LOS ANGELES **INFRASTRUCTURE**

BRIDGES & VIADUCTS

The Early Days

L.A. County saw its first major surge of bridges and viaducts in the early 1900s, driven by rapid urban growth. On the East side of the city, many bridges were built to cross the L.A. River and its floodplains as the city expanded. One of these bridges was the original 6th Street Viaduct, connecting downtown Los Angeles and Boyle Heights. This landmark was opened to the public in the year 1932, and became an icon of the city.

https://en.wikipedia.org/wiki/Sixth_Street_Viaduct

The role of the L.A. River in design.

The L.A. River posed a significant challenge to urban development, and many bridges were specifically designed to cross its floodplain and channels. Major viaducts like the 6th Street Viaduct and 7th Street Bridge were constructed to traverse the river, allowing for uninterrupted connectivity across the city.

https://www.jstor.org/stable/41171240

The Design.

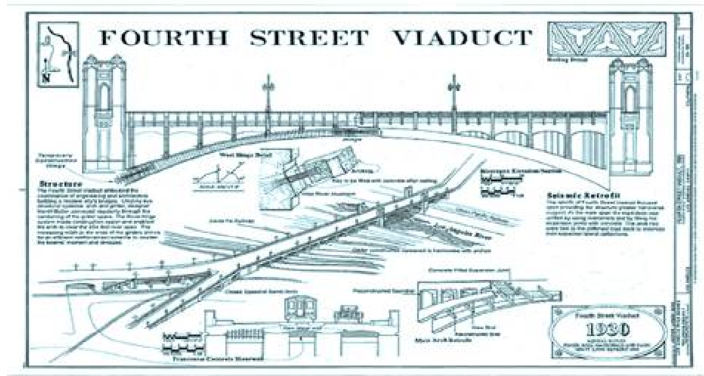
Many early bridges (1920s–1930s) featured Art Deco and Beaux-Arts influences, incorporating decorative railings, ornate lampposts, and intricate motifs. Many included elegant arches and structural details to highlight their engineering achievements. These styles reflected the era's focus on blending functionality with aesthetic appeal, and these bridges continue to inspire those who cross them because of it.

https://www.pbssocal.org/shows/lost-la/a-brief-history-of-bridges-in-los-angeles-county

The Designer.

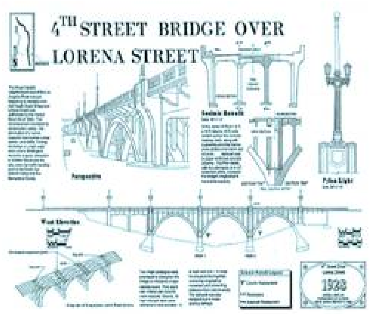
Merrill Butler (1891-1963).
A visionary engineer whose work helped define the infrastructure of early 20th-century Los Angeles. Responsible for designing some of the city's most iconic bridges, including the 6th Street Viaduct, Butler's contributions were vital in connecting a rapidly expanding city. His designs facilitated transportation and played a key role in shaping the city's modern landscape.

https://thelariver.com/guide/sightseeing/historic-bridges/merrill-butler/



A closer look at Bridge Design & Architectural Ornamentation in Los Angeles.

Los Angeles boasts a rich tapestry of bridge designs, reflecting various architectural movements and engineering advancements. The city's bridges not only serve functional purposes but also stand as artistic landmarks, showcasing intricate railings and ornamentation that narrate the region's history.



Early 1900s:

Bridges from this era often featured solid concrete railings or simple pipe designs. The focus was primarily on functionality, with minimal decorative elements.

Example: The Buena Vista Viaduct (now the North Broadway Bridge) exemplifies early utilitarian design, emphasizing structural integrity over ornamentation.

1920s-1930s: Art Deco

This period introduced more ornate railings, with geometric patterns, sunburst motifs, and stylized floral designs. The railings became more decorative, reflecting the Art Deco movement's emphasis on aesthetics.

Example: The Fourth Street Viaduct showcases railings with intricate geometric patterns, characteristic of the Art Deco era.

Post-WWII Era: Modernism and Minimalism

A shift towards simplicity emerged, with cleaner lines and less ornamentation. Railings became more streamlined, often utilizing materials like steel and aluminum.

Example: The Vincent Thomas Bridge features minimalist railings that align with mid 20th-century modernist principles.

Design & Priority changes after WWII.

After World War II, there was a significant shift in bridge design, influenced by both the demands of suburban expansion and advancements in materials and engineering Post-war bridges prioritized cost-efficiency and functionality over ornate design. The focus was on creating reliable, durable structures to accommodate the rapidly growing car-centric population.

https://www.pbssocal.org/shows/earth-focus/the-commission-that-shaped-the-los-angeles-rivers-bridges

The rise of freeways & the need for bridges.

As Los Angeles became known for its sprawling freeway network, bridges were built to support the growing car culture..The creation of these elevated freeway viaducts became necessary to navigate the complex terrain and connect the city's diverse neighborhoods, contributing to the increasing number of bridges.

https://en.wikipedia.org/wiki/Sixth_Street_Viaduct

Materials.

