FREIGHT RAIL AND WAREHOUSES

Although rail infrastructure often fades into the background of Los Angeles' urban fabric, its development has come at a considerable ecological cost. To support this system, warehouses were constructed alongside expanding rail lines, and large-scale soil excavation was undertaken to accelerate the movement of freight from the ports into the city.

Warehouse Network

More than a billion square feet of warehouses and distribution centers cover Southern California.
In the Inland Empire, 1 in 8 people are employed by Amazon.
Post-War housing tract developments displaced the agricultural industry.
Residents have experienced both economic change and environmental degradation.[1]

1.Newton, Jim. 2023. "California Warehouse Boom Comes with Health, Environmental Costs for Inland Empire Residents." CalMatters, January 26, 2023, sec. Commentary. https://calmatters.org/commentary/2023/01/inland-empire-california-warehouse-development/.

1869 LA & San Pedro Railroad opens.
First port-to-city freight rail connection

1875 Acquired by Southern Pacific
Becomes San Pedro Branch

1981 Ports Advisory Committee studies
Recommends consolidated, upgraded rail access

1890 Refrigerated box car introduction
Agricultural industry boom[5]

1893 California Oil Boom
45 Barrles produced a day[9]

1909 Motion picture industry popularity
Production ramps up to meet year round demand[8]

1916 Emergence of warehouse districts near rail lines
Centralized storage, efficient rail access[6]

2002 Alameda Corridor opens
Grade-separated, high-capacity freight expressway

2020 Major on-dock rail expansions at LA/LB ports
Increased capacity, reduced truck traffic [7]

5.R. Spitzzeri, Paul. 2019. "'In the Big City Class': A 'Progress Map' of the Union Terminal Warehouse District of Los Angeles, April and September 1917 -the Homestead Blog." The Homestead Blog. The Homestead Museum. September 18, 2019.
6.https://homesteadmuseum.blog/2019/09/17/in-the-big-city-class-a-progress-map-of-the-union-terminal-warehouse-district-of-los-angeles-april-and-september-1917/.
7.The Port of Los Angeles. 2025. "Rail | Supply Chain | Port of Los Angeles." www.portoflosangeles.org. 2025. https://www.portoflosangeles.org/business/supply-chain/rail.
8.Roland, Zelda. 2017. "How Did Hollywood End up In...Hollywood?" PBS SoCal. November 7, 2017. https://www.pbssocal.org/shows/lost-la/how-did-hollywood-end-up-in-hollywood.
9.Wells, Bruce. "Discovering Los Angeles Oilfields." American Oil & Gas Historical Society, 12 Apr. 2025, aoghs.org/petroleum-pioneers/los-angeles-oil-field.

Alameda Corridor

The Alameda Corridor is a 20-mile freight rail route in southern Los Angeles County, connecting the ports of Long Beach and Los Angeles to downtown Los Angeles, mainly along Alameda Street.[2]

2.Alameda Corridor Transportation Authority . 2025. "History - Who We Are - ACTA." Alameda Corridor Transportation Authority. April 2, 2025. https://www.acta.org/about/history/.

Pollution

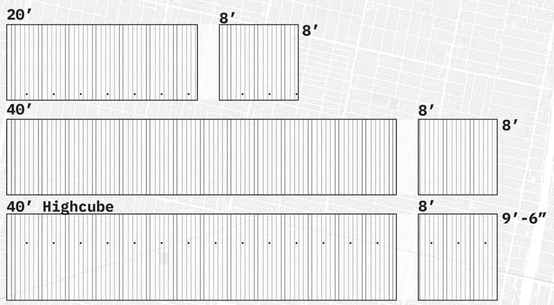
Ground-level ozone forms when sunlight reacts with nitrogen oxides in the air, especially during summer. It can reach harmful levels and affect areas up to 250 miles away from cities.[3]

3.Freudenrich, Ph.D, Craig. 2001. "How Ozone Pollution Works." HowStuffWorks. May 30, 2001. https://science.howstuffworks.com/environmental/green-science/ozone-pollution.htm.

