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The Lay of the Land

The Center for Land Use Interpretation



WINTER 2014

"Under our feet is the shared space of the earth, the common ground we collectively occupy, shape, and inhabit. This is where we begin the search for commonalities."
-Damon Farrugut

REFRIGERATED NATION

THE LANDSCAPE OF PERISHABLE FOOD IN AMERICA



Supermarket freezer aisles, the end of the cold chain.

CLUI photo

WHEN WE THINK of food, and look into our refrigerator, we open a door that is at the end of a long corridor of continuous coldness that reaches back through grocery store aisles, through fleets of refrigerated trucks and trains serving a nationwide network of chilled warehouses, and into chilled packing plants and food factories. This is the *cold chain*, which is like other product supply chains, except that it mechanically maintains a low temperature throughout, slowing the growth of bacteria and rot, allowing a wider variety of foods to reach us from greater distances. Like a time machine, the cold chain slows down the clock, letting more space slip by, enabling a continentally-scaled food supply to exist.

The cold chain was the subject of an exhibit at the CLUI in early 2013, titled *Perishable: An Exploration of the Refrigerated Landscape of America*, which was an opportunity for us to conduct extensive research and field photography on a subject that needed more representation in our database: the national *foodscape* that supports our life.

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Editor's Note

At the CLUI, some programs are national in their scope and coverage, and some are local, but either way they are about America. Some are macrocosmic, and investigate a particular phenomena as it occurs across the country, such as two featured in this newsletter, about information space and cold space. These programs describe integrated, nation-wide systems that operate like a vascular network or a GIS layer. Local programs on the other hand look inward, microcosmically, examining details. These programs are conducted because they explore some issue or idea that we feel is important and can be extrapolated outward, as is the case in two other programs described in the newsletter, about electrical distribution, and provisional architecture and development in the Los Angeles region. There is no place like Los Angeles, after all—except just about everywhere else.

NETWORKED NATION

THE LANDSCAPE OF THE INTERNET IN AMERICA



An Equinix data center in Ashburn, Virginia, at the heart of the cloud.

CLUI photo

NETWORKED NATION: THE Landscape of the Internet in America was presented at the Center's Los Angeles exhibit space in late 2013, examining the physical internet in the USA. The project looked at the roots, vines, and concrete of information-space, from AT&T through NSFnet, and early commercial network access points in places like Tysons Corner, Virginia. It ended with a survey of the dedicated data centers being built in office parks and remote locations by the major internet companies today, to house the cloud.

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NETWORKED NATION

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The first transcontinental telephone line was completed when the last splice was made, at the border of Utah and Nevada, in the town of Wendover, in 1914. A monument with an old telephone pole marks the spot, outside the Montego Bay casino. CLUI photo

When commercial and individual access to digital communication networks opened in the early 1990s, with the emergence of the World Wide Web, navigated through things like AOL and the Mosaic browser, it dematerialized the information space that had been enabled by the desktop publishing revolution. The physical flurry of print—newsletters, magazines, reports—sublimated into their genetic code.

This endlessly growing line of code, which now includes the majority of communications, visualizations, and data, can be seen in aggregate as the liquid flow of digital information, flooding over the landscape, following channels and rivulets that are physical wires, laid first by the phone companies.



The former AT&T Long Lines building at 33 Thomas Street is one of a few major data centers and internet connection points in Manhattan that started out as telegraph or telephone company buildings. Photo from Google StreetView



An office building at 8100 Boone Boulevard in Tysons Corner, Virginia, was the original Metropolitan Area Exchange for the eastern United States, with half the nation's internet traffic passing through it in the early 1990s. Today it is still a well-connected data center in the region of the Dulles Corridor, the highest concentration of internet infrastructure in the nation. CLUI photo

Commercial Internet Nodes

Though the early open internet was located on servers all over the place, connected to phone lines through modems, and to each other within buildings with routers, there were a few places where it converged and collected, where concentrations of the network linked to thick parts of the communications backbone.

Server rack space is desirable close to these points, such as *meet me* rooms, where main fiber lines converge, often in buildings near or at phone company central offices (COs) in major metropolitan centers, especially in Manhattan, Silicon Valley, Los Angeles, and the Dulles Corridor of Virginia, near the Pentagon, where the internet was born. These hubs emerged early on, and remain important gateways for the communications web of the world, even as it spreads further outwards.



The Manchester Cable Station in Northern California is one of a few dozen trans-oceanic fiber optic cable landing stations along the East and West Coasts. CLUI photo

Fiber Line Proliferation

Fiber optic cables carry the load of digital communications across the city, the country, and the world. These are the wires of the wired world (though the last mile—to the door of the consumer—is mostly still either a copper phone line carrying DSL, a coaxial cable owned by the cable company, or a satellite dish on a roof or apartment balcony).