Bridges built in the 1920s-30s primarily used reinforced concrete for its strength and durability. Steel was often combined with concrete to support longer spans, particularly in arches and trusses. Stone and masonry were also used in some early designs, giving bridges an aesthetic, classical look. These materials allowed for the creation of both functional and iconic structures during this period.

https://www.pbssocal.org/shows/earth-focus/the-commission-that-shaped-the-los-angeles-rivers-bridges

The influence of seismic activity.

After the San Fernando earthquake in 1971, new design standards and retrofitting technologies, such as base isolation and seismic damping, were incorporated into the city's bridges. Another major earthquake that severly impacted L.A.'s bridge & viaduct infrastructure was the 1994 Northridge Earthquake, which caused elevated sections of the 10 Freeway to collapse.

https://www.latimes.com/california/story/2023-11-13/the-1994-earthquake-smashed-the-10-freeway-how-l-a-rebuilt-it-in-record-time

Modern bridges & sustainability.

With modern infrastructure projects, sustainability has become a key concern. Bridges are now being designed to incorporate green spaces, bike paths, and pedestrian walkways to promote alternative transport and reduce the carbon footprint. The L.A. River Revitalization Master Plan envisions bridges as part of a strategy to restore the river's ecosystem and create public spaces.

The Legacy & Impact of L.A. bridges.

Los Angeles' bridges and viaducts are more than just infrastructure; they are testaments to the city's growth, resilience, and creativity. From their role in connecting neighborhoods to becoming cultural icons in films, these structures represent the spirit of innovation that shaped L.A. Their designs continue to evolve, balancing history, sustainability, and functionality, ensuring they remain vital to the city's future.

Beyond their utility, bridges in L.A. carry deep symbolic weight. They span physical and social divides — linking communities that were once separated by rivers, railways, and expanding freeway systems. Over time, these crossings have shaped urban development patterns, influenced traffic circulation, and defined the identity of many neighborhoods.

The future of Los Angeles' bridges depends on their ability to adapt. Through retrofitting, preservation, & upgrades, these structures must respond to seismic, environmental, and mobility needs. Their longevity will rely on public investment and thoughtful planning.

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Experiment:

Walk across 1st Street Viaduct and measure the physical impact of this infrastructure on the human body.
Metric Used: Heartrate

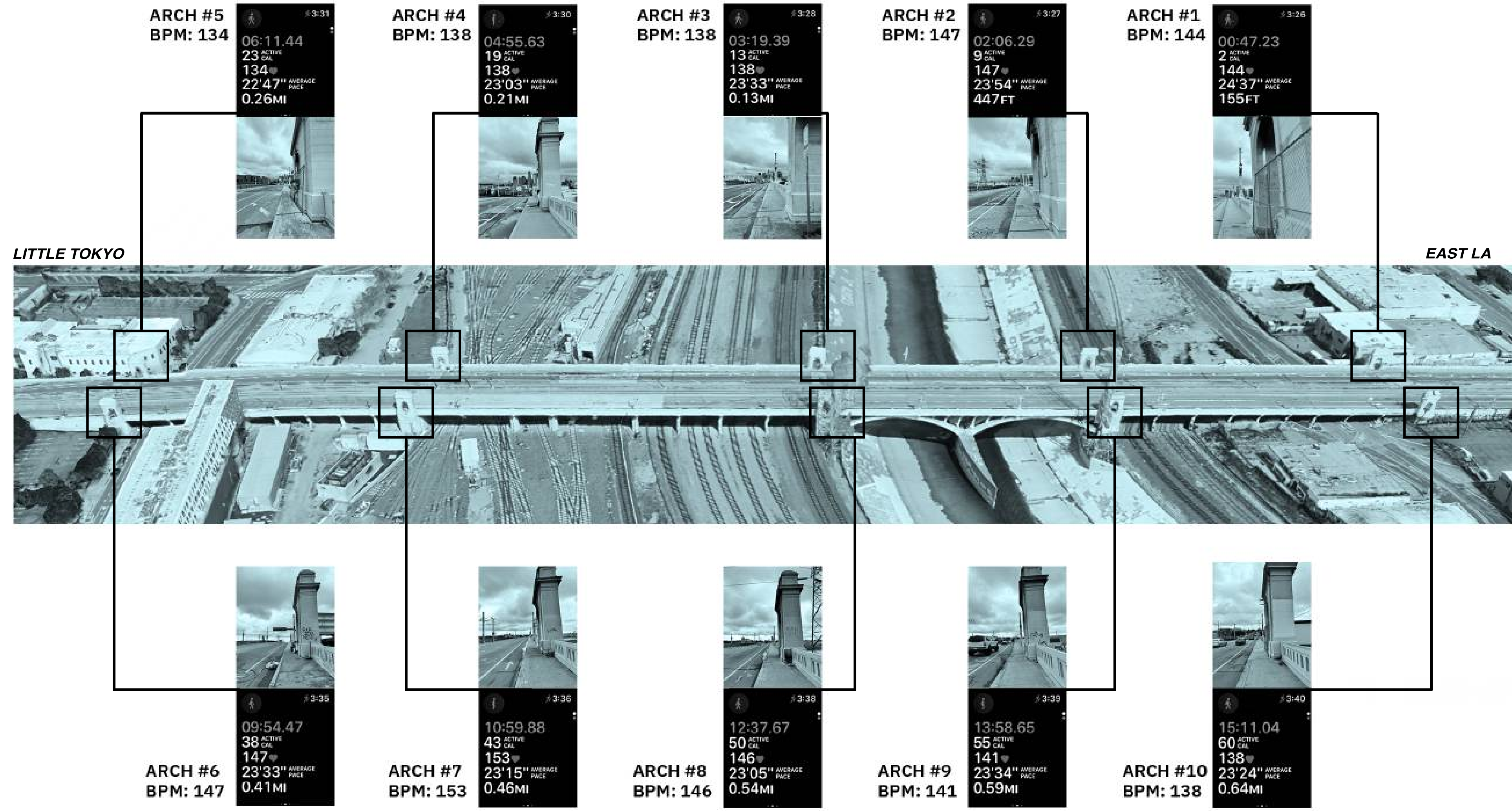
Measurements were taken at each Arch on both sides of the bridge, walking from the East LA side toward little Tokyo. Primary metric in this experiment is BPM, or hearttate as I cross the bridge. Results varied depending on the elevation & incline of the bridge. The different spans between some arches also can be seen in the difference in BPM, with some arches being spaced further apart than others.