Types of Cargo

ISO 668 – Series 1 freight containers
Classification, dimensions and ratings.[4]

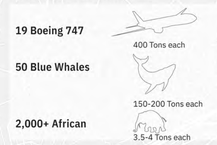
4.INTERNATIONAL STANDARD. 2020. "Series 1 Freight Containers - Classification, Dimensions and Ratings Conteneurs de La Série 1 -Classification, Dimensions et Masses Brutes." Http://www.iso.org/. https://cdn.standards.iteh.ai/samples/76912/7354663676144f8ab1a7b57cb573b0a6/ISO-668-2020.pdf.



Los Angeles Transportation Center Yard

Rail Line

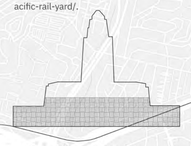
In our research territory there is approximately 15.91 miles of track in use. That is equivalent to:
3,810.48 Tons of total rail



Contaminated Soil 2005

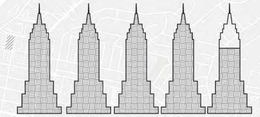
The Great Northern and UP downtown lines were abandoned in 1973. In 1990, Metropolitan Mortgage, a Spokane company, purchased the site for development, but the company went bankrupt in 2004. Developer Marshall Chesrown bought the site in 2005 and began environmental cleanup, hauling away 223,000 tons of contaminated soil while lawsuits over the industrial pollution continued.[10]

10.Tinsley, Jesse. 2020. "Then and Now: Union Pacific Rail Yard." Spokesman.com. The Spokesman-Review. April 6, 2020. https://www.spokesman.com/stories/2020/apr/06/then-and-now-union-pacific-rail-yard/.



Displaced Soil

The Alameda Corridor is the Mid-Corridor Trench, which is 10 miles long, 33 feet deep and 51 feet wide. That would mean that the amount of soil excavated would break down as follows:
Cubic yards of dirt removed: 6,582,400
Weight: 9,873,600 tons
Or
4.81 Empire State Buildings worth of soil



The Trench

The 10-mile Mid-Corridor Trench along Alameda Street passes through six cities, improving aesthetics, noise, and traffic flow. Bridges at 30 crossings separate rail and street traffic, easing congestion. Its construction used over 1 million cubic yards of concrete, 75,000 tons of steel, and 400,000 tons of ballast, with trench walls supported by piles, a concrete slab, and precast struts.[11]

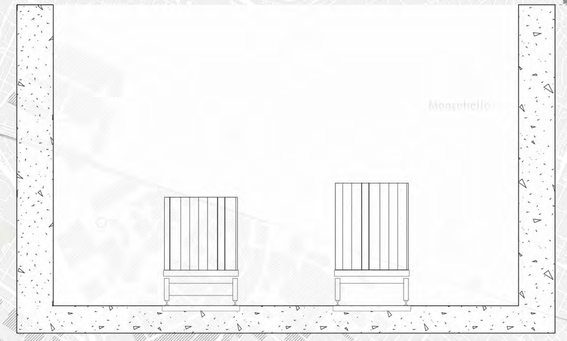
11."Alameda Corridor Mid - Completed Projects - ACTA." 2021. Alameda Corridor Transportation Authority. February 26, 2021. https://www.acta.org/about/projects/completed-projects/alameda-corridor-mid/

LATC: Street Images

Refer to Icon on Los Angeles Transportation Center Map

Beyond the physical weight of rail infrastructure, its impact extends to the artifacts and remnants of the past, embedding themselves into the urban fabric of Los Angeles.