When the dot-com bubble grew in the late 1990s, so did anticipation for the need for bandwidth. Dozens of communication infrastructure companies formed and ballooned in acquisition frenzies. Some even laid tens of thousands of miles of fiber, then

collapsed in spectacular bankruptcies in 2001 and 2002, including the biggest of them, WorldCom and Global Crossing. Today the internet is moving into the glut of bandwidth created ten years ago and new lines are being installed across the country.

The U.S. is connected to the world primarily through a few dozen points on the East and West Coast of the country where fiber-optic submarine cables emerge from the sea floor and connect to the inland network. Most of these cables were laid during the telco boom, between 1997 and 2002. A few cables across the Pacific have been laid since then, including the Unity/EAC-Pacific, largely funded by Google, which lands in Redondo Beach, California, and terminates at the One Wilshire building in downtown Los Angeles.



The Echostar satellite facility in Gilbert, Arizona, is one of the company's largest uplink sites. Echostar operates several earthstations in the USA for its network of communication satellites, serving video and data transmission customers. CLUI photo

Satellites and Cable Television

Not all national and international internet traffic is handled by fiber optic systems. Some of it travels via satellite and coaxial cables, systems primarily developed and operated by television broadcast and cable companies. Television has been a major driver for expanding telecommunication networks. Even the 1950s AT&T long line network carried television content as well as voice and data.

Today's cable TV company systems are increasingly used for data traffic, and are likely to be more so as the line between video and data continues to blur. Cable companies like Time Warner and Comcast provide many consumers with the last-mile connection to the internet, and are now the largest telcom companies, behind only Verizon and AT&T.

Since the first communications satellite launched in 1962 (AT&T's Telstar 1), television has favored space-based relay systems. Despite their lower bandwidth, the continuous stream of video information, transmitted over great distances, has been a better match for the medium. Satellites parked in space and rotating with the earth receive content from powerful uplink facilities and then beam it back to earth, generally non-directionally. (The signal can be collected anywhere on the ground with line of sight of the satellite).

This is done at cable company head-end facilities, where the signals are captured by parabolic collectors, and transmitted regionally via their cable network and by regional fiber networks. In the case of direct broadcast companies like DishTV, the signal is received directly by the end user through small dishes outside attached to consumer modems and cable boxes.



Digital Realty data center (next to an analog public storage facility) in Santa Clara, California, the biggest cluster of data centers in Silicon Valley. CLUI photo

Dedicated Data Centers

While data centers have tended to collect in pre-existing, partially occupied downtown buildings, near telco fiber connection points, a new type of structure is now spreading across the land: buildings wholly dedicated to housing digital data. These dedicated data centers exist in converted or rebuilt buildings in suburban office parks, and, increasingly, are built from scratch.

They are built by the companies dominating the internet now, like Google, Facebook, Apple, Amazon, and Microsoft. They are also being built by data center developers, like Sabey, CoreSite, Digital Realty Trust, and Equinix.

Data centers are clustering around one another in suburbs and in remote locations (instead of downtowns, near their customers), to take advantage of inexpensive real estate, but also for proximity to sources of electrical power and fiber bandwidth.

It's a new kind of physical information architecture: windowless boxes, often with distinct design features, such as an appliqué of surface graphics, or a functional brutalism, surrounded by cooling systems. A building that is a machine, tended by a small staff of technicians and security guards.

This is likely the future of the physical internet, where information storage is like an electrical utility, plugged into hydropower, cooled by river water, and connected by long wires to users around the world. Not a power plant, but a *data plant*. ♦



Terramark Data Center at 2970 Converse Street, in Santa Clara, California, one of the dozens of new *data plants* in the city. CLUI photo



Google built its first dedicated data center outside Silicon Valley in The Dalles, Oregon, in 2006. It cost around \$600 million. There are now three buildings on the site. It is located across the street from the site of a former aluminum plant. The aluminum industry once flourished along the Columbia, using power from the dams to produce the metal for Boeing Aircraft, in Seattle. Now the corridor serves Seattle-based Microsoft and its progeny in the information age. Google now has at least six dedicated company-owned data centers around the country, all built in the last few years. CLUI photo



Vantage, a data center company, built its first data center outside Santa Clara in Quincy, Washington, in 2012, joining Dell, Microsoft, Sabey, and Yahoo in this remote eastern Washington town. CLUI photo



Further up the Columbia River, Sabey built a data center campus on a bluff in East Wenatchee, Washington. Phase one is complete, and leased out. Phase two will likely begin soon. CLUI photo



Facebook built its first company-owned dedicated data center in the remote central Oregon town of Prineville in 2010, and opened another one next to it in 2013. Apple operates a data center nearby. CLUI photo



Facebook recently doubled the size of its data center complex near the North Carolina town of Forest City. One building broke ground in 2010, and a second building opened in late 2013. It is about an hour away from an Apple data center in Maiden, and a Google data center in Lenoir, all in rural western North Carolina. CLUI photo