OBSERVATION:

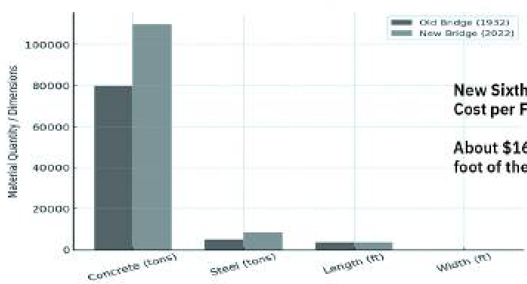
Every arch along this bridge acrries complete uniformity in its design & ornamentation, along with the railings on the both side of the bridge. The only design aspect of the bridge that differs compared to the rest is the new fence in the middle of the bridge separating the light rail lines (fence pictured above).

KEY FINDINGS:

- Elevation & Incline: Heart rate fluctuated in response to the bridge's varying incline, with BPM increasing on steeper sections and stabilizing on flatter spans.
- Arch Spacing & Impact: Some arches are spaced further apart, subtly affecting the walking rhythm and BPM variations.
- Uniformity in Design: Despite differences in elevation, every arch maintains a consistent aesthetic, from its ornamentation to the railings.
- A Singular Disruption: The only design element that disrupts this uniformity is the new fence added to separate the light rail tracks—a modern intervention in an otherwise historic structure.

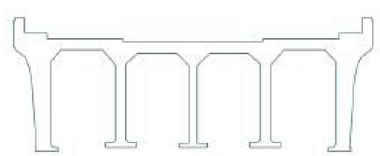


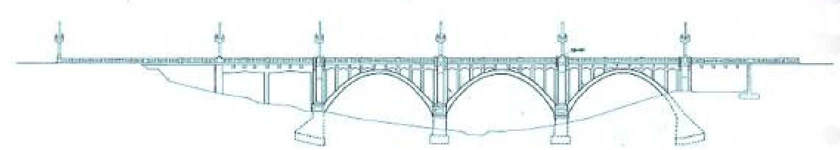
A Study of 6th Street Viaduct:
The Original Bridge vs. The New Bridge



New Sixth Steet Viaduct: Cost per Foot (Conrete)

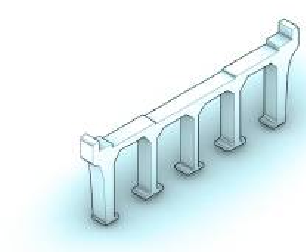
About $168,000 per linear foot of the bridge.

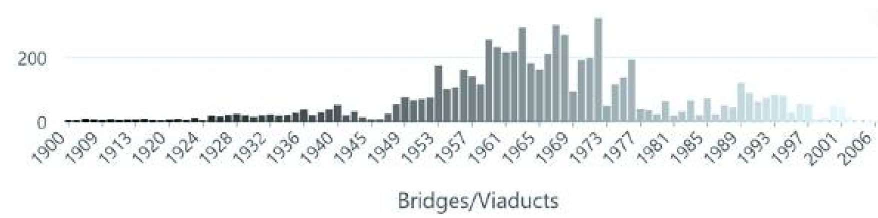




Seismic Retrofitting Material Used on LA Bridges

Time Period	Concrete Reinforcements (tons)	Steel Reinforcements (tons)
Before 1971	0	0
After 1971	20000	1500
After 1994	50000	4000
Modern (2020s)	80000	7000





