent of office square footage; 15 percent of market-rate residential square footage (Because of the physical challenge of delivering parking within each building envelope, the analysis calculated the cost of delivering 10 percent of the assumed parking requirement on-site with the remainder delivered on the lid's adjacent parcels, including the cost of site acquisition and parking construction.)

4.2.3 Development

Test Case 2 illustrates the distribution of approximate building footprints by development intensity (load capacity) as defined through the preliminary structural analysis, yielding low-, mid- and high-rise buildings. The mix of uses (commercial, residential, etc.) were established based on the real estate market scan (Table 3-1), assuming development seeking maximum profitability. Development requirements for housing affordability assumed Mandatory Housing Affordability payments and no on-site affordable housing.

4.2.4 Comparable

This test case is comparable to the Capitol Crossings lid in Washington, D.C., which is a privately funded \$1.3 billion project that contains 2.2 million square feet in five mixed-use buildings over a 7-acre site that spans three long blocks over I-395. Importantly, the terrain in that location is much flatter than the context of I-5 in downtown Seattle.

Figure 4-4. Capitol Crossing Lid in Washington, D.C.



Capital Crossing Lid over the active I-395 freeway in Washington, D.C.
Source: LERA structural engineers

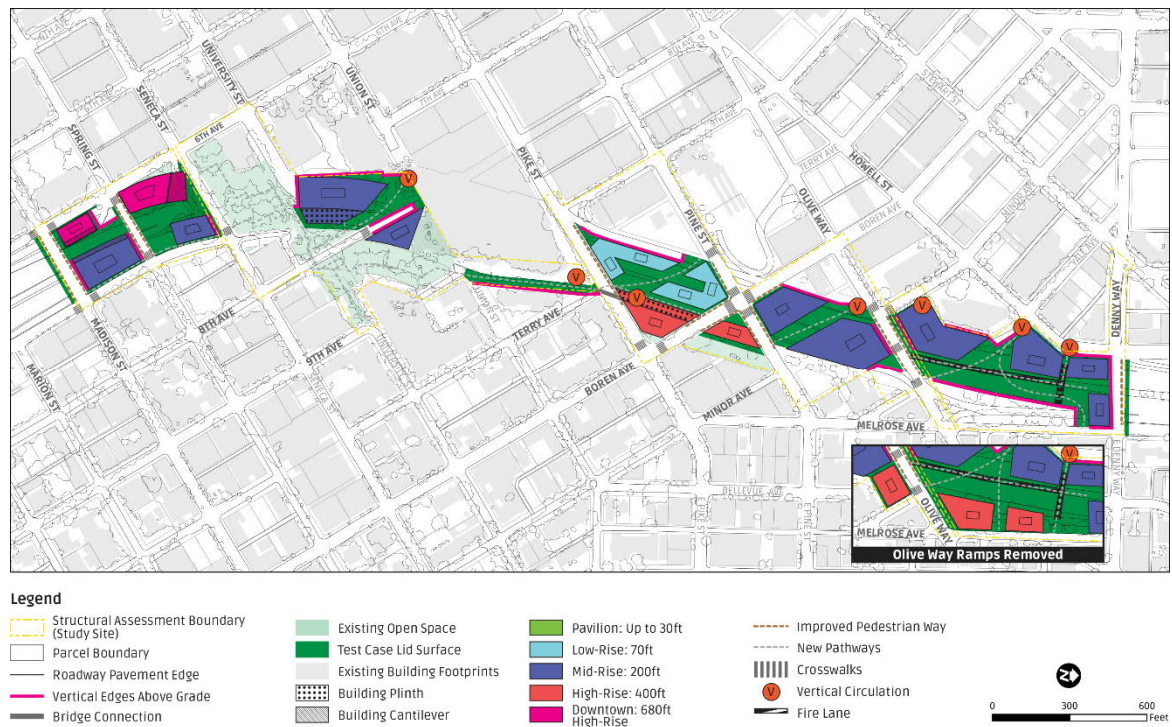
4.2.5 Urban Character and Function

Test Case 2 would reconnect neighborhoods across I-5, with office and residential high- and mid-rise buildings that would create permeability through a network of privately owned public spaces. A hotel and ground-floor commercial spaces would add to the mix of uses on the site. This test case explored creating a neighborhood extension that would bring the urban character of downtown blocks over I-5.

Buildings in Test Case 2 would serve as vertical circulation paths to overcome the significant grade changes on the site. They would also allow for an accessible and safer pedestrian crossing over Pike Street, with a pedestrian overpass directly linking the WSCC walkway to a building plinth.

While various public benefits could be achieved through this test case—such as improved pedestrian realm and reduced noise—maximizing private development could vary in public policy outcomes outlined in the study's guiding principles.

Figure 4-5. Test Case 2 – Maximum Private Investment



Schematic plan view of Test Case 2. All I-5 ramps would remain; a scenario with Olive Way ramps removed was explored and is shown in the lower-right corner.

4.3 Test Case 3: Mid-Density Hybrid

Guiding Question

How would a context-sensitive public-private mix of development affect financial performance?

4.3.1 Description

This test case considers the financial impact of a more mixed approach to development on the lid, with public park space and civic uses mixed with on-site affordable housing and market-rate development (including residential, commercial and hospitality). Like the other test cases, Test Case 3 is not a recommended development program. Its purpose is to test the financial outcomes of an illustrative “mid-density” approach that mixes public and private investment.

4.3.2 Assumptions

This is the most assumption-driven test case. As in Test Case 2, all structural requirements related to safety, seismic resilience and operations would be met, and the same standard development requirements and parking assumptions would apply. However, other assumptions would drive a lower overall intensity of development (compared to Test Case 2) and inclusion of public-serving uses, including the following:

- Public Open Space – same as Test Case 2 for market-rate development plus 5 acres of public park space.

- Civic Uses – 5 percent of total building square footage (but no assumed program for how that space would be used)
- Residential Uses – 40 percent of the residential uses would be dedicated to affordable housing (Refer to [test case workbook](#) for further detail.)
- Ramps – two possible variations: one with all ramps retained and one with Olive Way on- and off-ramps removed (Any future ramp removal would require substantial analysis and mitigation.)

4.3.3 Development

Building intensity is lower than Test Case 2, factoring in both the load capacity and the urban context. The illustration on Figure 4-7 shows the potential resulting distribution of open space and approximate building footprints. The use mix (commercial, residential, etc.) would be determined by the real estate market analysis, as part of the economic and financial feasibility assessment.

4.3.4 Comparable

While it is not a lid project, Yesler Terrace is a recent development that mixes affordable and market-rate housing (25/75 percent mix) with commercial space, community-serving uses (2 percent of total building space) and 3.2 acres of public open space.

Figure 4-6. Yesler Terrace Illustration



Source: Exxel Pacific

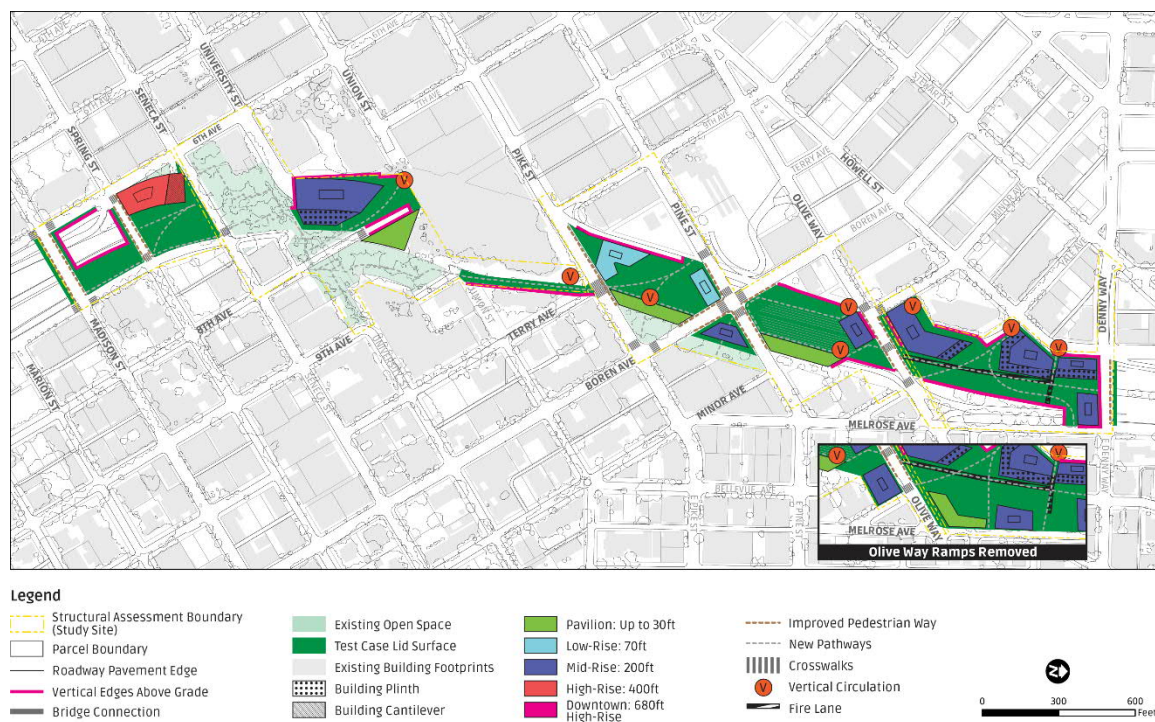
Yesler Terrace under construction. New development includes market-rate and affordable housing, public playground and community garden.

4.3.5 Urban Character and Function

Test Case 3 would create a mixed-use neighborhood extension to reconnect the urban fabric across I-5, with ample park space and low- and mid-rise buildings. It would bring the urban character and form of Capitol Hill and First Hill over I-5, closer to the Downtown Retail Core. It would serve as a community and civic district that would support a mixed-income neighborhood. As a hybrid between Test Cases 1 and 2, Test Case 3 would showcase open spaces that would allow for community cohesion and act as a gathering space for residents of all four neighborhoods.

Building intensity is lower than Test Case 2, factoring in both the load capacity and the surrounding urban context. The illustration on Figure 4-7 shows the potential resulting distribution of open space and approximate building footprints. Test Case 3 would provide additional park space and buildings in the immediate surroundings of Freeway Park, and would add active uses to its edges and to reduce noise impacts from the freeway.

Figure 4-7. Test Case 3 – Mid-Density Hybrid



Schematic plan view of Test Case 3. All I-5 ramps would remain; a scenario with Olive Way ramp removal was explored and is shown in the lower-right corner.

5. Elements for Area of Analysis Characterization

The following six elements describe and characterize each area of analysis within the study site, which then defines the opportunities and challenges for building siting, and the various uses and urban design criteria that informed the development program test case scenario.

5.1 Existing Conditions Considerations

The analysis descriptions consider the detailed existing conditions for each of the subsegments of the study site to understand the opportunities and constraints involved in the different areas and to inform appropriate potential future uses of a lid.

5.2 Size and Geometry

The size and shape of the areas range from the south end's Area 1 with standard downtown blocks oriented to the street grid, to the large irregular shape of Area 4. The developable area in each study site area of analysis is also affected by whether ramps are retained.

5.3 Ramps

All of the areas of analysis are affected by on- and off-ramps connecting to I-5. In some, but not all cases, buildings could be constructed over the connection of ramps to the street grid. Figure 5-1 and Figure 5-2 show the difference in buildable area with the ramps removed (17.7 acres) and the ramps retained (11.1 acres).

5.4 Structural Capacity

The structural engineering assessment determined load capacity for the areas within the study site (i.e. the Structural Assessment Boundary). Four load categories were used:

- High-rise (up to 400 feet)
- Mid-rise (up to 200 feet)
- Low-rise (typical “5 over 2” development)
- Pavilion (up to 3 stories).

In the Figure 5-1 and Figure 5-2, red areas would support high-rise development, dark blue would support mid-rise, light blue would support low-rise, and green would be pavilion only.

Figure 5-1. Highest Load Levels for Maximum Developable Lid-Area Potential for the Robust Lid Project

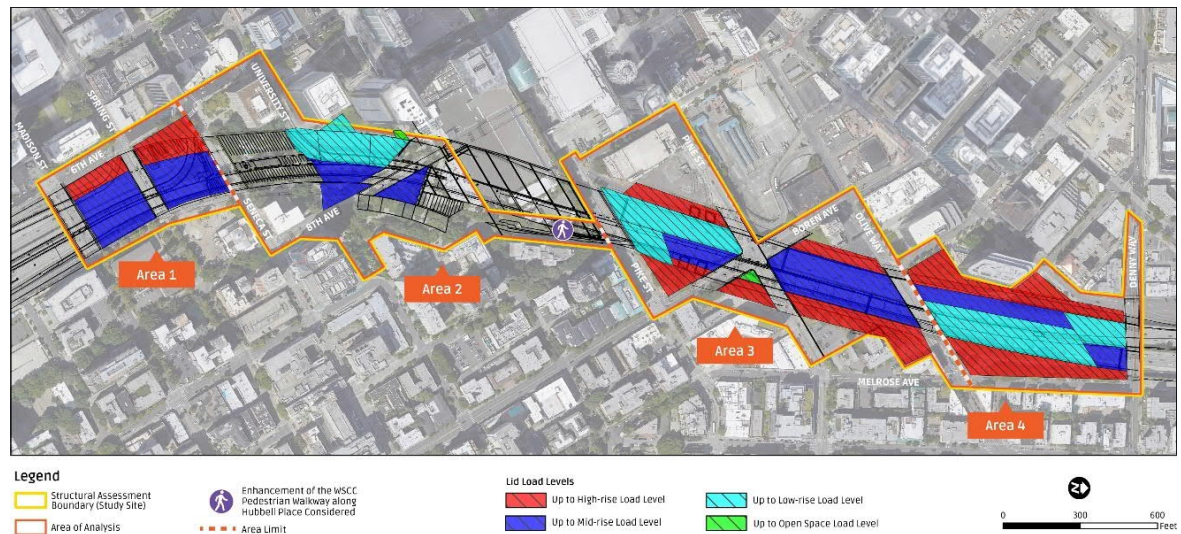
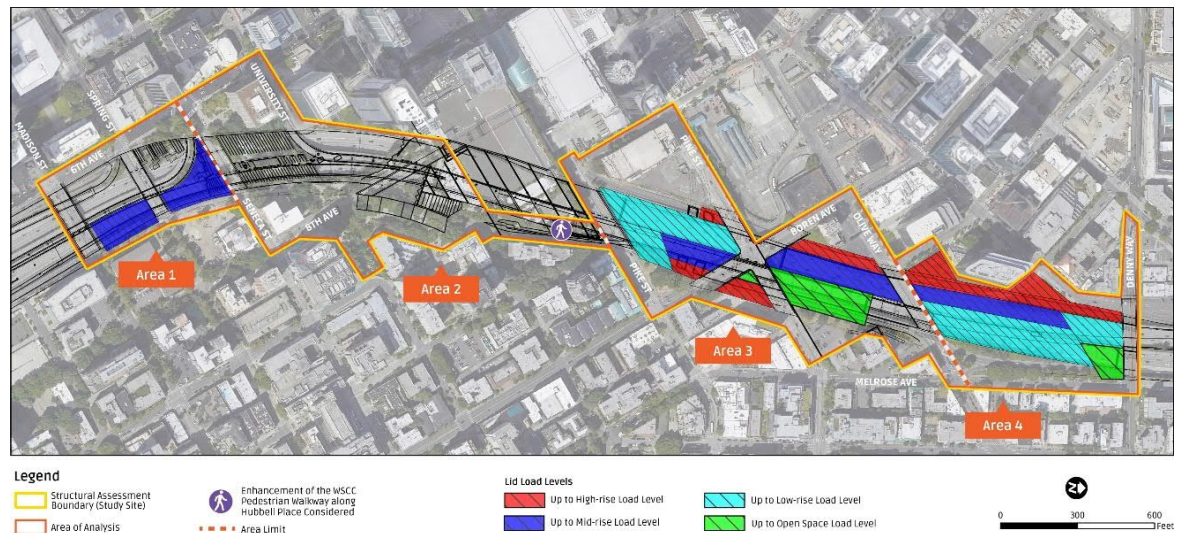


Figure 5-2. Highest Load Levels for Minimum Developable Lid-Area Potential for the Leanest Lid Project



5.5 Topography and Edges

Edge integration between the lid and the immediate surrounding area is critical to allow for lid access and enhance the human-scale experience around the study site. Understanding the site's topography is critical to successful rewearing of the neighborhoods. The drop from east to west runs from roughly 20 feet to over 40 feet, and grade changes also occur to varying degrees from north to south.

5.6 Connectivity

The considerations in the Areas 1 through 4 include opportunities to reconnect the urban fabric and permeability within the site and to the vicinity beyond. While this I-5 LFS does not lay out an urban design plan for the lid, several deficiencies are noted in terms of quality of experience, lack of facilities, and areas with safety concerns. The I-5 LFS analysis of the existing conditions noted opportunities to reconnect some routes that were severed by I-5, notably routes connecting to Yale Avenue and Minor Street that re-establish connections between the growing job and residential centers of Capitol Hill and Denny Triangle/South Lake Union. Vertical circulation needs were identified to allow for access to the lid and/or to buildings. This could take the form of stairs, escalators or elevators either in an exterior open space or in the interior of new buildings.

6. Areas of Analysis and Potential Development Programs

As part of the test case development, building typologies and siting were assessed relative to load capacity, access (pedestrian and vehicular), and parcel ownership. This analysis considered infrastructure impacts on ramps, overpasses, existing structures, and their historic designation. This examination was performed to yield proof of concept of viable development scenarios. These development scenarios served as input to real estate pro formas—based on a real estate development market scan—to appraise revenue-generation potential in the next key step. Removal of existing buildings or placement of new structures on private parcels was not considered as part of the analysis.

This section describes and characterizes each area of analysis within the study site, and describes the rationale used behind the resulting development program test case scenario. Moreover, the rationale and description of the choices made for the buildings and uses included in each test case and each area of analysis is described in this section.

6.1 Area 1

Area 1 is fairly similar to standard downtown blocks in terms of geometry, but is challenged by freeway ramps at both Seneca and Spring Streets.

Area 1 has two blocks that are similar to downtown in terms of block size and geometry. The south block, between Madison and Spring Streets, has an on-ramp on the west side that limits the opportunity for vertical development. The northern block, between Spring and Seneca Streets, has the Seneca Street off-ramp on the west side. This ramp could remain with vertical development if the entry to the ramp were enclosed within a building, similar to the Seattle Municipal Tower.

Area 1 context includes a mix of uses on the west, including the historic Nakamura Courthouse and the Women's University Club, with taller buildings nearby such as the Crowne Plaza and Renaissance Seattle hotels. On the First Hill side to the east is the First Presbyterian Church (which has been discussed for redevelopment) and historic Town Hall. Two new residential high-rise buildings are being built along Spring Street, with an open space along Seneca Street. High-rise development would be appropriate to Area 1 given that a number of high-rise buildings exist in the surrounding area. With Freeway Park to the north, shading of the park would be a consideration.

The box gardens associated with Freeway Park are on the northern block but are more visual than usable green space. The Nakamura Fountain is between Seneca Street and the Seneca Street off-ramp. Freeway Park, adjacent to the north, is a valued open space in downtown with entries off of Seneca Street.

6.1.1 Size & Geometry

Area 1 is 3.1 acres, but not all of it may be usable because of the presence of the ramps. Its geometry is similar to standard downtown blocks within a regular grid.

6.1.2 Ramps

The southbound on-ramp south of Spring Street limits development opportunities on the southwest corner of the Madison Street to Spring Street block. While the ramp is challenging for vertical development, a building along 6th Avenue could be possible by keeping the edge of the building south of the ramp, or by having an opening for the ramp and building over the clearance required for the ramp, similar to the Seattle Municipal Tower.

6.1.3 Structural Capacity

This area can support high-rise development on the west, and mid-rise development on the east. There is a narrow band of terra firma on the west side; wider buildings would need to be cantilevered over structure or be limited to mid-rise.

6.1.4 Topography & Edges

The drop of approximately 20 feet east to west could be taken up by multiple levels of a building or by landscape treatment. The site also slopes downward to the north.

6.1.5 Connectivity

The existing street grid provides standard connectivity, but walking along the sidewalk of the bridges is not pleasant, with traffic on one side and the freeway below. There is an existing gap with a lack of sidewalk on the west side of 7th Avenue along the edge of the freeway.

6.1.6 Other

Freeway Park's historic designation would require significant coordination because a lid development would tentatively alter its signature walls and box gardens at its edges. The box gardens associated with Freeway Park on the northern block are more a visual element than a usable green space. The Nakamura Fountain is between Seneca Street and the Seneca Street off-ramp. Freeway Park, adjacent to the north, is a valued open space in downtown with entries off of Seneca Street.

Figure 6-1. Area 1: Existing Cross Section

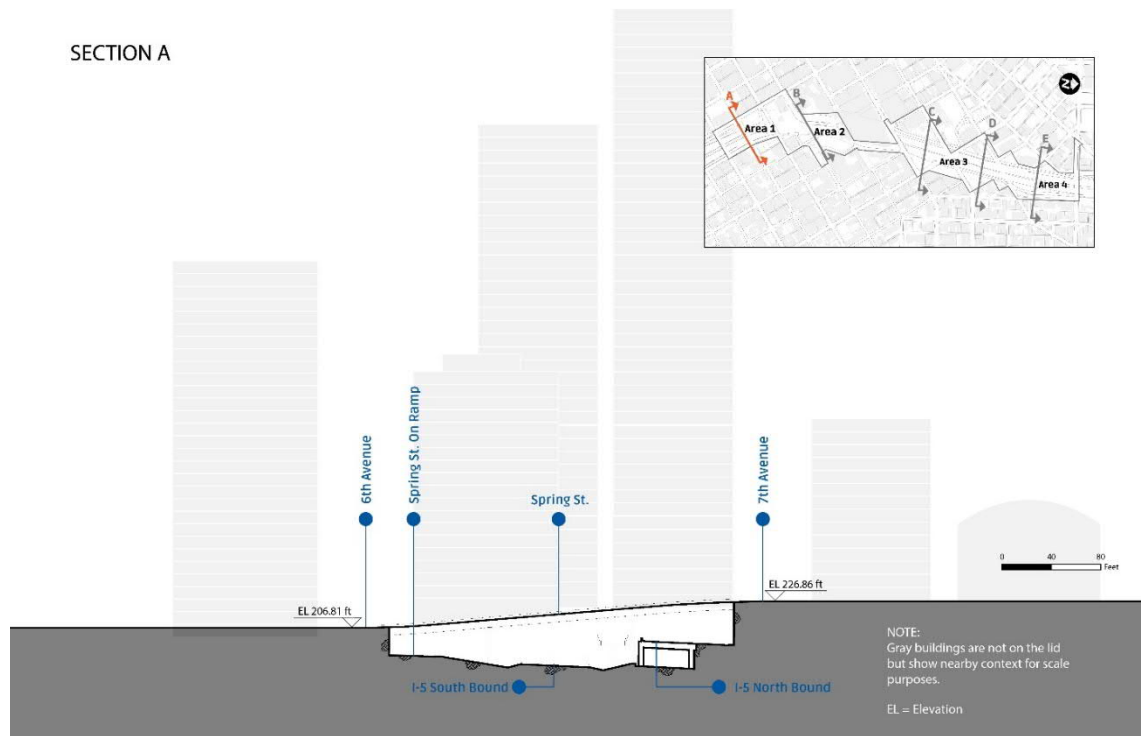
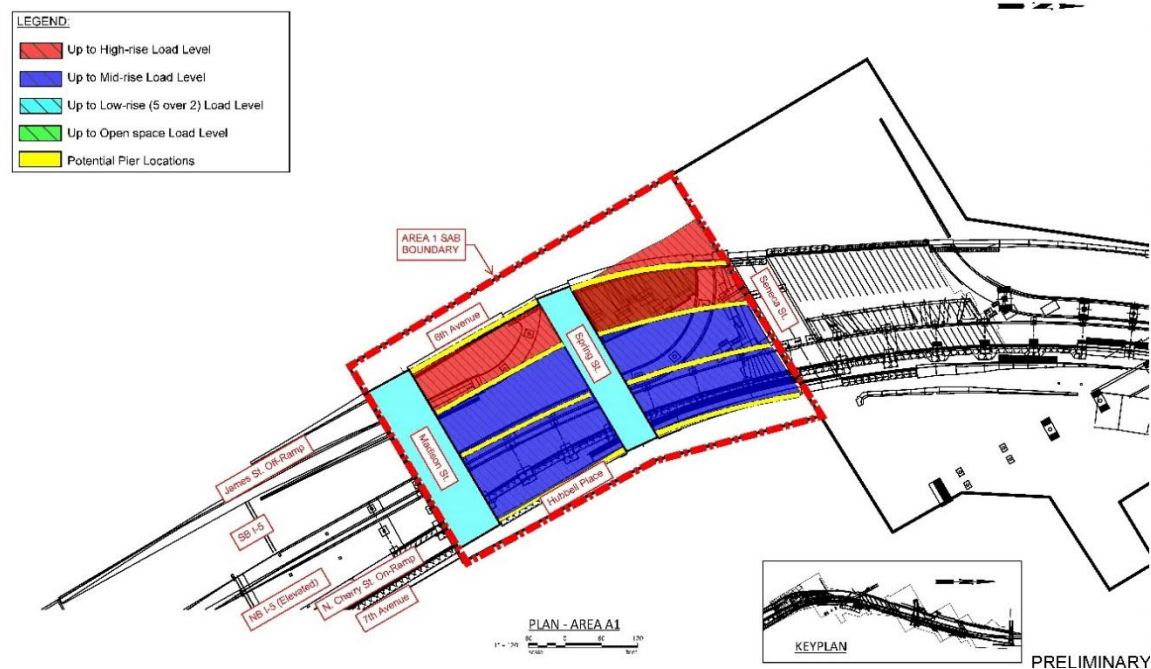


Figure 6-2. Area 1: Adjacent Land Uses



Figure 6-3. Area 1: Load Level Plan



6.2 Area 1: Test Cases

6.2.1 Area 1: Test Case 1

In Test Case 1, the intent was to increase green space in the most cost-effective fashion. In Test Case 1, Area 1 would increase green space on the east side where spanning is possible between 7th Avenue and the column line to the west. The box gardens of Freeway Park would be left in place. On the southernmost block between Madison and Spring Streets, because the spanning would be difficult without removing the ramp, the western portion of the block would not be lidded. However, a landscaped edge could be added along all the edges of the bridge structures and edges with topographic drops.