- In our research territory there is approximately 15.91 miles of track in use. That is equivalent to:
- 3,810.48 Tons of total rail
- Ground level ozone can travel up to 250 miles downwind of its source
- Environmental cleanup for LATC yard . Hauled away 223,000 tons of contaminated soil
- Equivalent to 0.53 the volume of Los Angeles City Hall
- (10 miles long x 33 feet deep x 51 feet wide) x 20 miles long
- Cubic yards of dirt removed: 6,582,400
- Weight: 9,873,600 tons Or 4.81 Empire State Buildings worth of soil
- Alameda Corridor:
- Over 1 million cubic yards of concrete and 75,000 tons of reinforcing steel were used, and 400,000 tons of ballast were placed to support the tracks.



WAREHOUSE CONDITIONS CONNECTED TO RAIL

Warehouses Connected to Rail

Using a 15ft buffer in ArcGIS PRO we inferred that where it intersects a warehouse it utilizes the rail infrastructure

Historically, re-rolled rail steel was used as re-bar in structural components, as regulations on re-bar were not established until the 1980's. With this information, we establish that buildings built pre-1980 could have used re-rolled rail as re-bar(excluding residential).[12]

12.History – Twisted Steel Rebar – SteelX Rebar. www.steelxrebar.com/history-twisted-steel-rebar.

- Intersection
- 15 Ft Rail Buffer
- Warehouses

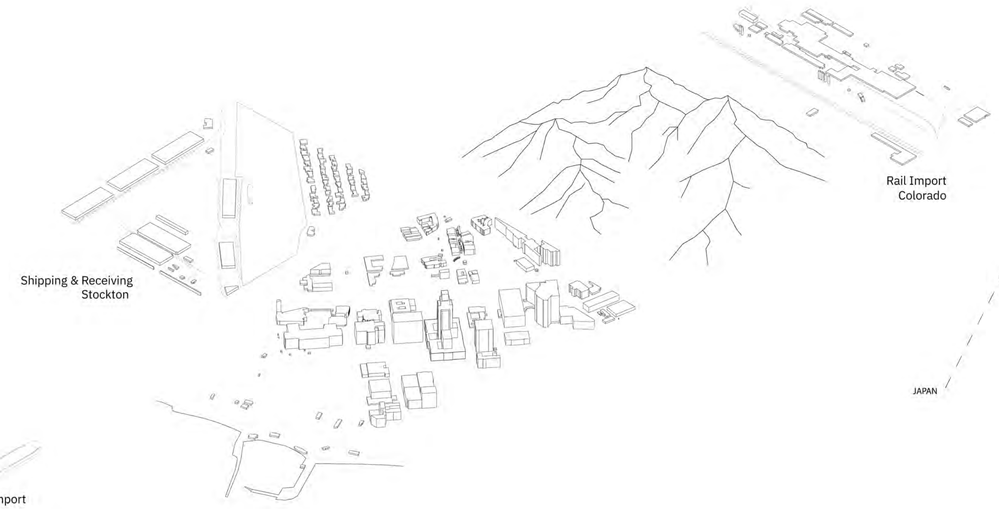
Year Built

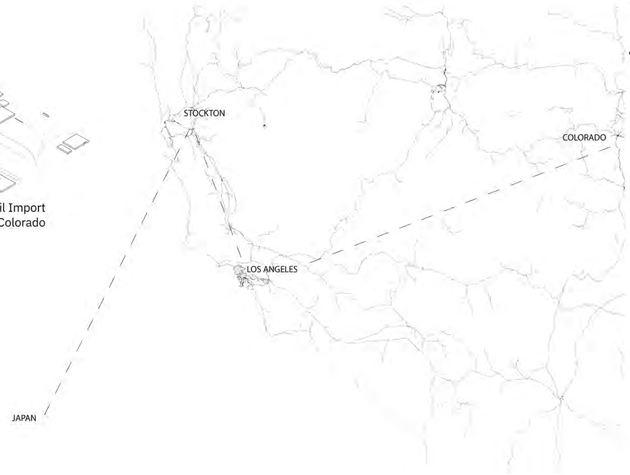
- 1895-1897
- 1901-1930
- 1931-1940
- 19412-1950
- 1951-1960
- 1961-1970
- 1971-1979