The Digital Loudoun development is expanding an already major data center cluster along the Dulles tollway, in Ashburn, Virginia. This region is the largest commercial data center district in the nation. Ashburn and the Dulles Corridor is where the internet started, as a government contractor mainframe time sharing network, funded by the Pentagon, located nearby. CLUI photo



Data storage company Dupont Fabros' largest cluster of data centers is located in the Meadowbrook Plaza area in Ashburn, where it, along with Equinix, operates around a dozen dedicated data center buildings in an office park. CLUI photo



Verizon's Ashburn campus is where the telephone company and the internet meets the Federal government. The campus is located on UUNET Drive and was owned by MCI and WorldCom, before Verizon took over. CLUI photo

Networked Nation: The Landscape of the Internet in America was supported by a grant from the Andy Warhol Foundation for the Visual Arts. View the online exhibit at www.clui.org.

LADWP POWER
ELECTRICITY IN LOS ANGELES



A banner being installed at the Department of Water and Power headquarters in Los Angeles's Civic Center as part of the department celebrations of the centennial of the L.A. Aqueduct in November 2013. CLUI photo

ANTICIPATING LOTS OF attention going to the Los Angeles Aqueduct in this year of its centennial, and to the legendary accomplishments of the *water* side of the Los Angeles Department of Water and Power, the CLUI started planning an exhibition about the *power* side of the DWP's system two years ago, visiting the full spectrum of the utility's operations, from far-flung power production plants to small distribution substations scattered around the city that they serve.

LADWP Power: Electricity in Los Angeles opened at the CLUI exhibit space in November 2013, (coinciding with the L.A. Aqueduct's centennial celebration) and will be on display through February 16, 2014. The exhibit includes a tour program and a version on the CLUI website.

The Los Angeles Department of Water and Power is the largest municipal utility in the nation, serving four million inhabitants of the city (though not the other eight million in the surrounding cities of the Southland). It is culturally identified with Los Angeles, part of its fictionalized blend of Deco-noir.

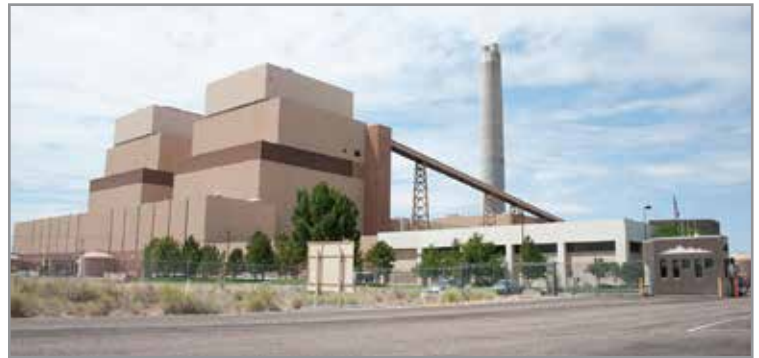
DWP is famous for its water service, which began 100 years ago with the opening of the Los Angeles Aqueduct. But its electrical service accounts for far more of its budget, and dates back further. Though water is certainly essential to the city, the power of DWP comes from power.

DWP has 8,800 employees and a \$4 billion annual budget, serving an area of 465 square miles. DWP has more than a dozen maintenance and engineering centers, extending from downtown to Owens Lake; four large gas-fired power plants; 13 hydro-electric plants; two of the nation's largest DC inverter stations; 3,656 miles of transmission lines; more than 10,000 miles of distribution lines; and 321,781 distribution line utility poles.

DWP started as one of several water and power providers in Los Angeles in 1902, and grew by buying other companies, finally becoming LADWP in 1937, when Boulder Dam power flooded the utility's energy capacity. Prior to the dam, DWP energy came from small to medium-sized hydro-electric stations along the L.A. Aqueduct. While William Mulholland made the water flow, Ezra Scattergood, head of the department's electrical division, figured out how to harvest the energy from this engineered 233 mile-long waterfall to power the city.

Sources of Power

DWP provides up to 6,500 megawatts of power to its 1.5 million paying customer accounts. Nearly a quarter of that power comes from power plants within the Los Angeles basin. The rest comes from elsewhere, including the Owens Valley, and as far away as the Columbia River in the Pacific Northwest, and the coal fields of central Utah. The city's reach for energy extends even further than its reach for water.



The Intermountain Power Plant, near Delta, Utah, one of the largest coal-fired power plants in the nation, and the largest single source of electricity for DWP, at the moment. CLUI photo

The largest single source of electricity for DWP is the Intermountain Power Plant, located in the middle of Utah, and fueled by coal mined from the eastern part of the state, which arrives by train. The construction of the plant started in 1981. By the time the two boiler units went online in 1987, the project cost \$4.5 billion. The DWP initiated the project and operates the plant. More than 80% of its 1,900 megawatt capacity output goes directly to Southern California via a dedicated high voltage DC line, one of two long-distance DC lines operated by the department. The DWP has pledged to use less power from the plant, and to convert it to natural gas over the next ten years.