Open Space: The open space on the east side could provide usable open space and a green connection to Freeway Park that does not currently exist. The connection between the new open space and the box gardens would likely not be continuous.

Connections: The landscaped edges would make the existing sidewalks much more pleasant for pedestrians, and the west side of 7th Avenue, now not pedestrian accessible, would be a landscaped path.

Figure 6-4. Area 1: Test Case 1

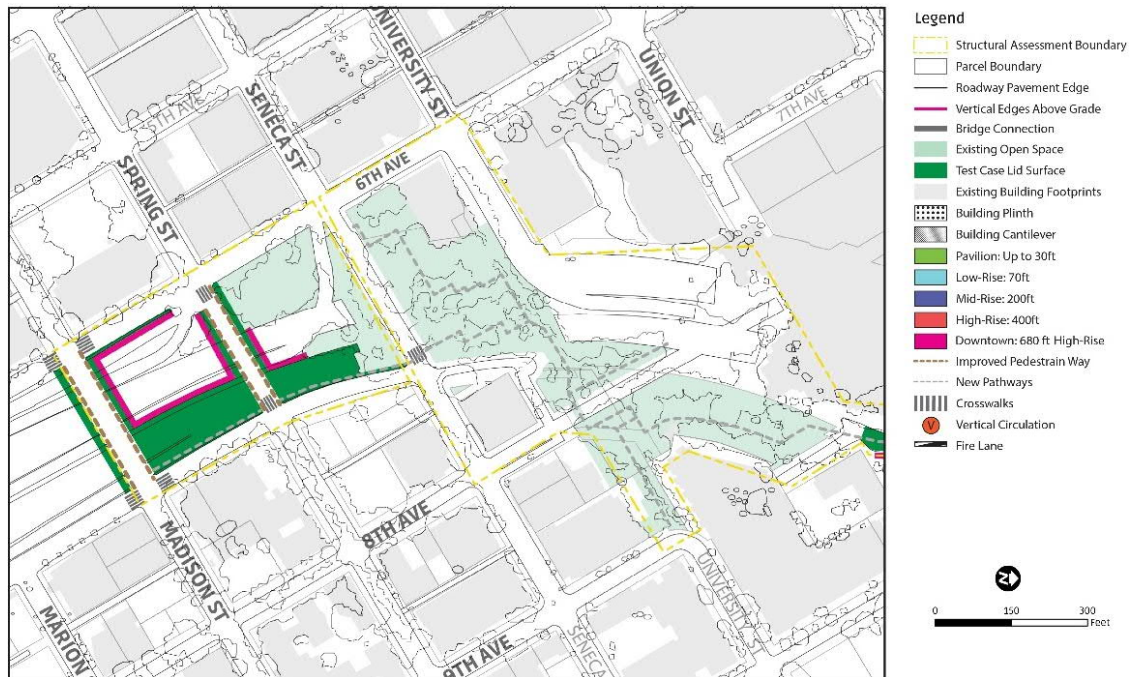
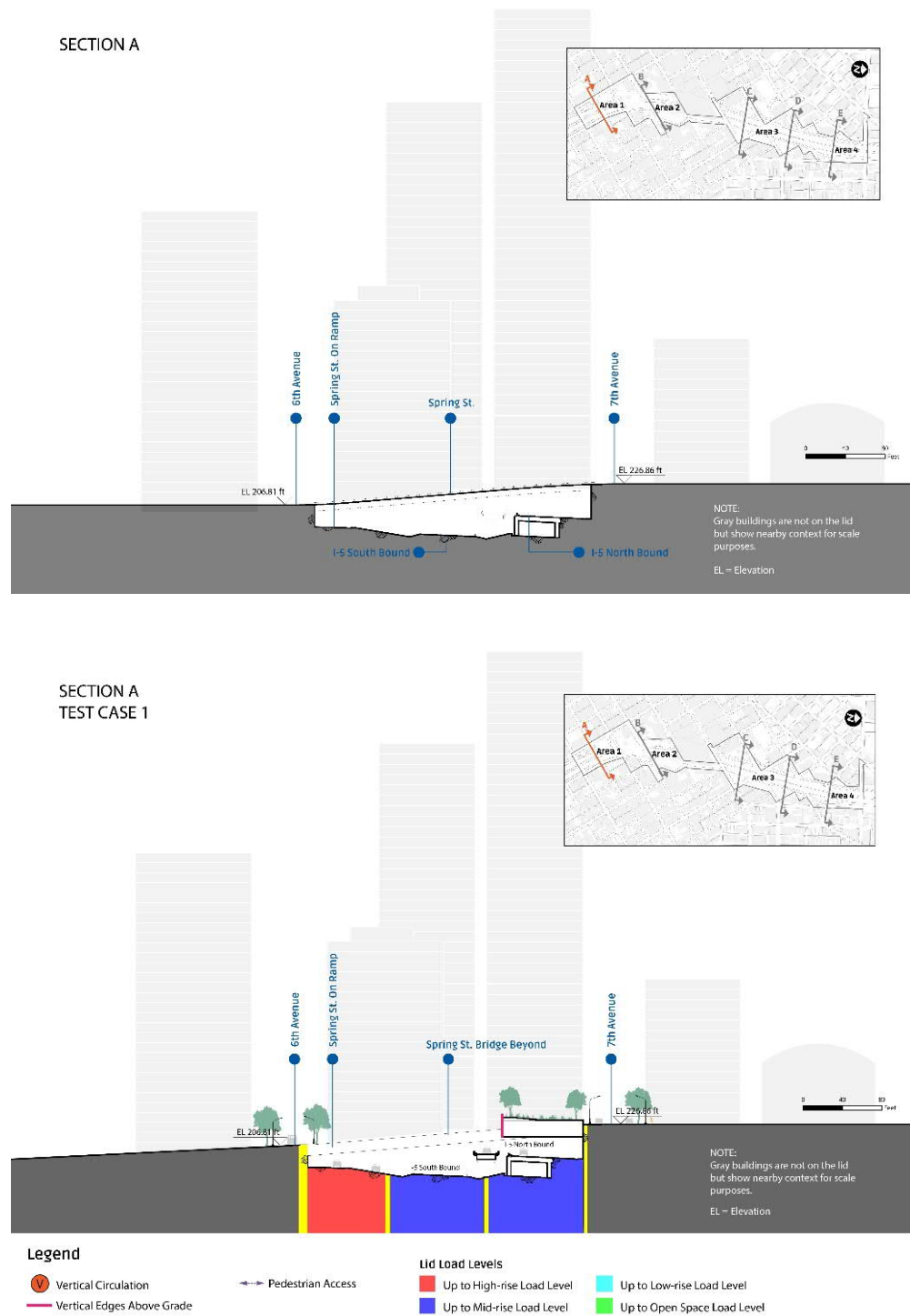


Figure 6-5. Area 1: Test Case 1 — Cross Sections Before and After Lidding



6.2.2 Area 1: Test Case 2

Test Case 2 would maximize built space, and Area 1 is considered appropriate for high-density development because of it is adjacent to downtown. The west edge of Area 1 has the structural capacity for high-rise structures along a band that is fairly narrow, widening toward the north. This edge would be used to support very tall high-rise structures (680 feet in height).

Building 1 (Assumed Residential Use): At 6th Avenue and Madison Street, Building 1 would not run the full block in order to leave space for the southbound on-ramp. The building would also be cantilevered (similar to “Rainier Tower”) in order to increase the building width beyond the narrow width of soil available west of the ramp. The narrow footprint would make the building most appropriate for residential use.

Building 2 (Assumed Office Use): At 7th Avenue and Madison Street, Building 2 would maximize structural capacity as a mid-rise building (400 feet height). Again, the building would be cantilevered to increase its width. The larger floor plate and wider footprint would be appropriate for office use.

Building 3 (Assumed Residential Use): At 7th Avenue and Seneca Street, Building 3 would also be a mid-rise building because of structural capacity. It would not run the full block because the column line on the south end of the block would be over the Seneca Street off-ramp. A smaller footprint and nearby residential uses on the First Hill side of the freeway would make residential development appropriate for the site.

Building 4 (Assumed Office Use): At 6th Avenue and Seneca Street, Building 4 would be built on terra firma, so it would be a 680-foot-tall building that would follow the curve of the column lines below. To extend the building the full length of the block, the building would follow a “Municipal Tower” design, with a large opening near the corner of 6th Avenue and Seneca Street to allow for the off-ramp. The building footprint and adjacent uses would make an office building appropriate for the site.

Building footprints: In developing the program, the geometry of a parcel was one consideration in the appropriate type of use. Larger footprints were assumed for office floorplates, narrower footprints were considered suitable for residential development.

Open Space: New open space would be created between buildings that would be privately managed. Because of the depth of structure for the lid, there would likely to be some amount of grade change between sidewalk level and the adjacent open space.

Connections: The landscaped edges would make the existing sidewalks much more pleasant for pedestrians, and the west side of 7th Avenue, now not pedestrian accessible, would have a sidewalk along the new buildings.

Figure 6-6. Area 1: Test Case 2

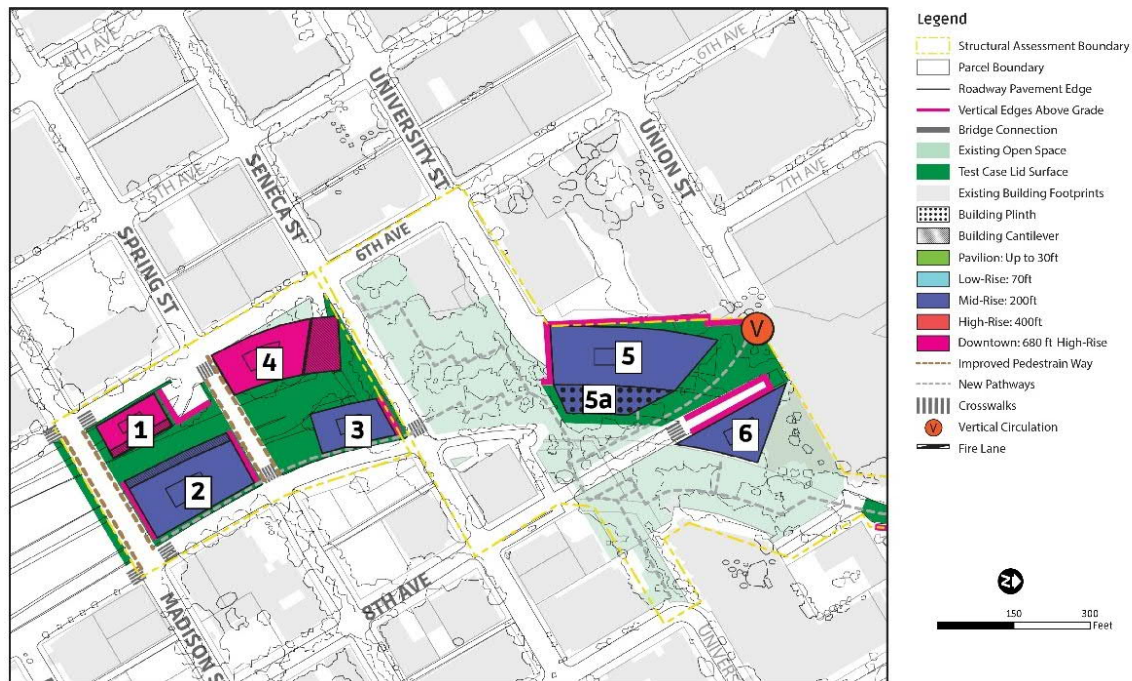
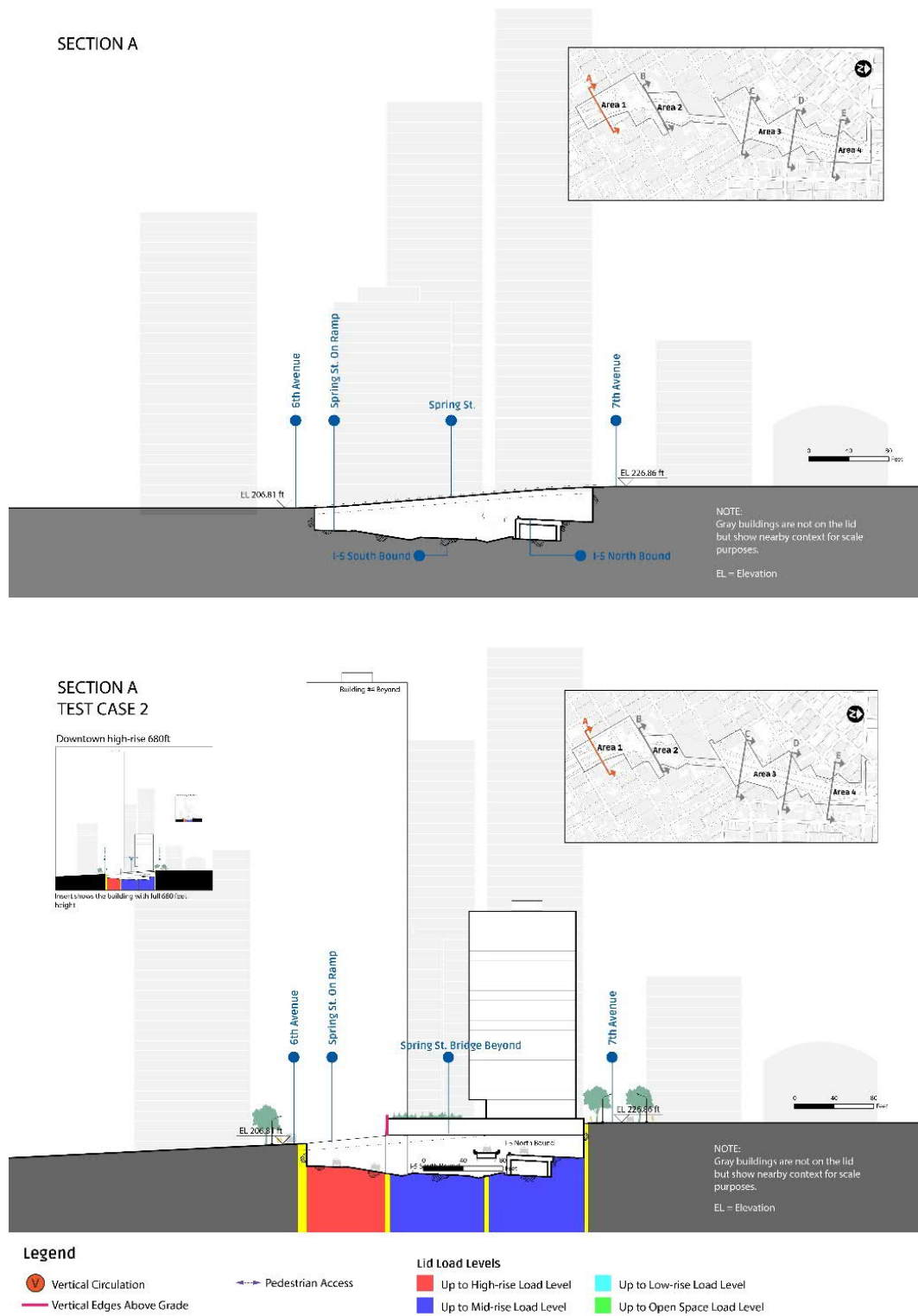


Figure 6-7. Area 1: Test Case 2 — Cross Sections Before and After Lidding



6.2.3 Area 1: Test Case 3

Test Case 3 would include a greater amount of open space along the east side, extending the green of Freeway Park to Madison Street. Without buildings on the east side, the lighter structure would allow the open space to be better integrated into the surrounding streets. Because of the difficulty of working around the existing Spring Street on-ramp, the west side of the block between Madison and Spring Streets would be left open to below, with a landscaped edge added.

Building 4 (Assumed Office Use): At 6th Avenue and Seneca Street, Building 4 would be a 400-foot-tall high-rise building to better fit in with the scale of the nearby buildings. It would keep the strategy of the at-grade opening for the Seneca Street off-ramp in order to have more built square footage. The building footprint and adjacent uses would make an office building appropriate for the site.

Open Space: New open space would be along the east side of Area 1. The box gardens would be removed to make the open space more usable. New landscaped edges would make the existing sidewalks much more pleasant for pedestrians, and the west side of 7th Avenue, now not pedestrian accessible, would be a landscaped path.

Connections: The landscaped edges would make the existing sidewalks much more pleasant for pedestrians, and the west side of 7th Avenue, now not pedestrian accessible, would be a sidewalk along the new buildings.

Figure 6-8. Area 1: Test Case 3

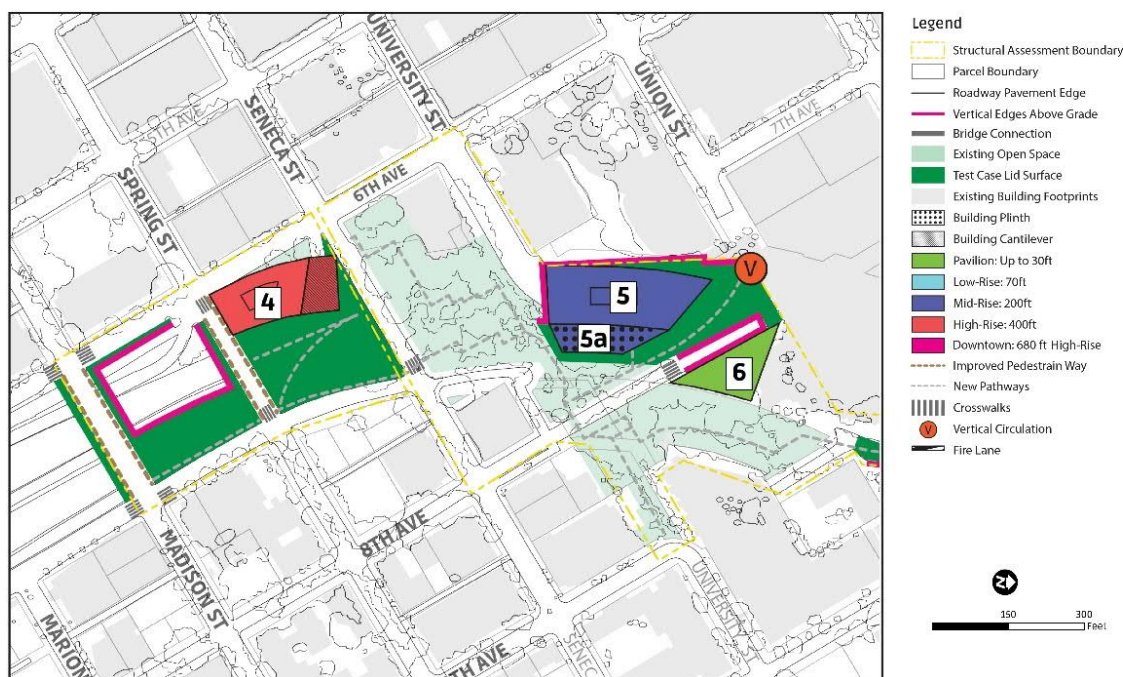
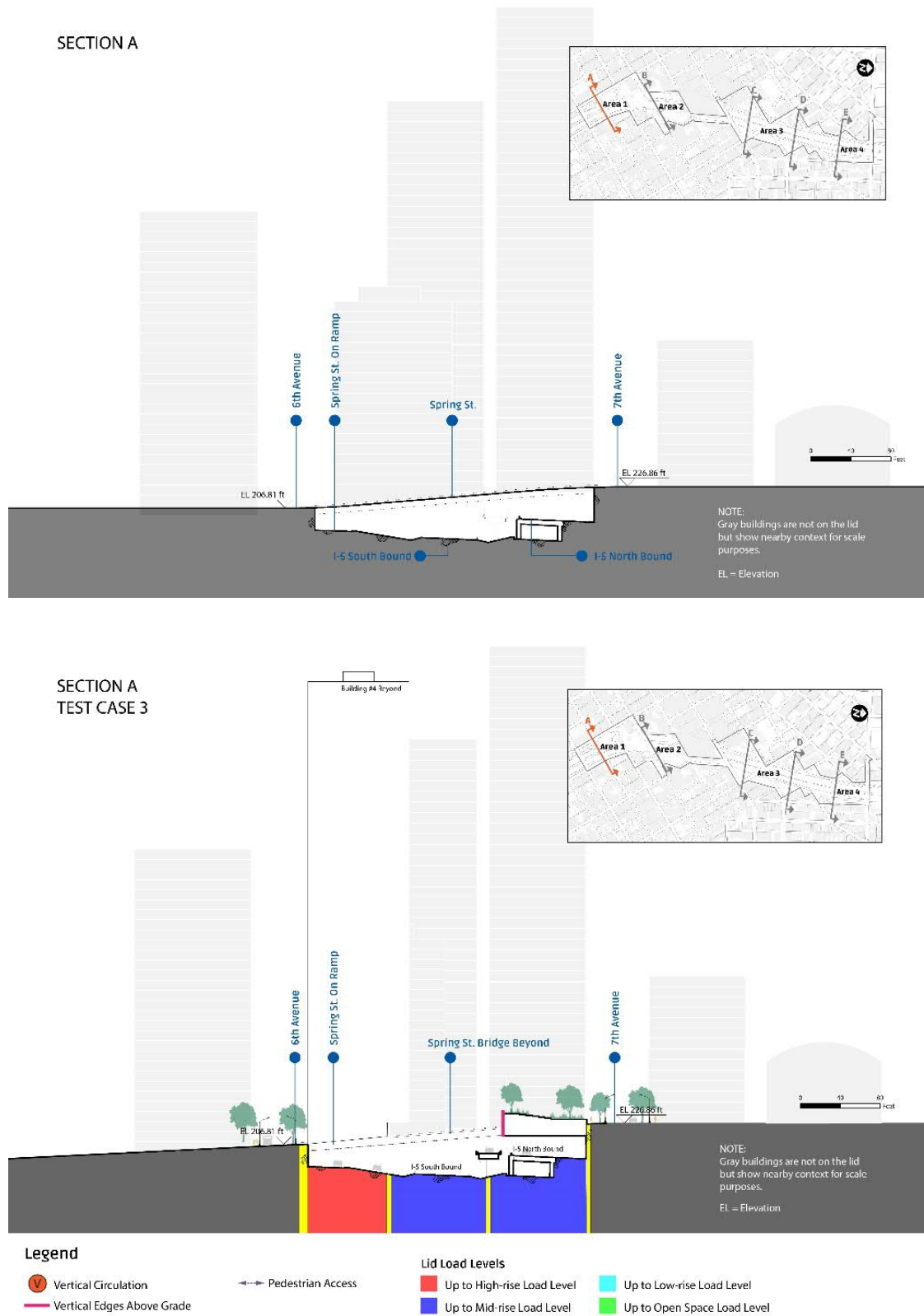


Figure 6-9. Area 1: Test Case 3 — Cross Sections Before and After Lidding



6.3 Area 2

Area 2 is Freeway Park and its surroundings; this area would ideally increase activity and usability to the existing park. New buildings on this potential section of lid may be more difficult to make financially viable.