Old vs. New Sixth Street Bridge Viaduct Comparison

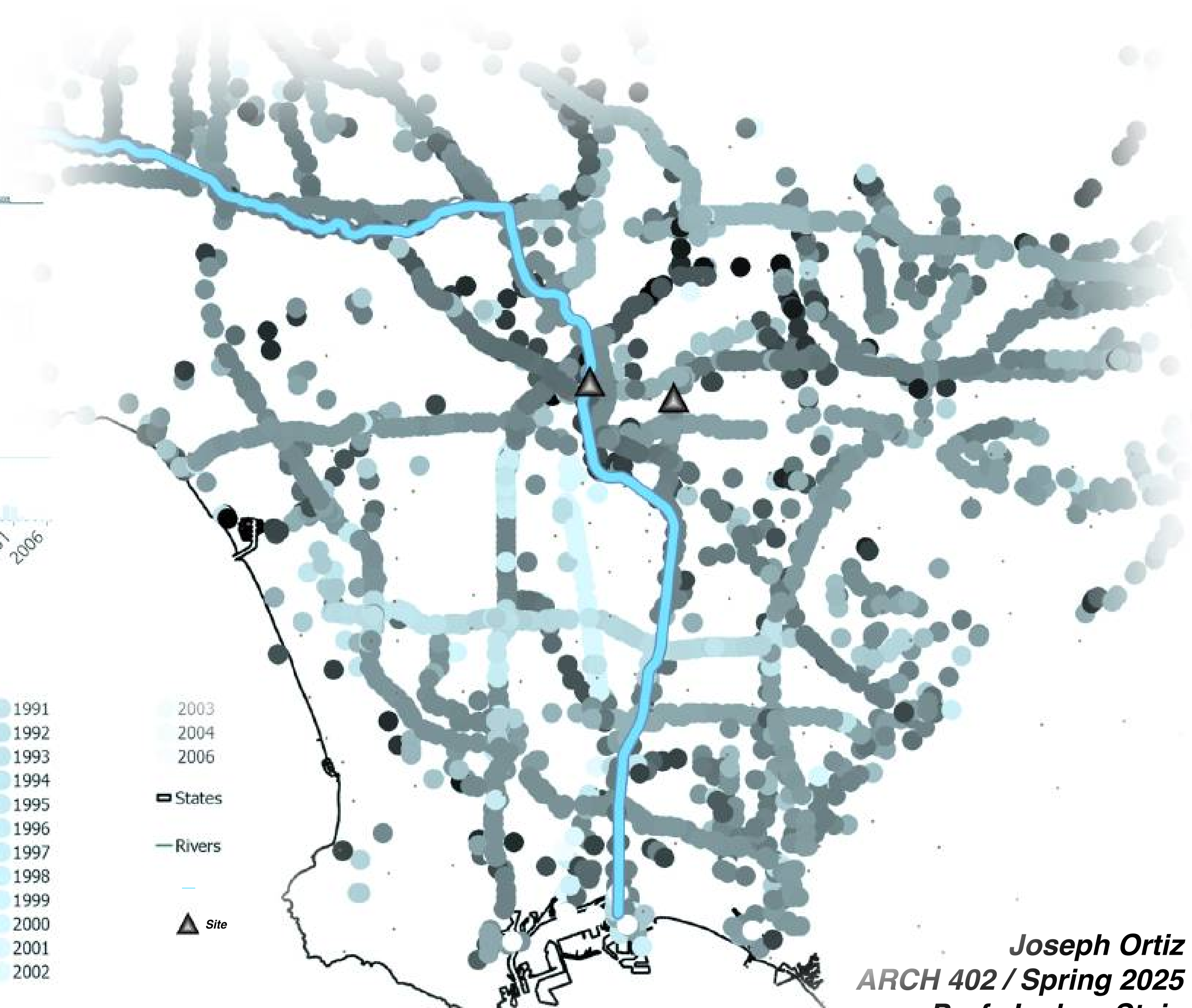
Category	Old Sixth Street Viaduct (1932)	New Sixth Street Viaduct (2022)
Concrete (tons)	80000	110000
Steel (tons)	5000	8250
Length (ft)	3500	3500
Width (ft)	80	100

Material Weight Breakdown for New Sixth Street Viaduct

Material	Weight (Tons)	Weight (Pounds)	Weight (Kilograms)
Concrete	110000	220000000	99790240.0
Steel	8250	16500000	7484268.0

Cost Breakdown for New Sixth Street Viaduct

Category	New Sixth Street Viaduct (2022)
Concrete Cost ($)	$7,700,000.00
Steel Cost ($)	$8,250,000.00
Total Material Cost ($)	$15,950,000.00
Cost Per Foot ($)	$4,557.14
Cost Per Square Foot ($)	$45.57
Cost Per Lane Mile ($)	$4,010,285.71
Concrete Quantity (Cubic Yards)	55,000.00 CY
Cost Per Cubic Yard of Concrete ($)	$140.00
Cost Per Ton of Steel ($)	$1,000.00



Bridges & Viaducts Year Built
1900 1901 1906 1907 1909 1910 1911 1912 1913 1914
1916 1917 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
1942 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954
1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002
2003 2004 2006
States
Rivers
Site