Building Usage

- Commercial
- Government
- Industrial
- Institutional
- Miscellaneous
- Recreational

Extents of Where Los Angeles Receives Materials





- Nippon Steel of Japan and Sumitomo Metal Corporation provided Union Pacific with 480 foot long segments of rail [13]
- Evraz Pueblo steel mill in Colorado reached an agreement with Union Pacific to produce 325 foot segments of rail. [14]
- Martin Marietta is Union Pacific's largest supplier of ballast, which is used to form the bed of railroad tracks with quarries in Irwindale[15]

13.Long Rail Is a Game Changer. www.up.com/aboutup/community/inside_track/long-rail-3-27-2015.htm.

14.Bonior, By Jeffrey. "A Fourth-Generation Steelworker on How Trade Action Saved a Historic Colorado Steel Mill - Alliance for American Manufacturing." Alliance for American Manufacturing, 23 Sept. 2021, www.americanmanufacturing.org/blog/a-fourth-generation-steelworker-on-how-trade-action-saved-a-historic-colorado-steel-mill.

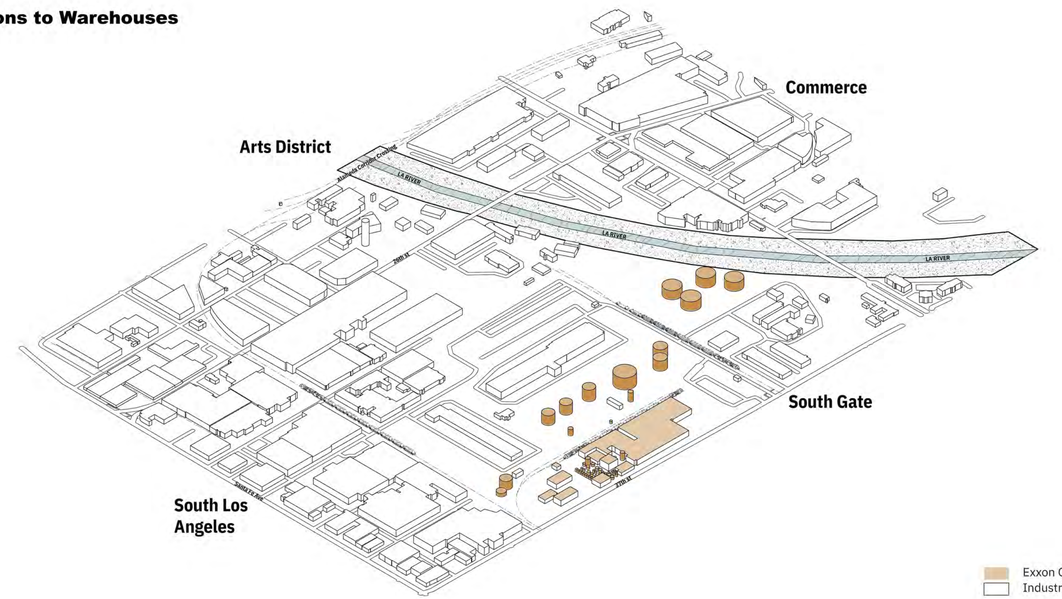
15.Feeding the Stone-Starved Beast. www.up.com/aboutup/community/inside_track/martin-marietta-9-16-2016.htm.

3 Typologies of Rail Connections to Warehouses

As Los Angeles developed the reliance of rail connectivity to warehouses diminished leaving behind artifacts of rail infrastructure. These examples show the 3 different stages of reliance.

Vernon

The city of Vernon is one of Los Angeles' manufacturing hubs. Most rail lines here are active and are used by the industrial areas including the Exxon Oil processing plant.



- Exxon Oil
- Industrial

WAREHOUSE CONDITIONS CONNECTED TO RAIL

Rail Connectivity

The Extent of the rail infrastructure spans across the entirety of the United States with various levels of connectivity.