The second largest single source of power to DWP is the Navajo Generating Station, a coal-fired plant near Page, Arizona. It has an output capacity of 2250 megawatts, even larger than the Intermountain Plant. The Navajo Generating Station was built starting in 1970, on a Navajo Reservation, and is operated by the Salt River Project, a utility providing electricity and water to the cities of Arizona. The DWP has a 21% share in the plant. Coal comes via a dedicated railway connecting the plant to the Kayenta mines on Black Mesa, 78 miles to the south.

Around a quarter of the power consumed by DWP comes from four gas-fired power plants, owned and operated by the department, and all located inside the Los Angeles basin. The Valley Generating Station, in the San Fernando Valley community of Sun Valley, was

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built in 1953, and is the oldest of them. The plant is also the location of the Truesdale Training Center, DWP's main training center for electrical line workers, and the site of the annual lineman's rodeo.

The Scattergood Generating Station was built a few years later, in 1958, and looms above the beach at Playa del Rey, next to the Hyperion Water Treatment Plant, the main sewage treatment plant for the city. It has three gas-fired units, and produces around 800 megawatts. The Haynes Generating Station in Long Beach has six units and generates up to 1,580 megawatts, and the Harbor Generating Station in Wilmington, also near the harbor, generates 450 megawatts.

DWP has a 5.7% stake in the Palo Verde Nuclear Generating Station, located outside Phoenix, Arizona, enough to supply up to 11% of DWP power needs. Palo Verde is the largest nuclear power complex in the country. The facility cost nearly \$6 billion, and took twelve years to build, with the last reactor completed in 1988. With a net capacity of 3,663 megawatts, the three reactor units generate power for nearly 4 million people—a major source of electricity for Phoenix and Southern California.

Around 10% of DWP power comes from hydroelectric plants. The DWP built one of the longest DC power transmission lines in the country to connect Los Angeles with the tremendous electrical generation capacity from Federal dams along the Columbia River in the Pacific Northwest. Known as the Pacific Intertie, this line starts at the Celilo Converter Station, above the Dalles Dam, on the Oregon side of the river. The line runs for 850 miles through Oregon and Nevada, then follows the DWP's Owens Gorge AC line through the Owens Valley. It terminates at a converter station in Sylmar, next to where the Los Angeles Aqueduct spills into the city at the Cascades.

The line has a capacity of 3,100 megawatts, enough to meet nearly half of DWP's electrical demand, and has historically been a major source of power for DWP. Currently the line supplies only around 3% of DWP power. Most of the electricity from the Intertie is used by other local utilities, such as Southern California Edison. In the winter, when less air-conditioning use decreases the electrical demand in Southern California, and the Pacific Northwest's heating needs increase, the line can be reversed, to send any surplus of energy in Southern California back up to the Northwest.

The other hydro-electric sources of power for DWP are a series of facilities generating electricity from the falling water of the Los Angeles Aqueduct, including two medium sized plants in San Francisquito Canyon, north of Santa Clarita. One of them, San Francisquito Power Plant #1, went online in 1917. It was the first source of hydropower directly for the city, and provided 97% of DWP power at that time.

The other, San Francisquito Power Plant #2, was built a few miles further downstream along the Aqueduct around 1926, a mile from the base of the San Francisquito Dam. The dam failed in 1928, in one of the worst industrial accidents in American history. More than 450 people were killed when the sudden rush of water flowed through the canyon, and through the Santa Clara River Valley to the ocean at Ventura, 50 miles away. Power Plant #2 was destroyed,

but was quickly rebuilt. The dam was not. Ruins remain on site.

The other hydroelectric plants along the aqueduct are much smaller, generating less than a few megawatts each. These include four plants built in the 1940s in the Owens River Gorge, a steep canyon through a volcanic landscape north of Bishop; another four built in the early 1900s in the Owens Valley, south of Bishop (Division Creek, Cottonwood, Lone Pine, and Haiwee); and two small hydro-electric plants at the Cascades, where the Aqueduct makes its final descent into the LA basin (the San Fernando Power Plant and the Foothill Power Plant).

A large hydro-power plant on Elderberry Lake, on the north arm of Castaic Lake, north of Santa Clarita, is a source of power for DWP during peak periods of demand. The project is shared by the DWP and the State Water Project. Water flows from Pyramid Lake, an upstream reservoir on the State Water Project's aqueduct, which brings water from Northern California. When activated, water flows out of Pyramid Lake through a 30-foot diameter tunnel, seven miles long, descending more than 1,000 feet into the turbines of the Castaic Power Plant, generating up to 1,500 megawatts. After the peak demand period ends, the turbines reverse, pumping the water back up to Pyramid Lake. Because electricity is sold at higher rates during peak demand periods, this is cost effective, even if it is not energy effective.