Area 2 includes Freeway Park, the associated area adjacent to the WSCC, and the pedestrian connection to Pine Street along Hubble Place. The existing lid does not cover the freeway at two locations within Area 2, and these locations could be included in a new lid.

The western site is between the Union 1 and 2 buildings and Freeway Park. A building on this site could front on the area named as the Botanical Walk on the Finding Freeway Park map, adding activity to Freeway Park. The second site is a triangular shape that could be accessed from 8th Avenue as it slopes below the WSCC and activating the area named as the Back Yard on the plan.

The University Street northbound on-ramp affects Area 2 on the west side, making access to the site via University Street challenging. University Street continues to run adjacent to the ramp, providing service access to the Union 1 and 2 buildings, and potentially to a new building on Area 2. A lid could be built avoiding University Street ramp.

Freeway Park has many unique assets, but the lack of adjacent activity in some areas of the park make it less usable than it could be. Filling in the two existing openings with active uses could make the park increase its activity, especially on evenings and weekends.

Freeway Park is a historic site, and there will be landmark challenges with changes to the designated historic areas. Design would need to be sensitive to the edge conditions of the park in terms of structural integration, construction staging and landscape design.

Additional lidding could better connect this portion of downtown and First Hill, including ACT Theater and Town Hall. New buildings with active pedestrian-level uses could benefit from the increase in park use. All alternatives for Area 2 should improve pedestrian connections along the edge of the WSCC along Hubble Place that connects to Pike Street.

6.3.1 Size & Geometry

There are approximately 2.0 acres of developable area that could fill gaps in the existing Freeway Park lid.

6.3.2 Ramps

The northbound University Street ramp on the west side could be retained. The configuration at University Street would need to be studied in order to bring service access into a potential new building.

6.3.3 Structural Capacity

A maximum of mid-rise development could be supported.

6.3.4 Topography & Edges

Buildings would meet existing Freeway Park grade with active uses. Particularly for the site to the east, 8th Avenue would also be a point of connection, and would need to access the street as it slopes downward to the north below the WSCC.

6.3.5 Context

Mid-rise development could be compatible with Union Square buildings. Street level uses that could help activate the park are desirable. Shading impacts on Freeway Park should be considered.

6.3.6 Connectivity

Adding additional lid space to Freeway Park would increase usability of the existing park both in terms of recreation and connectivity. All options to Area 2 would consider improvements to the connection along the WSCC leading to Pike Street along Hubbell Place. Hubbell Place is part of the bicycle network, allowing cyclists to avoid riding through Freeway Park. A bridge across 8th Avenue is another potential connection if new buildings are built on Area 2.

Figure 6-10. Area 2: Existing Cross Section

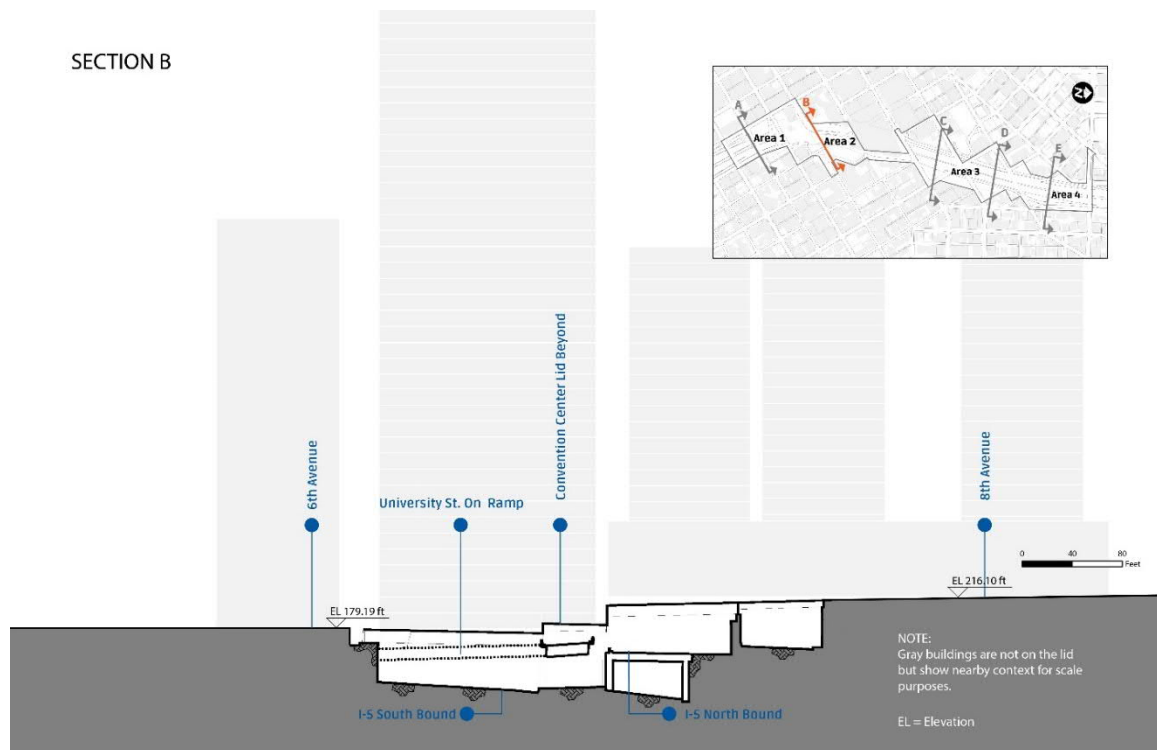


Figure 6-11. Area 2: Adjacent Land Uses

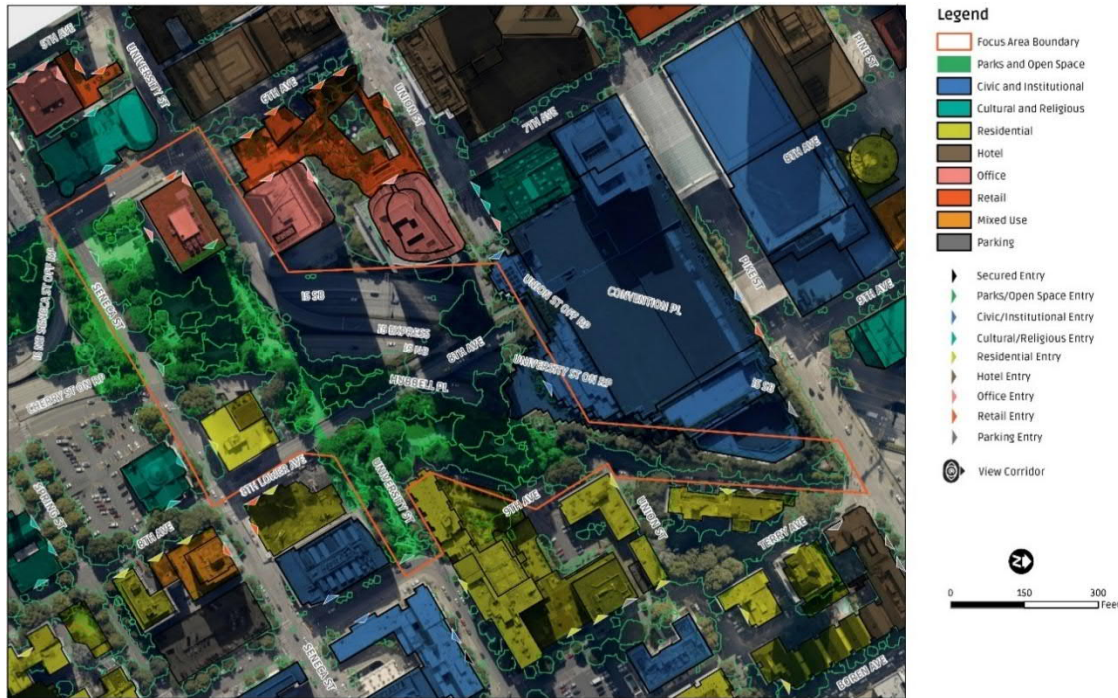


Figure 6-12. Area 2: Load Level Plan

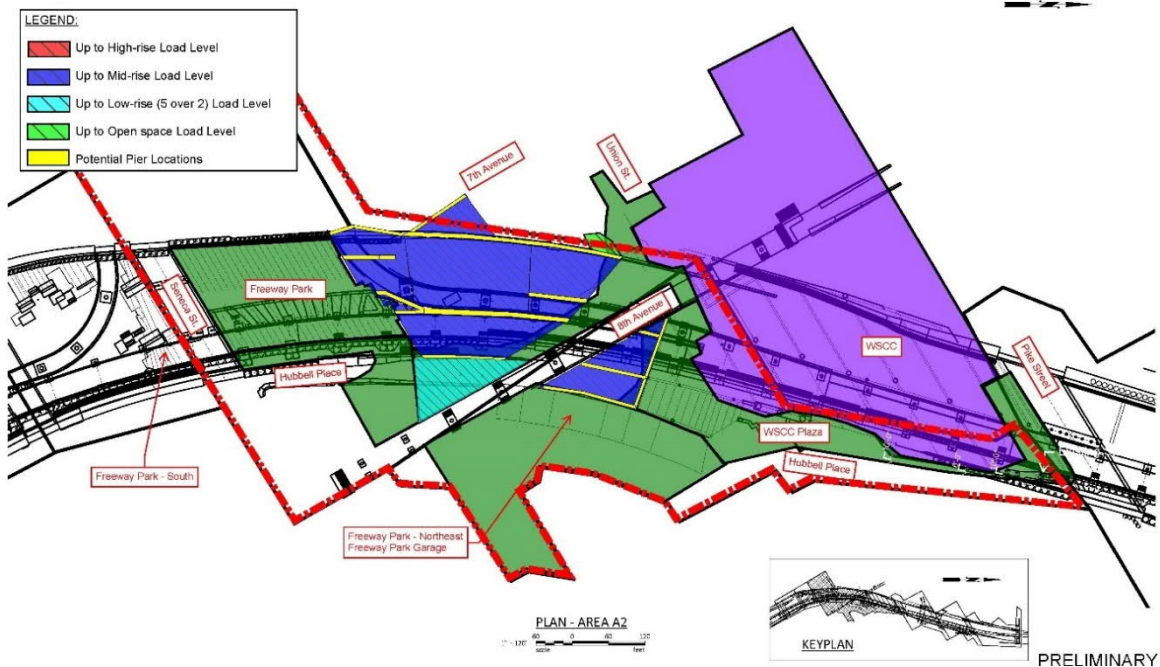
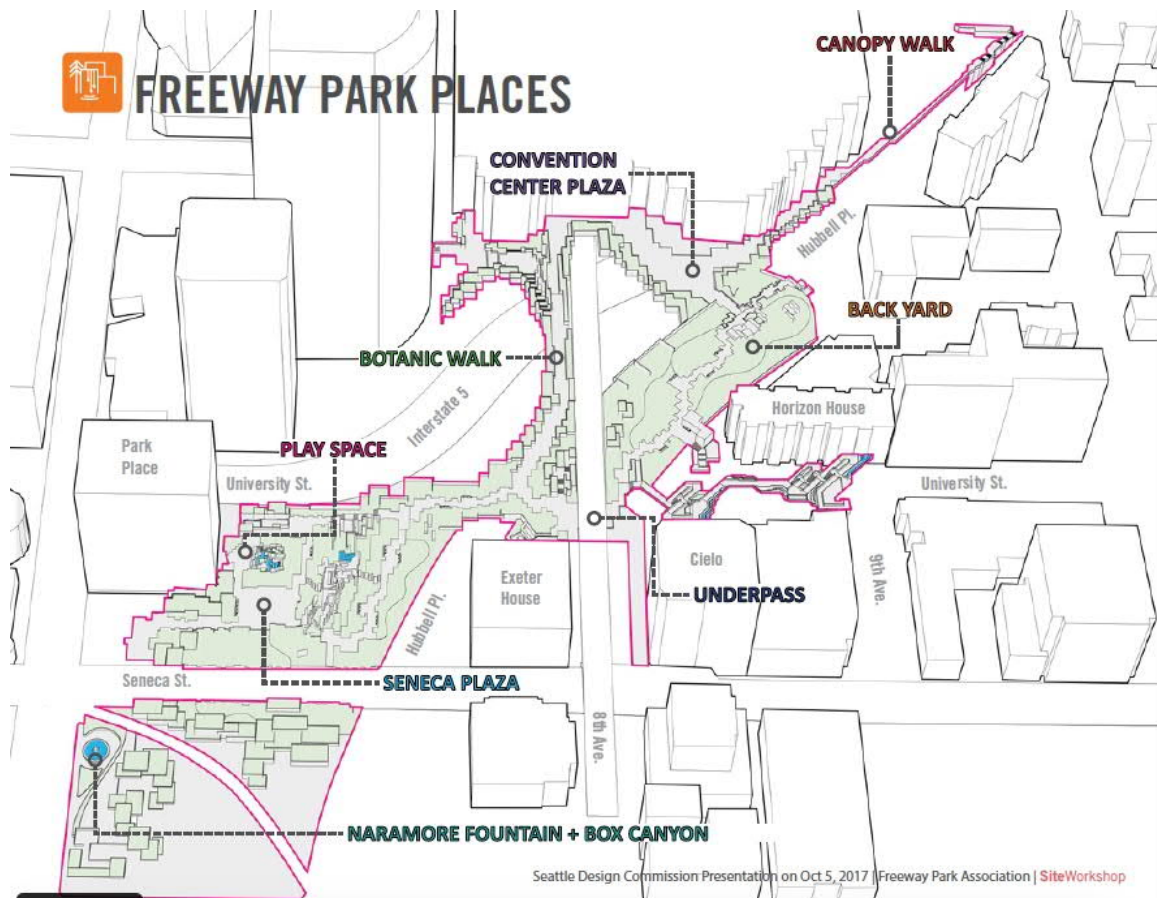


Figure 6-13. Area 2: Map of Freeway Park



6.4 Area 2: Test Cases

Most of Area 2 is the existing Freeway Park. A lid could fill in places not covered by Freeway Park between University Street and the Convention Center. The other addition to Area 2 is not a freeway lid, but is an extension of the pedestrian route that runs east of the WSCC, parallel to Hubble Place. This route is currently disconnected from any activities and can be perceived as unsafe.

6.4.1 Area 2: Test Case 1

In Test Case 1, the only change in Area 2 would be the improvement of the connection along the WSCC. The reason to not include a lid in Test Case 1's minimal scenario is both the challenge to lid this space, which as a park results in a sloped surface that would provide limited usability at a high cost per square foot.

Connections: The pedestrian route along the Convention Center, above Hubbell Place, would be improved, including better vertical circulation at Pike Street.

Figure 6-14. Area 2: Test Case 1

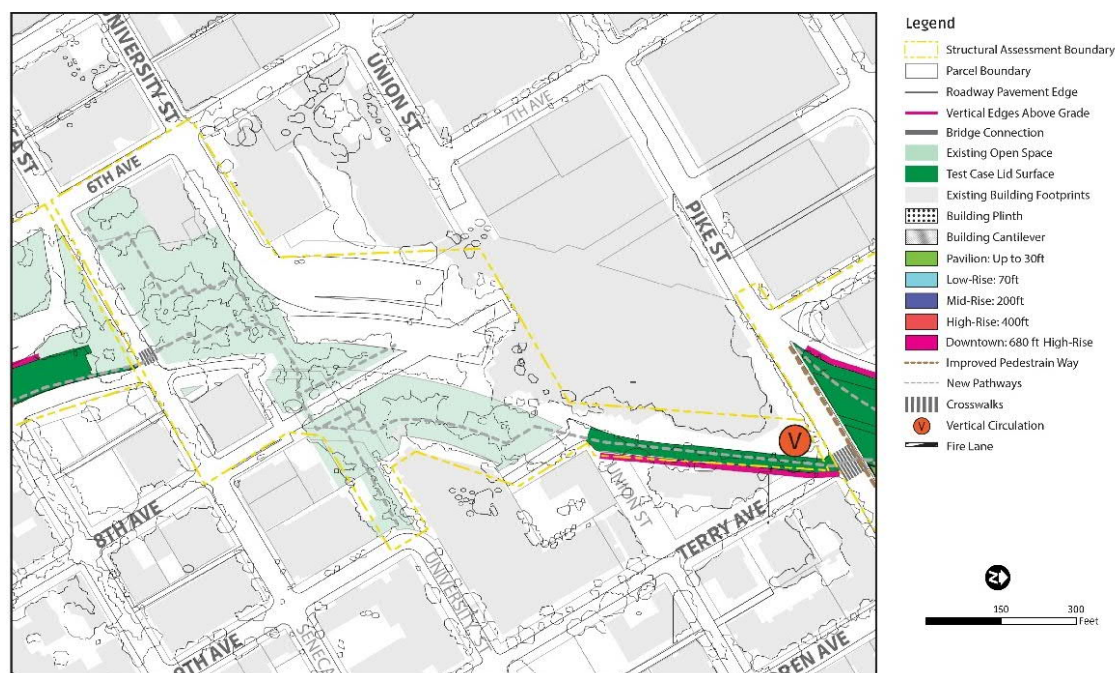
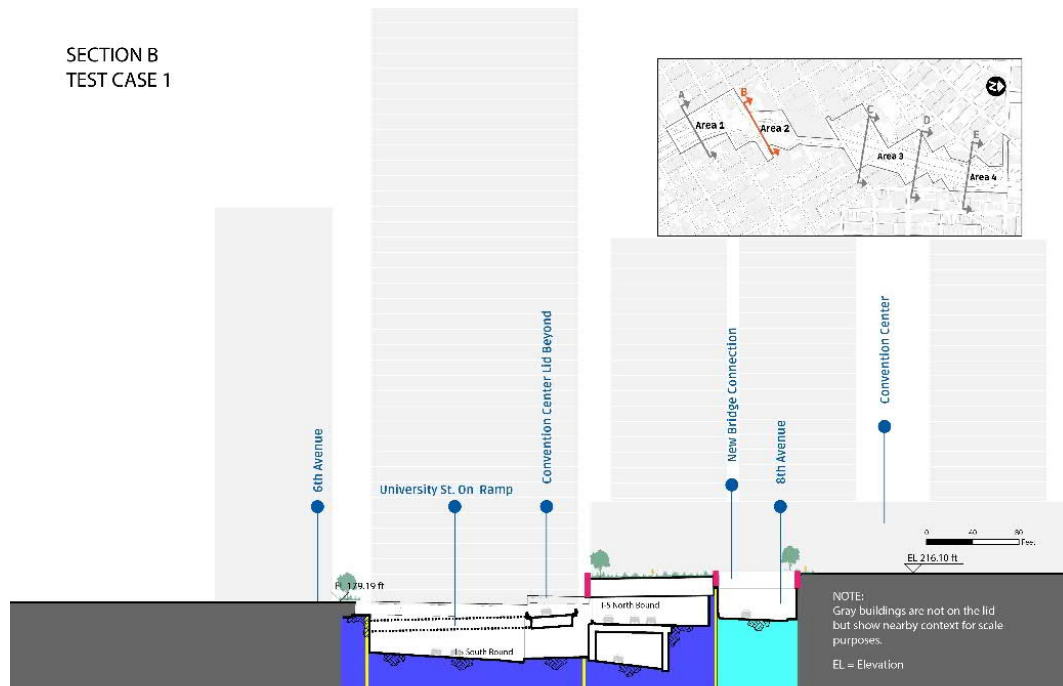
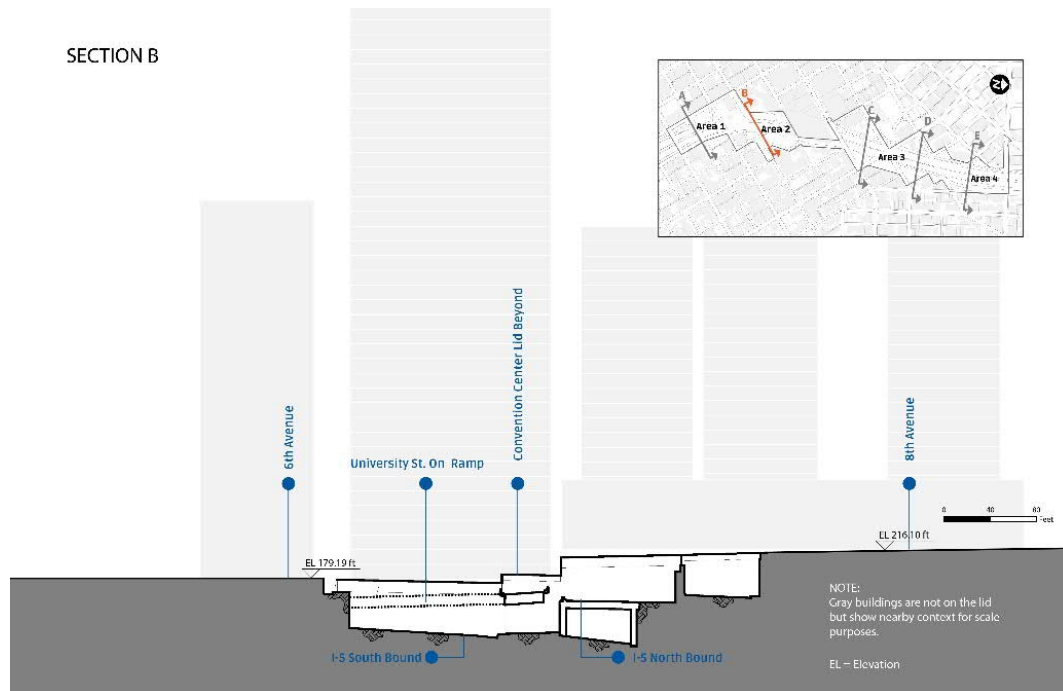


Figure 6-15. Area 2: Test Case 1 — Cross Sections Before and After Lidding



Legend

Vertical Circulation

Pedestrian Access

Vertical Edges Above Grade

Lid Load Levels

Up to High-rise Load Level

Up to Low-rise Load Level

Up to Mid-rise Load Level

Up to Open Space Load Level

6.4.2 Area 2: Test Case 2

The maximized vertical development scenario on Area 2 would include two buildings.

Building 5 (Assumed Office Use): The maximum structural capacity for this site would be mid-rise development, so Building 5 would be a 200-foot-high building. Building 5 would have a footprint large enough to be appropriate for office use. With its adjacency to the Union 1 and Union 2 office buildings, this site would be a good candidate for office use. A podium would help mitigate grade changes. The primary building entry would be on 8th Avenue, contributing activity to Freeway Park. Service access would be off of University Street; this would be a complicated area with the northbound freeway ramp, and service access would need additional study.

Building 6 (Assumed Hotel Use): This location would be well suited to a hotel, adjacent to the WSCC and would bring activity to Freeway Park. The primary entry would be from 8th Avenue, on the southern edge, which would be the highest point as the road descends below the WSCC.

Open Space: New open space could be created north of Building 5, managed along with the building. The design of Building 5 would add activity to increase usability of Freeway Park.

Connections: The pedestrian route along the WSCC, above Hubbell Place, would be improved, including better vertical circulation at Pike Street. A pedestrian route with vertical circulation would increase connectivity to the downtown street grid at Union Street. A sidewalk would connect Buildings 5 and 6 across 8th Avenue, and a landscaped “bridge” could connect them above the north end of 8th Avenue where it would descend below the WSCC.