Boyle Heights

Boyle Heights is among the oldest cities in Los Angeles. It is also a heavily industrialized zone with over 11 acres of warehouses now with various uses. [16] [17]

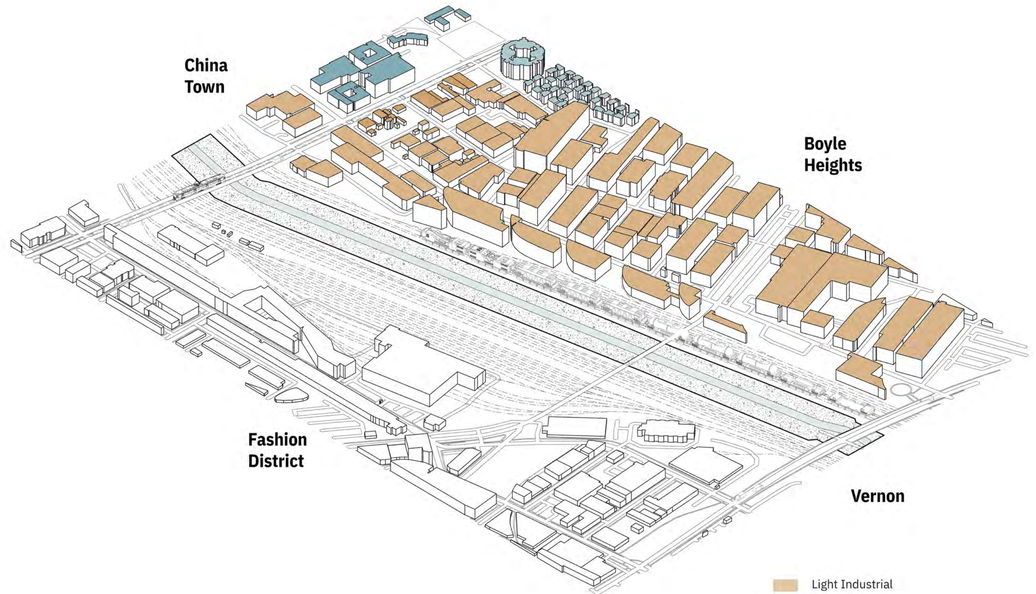
16.LA Conservancy. "Boyle Heights Community Plan - LA Conservancy." LA Conservancy, 3 Oct. 2024, www.laconservancy.org/save-places/issues/boyle-heights-community-plan.

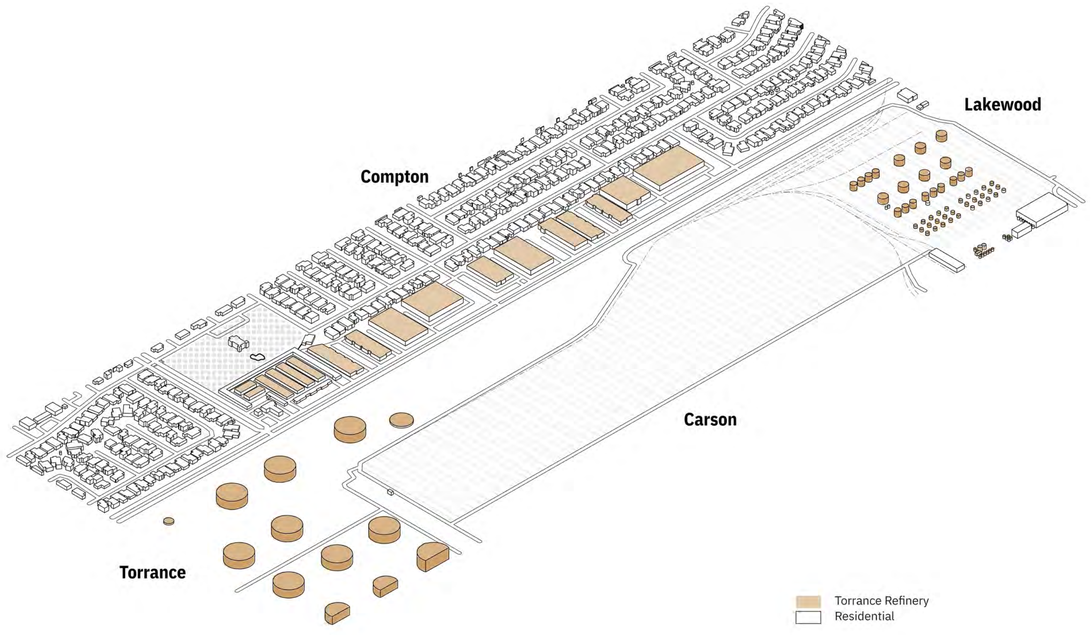
17.Lachs. "The East Side - the Legendary Sears Building: How It Was Assembled, Packaged, and Delivered the American Dream — Los Angeles City Historical Society." Los Angeles City Historical Society, 18 July 2023, www.lacityhistory.org/blog/2023/7/17/the-east-side-from-native-refugee-site-to-marachi-plaza-1-n468c.