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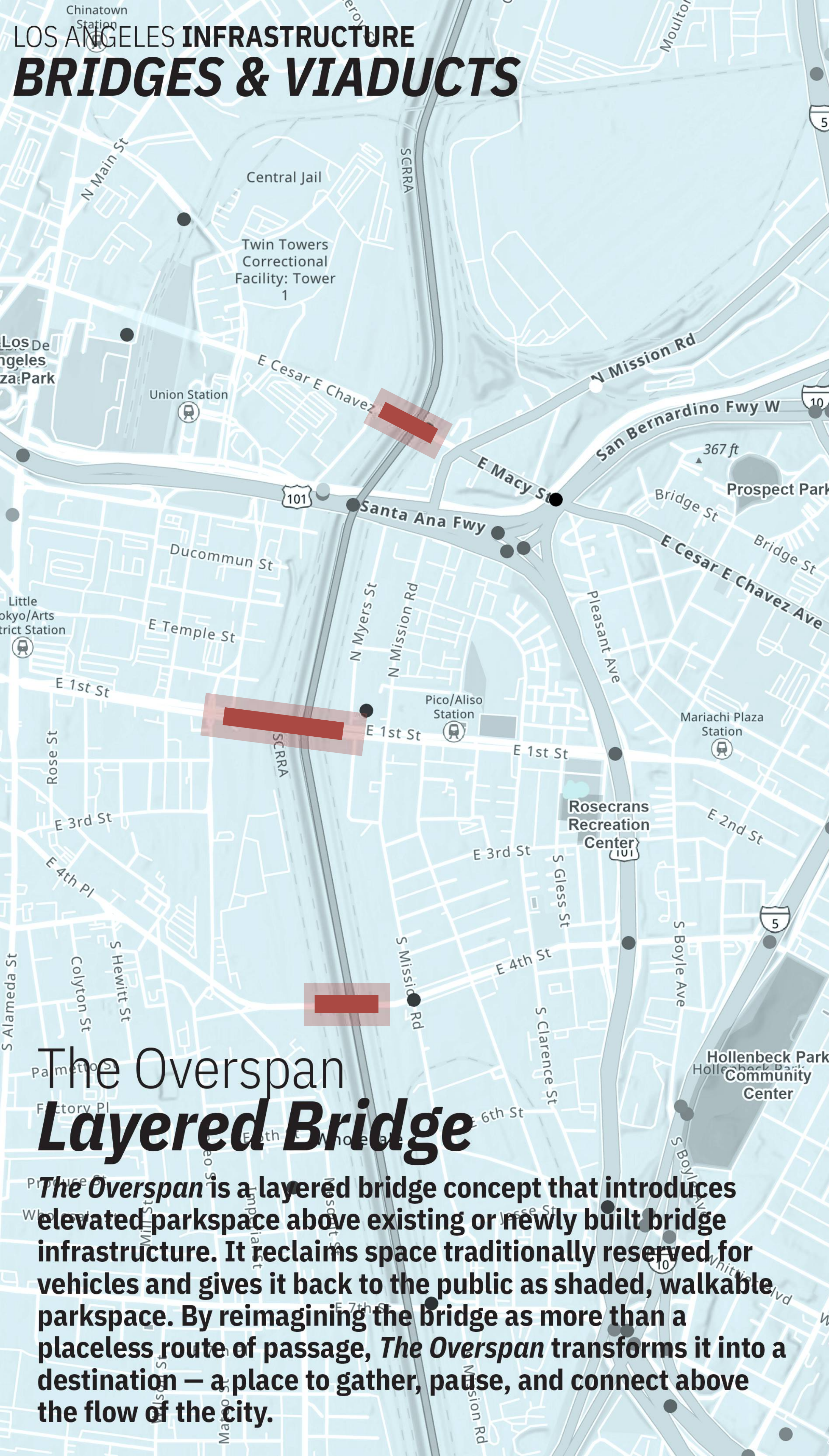
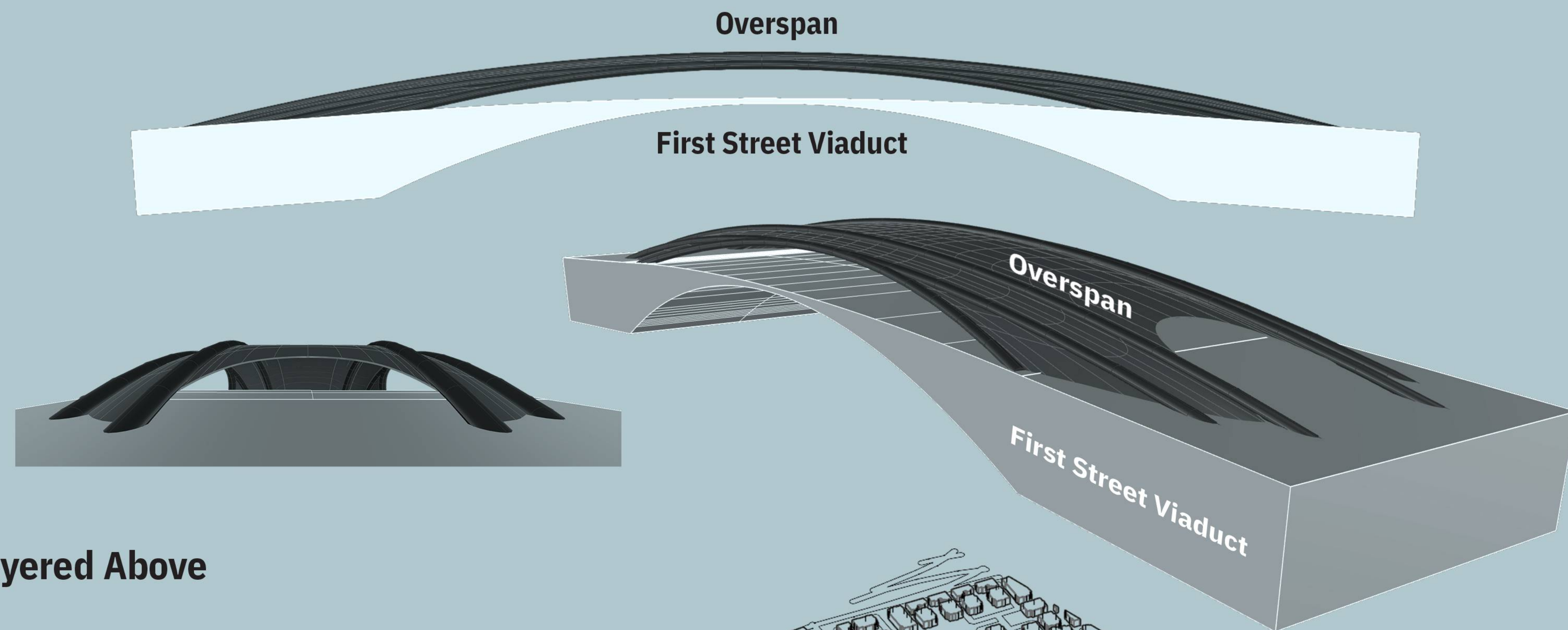