Figure 6-16. Area 2: Test Case 2

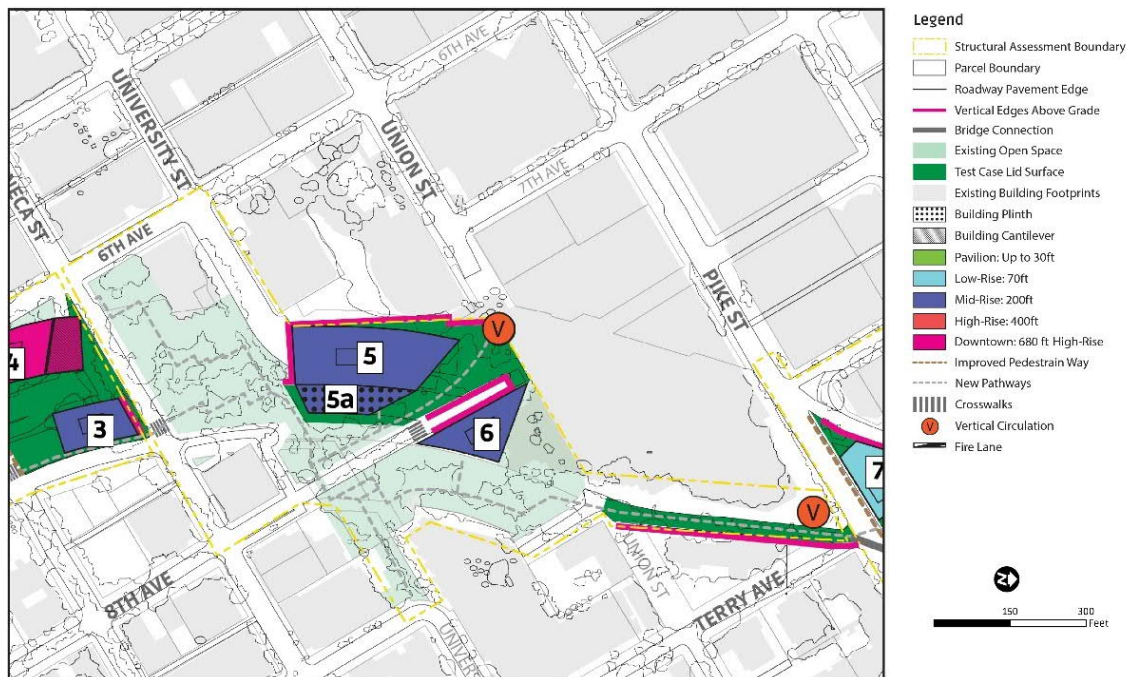
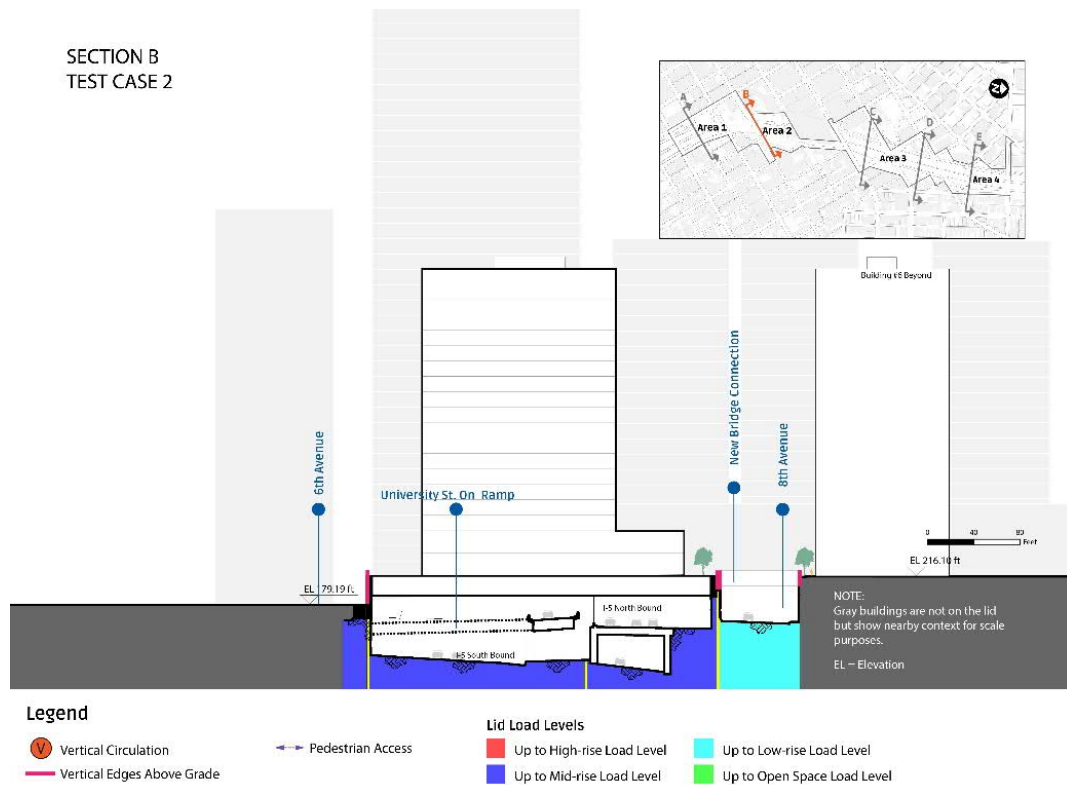
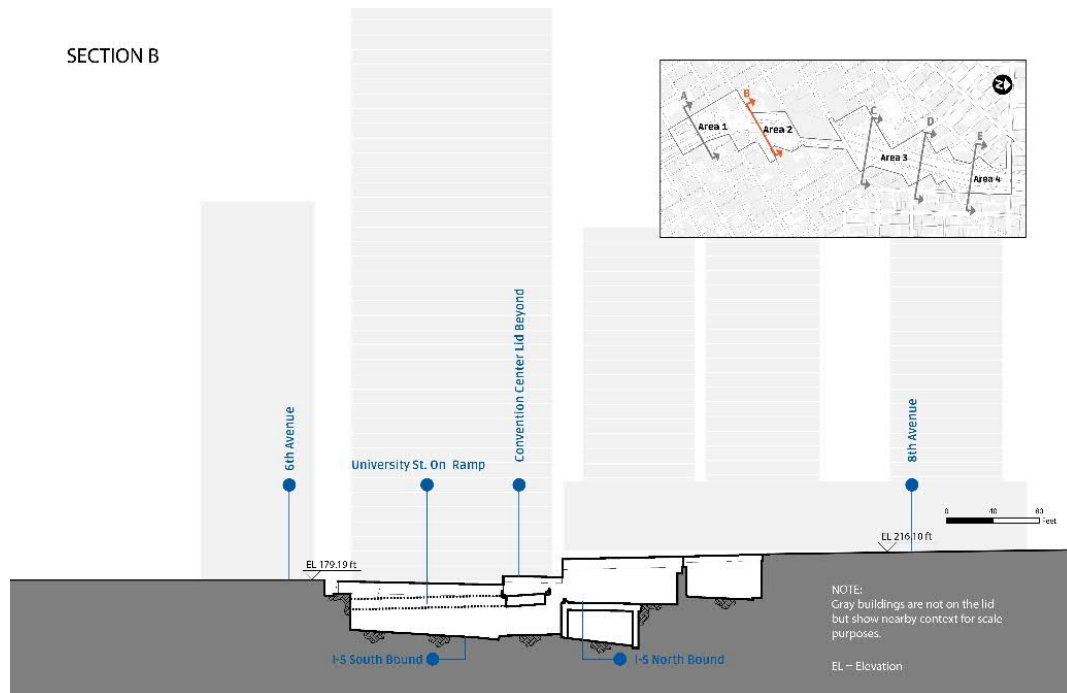


Figure 6-17. Area 2: Test Case 2 — Cross Sections Before and After Lidding



6.4.3 Area 2: Test Case 3

The Mid-Density Hybrid development scenario on Area 2 would include two buildings, one of which would be a pavilion.

Building 5 (Assumed Office Use): Building 5 would be the same for this scenario as Test Case 2. The maximum structural capacity for this site would be mid-rise development, so Building 5 would be a 200-foot-high building. Building 5 would have a footprint large enough to be appropriate for office use. With its adjacency to the Union 1 and Union 2 office buildings, this site would be a good candidate for office use. A podium would help mitigate grade changes. The primary building entry would be on 8th Avenue, contributing activity to Freeway Park. Service access would be off of University Street; this would be a complicated area with the northbound freeway ramp, and service access would need additional study.

Building 6 (Assumed Pavilion Use): A pavilion in this location could be a civic- or community-based use that would add activity to Freeway Park without the presence of a larger building. The primary entry would be from 8th Avenue, on the southern edge, which would be the highest point as the road descends below the WSCC.

Open Space: New open space would be created north of Building 5, managed along with the building. The design of Building 5 would increase activity in Freeway Park.

Connections: The pedestrian route along the WSCC, above Hubbell Place, would be improved, including better vertical circulation at Pike Street. A pedestrian route with vertical circulation would increase connectivity to the downtown street grid at Union Street. A sidewalk would connect Buildings 5 and 6 across 8th Avenue, and a landscaped “bridge” could connect them above the north end of 8th Avenue where it would descended below the WSCC.

Figure 6-18. Area 2: Test Case 3

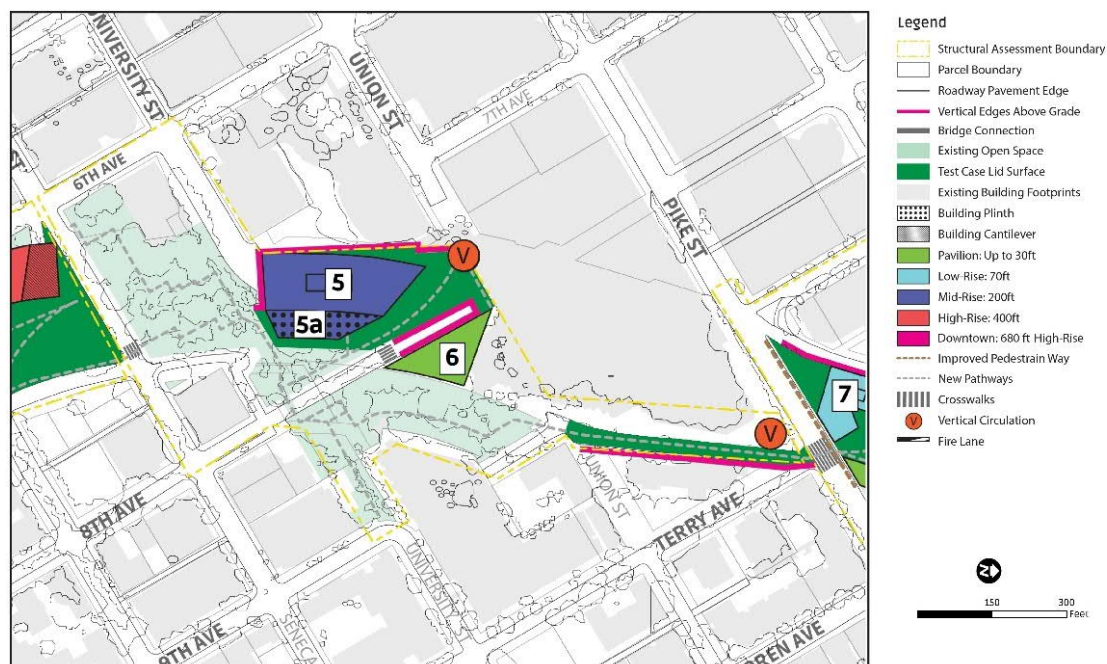
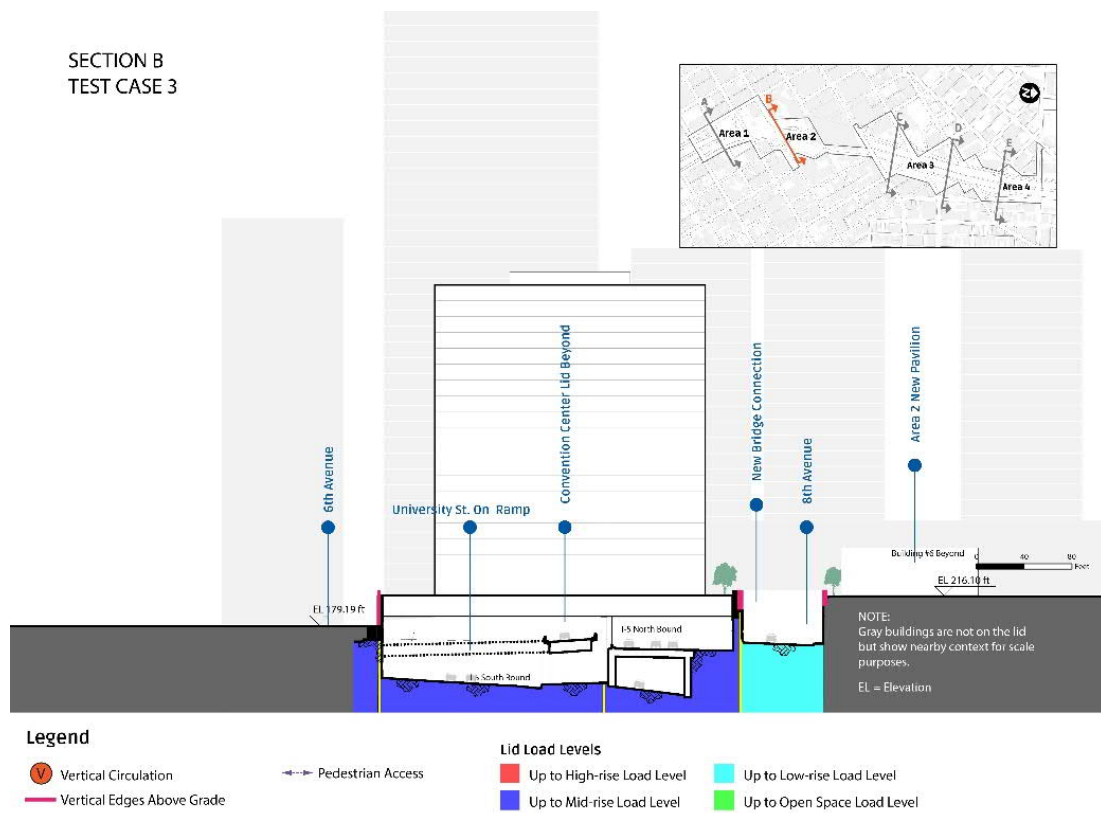
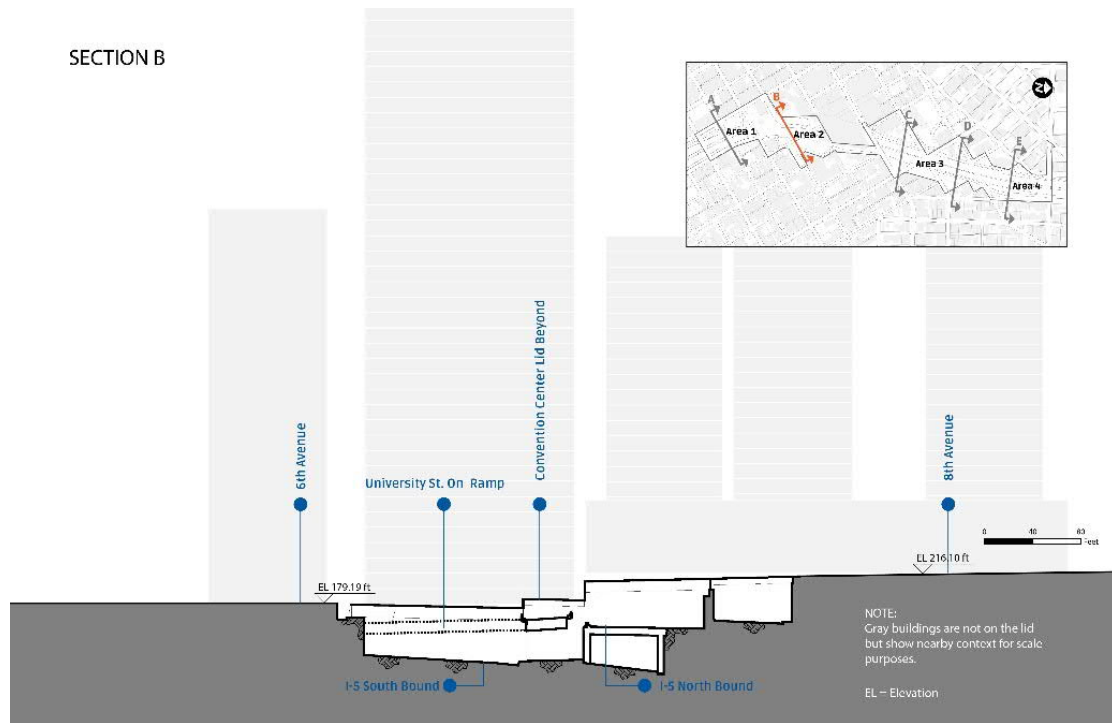


Figure 6-19. Area 2: Test Case 3 — Cross-Sections Before and After Lidding



6.5 Area 3

Area 3 would be a priority location for a lid because of the high level of activity along the Pike-Pine corridor.

Area 3 runs between Pike Street and Olive Way, with three segments separated by the intersection of Pine Street and Boren Avenue. Area 3 is in the area where the walk between the Downtown Retail Core and Capitol Hill is most accessible and comfortable, with relatively high pedestrian traffic.

On the east side are relatively small but notable open spaces—Plymouth Pillars Park and the off-leash dog park. These parks are proposed to stay in all cases.

A variety of uses on the east side include a hotel and mixed-use buildings. On the west side of Area 3, a triangular-shaped parcel owned by Sound Transit will accommodate transit-oriented development and adjoins the Paramount Theater. Plans for the WSCC expansion include an edge along Pine Street with active uses at street level.

The two potential lid areas in Area 3 are the strongest candidates for accommodating large park areas and reconnecting the urban fabric across I-5 because the location is already highly preferred by pedestrians and cyclists to cross I-5 between the Downtown Retail Core and Capitol Hill. Moreover, lidding Area 3 would complement the existing plans the City of Seattle has for the Pike-Pine Renaissance project to reconnect the waterfront and the Melrose Promenade. In addition, there is an opportunity to increase connectivity by creating new routes matching desire lines between Capitol Hill and South Lake Union, bridging the gap in the original street grid.

The central area of the two blocks over the freeway at the center of the study site has lower structural capacity (low- to mid-rise buildings) than the areas at the edges. Ramps include express lane ramps on the west side of Area 3, and the exit ramps to Olive Way on the east side. It would be possible to build over these ramps so long as there is clearance near street level.

A major open space would be appropriate on one or both of the blocks in Area 3 because of its location in an active area with high pedestrian and bicycle traffic. Pavilions could be used to activate an open space and mitigate topographic changes, and to potentially expand the existing small parks using a strategy similar to Fisher Pavilion at Seattle Center.

A higher level of development could also take advantage of the central location with high-rise buildings where possible and low-rise buildings holding the street edge and park edge with active uses.

6.5.1 Size & Geometry

Area 3 would be approximately 4.9 acres in the lid concept if the ramps remained and 6.4 acres in the lid concept if the ramps were removed. Most of the area is in two large blocks that are aligned with the downtown grid but skewed to the freeway direction and potential column lines of a potential lid. An additional triangular parcel is on the east corner of the intersection of Boren and Olive.

6.5.2 Ramps

An express lane ramp parallels the west edge of Area 3, connecting to the street grid at 9th Avenue and Pike Street. This ramp could be retained with development above if space was left for vehicular ingress and egress. On the west side, the Olive Way off-ramp brings vehicles onto eastbound Olive Way. The connection of the off-ramp and Olive Way is a challenging pedestrian environment. The ramp could remain with development as long as design allows for space for motor-vehicle traffic.

6.5.3 Structural Capacity

Relatively narrow strips of terra firma are capable of supporting high-rise development along the eastern edge of Area 3. Between these opportunities for high-rise zones, most of the southern block of Area 3 would support only low-rise. The interior of the northern block could support mid-rise development.

6.5.4 Topography & Edges

The site slopes from east to west with an approximate 33-foot change in elevation. This topography change could be addressed with a building on the east side or with landscape elements such as planted areas and constructed planters like those on Seneca Street along Freeway Park.

6.5.5 Connectivity

Pike Street is one of most heavily used pedestrian routes between Capitol Hill and the Downtown Retail Core, with pedestrian volumes of 1,000 people per hour on a weekday afternoon (City of Seattle. 2018. [Pedestrian Counts]. Unpublished raw data). Steps from the main level of Freeway Park lead down to Pike Street at Hubbell Place, but these steps do not land on an area where Pike Street can be safely crossed, inducing a pedestrian desire line. Boren Avenue presents a less comfortable pedestrian environment with a steeper slope and high motor-vehicle traffic volumes.

Pedestrian and bicycle connectivity improvements are underway on Pike and Pine Streets via the Pike + Pine Renaissance project.

The north-south human-scale connection through Freeway Park is not easily continued to the north through Area 3 because of the orientation of the street grid. There is an opportunity to continue north-south pedestrian and bicycle routes through new open space, but connections mid-block at the street level are more problematic. At the key intersection of Pike Street and Hubbell Place, there could be an opportunity to address the pedestrian and bicycle desire line through a “skybridge” with an upper-level building-integrated pedestrian and/or bicycle connection to Freeway Park above Pike Street.