Torrance

The city of Torrance has benefited economically from the Torrance Refinery, formerly operated by ExxonMobile. Due to it being one of the largest refineries in California, it relies on rail networks for its operation. [18]

18.Williams, Brad and Capital Matrix Consulting. Economic Impacts of the Torrance Refining Company LLC Torrance Refinery. torrancerefinery.com/wp-content/uploads/2018/01/TORC_Torrance_Refinery_Economic_Impact_8-24_FINAL.pdf.





Vertical Legacy: The Heirloom Project

Overview

Vertical Legacy: The Heirloom Project seeks to reduce Los Angeles residents' reliance on imported goods by transforming existing warehouses into hyper-productive vertical farms. These farms will supply fresh, locally grown produce to nearby communities, reducing transportation emissions and enhancing food security.

To minimize the carbon footprint of construction, the original warehouse facades will be preserved, and salvaged materials will be re-purposed wherever possible. Portions of the warehouse space will be returned to the community, while sections of paved concrete floors will be removed to allow for the planting of native species. In areas where soil contamination is most severe, remediation strategies will be employed to mitigate environmental and health risks to surrounding neighborhoods.

Urban Development

This map shows the Surface Imperviousness of Los Angeles and more than 95% of the land area is covered by concrete or asphalt.

Phasing

5 Years Pilot projects in underutilized warehouses.

15 Years Large-scale warehouse conversions.
Major reduction in imported produce, LA begins exporting hydroponic crops.
AI-driven monitoring systems optimize growth.

50 Years Warehouses are entirely dedicated to hydroponics.
Expansion into vertical hydroponic towers, subterranean farming in abandoned infrastructure.
California's traditional farmland begins re-wilding.

Crop Inputs

Farmland Coverage

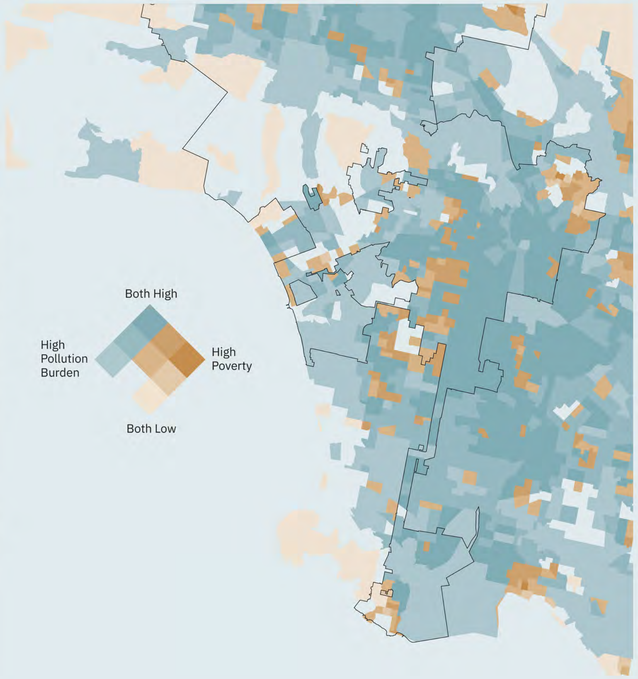
As of 2022, California dedicates approximately 24.2 million acres to agriculture. However, due to urban sprawl and environmental pressures, the state has lost an estimated 332,197 acres of agricultural land since 2017.[19]

19."What the 2022 Census of Agriculture Confirms About California." American Farmland Trust, farmland.org/blog/2022-census-of-agriculture-california.