Around 8% of DWP electricity comes from wind, especially from the wind arrays around Tehachapi, California. Another 5-8% comes from other various sources, including biomass, landfill gas, geothermal, and solar. This amount is increasing as new generating sites come online.



The DC line from the Pacific Intertie enters symmetrical Valve Halls at the Sylmar Converter Station. CLUI photo

Power Distribution: Receiving Stations, Converter Stations, and Switching Stations

Electricity from these sources comes via the familiar high-tension lines visible along highways and vistas in the desert around the city. They terminate at one of a few types of high voltage substations used by the DWP, which then act as a bridge between power plants and local distribution.

WATER AND POWER

The principal type is called a receiving station. High voltage AC lines, typically from 115,000 volts to 230,000 volts, coming from power plants, enter the grid at receiving stations, where the voltage is stepped down to 34,500 volts or less, in long transformer banks. From there, the power is sent via underground or above-ground wires to surrounding distributing stations, which reduce the current further, to send to customers.

There are 23 receiving stations in the DWP system. Most of them are designated by a letter in the alphabet, reflecting the sequence in which they were built, and most also have a name, usually derived from a nearby street. Each receiving station has arrays of high voltage equipment in a yard larger than a few city blocks, and usually a control house facing the street, designed to reflect the architectural styles and aspirations of the time it was built.

In addition to receiving stations, there are a few switching stations in the DWP system, two DC to AC converter stations, and other control and support facilities that manage and maintain the electrical distribution network.



Receiving Station B, on Central Avenue, is one of 23 DWP receiving stations, where power enters the grid from its various sources. Voltage is usually stepped down at the receiving stations, and is distributed to clusters of smaller substations, known as distributing stations. Bing photo

Distributing Stations

Powered by receiving stations, distributing stations are the last link in the high-voltage chain. They deliver their current to the community that surrounds them, usually in the form of 4,800-volt feeder lines which leave the station on top of poles, or are buried underground. The lines loop out in a vast circuit, stringing together businesses and homes, where the current is generally stepped down to 240 volts on a pole-mounted transformer.

Inside, distributing stations have transformers and racks for line wire management, including jumpers, disconnects, insulators, and breakers. They are sometimes enclosed, but more often they are roofless—their architecture really just a wall surrounding a small substation.

There are currently 123 standard distributing stations operated by DWP (and another few dozen small pole-top versions) each with a numerical designation. Most also have a name, derived from the street location, or the community they are in. The older ones look like temples of infrastructure, solid architectural fixtures facing the street. More recent ones are constructed in a style meant to blend in, intending perhaps to be unnoticed. ♦



Distributing Station #6, located on Vine Street in Hollywood, was built in a solid and stolid Federal Style in 1924, typical of the early period of DWP substation architecture. CLUI photo



Distributing Station #46 is high Deco, almost Hollyhocky, suitable for its posh surroundings next to the Los Angeles Country Club on Wilshire Boulevard, not far from the Playboy Mansion in Holmby Hills. CLUI photo



Distributing Station #88 in Chatsworth was built in 1973 in a sort of functional institutional modernism typical of the distributing stations of the San Fernando Valley. CLUI photo



Distributing Station #87 near Melrose and Western got a facelift in 2007, and is one of a few more recent distributing stations that have a contemporary, post-modern look. CLUI photo

LADWP Power: Electricity in Los Angeles was supported by a grant from Metabolic Studio. View the online exhibit at www.clui.org.

AQUEDUCT CENTENNIAL FIELD TRIP
 COMMEMORATION OF A CELEBRATION



DWP tent set up at the Cascades for the commemoration.

CLUI photo

ON NOVEMBER FIFTH, 2013, the Center was on hand at the Cascades to witness the celebrations and commemorations of the centennial of the opening of the Los Angeles Aqueduct.

The opening of the L.A. Aqueduct a century ago was of course of great importance to Los Angeles, and to the development of the West. It was the moment the city gave birth to its future, and the day that its claim to the resources of its vast hinterlands was realized. It could now become a regional mega-city, capable of massive expansion. Over the years, this embrace has extended, through high-tension lines and more aqueducts, to cover all of the watersheds west of the continental divide. But November 5, 1913 is when it all began.

To understand this, truly, we would have to go back in time, which is sort of what happened during the commemoration event, organized by the DWP. The tour group departed from the CLUI office on a chartered bus, and arrived at the Cascades to witness a scaled-down re-enactment of the events there, a century ago.

That was then ...

100 years ago, nearly 40,000 were in attendance to watch the water get turned on for the first time. They came to this spot, at the north end of the San Fernando Valley, by car, horse, buggy, and train. They were encouraged to bring cups, suggesting they could scoop up the newly arrived Sierra water as it flowed down the hill. Sandwiches and commemorative pennants could be had for ten cents, though the event was emphatically free, paid for by city banks and the Chamber of Commerce. *Los Angeles Times* called it “the biggest and most heartfelt celebration ever held in Los Angeles.”