Figure 6-20. Area 3: Existing Cross Section between Pike and Pine Streets

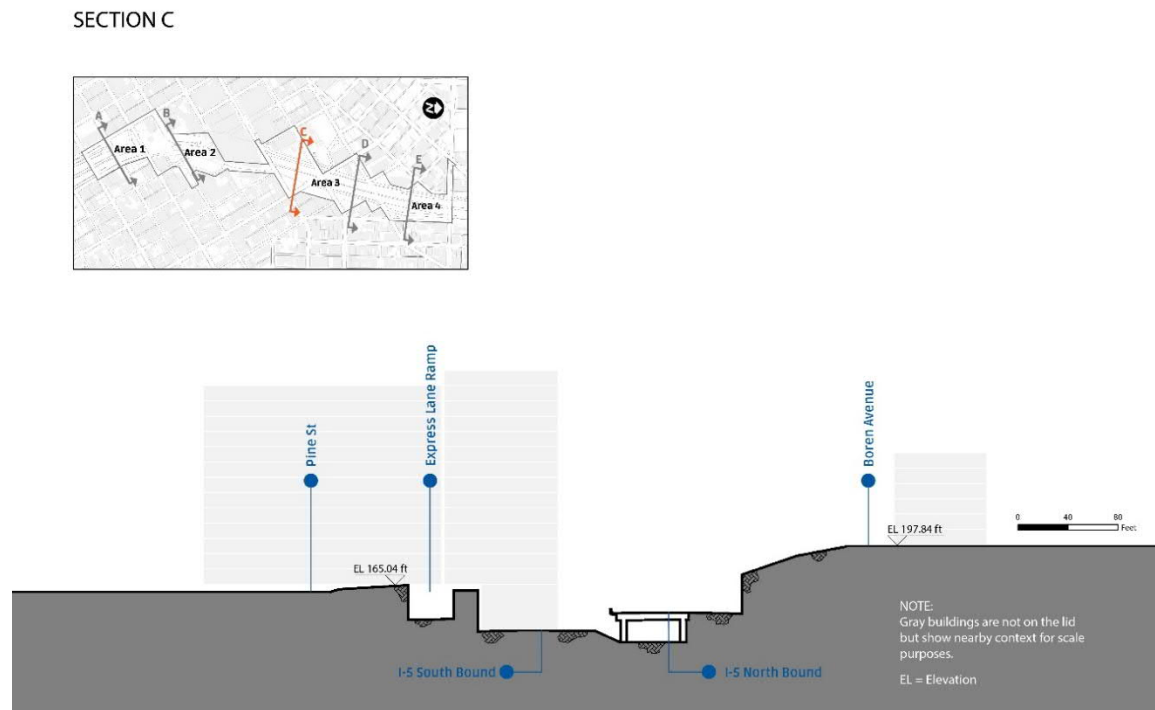


Figure 6-21. Area 3: Existing Cross Section between Pine Street and Olive Way

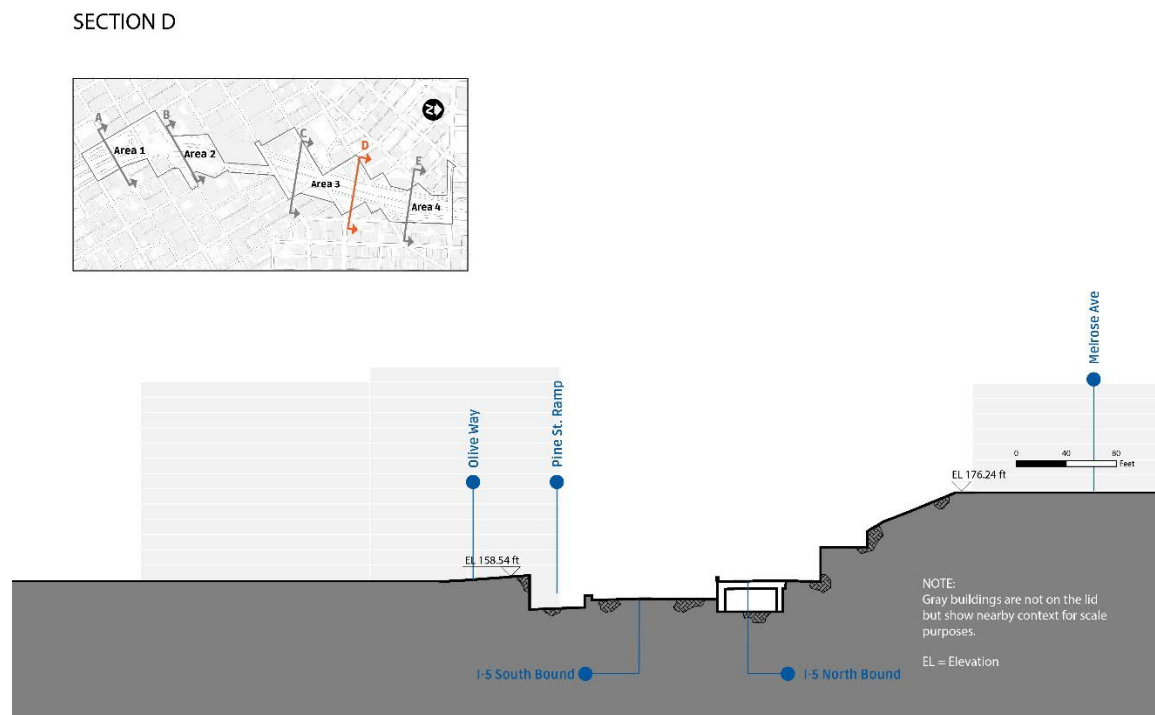
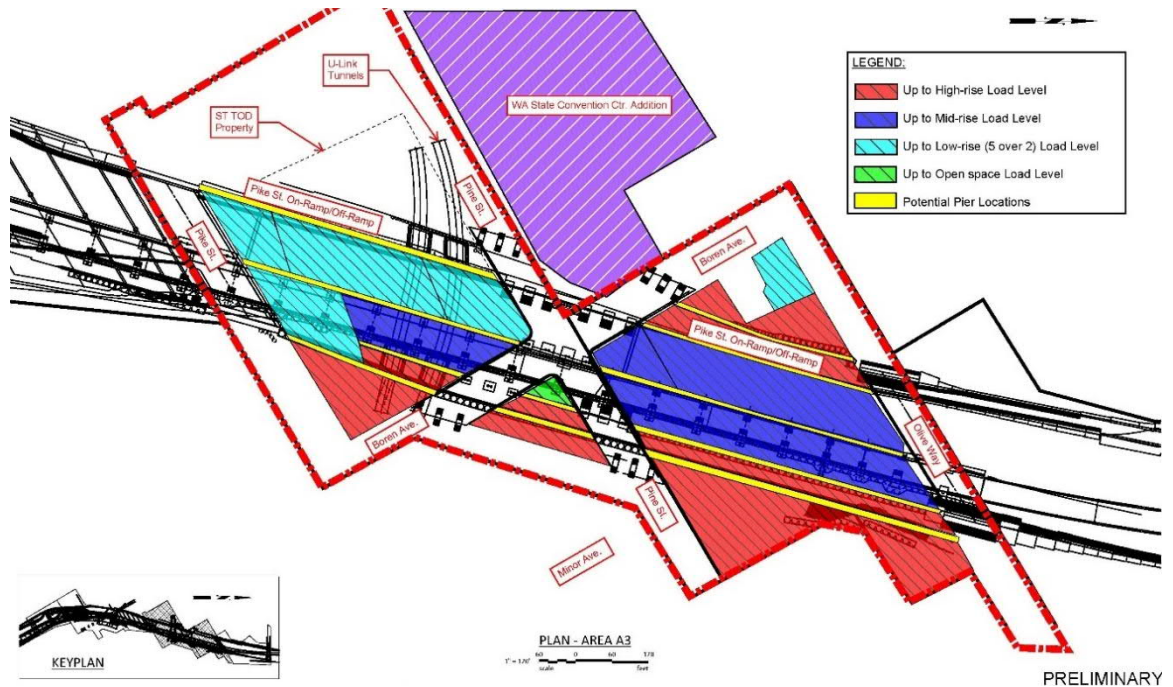


Figure 6-22. Area 3: Adjacent Uses



Figure 6-23. Area 3: Load Level Plan



6.6 Area 3: Test Cases

6.6.1 Area 3: Test Case 1

In Area 3, the minimum development scenario would create major public open spaces, with grade changes taken up by pavilions on the east side of the site. The pavilions can extend the adjacent grade to the west at a roof level, overlooking downtown. The lower level could open up to the park level, offering indoor space adjacent to green space in a similar way to Fisher Pavilion at Seattle Center.

Open Space: Large open spaces would be on the two blocks diagonally across the intersection of Pike Street and Boren Avenue from one another. These could be designed to be flexible spaces with flat areas and possibly a tiered area that could be used as an outdoor amphitheater. The green roofs of the podiums would extend Plymouth Pillars Park and the area with the existing off-leash dog park.

A major open space would be appropriate on one or both of the blocks in Area 3 because of its location in a very active area of the city. Pavilions could be used to activate an open space and mitigate topographic changes and potentially expand the existing small parks on the east side by using the strategy used at Fisher Pavilion with a roof terrace and lower space connected to park space.

Connections: These open spaces would offer various possibilities to increase connectivity for pedestrians and bicycles. Some potential pathways are indicated on Figure 6-24.

Figure 6-24. Area 3: Test Case 1

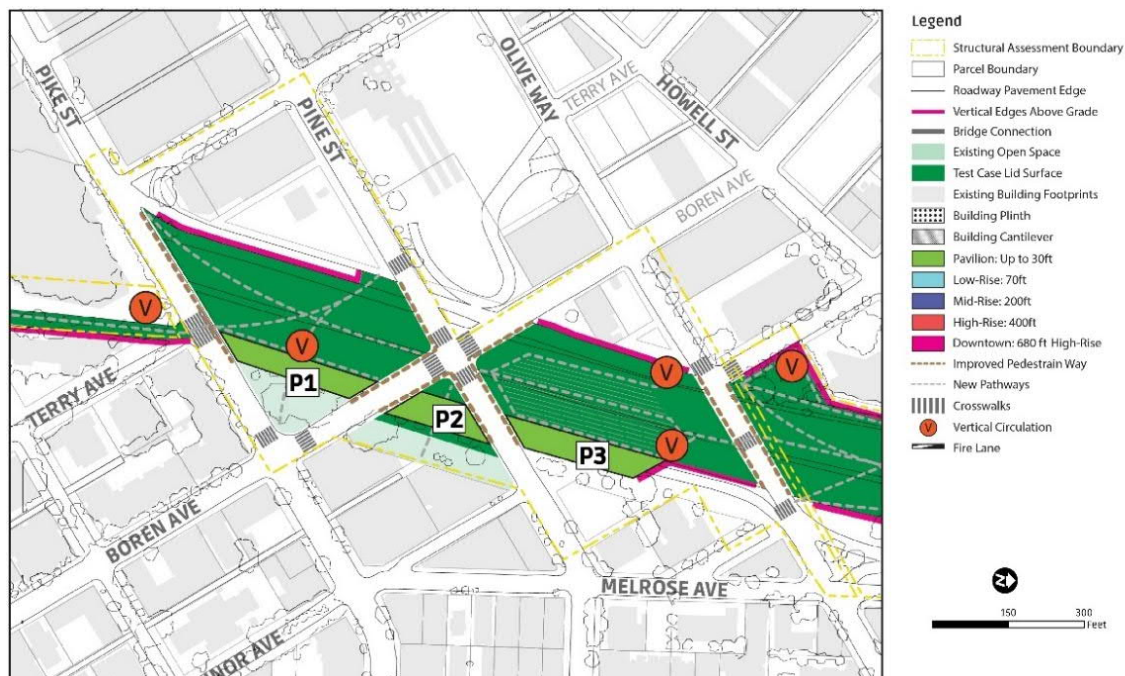
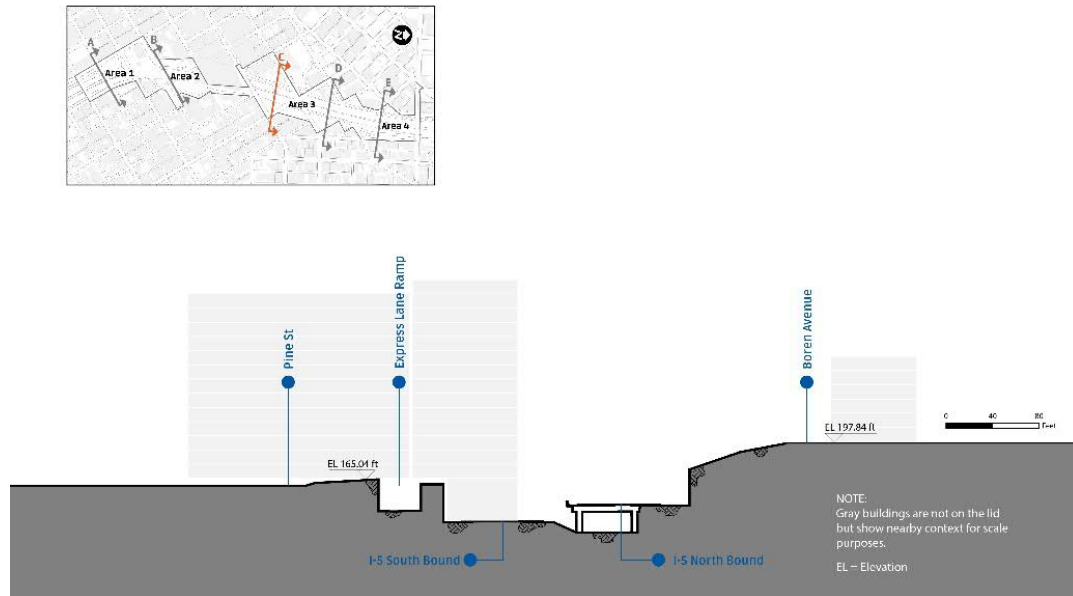


Figure 6-25. Area 3: Test Case 1 — Cross-Sections Before and After Lidding for the Block between Pike and Pine Streets

SECTION C



SECTION C TEST CASE 1

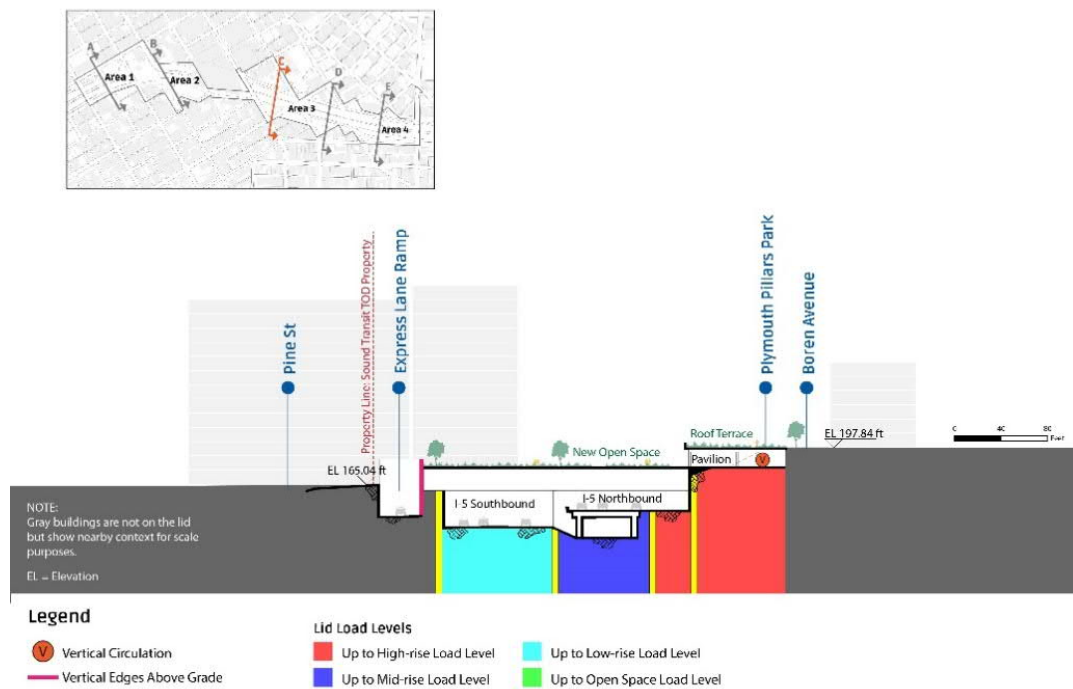
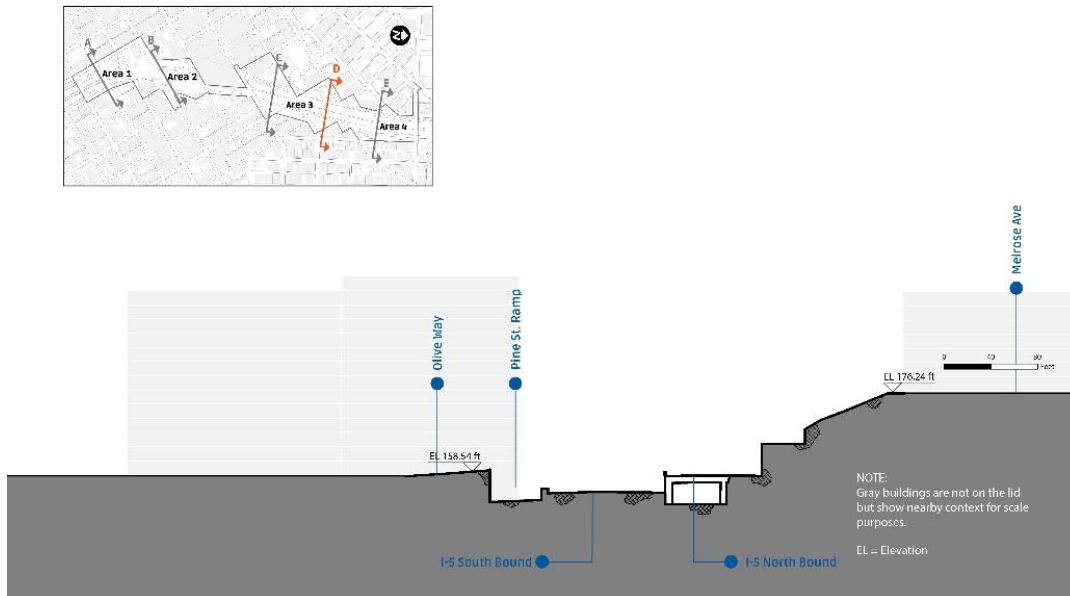
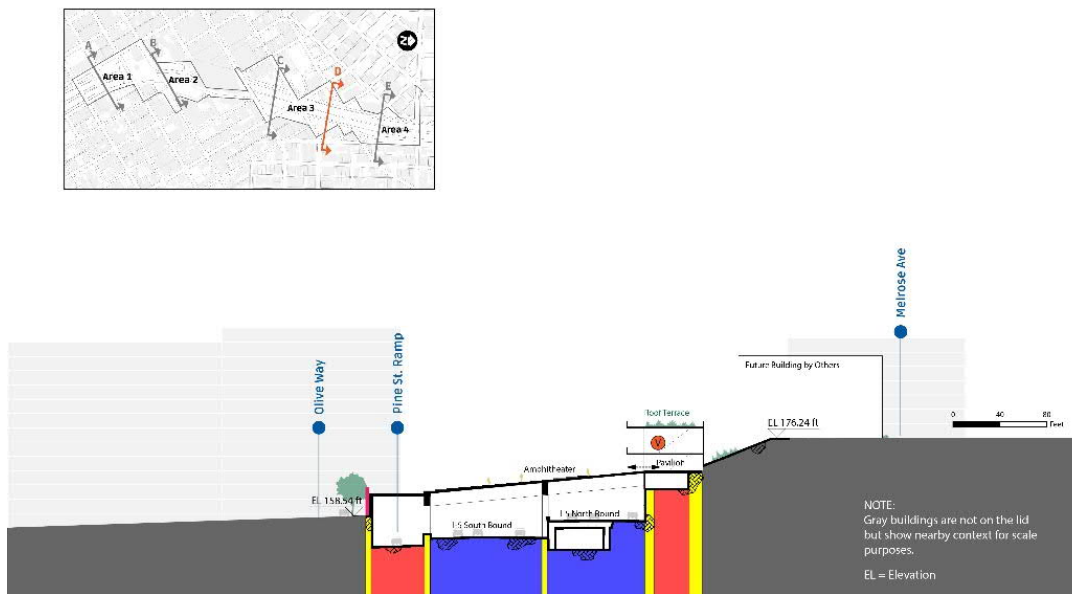


Figure 6-26. Area 3: Test Case 1 — Cross-Sections Before and After Lidding for the Block between Pine Street and Olive Way

SECTION D



SECTION D TEST CASE 1



Legend

- Vertical Circulation
- Vertical Edges Above Grade

Pedestrian Access

Lid Load Levels

- Up to High-rise Load Level
- Up to Mid-rise Load Level
- Up to Low-rise Load Level
- Up to Open Space Load Level

6.6.2 Area 3: Test Case 2

Test Case 2 would include dense development that would reflect the structural capacity of the lid.

Buildings 7 and 8 (Assumed Residential Use): Buildings 7 and 8 would be low-rise buildings because the structural capacity would allow only low-rise construction. The buildings would be residential, with narrow footprints (approximately 70 feet), which is typical of residential buildings with units arranged on a double-loaded corridor.

Building 9 (Assumed Residential Use): Building 9 would be a high-rise building with a podium on the west side to mitigate the change in grade. Residential use with retail at grade and in the podium is assumed because of its adjacency to Capitol Hill and the fairly small footprint.

Building 10 (Assumed Residential Use): Building 10 would be on a small triangular parcel adjacent to the existing dog park. Because it would be on terra firma, a high-rise structure would be possible. Its narrow footprint and adjacent residential would make it well suited for residential use.

Buildings 11 and 12 (Assumed Office Use): Buildings 11 and 12 would be on an area with structural capacity for mid-rise buildings and would be 200-foot high buildings. Building 11 could be accessed from Pike Street and/or Boren Avenue. Building 12 would be challenged by grade conditions along Olive Way, but could have primary entries via the east end of the building on Olive Way or off the open space via Pine Street. Both buildings would have larger footprints suitable for office use.

Open Space: Green spaces created in this test case would be privately owned and managed, but generally open to the public.

Connections: New connections could be made between Pike and Pine Streets, and between Pine Street and Olive Way. Vertical circulation could improve accessibility and ease of negotiating the hill. New connections would include a skybridge from the Freeway Park/WSCC route across Pine Street. This bridge would connect into the podium level of Building 9.

Figure 6-27. Area 3: Test Case 2 with the Olive Way Ramp Retained

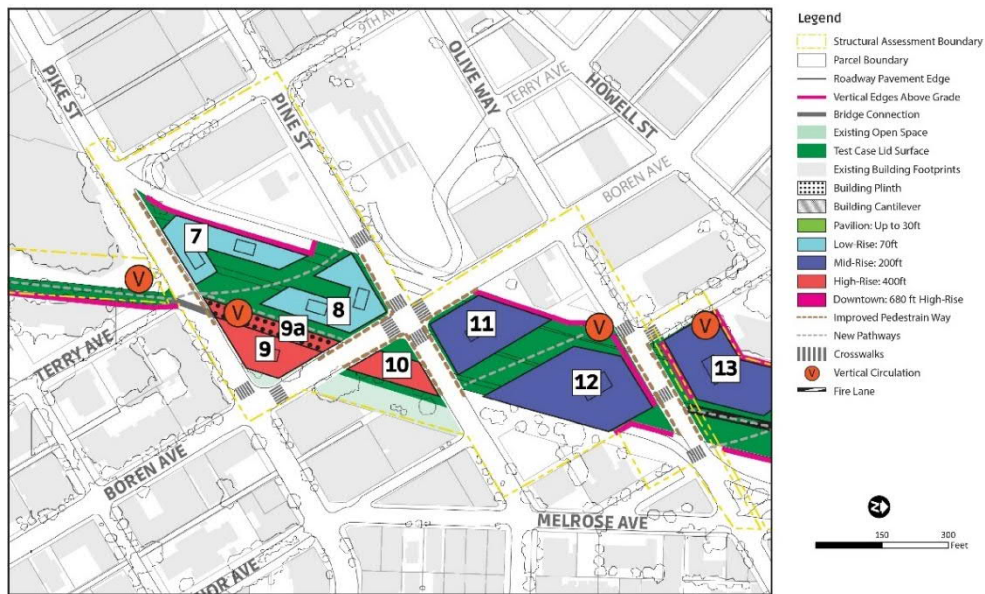


Figure 6-28. Area 3: Test Case 2 — Cross Sections Before and After Lidding for the Block between Pike and Pine Streets