Areas of Intervention

Boyle Heights Intervention

Pollution Burden on Communities



Health Risk

Communities near rail yards such as Commerce face cancer risks up to 1,200 chances per million due to diesel particulate matter, far exceeding regional averages. Respiratory illnesses like asthma are 2x more prevalent in these areas compared to wealthier neighborhoods.[20]

Rail yards emit 22 tons of nitrogen oxides daily, contributing 9% of smog-forming pollution in the region. Diesel locomotives, responsible for 70% of rail yard emissions, idle near homes and schools, releasing carcinogenic soot.[21]

Affected Communities

Working-class Latino neighborhoods, such as Boyle Heights and Commerce, are disproportionately exposed. The 2007 Air Resources Board study found cancer risks 140% higher near Commerce rail yards, with schools and parks within pollution plumes.

Recent regulations, 2024's Rule 2306, aim to cut nitrogen oxide emissions by 82% by 2037, but legal challenges and infrastructure delays threaten progress.[22]

Agricultural Shipping Impact

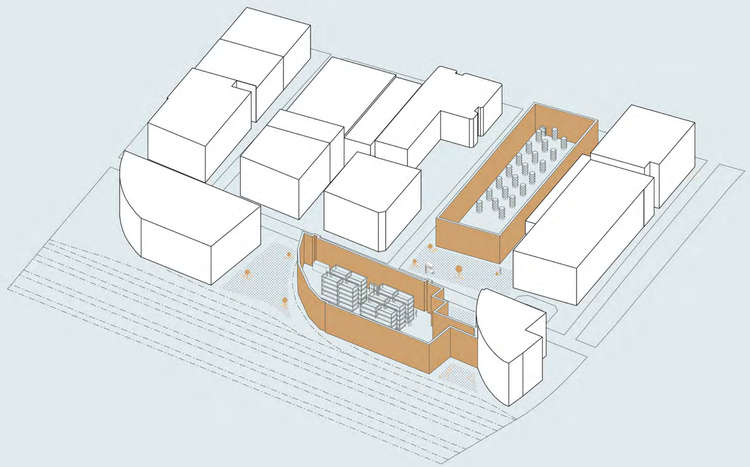
Agricultural products like Midwest grain and Central Valley produce are part of the cargo moved through LA's rail yards, but pollution stems from diesel locomotives and trucks.[23]

20.Health Risks From Rail Yards Revealed in ARB Report | California Air Resources Board. 11 Mar. 2008, ww2.arb.ca.gov/news/health-risks-rail-yards-revealed-arb-report.
21.Wilson, Janet. "Cancer Risk Rises for Those Near Rail Yards - Los Angeles Times." Los Angeles Times, 3 Mar. 2019, www.latimes.com/archives/la-xpm-2007-may-25-me-smog25-story.html.
Briscoe, Tony. "Southern California Regulators Impose Pollution Limits on Rail
22.Yards - Los Angeles Times." Los Angeles Times, 2 Aug. 2024, www.latimes.com/environment/story/2024-08-02/southern-california-regulators-impose-pollution-limits-on-the-regions-rail-yards.
23.Jiao, Hongxia. "How California's New Locomotive Regulation Could Impact Midwest Agriculture." Farmdoc Daily, 1 July 2024, farmdocdaily.illinois.edu/2024/06/how-californias-new-locomotive-regulation-could-impact-midwest-agriculture.html.