Bands played, speeches were made, and anthems were sung. Harrison Gray Otis, the publisher of the *Los Angeles Times*, introduced Ellen Beach Yaw, a famous singer of the time, known as the California Nightingale, who then sang her composition “Hail the Water.” George Pardee, the former governor of California, said that the L.A. Aqueduct “ranked higher than the bloody accomplishments of all the Caesars.”

After two hours of music and speeches, it was time to turn on the water. The aqueduct’s engineer, William Mulholland, took a position next to a concrete wall of the aqueduct, and addressed the crowd. “This rude platform is an altar,” he said, “and on it we are consecrating this water supply and dedicating this aqueduct to you and your children and your children’s children for all time. That’s all.”

A flag was unfurled, signaling the valve operators, high up on the hill, to open the gates. As the water began to move towards them, Mulholland turned to the mayor, and said his most famous line, “There it is, take it.” Then, according to the *Los Angeles Times*, reporting the next day, “40,000 people cheered long and lustily. Shout after shout went up until the hills rang again and again in echoing response...Cheering hand-clapping and noisy congratulations continued for twenty minutes, while the murmur of the onrushing water sang a comforting and harmonious obligato to it all.”

... This is now

Since that time the area has been transformed by changes the aqueduct provoked. The Cascades are now dominated by an Interstate highway, a housing development called “The Legends at the Cascades” and a second aqueduct next to the old one. Across the highway is one of the city’s largest landfills, and a much expanded waterworks.

The city had filled in, and there was not much room left for its citizens to gather for the centennial celebration at the Cascades. Attendance at the event was limited to invited guests, while being simulcast via satellite to the DWP headquarters downtown, where the throngs could congregate, if they desired.

The CLUI group, arriving by bus, found closed streets and access control, but since we had been invited to attend, we found our way in, and joined a few hundred DWP employees, officials, and journalists, who were assembling in a large white tent to witness the ceremonies.

In the tent was a stage, behind which the aqueduct was visible through a clear plastic wall. On stage sat a row of persons and personalities facing the crowd, whom they addressed, in turn, through one of two microphones, one for those playing historic roles, and the other for those playing contemporary roles.



Watermaster William Mulholland, returned from the past to speak at the commemoration.
 CLUI photo

WATER AND POWER

An actor playing Ellen Beach Yaw, the California Nightingale, stood at the historic microphone, and lip-synched to a screechy early recording of the national anthem, initiating the volley of anachronistic dissonance that was to follow through the production. Next to take the stage was President Theodore Roosevelt, who expressed his regrets for missing the event 100 years ago, and proclaimed “What is the ultimate good for the greatest number of people? The Los Angeles Aqueduct—the culmination of effort, ingenuity, integration, and a free government at work—is for the greater good of America!”

Applause followed. He then introduced William Mulholland (played by the actor Rich Skidmore), who said to Roosevelt, in a rehearsed aside as he took to the microphone, “Great job on the Panama Canal, by the way.” His brief speech gave thanks to those who helped make the aqueduct, and proclaimed that “the future will justify the efforts of the city in doing it.” He spoke of the toll his five years of absence, working on the aqueduct, took on his family, then introduced the next speaker as “the real Christine Mulholland,” which it was.

Ms. Mulholland took the stage, saying “Thank you great-grandfather, it’s about goddamned time I got a chance to talk to you.” She had been handed the mantle of family spokesperson for the Mulholland family by her aunt, the historian and author Catherine Mulholland, who passed away a few years ago.

She was followed by an actor playing Mayor Fred Eaton, who devised the plan for the aqueduct with Mulholland, but who differed with him about how the department should operate. The former mayor then introduced his real great-grandson, John Eaton, who spoke briefly, then introduced the current mayor of Los Angeles, Eric Garcetti, who started by declaring “I come to you today from the future,” by which he meant the present. Then and now fully merged.

Harry Chandler, the publisher of the *Los Angeles Times*, who developed a real estate empire in Southern California and profited immensely by its development, spoke next, then introduced his great-grandson, also named Harry Chandler. Senator Frank Putnam Flint, another politician, developer, and aqueduct proponent from a hundred years ago, also spoke. So did Whistling Dick, an aqueduct worker who led 52-mule wagons pulling 30-ton sections



And here comes the water to the awaiting crowd.

CLUI photo

of steel pipes into Jawbone Canyon, more than a hundred years ago.

We were finally released from this temporal maelstrom, propelled by jaunty flapper jazz over loudspeakers, into a windy bright day, outside the tent, for the final stageplay. Here, at the aqueduct’s edge, the “crude altar,” Mulholland waved the flag, triggered the opening of the floodgates on the hill—the very same structure that was used a hundred years ago—and the water fell towards us. There it is, Mr. Garcetti, take it.