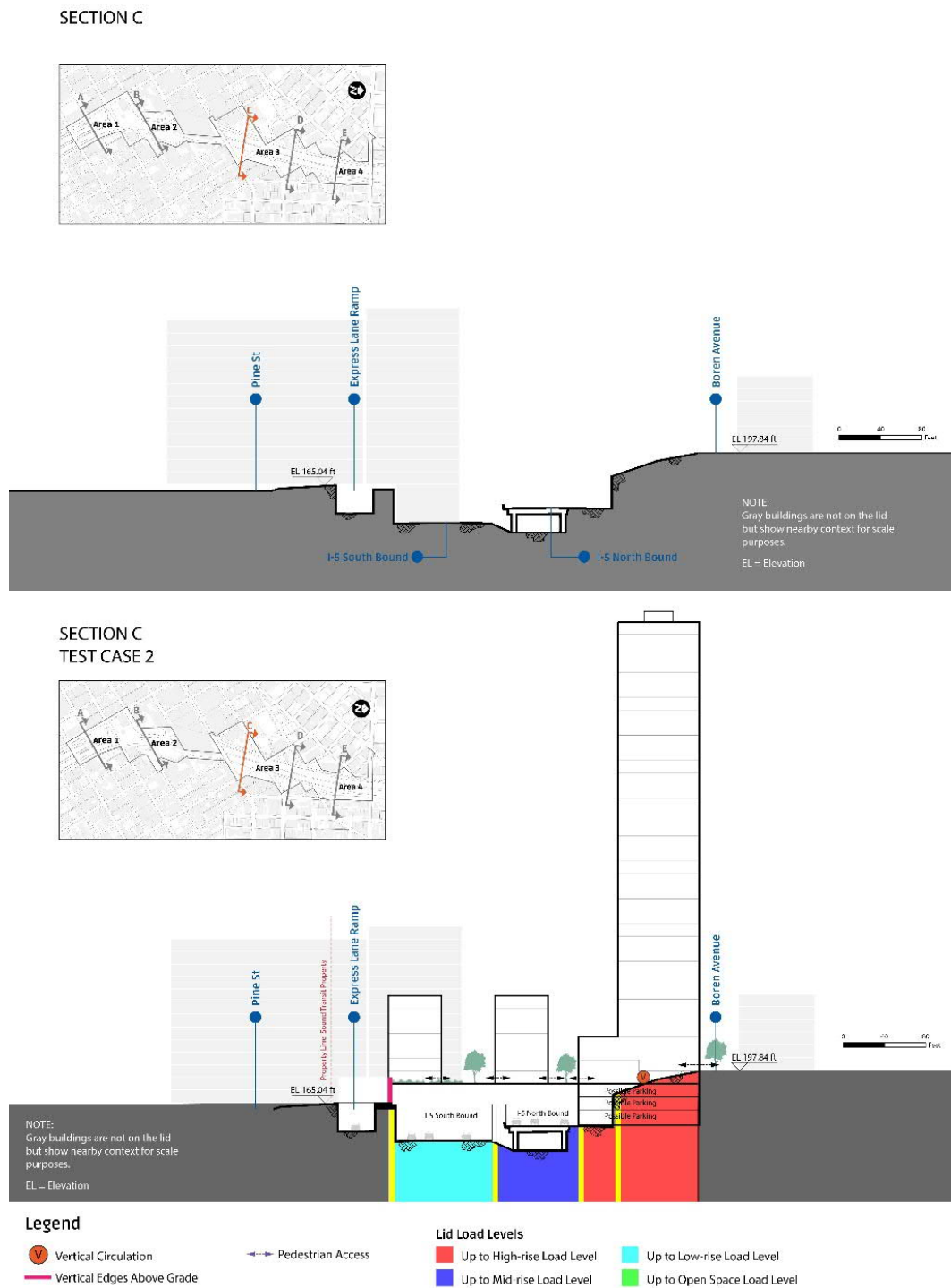
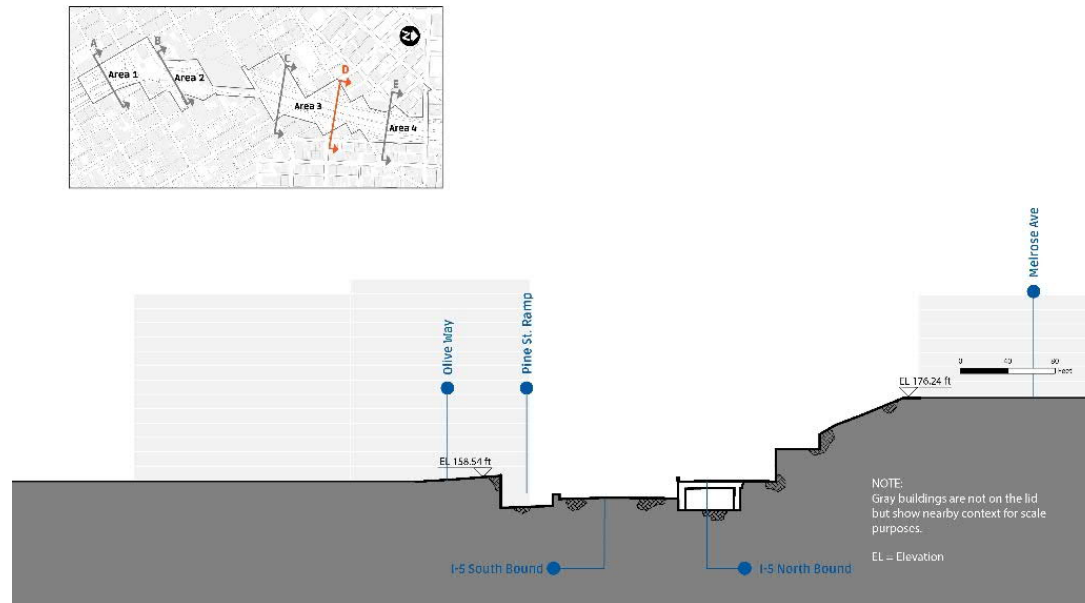
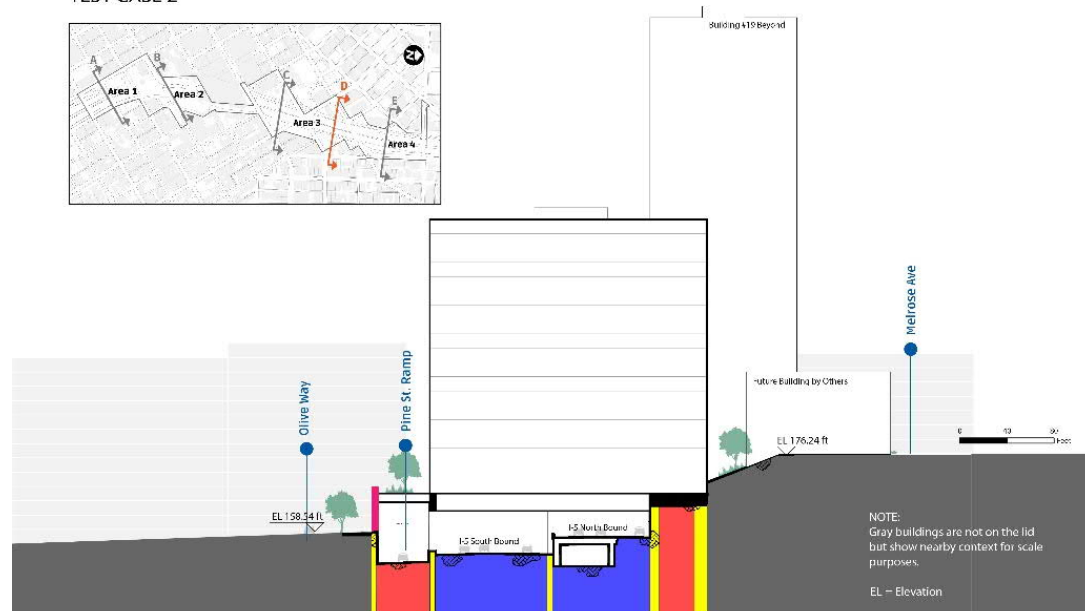


Figure 6-29. Area 3: Test Case 2 — Cross Sections Before and After Lidding for the Block between Pine Street and Olive Way

SECTION D

SECTION D
TEST CASE 2

Legend

- Vertical Circulation
- Vertical Edges Above Grade

- Pedestrian Access

Lid Load Levels

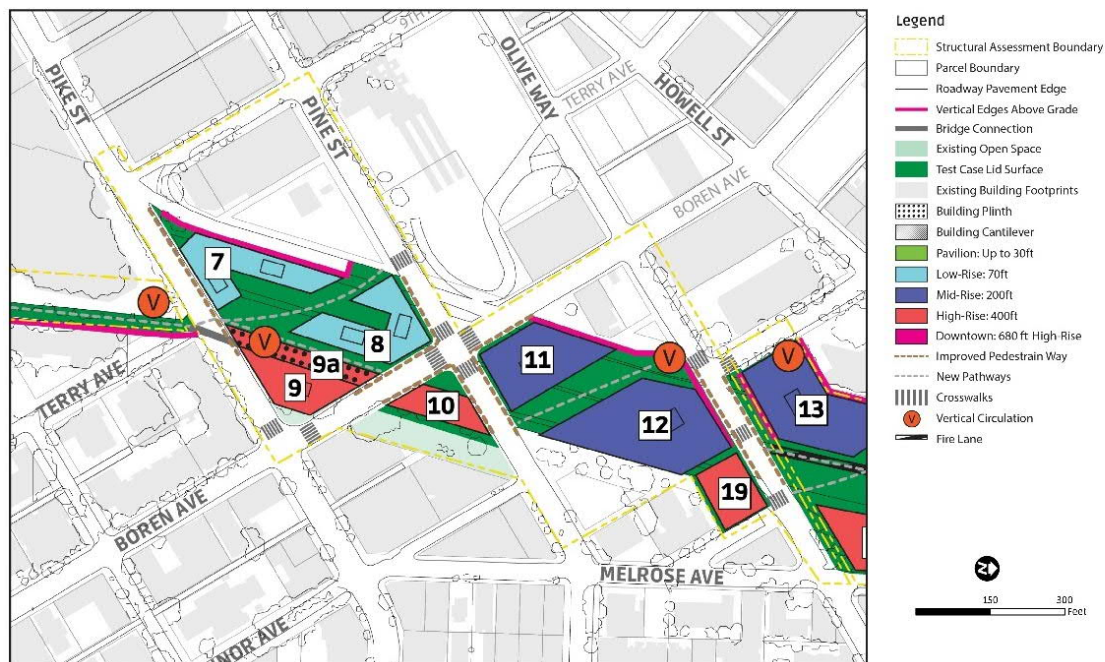
- Up to High-rise Load Level
- Up to Low-rise Load Level
- Up to Mid-rise Load Level
- Up to Open Space Load Level

6.6.3 Area 3: Test Case 2 with Olive Way Ramp Removed

A version of Test Case 2 was considered with the Olive Way ramps removed, which would allow three additional buildings and additional connecting routes. Building 19 would be within Area 3.

Building 19 (Assumed Residential Use): Building 19 would be on the corner of Olive Way and Yale Avenue on a relatively small site with soil below. Building on the soil would allow for a high-rise building. A 400-foot high-rise building is assumed because of the adjacency to Capitol Hill rather than downtown, where a 680-foot high-rise building would be acceptable. Building 19 would be residential because of the relatively small footprint along available soil below, and proximity to the more residential Capitol Hill neighborhood.

Figure 6-30. Area 3: Test Case 2 with Olive Way Ramp Removed



6.6.4 Area 3: Test Case 3

Test Case 3 Mid-Density Hybrid assumes a development intensity-level between Test Cases 1 and 2, with a mix of civic- and open space and buildings that can activate the space and provide housing on Area 3.

Buildings 7 and 8 (Assumed Residential Use): Buildings 7 and 8 would be low-rise buildings because the structural capacity would allow only low-rise construction. They would be smaller than in Test Case 2, with open spaces between the two buildings and along Pike Street. The buildings would be residential, with narrow footprints (approximately 70 feet), which are typical of residential buildings with a double-loaded corridor.

A Pavilion (Civic Use) would be in place of Building 9. A pavilion in this location would extend Plymouth Pillars Park, offering a public viewpoint and vertical circulation to the open space. The pavilion would have civic or community-based uses on the open space level, similar to Fisher Pavilion at Seattle Center.

Building 10 (Assumed Residential Use): Building 10 would be on a small triangular parcel adjacent to the existing dog park. Although the structural capacity would allow for a high-rise building, a mid-rise building (200 feet high) would be more compatible with the adjacent scale of Capitol Hill. Its narrow footprint and adjacent residential would make it well suited for residential use.

Building 20 (Assumed Residential Use): Building 20 would be a mid-rise building that would mitigate the grade along Olive Way and would anchor the large open space with activity. The size of the footprint would be most appropriate for residential use.

A Pavilion (Civic Use) would be on the east edge of the site north of Pine Street. The pavilion would be integrated with the lid's open space on the lower level with a roof deck above with views to the west for the public. The pavilion would have civic or community-based uses on the open space level.

Open Space: Two large open spaces on Area 3 would be separated by the intersection of Pine Street and Boren Avenue. These two open spaces would be flexible, civic-scale open space. The northern open space, between Pine Street and Olive Way, could be sloped for use as an outdoor amphitheater. The open spaces would have discontinuous edges on the west side because of the reversible lane ramp and topographic challenges.

Connections: New connections could be made between Pike and Pine Streets, and between Pine Street and Olive Way. Vertical circulation could improve access and ease of negotiating the hill. The experience of walking on sidewalks would be vastly improved with landscaping and urban edges; noise and air pollution would also be reduced.

Figure 6-31. Area 3: Test Case 3 with Olive Way Ramp Retained

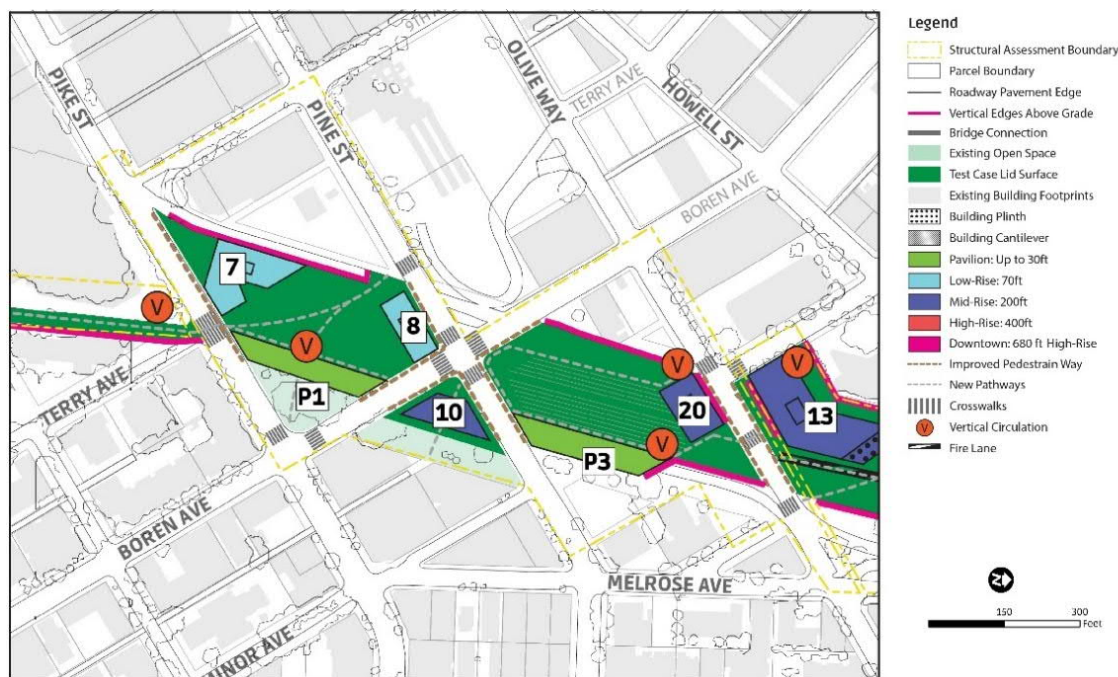
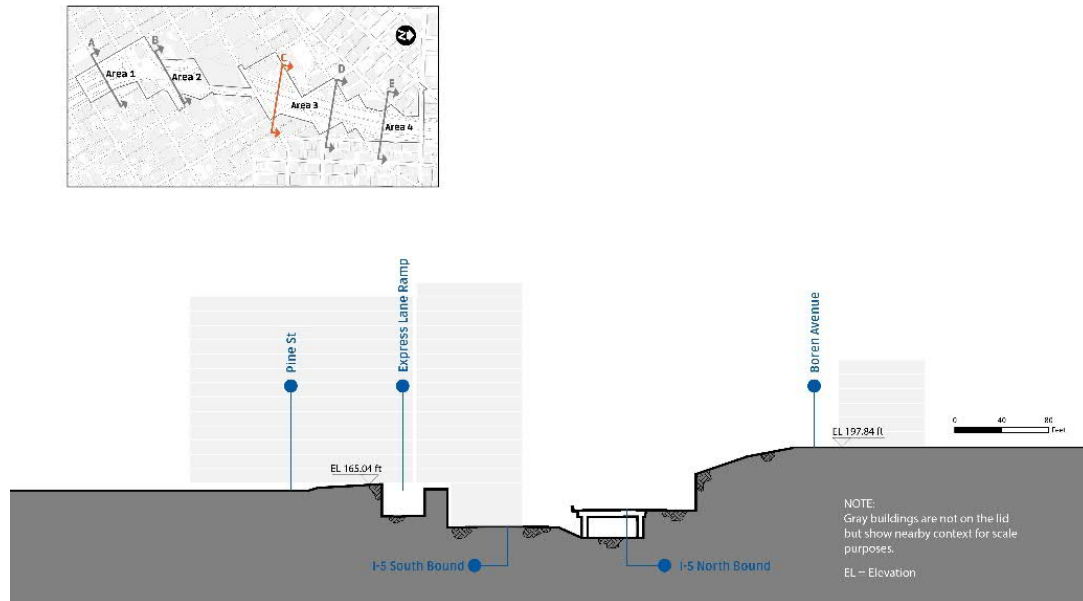
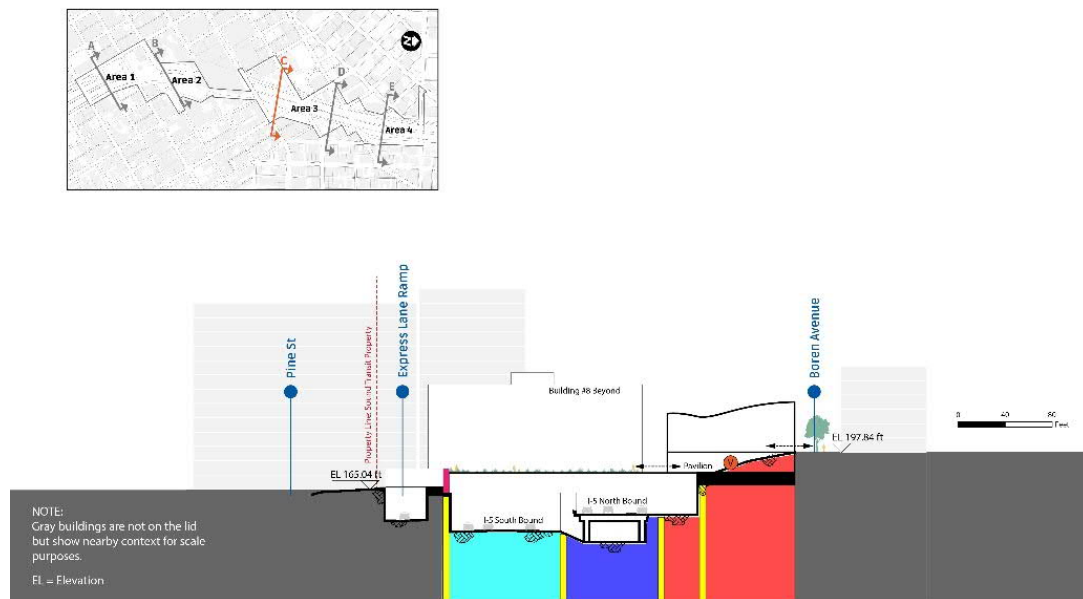


Figure 6-32. Area 3: Test Case 3 — Cross Sections Before and After Lidding for the Block between Pike and Pine Streets

SECTION C



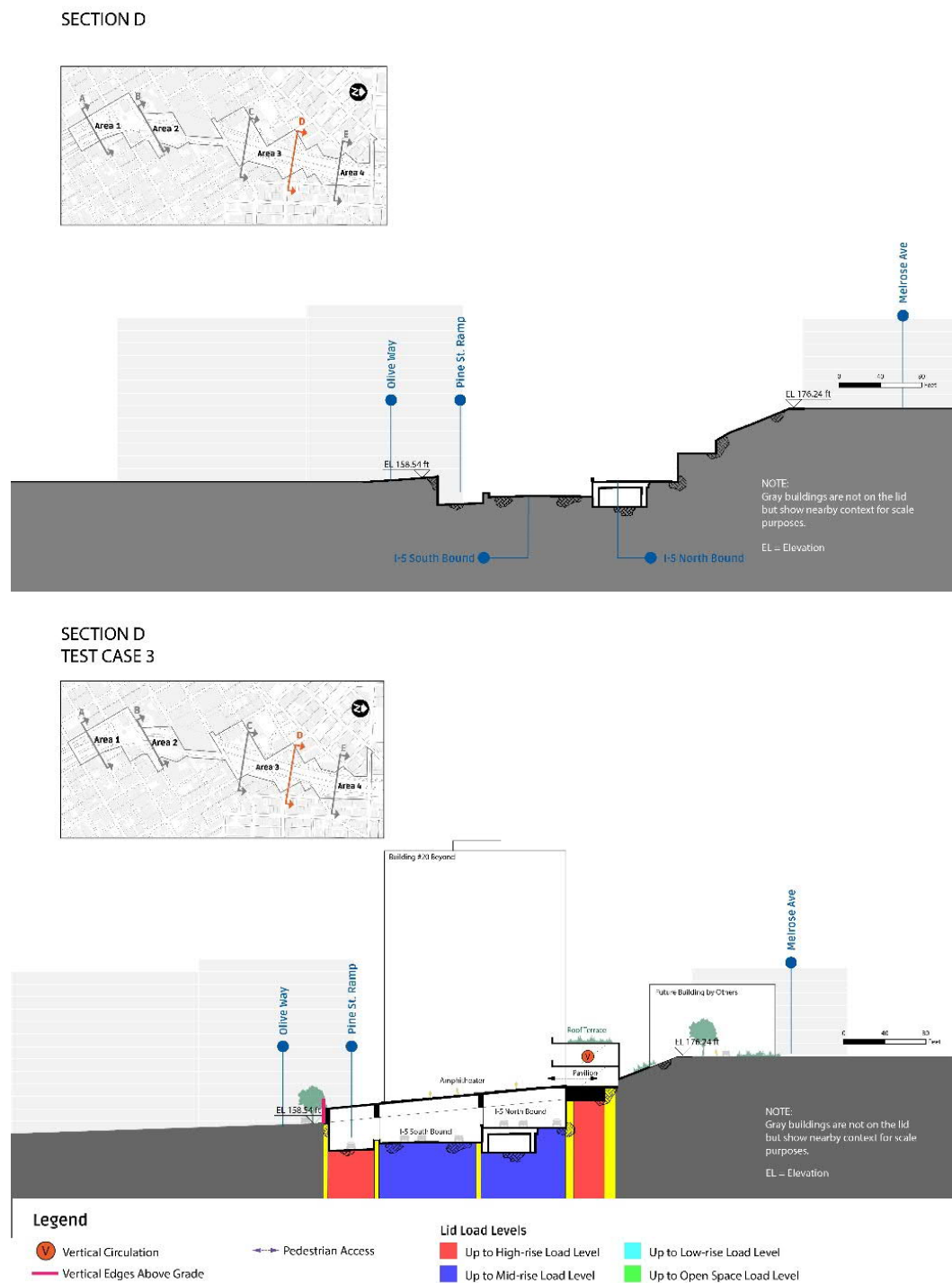
SECTION C TEST CASE 3



Legend

- | | | | |
|----------------------------|-------------------|----------------------------|-----------------------------|
| Vertical Circulation | Pedestrian Access | Up to High-rise Load Level | Up to Low-rise Load Level |
| Vertical Edges Above Grade | | Up to Mid-rise Load Level | Up to Open Space Load Level |

Figure 6-33. Area 3: Test Case 3 — Cross Sections Before and After Lidding for the Block between Pine Street and Olive Way

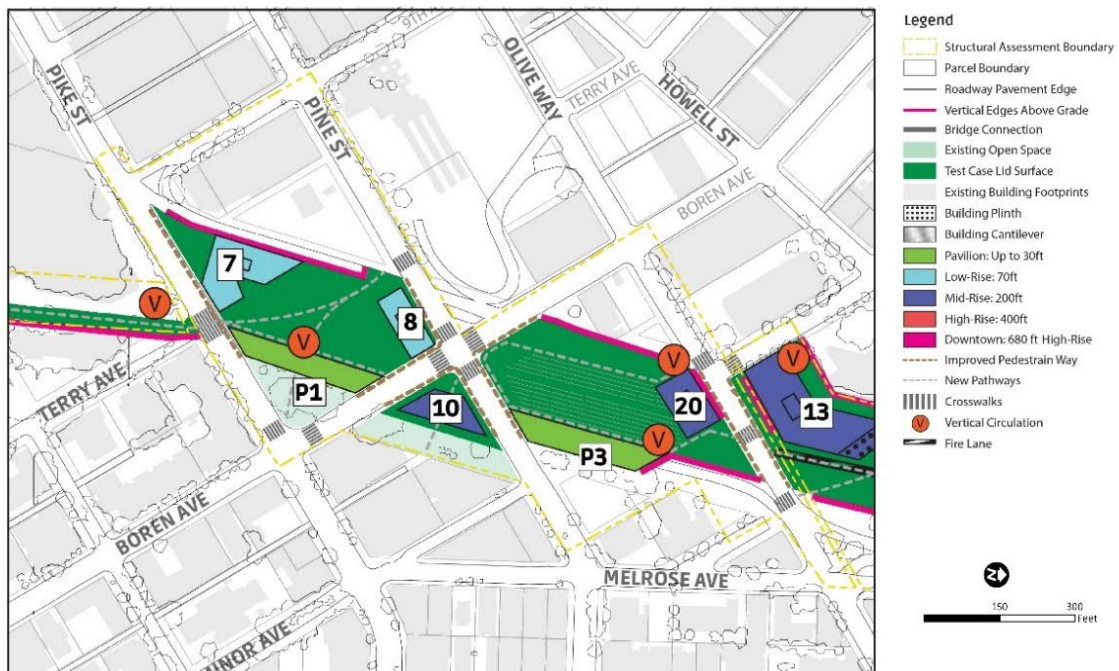


6.6.5 Area 3: Test Case 3 with Olive Way Ramp Removed

A version of Test Case 3 was considered with the Olive Way ramps removed, which would allow additional buildings and connecting routes. Building 19 would be within Area 3.

Building 19 (Assumed Residential Use): Building 19 would be on the corner of Olive Way and Yale Avenue, on a relatively small site with terra firma below. Building on the terra firma would allow for a high-rise building, but a mid-rise building would be assumed in Test Case 3 because of the adjacency to Capitol Hill and its finer-grained scale. Building 19 would be residential because of the relatively small footprint along available terra firma below and proximity to the more residential Capitol Hill neighborhood.

Figure 6-34. Area 3: Test Case 3 with Olive Way Ramp Removed



6.7 Area 4

Area 4 is the largest contiguous area with the most severe grade drops.

Area 4, between Olive Way and Denny Way, is large and irregularly shaped and has the largest topographic drop (approximately 45 feet) from east to west compared to the rest of the areas of analysis. Area 4 could reconnect pedestrian routes that were severed by freeway construction at Minor and Yale Avenue. Vertical assists would be necessary to increase connectivity between Denny Triangle/South Lake Union and Capitol Hill.