Firms Working on Remediation

Nina Weithorn
Metabolic Studio
Salt Architect

Phasing 5 Years

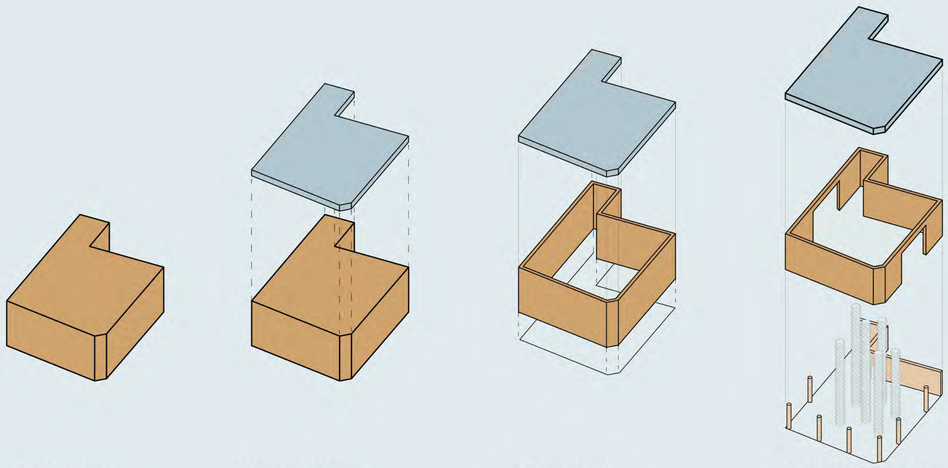


- 70,950 Square Feet of roof are removed and transformed into topological mounds that people can walk on
- In a Square Foot roof chunk of Built-Up Roofing including structure it can weigh between 10-25 lbs
- Assuming the heavier weight the total weight of material being removed and repurposed would be approximently 1.8million lbs

Vertical Legacy: The Heirloom Project

Warehouse Transformation

Warehouses will undergo transformation by first removing the roof tops which will be utilized elsewhere. Selected warehouse facades will be elevated to allow for continuous access from street level.



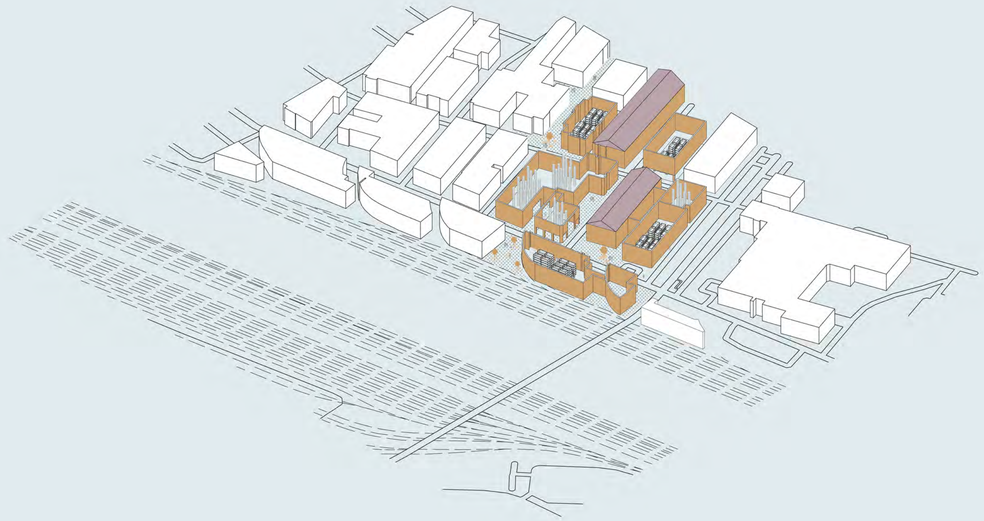
Warehouse

Remove Roof

Lift Facade

Add Vertical Farm

Phasing 15 Years



Phasing 50 Years