People milled around, posed for photographs, reporters did their on camera reports for the TV news, and others went back to the tent to eat aqueduct cake. The CLUI crew collected at the bus, and drove around to the other side of the dried up and abandoned Cascades Golf Course, to Stetson Ranch. Here we visited 100 mules and their respective handlers, who had been at the Cascades briefly during the commemoration, but had since moved on, and were taking a break at the ranch.

The mules had been walking the length of the aqueduct over the past few weeks, as a separate and independent commemorative activity by Metabolic Studio, a group led by the artist Lauren Bon. Mules, who of course helped build the aqueduct, make an evocative bridge between the pre-industrial past and the post-industrial future. They also represent a kind of organic indigenous industry in the Owens Valley, as pack animals enabling trips into the deep nature of the Sierras. It makes sense for the mules, in this historical tipping point, between the last 100 years and next, to finally come down to the city, to see the great spectacle their figurative ancestors helped create.

Centennials are just numerals lining up nicely, but they do bring people together to consider the significance and legacy of a shared person, place, or thing. Though November 5, 2013, may have been a day about history, more than it was a day where history was made, this was the first and last time the centennial of the Los Angeles Aqueduct would be celebrated, and it was way more historic than that day in history, 100 years ago. ♦



Mulholland, as cut-out, and Ron Nichols, current General Manager of LADWP. Both were to leave the agency in disgrace—Mulholland in the 1920s, in the wake of the San Francisco Dam disaster, and Nichols, a few weeks after the centennial, due to financial scandals at the department.

CLUI photo

OFFICE TRAILERS

INVISIBLE ARCHITECTURE? OFFICE TRAILERS AND CONSTRUCTION SITES EXAMINED



The CLUI office trailer, located at the transitional Parcel B lot in downtown Culver City, contained the exhibit *On-Site Office Trailers: Invisible Architecture of the Urban Environment*. CLUI photo

OFFICE TRAILERS ARE small manufactured mobile commercial buildings, made to be trucked to a location to support business activities, like construction projects. Their use is generally considered to be temporary, but collectively they are fixtures of the urban landscape—a functional, national architecture of perpetual transition.

Also known as mobile offices, construction trailers, and portable buildings, these structures are a ubiquitous and overlooked form of architecture, and a rare example of a successful application of factory built buildings, which take advantage of the efficiency and economy of modular and prefabricated construction techniques. Though modernist and revolutionary in a sense, they come not from the desks of idealistic designers, but from the utilitarian demands of commerce and the workplace.

Office trailers are in every neighborhood, in every city in the nation, a kind of *international style* of prefab functionality. Perhaps because they are seen as temporary, they are not usually considered as architecture, despite being ever-present, and often staying on site indefinitely. They are used as classrooms, hospital space, and minimum-security prisons (it is possible to spend much of one's life in them, from birth through education, work, and incarceration).

These structures are most common, though, as on-site job trailers, used by contractors, engineers, and architects as field offices. They are found in this form at every manner of construction project, from individual building construction, to major infrastructure projects that make the city function, like electrical distribution projects, water supply maintenance, sewer line construction, metro-rail line construction, airports, and highways. They house the interface between people and place, at the work sites of the dynamic urban landscapes we create and inhabit.

The CLUI produced a public exhibit and tour program about office trailers in May and June 2013, and installed the exhibit inside an office trailer in the middle of a transitional urban space near the

Center's Los Angeles office. The program was part of a series of exhibitions sponsored by the Getty Foundation as part of Pacific Standard Time Presents: Modern Architecture in Los Angeles.

On-Site Office Trailers: Invisible Architecture of the Urban Environment was composed of photos and text describing a variety of office trailer types and locations, found at the moment throughout the city, including the construction camps set up at the 405 freeway widening project in the Sepulveda Pass; supporting the multiple construction projects at LAX; at Dodger Stadium; the Echo Park Lake Rehabilitation Project; Expo Line construction; the Broad Museum; and the ongoing Playa Vista project.

The exhibit also described the places where these trailers come from, such as the massive Mobile Modular company yard in Mira Loma, the principal location for the region's largest commercial trailer sales and leasing company, and their deep storage yard in Rubidoux. Together these two sites have over 1,500 trailers at any given time, most of which are 60 feet long. Also depicted and described were the facilities for Mod Space, Mobile Mini, and Williams Scotsman, the other major trailer leasing companies in the region, whose yards are also in the Inland Empire, along with the Silver Creek company, a manufacturer of modular office trailers in Perris.

The exhibit was installed inside an office trailer provided by the Mobile Modular company, and parked for two months in the middle of an empty lot in Culver City known as Parcel B, a site in development limbo, but destined to become the last part of the city's downtown redevelopment project. One room in the trailer had renderings of the building proposed for Culver City's Parcel B site, designed by Ehrlich Architects. 100,000 square feet of retail, ready to go, once the economic and political conditions to support it improve. ♦

On-Site Office Trailers: Invisible Architecture of the Urban Environment was part of *Pacific Standard Time Presents: Modern Architecture in L.A., celebrating Southern California's lasting impact on modern architecture through exhibitions and programs organized by seventeen area cultural institutions from April through July 2013*. Major support for *On-Site Office Trailers* was provided by the Getty Foundation.