Melrose Avenue, along the east side of Area 4, is a narrow right-of-way lined on the east side by mid-rise housing. Those units experience higher levels of freeway noise, but also have exceptional views. The west side of Area 4 has a mix of uses that experience high motor-vehicle traffic and pedestrian safety risks as a result of the proximity to the freeway and existing ramps, which is further heightened by the grade south of Denny Way being lower than the Denny Way bridge structure to the east.

Structurally, the edges of the site have more capacity, allowing mid- and high-rise buildings. The interior of the site is suitable for low-rise development. Because of the size of the site and the lack of through streets, access is limited. Connections through the site would need to provide access to buildings for pedestrians and possibly service and parking. Re-establishing and improving pedestrian and bicycle routes between Capitol Hill and Denny Triangle/South Lake Union would be an important role for Area 4.

6.7.1 Size & Geometry

The site is 5.9 acres without ramps and 5 acres with ramps with no current circulation. The site runs along Melrose Avenue on the east, Denny Way to the north, and Olive Way to the south. The east edge has a sawtooth configuration because of the grid shift.

6.7.2 Ramps

The Olive Way off-ramp is along the east side of the site but could be lidded if a building opening is designed to allow for a ramp exit, similar to the Seattle Municipal Tower. An I-5 southbound on-ramp on the west side of Area 4 brings in motor vehicles along Yale Avenue. This ramp could also be accommodated with a building atop of it.

6.7.3 Structural Capacity

High-rise development is possible on relatively narrow strips of terra firma on both the east and west sides. Mid-rise development is possible along Denny Way and a strip on the west, with a sizable central area that would only be able to accommodate low-rise development.

6.7.4 Topography & Edges

The topographic drop of up to 44 feet east-west makes grade resolution on the west side challenging, especially where there is limited space to build along Eastlake and near the existing office building.

6.7.5 Connectivity

The original grid included connections between Capitol Hill and Denny Triangle along Yale and Minor Avenues. These links could be reconnected for pedestrians and cyclists through open space on a lid, including new vertical circulation—elevators and/or escalators—to assist with the grade change. North-south connection could also be accommodated through the site, linking Olive Way and Denny Way. Area 4 would have grade discontinuities on the west side, some of which could be mitigated with buildings that have some street level presence on Howell Street.

This area could accommodate significant development, but would need to have internal access because of the size and lack of connections to the street grid. It would be difficult to connect vehicles (including service and emergency vehicles) to Denny Way's existing bridge structure.

Figure 6-35. Area 4: Existing Cross Section

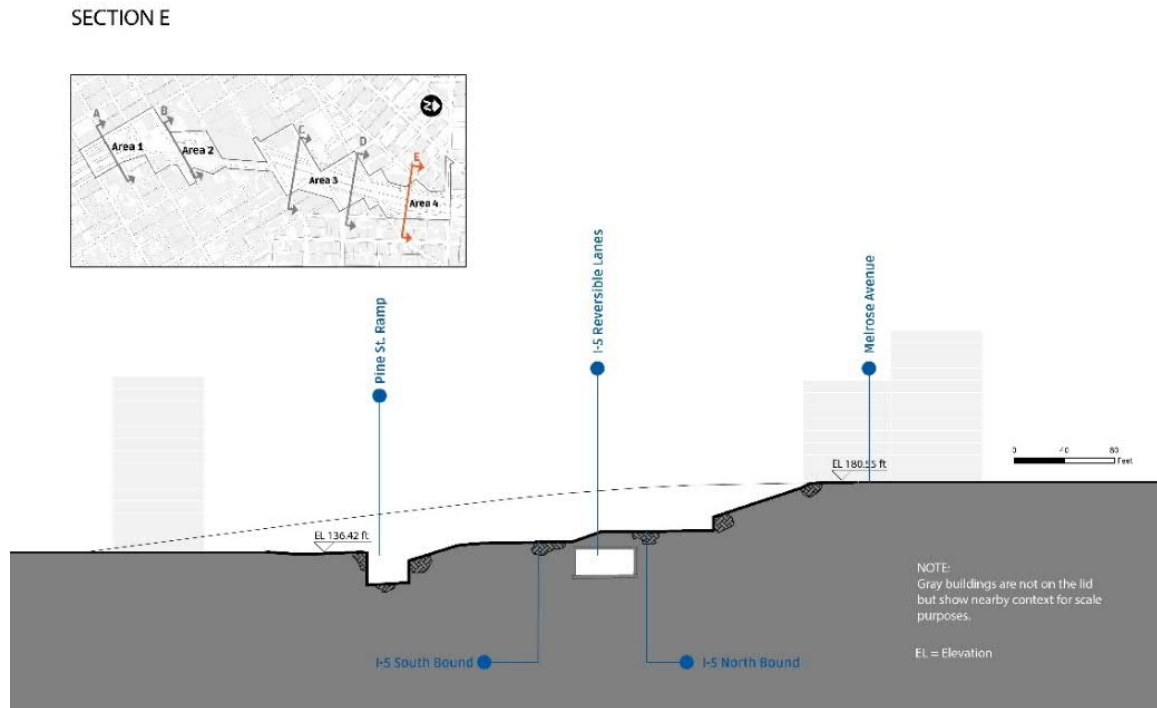
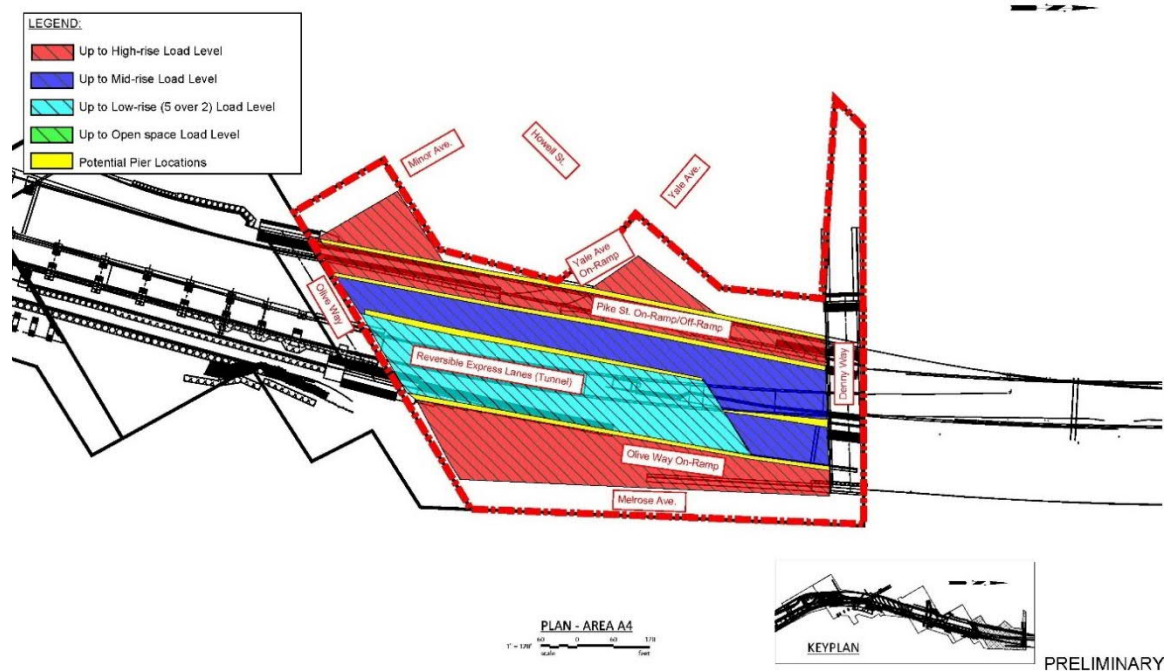


Figure 6-36. Area 4: Adjacent Land Uses



Figure 6-37. Area 4: Load Level Plan



6.8 Area 4 Test Cases

6.8.1 Area 4: Test Case 1

In Area 4, the minimum development scenario would create major public open spaces of 5 acres. There would be a major topographic change from east to west, and the lid could be shaped to be level space with a large drop at the east edge, or sloped to take up some of the grade. In either case, there would be a grade drop at the west edge. The presence of the Olive Way off-ramp would affect the east side of the open space in terms of connectivity, noise, and air quality.

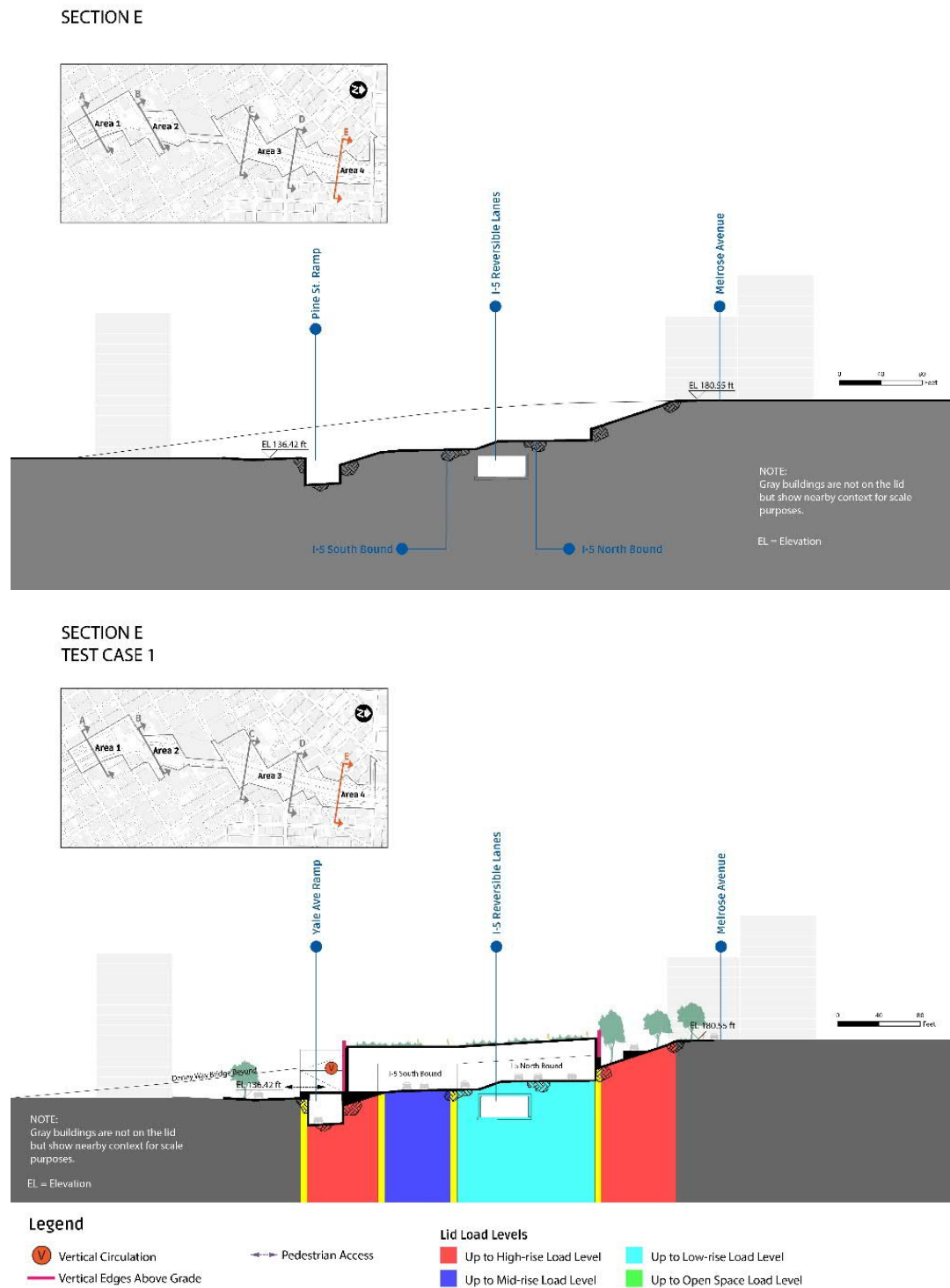
Circulation: The open space scenario would offer many new circulation routes, especially with paths that would reconnect along the grid of the original streets severed by I-5. Paths would run north-south and diagonally through to connect to Yale Avenue and to Denny Way. These paths would make a shorter and more pleasant walking/biking route between much of Capitol Hill and Denny Triangle/South Lake Union.

The presence of the Olive Way ramp would result in a long disconnect along Melrose Avenue. In addition, pedestrians and people living along Melrose would still be subject to freeway noise and pollutants.

Figure 6-38. Area 4: Test Case 1



Figure 6-39. Area 4: Test Case 1 — Cross Sections Before and After Lidding



6.8.2 Area 4: Test Case 2 with Olive Way Ramp Retained

The structural capacity for Area 4 would be a mix of high-rise buildings over existing terra firma and mid-rise and low-rise buildings over the reversible lane. The strategy for maximizing vertical development would be to build larger floor plates for offices at a mid-rise height.

Access for the buildings on Area 4 would be both from the west on Howell Street or Minor Avenue, using the building edge to the extent possible to mitigate the grade change. Pedestrian access between the upper floors and the lid would be desirable. Limited vehicular access would be a shared alley condition with a hammerhead turn-around, for emergency and limited service use only. The alley would not connect to Denny Way because the Denny Way bridge would not be a suitable connection without being rebuilt.

Buildings 13 and 14 (Assumed Office Use): Buildings 13 and 14 would have larger floorplate buildings that would take up much of the west side of the site. The Yale Avenue on-ramp would be accommodated below the lid. The wall of Building 13 would mask the edge of the lid with a wall to grade on the northwest. Entry would be from Minor Avenue. Building 14 would be accessed from Howell Street. The size and geometry of the footprints would be appropriate for office use, and adjacent uses would be primarily office.

Buildings 15 and 16 (Assumed Residential Use): Buildings 15 and 16 would be on smaller sites along Denny Way with challenging edge conditions. Entry to Building 15 would be off of Howell Street; vertical circulation would be important for accessing both the building and the lid's open space. Building 16 could have a primary entry on Melrose Avenue. The smaller footprints would make residential use likely for these buildings, and would bring the residential feel of Capitol Hill westward.

Open Space: The open space in Test Case 2 is assumed to be open to the public but privately managed. Most of the open space is over the reversible express lane tunnel where structural capacity is low, and adjacent to the edge of the lid required by the Olive Way on-ramp. The presence of the ramp will mean that noise and pollutants will affect the open space and Melrose Avenue.

Circulation: Paths on Area 4 would increase pedestrian and bicycle options. A path roughly along the disconnected Yale Avenue would be useful for moving between parts of Capitol Hill and South Lake Union/Denny Triangle; vertical circulation would be required at the west edge. North-south connectivity would be challenged by edge conditions along Denny Way. A new sidewalk with a landscaped edge along the north side of Denny would allow pedestrians to use both sides of the street and would improve the quality of the route.

Figure 6-40. Area 4: Test Case 2 with Olive Way Ramp Retained

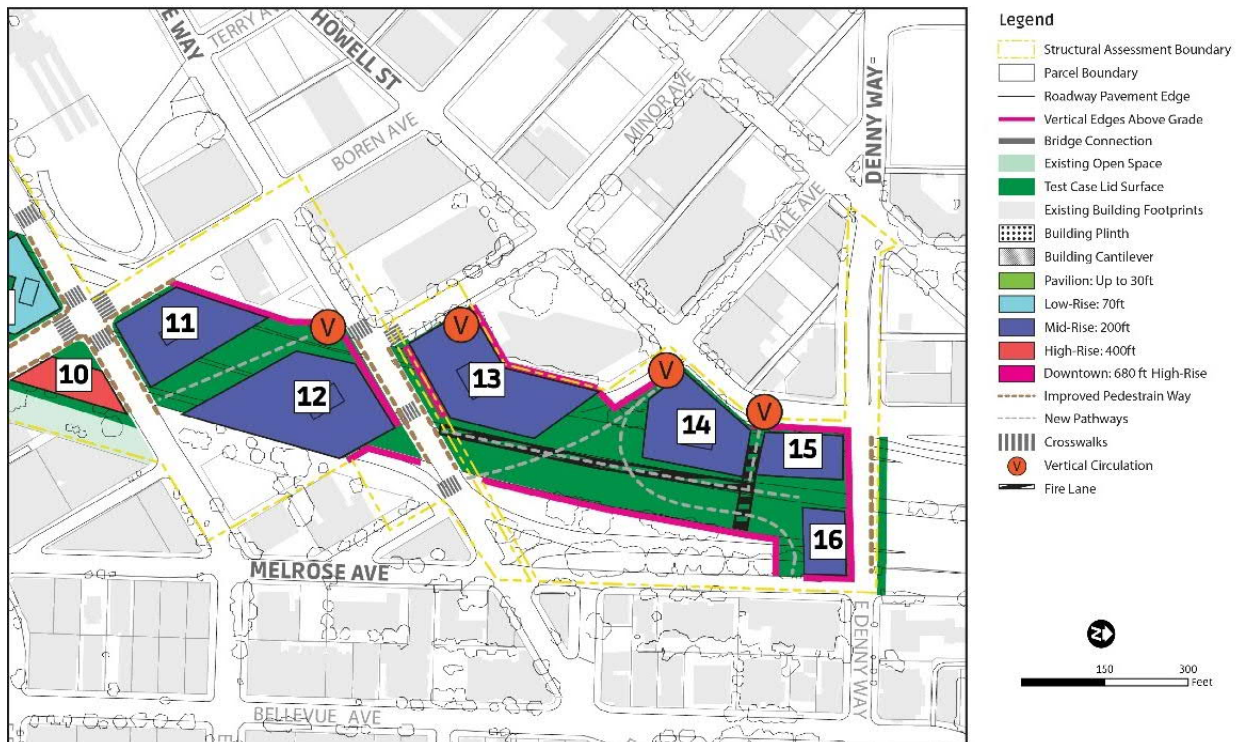
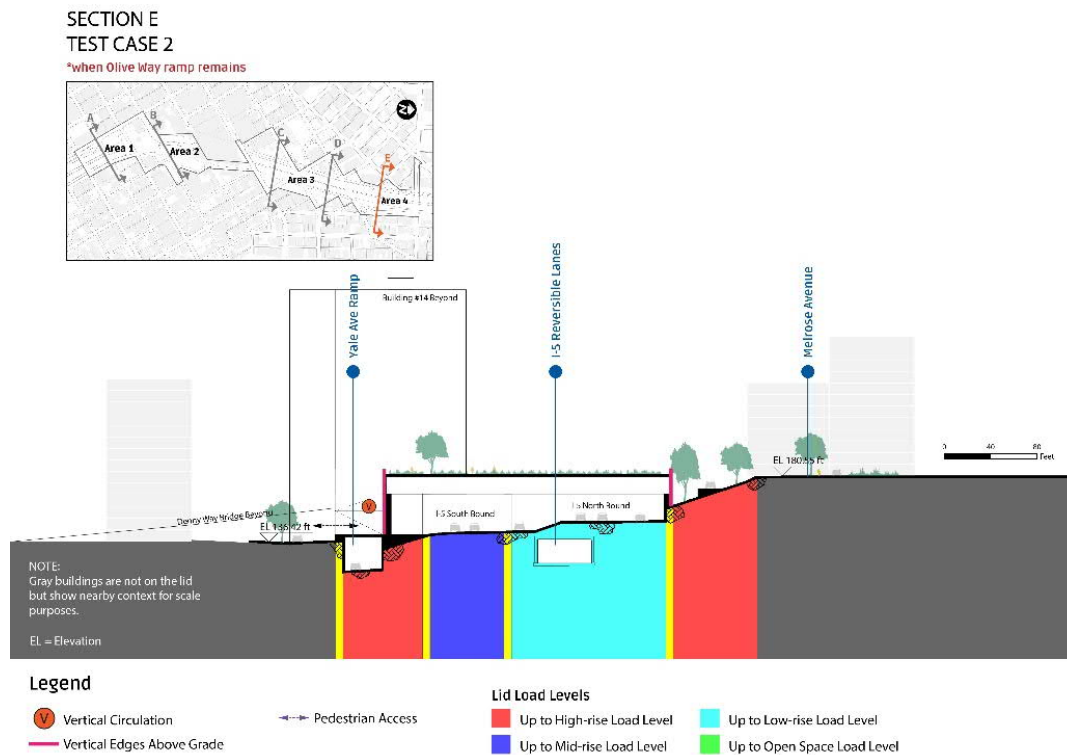
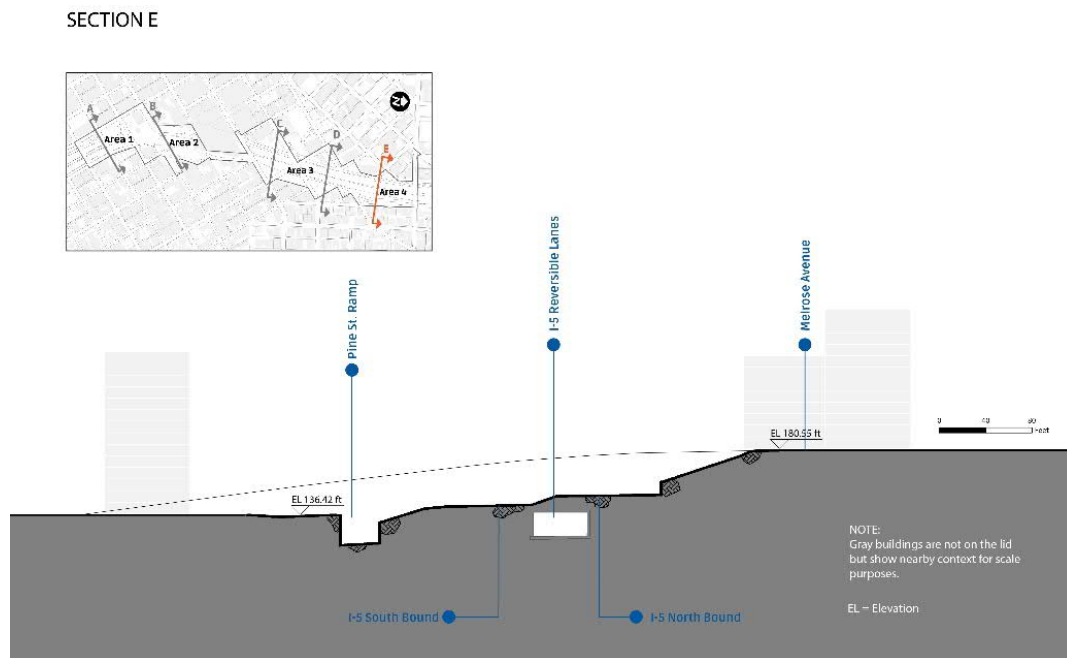


Figure 6-41. Area 4: Test Case 2 — Cross Sections Before and After Lidding with Olive Way Ramp Retained



6.8.3 Area 4: Test Case 2 with Olive Way Ramp Removed

A version of Test Case 2 was considered with the Olive Way ramps removed. Figure 6-42 shows two additional high-rise buildings on Melrose Avenue and increased connectivity across the lid.

Buildings 17 and 18 (Assumed Residential Use): Buildings 17 and 18 would be built on soil and would be high-rise buildings that take advantage of that structural capacity. The width of that soil area would be fairly narrow, so the footprints would also be narrow. Primary entrances could be off of Melrose with secondary access off of a lower floor adjacent to the lid. Space would be left between Buildings 16 and 17 where the soil capacity would be very narrow, with the intent of lessening the “wall” effect of new buildings on the west side of Melrose Avenue.

Circulation: Without the ramp, more paths would be possible between Melrose Avenue and the west edge of the lid.