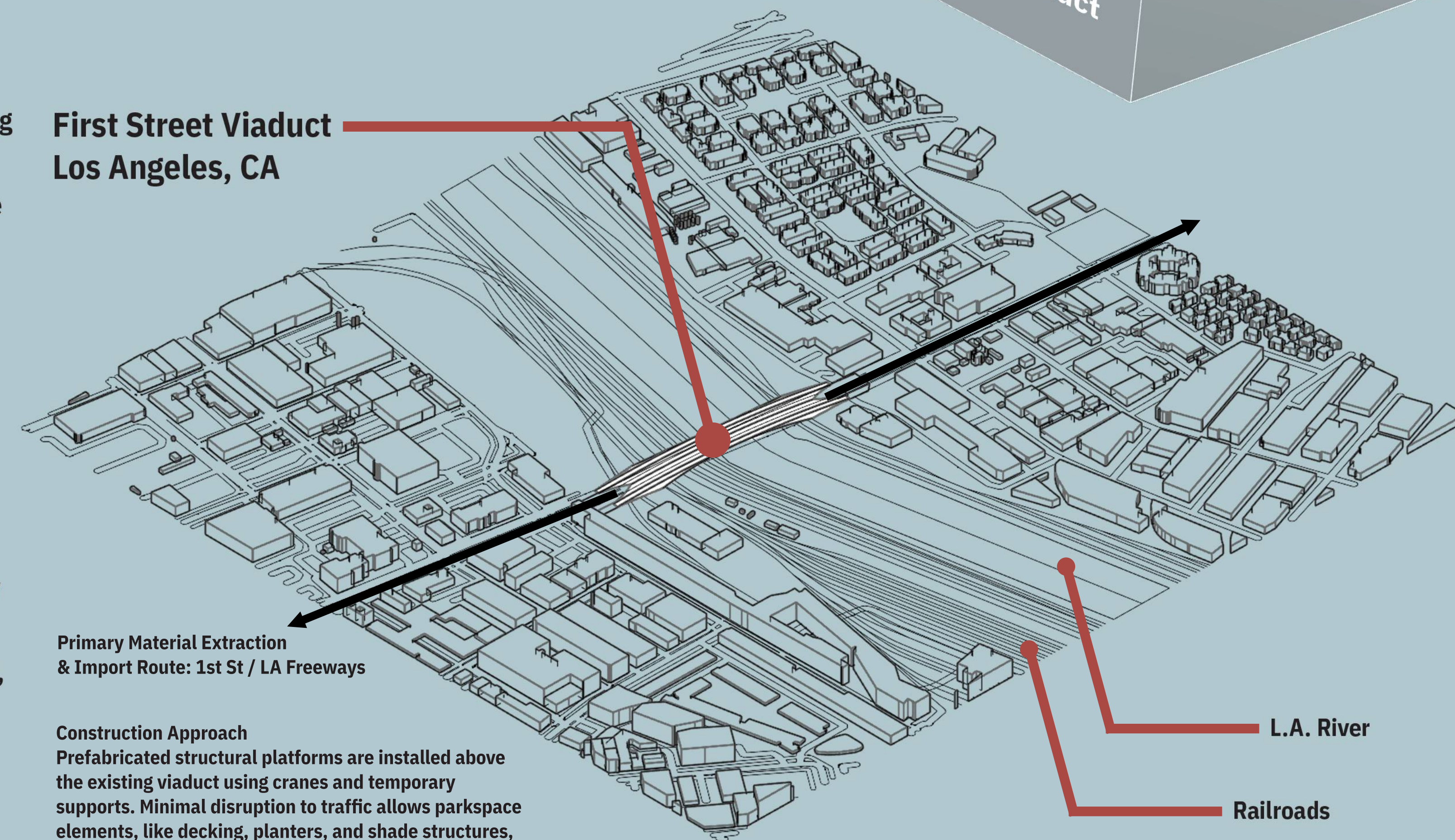
The Overspan
Layered Bridge

The Overspan **is a layered bridge concept that introduces elevated parkspace above existing or newly built bridge infrastructure. It reclaims space traditionally reserved for vehicles and gives it back to the public as shaded, walkable parkspace. By reimagining the bridge as more than a placeless route of passage, *The Overspan* transforms it into a destination — a place to gather, pause, and connect above the flow of the city.**



Layered Above

Rather than replacing existing infrastructure, the Overspan introduces a new layer of use — one that reflects a shift in urban priorities. By layering parkspace above active bridge structures, it offers a quiet resistance to car-dominated design and reframes infrastructure as a shared urban asset. This approach doesn't just modify the bridge; it repositions it within the city's social fabric, inviting new relationships between movement, public space, and the everyday experience of crossing.