Figure 6-42. Area 4: Test Case 2 with Olive Way Ramp Removed

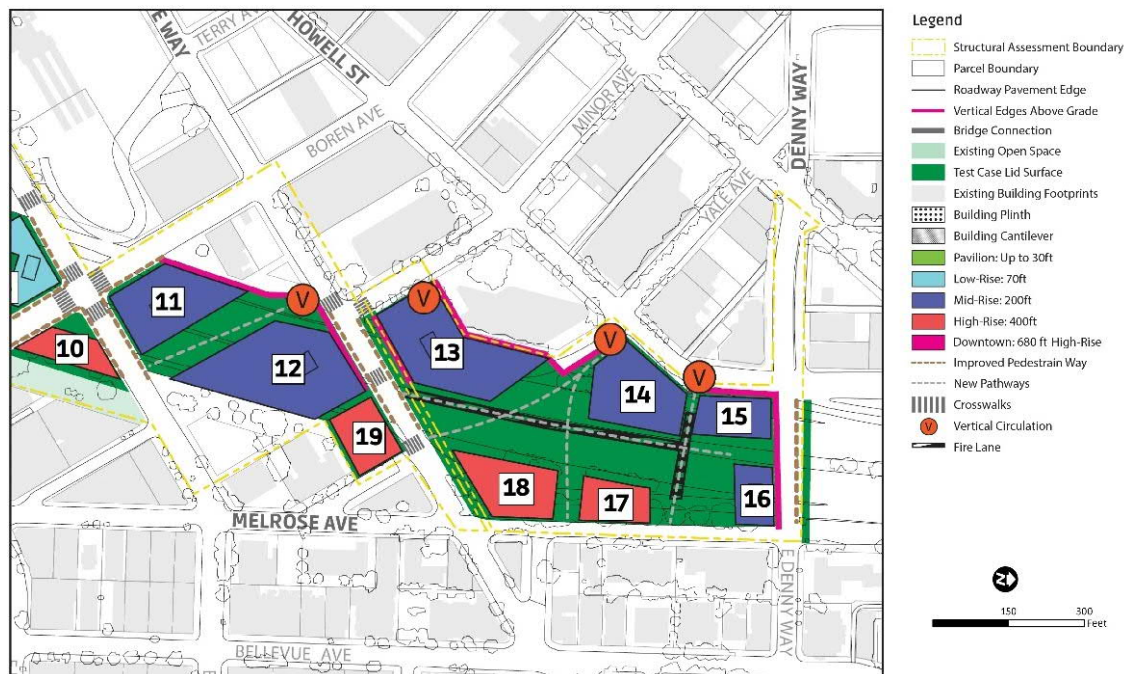
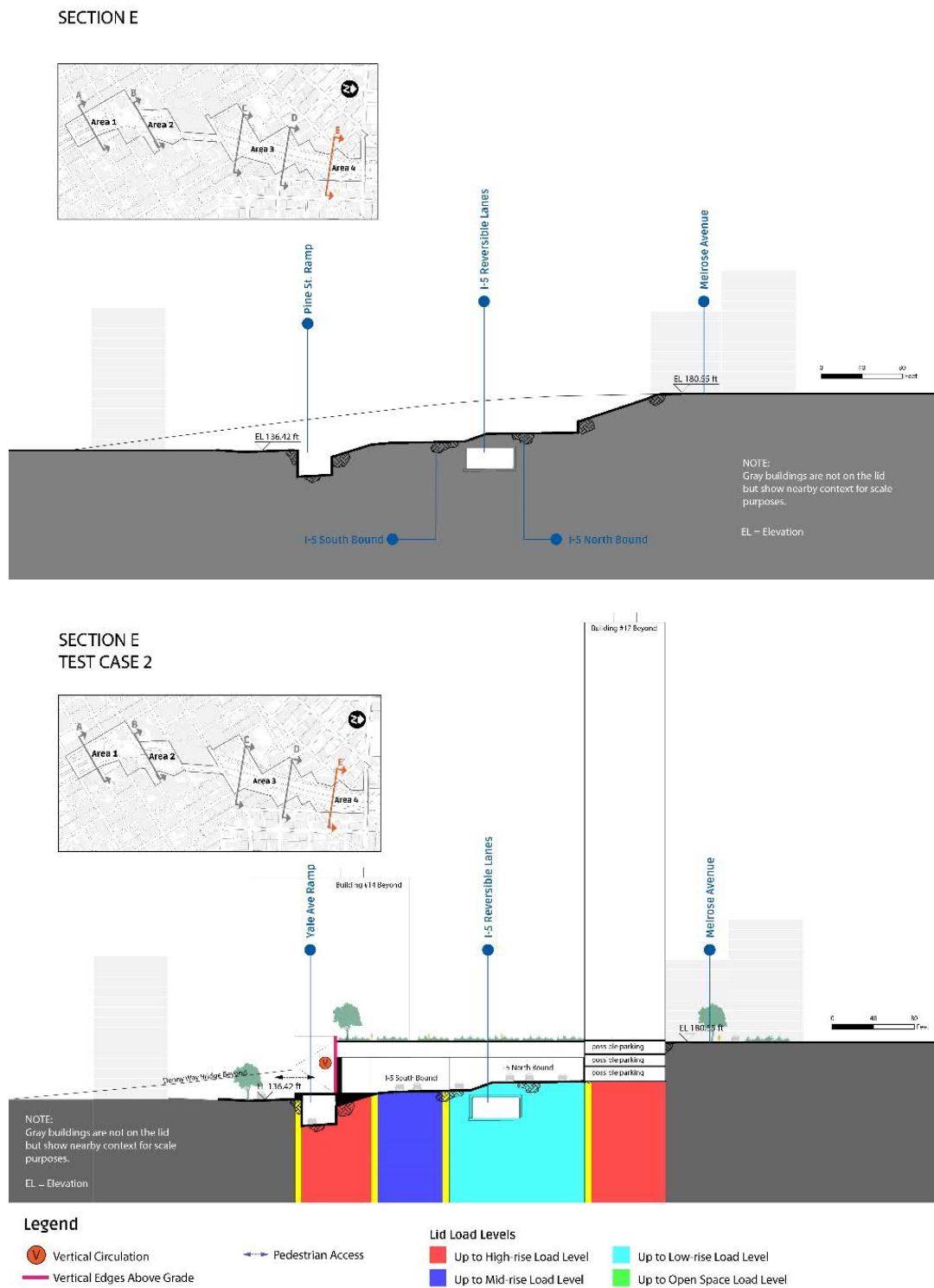


Figure 6-43. Area 4: Test Case 2 — Cross Sections Before and After Lidding with Olive Way Ramp Removed



6.8.4 Area 4: Test Case 3

The strategy for Test Case 3 would be similar to that of Test Case 2, but the building footprints would be reduced to allow for more visual permeability looking west to downtown from west edge of Capitol Hill, and to better fit into the scale of the existing urban fabric. Buildings 13, 14 and 15 would have podiums rather than larger footprints.

Buildings 13 and 14 (Assumed Office Use): Buildings 13 and 14 would have podiums and open space along the building edges. The Yale Avenue on-ramp would be accommodated below the lid. The wall of Building 13 at the edge of the open space “balcony” would mask the edge of the lid with a wall to grade on the northwest. Entry would be from Minor Avenue. Building 14 would be accessed from Howell Street. The footprints would be appropriate for office use, and adjacent uses would be primarily office.

Buildings 15 and 16 (Assumed Residential Use): Buildings 15 and 16 would be on smaller sites along Denny Way with challenging edge conditions. Entry to Building 15 would be off of Howell Street; vertical circulation would be important for accessing both the building and the lid’s open space. Building 16 could have a primary entry on Melrose Avenue, and would be a mid-rise building, but would be built only to 12 stories to be compatible with the scale of development on the east side of Melrose Avenue. Smaller footprints would make residential use likely for these buildings, and would bring the residential feel of Capitol Hill westward.

Open Space: The open space would be open to the public but privately managed. Most of the open space would be over the reversible express lane tunnel where structural capacity would be low, and adjacent to the edge of the lid required by the Olive Way on-ramp. The presence of the ramp would mean that noise and pollutants would affect the open space and Melrose Avenue.

Circulation: Paths on Area 4 would increase pedestrian and bicycle options. A path roughly along the disconnected Yale Avenue would be useful for moving between parts of Capitol Hill and South Lake Union/Denny Triangle; vertical circulation would be required at the west edge. North-south connectivity would be challenged by edge conditions along Denny Way. A new sidewalk with a landscaped edge along the north side of Denny would allow pedestrians to use both sides of the street and would improve the quality of the route.

Figure 6-44. Area 4: Test Case 3 with Olive Way Ramp Retained

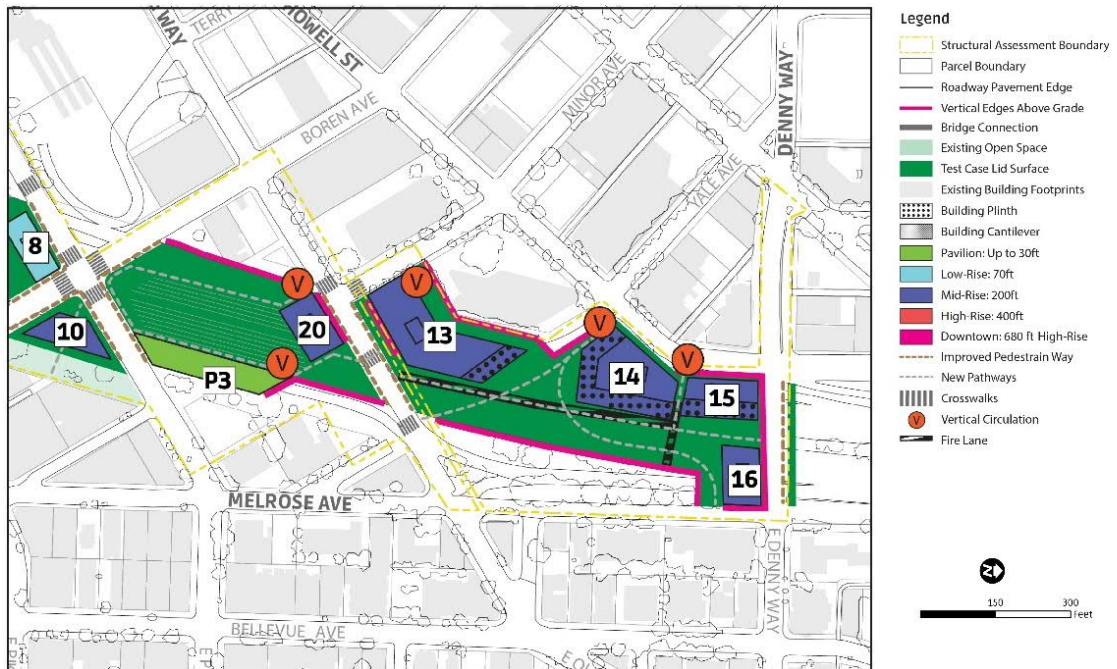
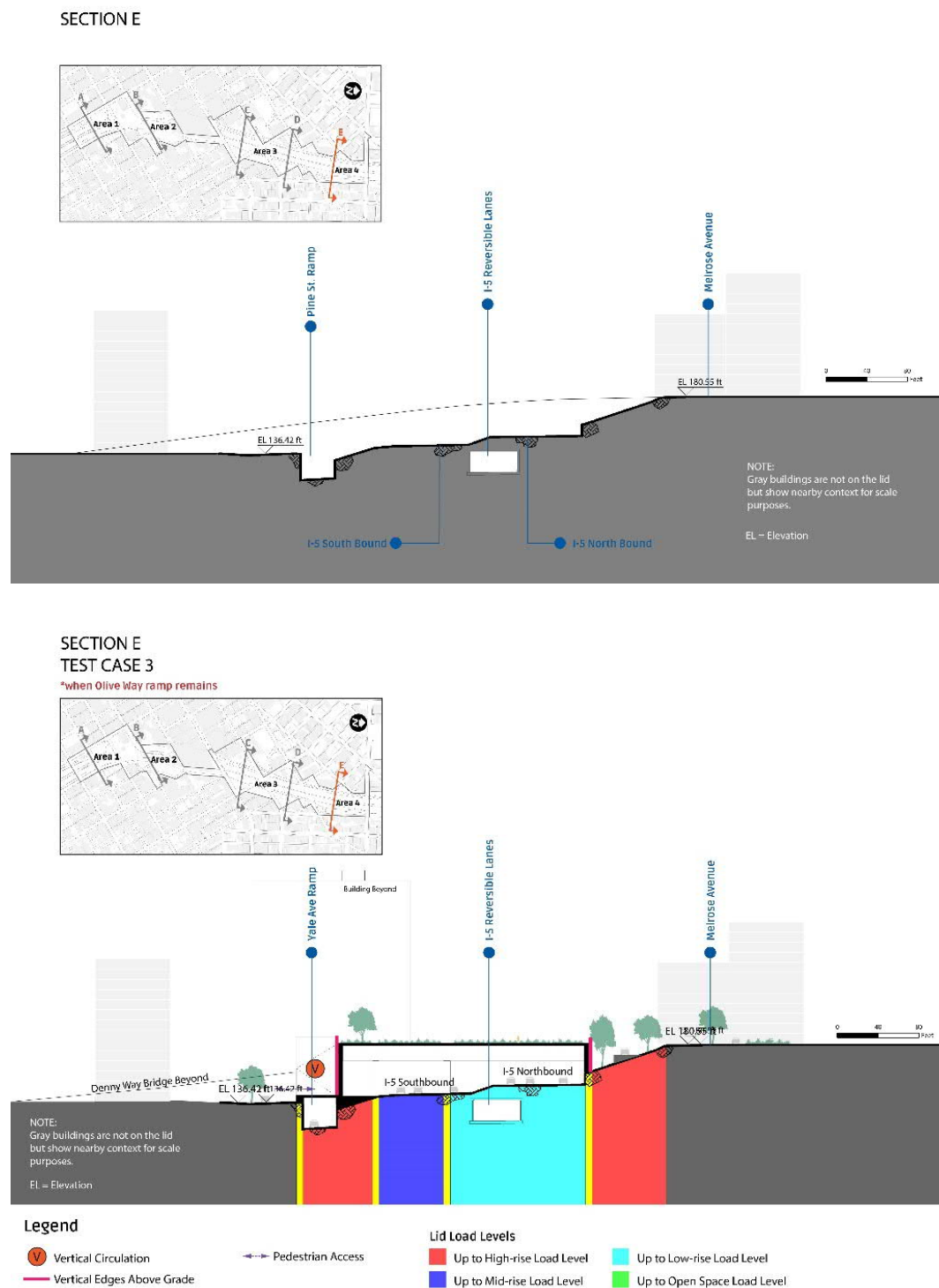


Figure 6-45. Area 4: Test Case 3 — Cross Sections Before and After Lidding with Olive Way Ramp Retained



6.8.5 Area 4: Test Case 3 with Olive Way Ramp Removed

A version of Test Case 3 with the Olive Way ramps removed was considered. Two buildings, one pavilion structure and pathways would be added with the ramp removal. Building 17 and a pavilion would be added on Area 4.

Buildings 17 (Assumed Residential Use): Building 17 would be along Melrose Avenue, and built to 12 stories to be compatible with the development on the east side of Melrose Avenue. Residential Building 17 would be residential because of its small footprint along available soil below, and because of the residential nature of Melrose Avenue.

A Pavilion (Civic Use) would be at the corner of Olive Way and Melrose Avenue with a roof terrace and lower-level connection to indoor space following the Fisher Pavilion model. This would offer public space and civic/community use and keep the view to the west more open.

Open Space: The open space and a Pavilion would be appropriate as fully public open space rather than privately managed open space. Noise and local air quality would improve with the increase of lid possible with ramp removal.

Circulation: Without the ramp, more paths would be possible between Melrose Avenue and the west edge of the lid.

Figure 6-46. Area 4: Test Case 3 with Olive Way Ramp Removed

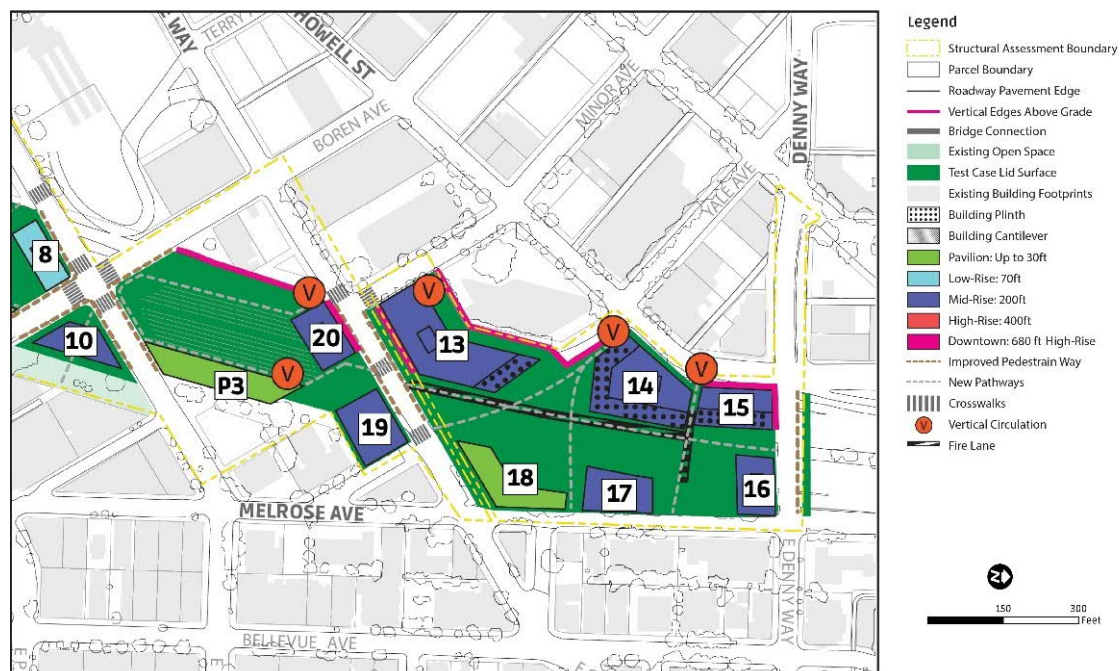
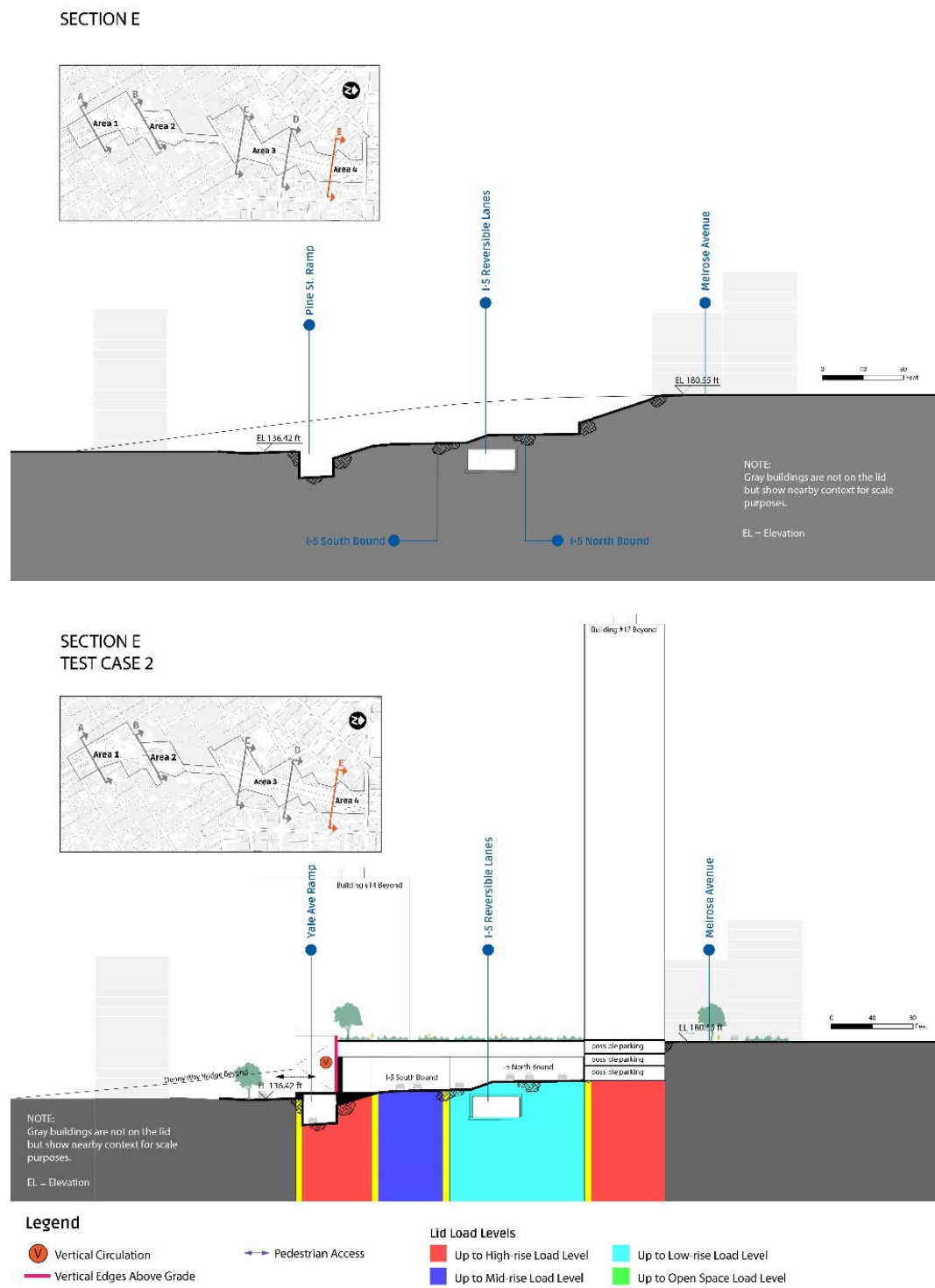


Figure 6-47. Area 4: Test Case 3 — Cross Sections Before and After Lidding with Olive Way Ramp Removed



7. Summary of Development Programs for Test Cases Considered

The resulting test case development program exercises allowed the creation of input to calculate a test case's development capacity (i.e., determine the total area of a lid used for siting buildings and their corresponding total square feet of development). Development capacity, in turn, can inform the revenue-generation potential of a lid test case, assumed to contribute to the financial feasibility assessment of the lid concepts. Test cases allowed the study to further explore the economic feasibility of the lid concept, potential governance models, funding and financing mechanisms, and project-delivery options.

An overbuild development over I-5, as measured by the three test cases explored, could bring substantial benefits to Seattle, including up to 4,500 total new market-rate housing units (Test Case 2), up to 10 new acres of open space in the heart of downtown (Test Cases 1 and 3), and opportunity for new civic spaces (including space for a school or community facilities) and retail amenities to serve new residents and the surrounding community (Test Cases 1 and 3). Test Case 3 (Mid-Density Hybrid) could create at least 380,000 to 620,000 square feet of new affordable housing, contributing toward the City of Seattle's housing affordability policy goals. Providing a fire and life safety facility on the lid with 25,000 square feet was assumed in all development program test cases, given that the lid will be technically considered a "tunnel."

Table 7-1 summarizes a review of the development programs for each of the three test cases.

Various physical, operational, structural, and economic conditions would affect the potential development program on a lid over I-5. While these development conditions would be complex, they would expose a set of distinct, valuable findings that could be used to guide development of a future lid.

Table 7-1. Summary of Development Programs for Test Cases

	Test Case 1 All Ramps Remain	Test Case 2 All Ramps Remain	Test Case 2 Removal of Olive Way Ramps	Test Case 3 All Ramps Remain	Test Case 3 Removal of Olive Way Ramps
Residential* (Total)	NA	2.9M SF	4.7M SF	621K SF	1.2M SF
Market-Rate Housing	NA	2.9M SF	4.7M SF	373K SF	0.72M SF
Affordable Housing (Middle-Income)	NA	0 SF	0 SF	93K SF	180K SF
Affordable Housing (Lower-Income)	NA	0 SF	0 SF	155K SF	300K SF
MHA Contribution	NA	\$150M	\$215M	\$32M	\$39M
Office	NA	4.5M SF	4.9M SF	1.9M SF	1.9M SF
Hotel	NA	280K SF	280K SF	50K SF	50K SF
Retail	NA	350K SF	410K SF	150K SF	170K SF
Total Vertical Development	NA	8.0M SF	10.3M SF	2.8M SF	3.4M SF
Park Space	9.8 acres	0 acres	0 acres	7.7 acres	7.7 acres
Privately-Owned Public Space	0 acres	2.5 acres	2.7 acres	1.1 acres	1.2 acres
Pavilion	63K SF	20K SF	20K SF	46K SF	46K SF
Fire / Life Safety Building	25K SF	25K SF	25K SF	25K SF	25K SF
Total Lid Area	11.2 acres	15.2 acres	16.8 acres	14.6 acres	16.2 acres
Parking 10% onsite	0	160K SF 1.1K spaces	190K SF 1.3K spaces	56K SF 390 spaces	64K SF 450 spaces
Parking 90% offsite (nearby lid)	0	1.4M SF 9.7K spaces	1.7M SF 12.1K spaces	500K SF 3.5K spaces	580K SF 4K spaces

***Affordable Housing Assumptions:**

Test Case 2: No affordable housing delivered onsite; MHA contributions to Seattle Office of Housing fund.

Test Case 3: 40% of all residential housing is affordable; 25% reserved for lower-income housing (households below 60% AMI); 15% for middle-income housing (households at 60-120% of AMI).