Construction Approach
Prefabricated structural platforms are installed above the existing viaduct using cranes and temporary supports. Minimal disruption to traffic allows parkspace elements, like decking, planters, and shade structures, to be added in phases above the active roadway.

The ideal site for the Layered Bridge can be found at the multitude of bridges that cross over the LA River near downtown. This approach can be scaled up or down, depending on bridge length, allowing for easy application around the city.

In 5 years, the bridges remain in peak condition with minimal wear. Green spaces start establishing but need upkeep. Public reception is mixed, with both support and resistance.

In 15 years, maintenance costs rise as materials age. Green infrastructure is fully integrated but may need reinforcements. Surrounding urban development influences bridge use.

In 50 years, major renovations are required. Some materials degrade, leading to redesigns. Certain bridges become cultural icons, while others face removal.

In 100 years, only the most successful designs survive. Some gain historic status, while others are repurposed. Climate change and urban needs dictate their future roles.

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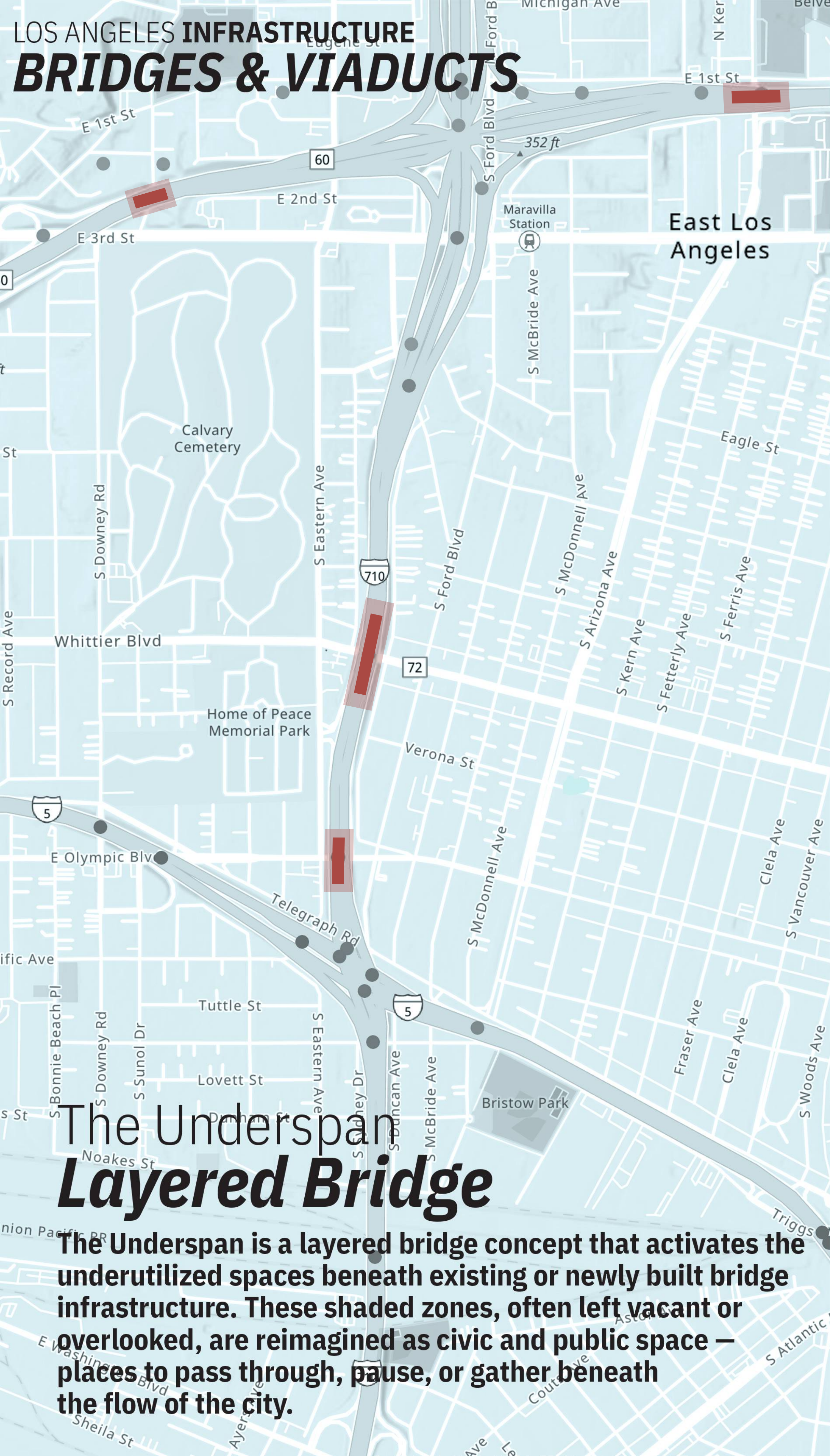
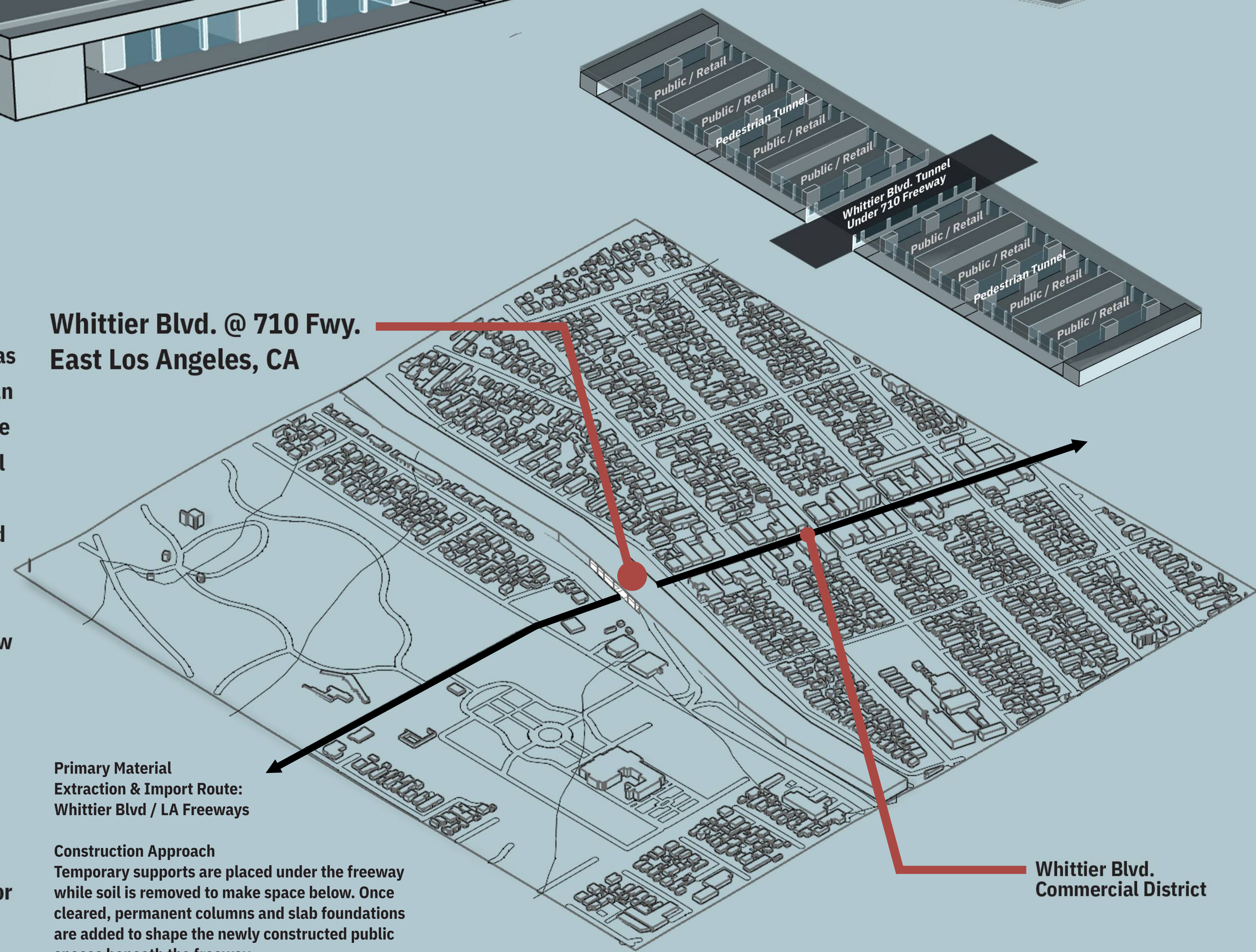


The Underspan

Layered Bridge

The Underspan is a layered bridge concept that activates the underutilized spaces beneath existing or newly built bridge infrastructure. These shaded zones, often left vacant or overlooked, are reimagined as civic and public space — places to pass through, pause, or gather beneath the flow of the city.



Layered Below

Rather than leaving the underside of infrastructure as leftover voids, the Underspan introduces a new layer of use — one that reflects the social realities and spatial inequalities often embedded in infrastructure systems.

By designing the space below as a usable threshold rather than an inaccessible boundary, the Underspan elevates the potential of bridges to create vertical continuity in the urban landscape. It opens space for informal economies, public seating, lighting, and vegetation — adapting to different conditions across the city.

The approach is less about aesthetics and more about reclaiming neglected urban volume.

Primary Material
Extraction & Import Route:
Whittier Blvd / LA Freeways

Construction Approach
Temporary supports are placed under the freeway while soil is removed to make space below. Once cleared, permanent columns and slab foundations are added to shape the newly constructed public spaces beneath the freeway.

In 5 years, underpasses show increased pedestrian use, especially near transit and markets. Issues of lighting, noise, and safety drive early modifications.

In 15 years, adjacent development pressures create tension between activation and displacement. Some spaces formalize into maintained public zones; others decline due to lack of oversight.

In 50 years, select Underspans become permanent civic infrastructure — spaces for vendors, mobility hubs, or recreation. Others are sealed off or demolished based on surrounding urban change.

In 100 years, only those adapted to shifting social, economic, and environmental conditions remain. Cities redesign bridge underbellies with climate resilience and flexibility in mind.

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