Interior of the exhibit trailer.

CLUI photo

JOB SITE TRAILER TOUR
VISITING INVISIBLE ARCHITECTURE

TWO BUS TOURS conducted by the CLUI looked at construction sites significant to the expansion of the city, and their respective office trailers, as part of the exhibit *On-Site Office Trailers: Invisible Architecture of the Urban Environment*, in the summer of 2013.

Before departure, the group gathered at the CLUI Job Site Trailer containing the CLUI exhibit. The trailer was located in the middle of an empty lot known as Parcel B, which was selected by the CLUI as it is a transitional lot, the last part of a downtown redevelopment project planned for Culver City, and a block away from CLUI headquarters.

Though a fancy design has been prepared for Parcel B, with 100,000 square feet of retail and plazas with wide Spanish Steps kind of spaces, the project has been stalled for a number of years. It is now bogged down in the fall-out from the governor's state-wide dissolution of Community Redevelopment Agencies (and the lot is technically owned by a nameless entity called "the successor agency of the community redevelopment agency," poetically implying the depth of this bureaucratic limbo).

In the meantime the lot, whose pavement was unfortunately resurfaced and striped just before the CLUI trailer arrived, is the kind of place where Christmas trees are sold in the winter, and movie trucks park when they shoot on location downtown.

In Los Angeles, this city renowned for vehicles, we will look at current major construction sites related to transportation: the new Metro Rail line, the 405 freeway widening project, the airport's upgrades and expansions. And we will sit in traffic, as if in a bath, while we talk about the surrounding efforts to do something about it. We will also look at some redevelopment projects, and the transformation of spaces, from historic aircraft factories and oil fields, to master-planned residential and commercial projects at Playa Vista.

This tour is about office trailers too, and we will be using them as gateways to talk about the larger project they are associated with. We will continuously point out these "invisible" buildings as we move around the city. This tour is a kind of urban architectural safari, through herds of office trailers, flocks of mid-century modernism, and gaggles of dingbats.

Metro Rail's Expo Line

Our first stop is just a few blocks away, on Venice Boulevard, at the current limit of the construction of the new Expo Line of Los Angeles' light rail system. Phase One cost close to a billion dollars, and was completed last summer. It goes from somewhere near downtown, to here. Phase Two, under construction, is expected to cost \$1.5 billion, and will go from here to the ocean at Santa Monica, 6.5 miles away, with seven new stations between here and there.

The new line is cutting a swath of construction through the



Tour participants crane to see the first trailer spotted on the tour, a small grey 24-footer from ModSpace at the Expo Line light rail construction site. CLUI photo

Westside, where some home lots start at around a million dollars, with or without a house. Mostly the line follows Exposition Boulevard, which was a rail line as far back as 1875, when steam trains brought ore to ships in Santa Monica Harbor, before the railway closed in the early 1900s. Southern Pacific Railroad bought the line and converted it to electric in 1909. It became the Santa Monica Air Line, and it carried passengers until 1953. Portions of it carried local freight between industrial sites until the late 1980s, though most of the tracks were ripped out. Metro bought it in 1990, to keep the rest of the right of way from being developed, in anticipation of what we see here going in today, 23 years later.

At the construction site is the stub of the new elevated railway, rising high enough to cross over Venice Boulevard, on an as yet to be built bridge. Next to it is a big parking lot, and some remnants of construction, though for the moment most of the work on the line has moved elsewhere, until they come back to work on the bridge. A small office trailer remains at the site, a grey 24-footer from ModSpace, used as a staff room for security and maintenance personnel.

Heading west on Venice Boulevard, we pass the old Red Line power station, from the electric streetcar lines that used to meet here, before they too were torn up in the 1950s. The station is now a theater for the Actors' Gang, a group led by the actor Tim Robbins, who can sometimes be spotted grabbing a snack at Trader Joe's across the street.

We pass the In-N-Out Burger, then we drive by the headquarters of the CLUI, and the barbeque grill shop that back in 1913 was Harry Culver's sales office for the new development that he named Culver City, at the end of his new block-long Main Street. On the other side of the road, an empty lot next to India Sweets and Spices is a ghostly reminder of the gasoline line explosion that occurred in the median of Venice Boulevard in 1976, causing a fire that killed nine people.

We turn right on Watseka, at the Hare Krishna temple, and are soon at the end of the road, at the diagonal swath of Exposition Boulevard, and the light rail construction again. Here the grade, which has gone back to ground level after crossing Venice, is rising up again, to go over National Boulevard. Crews are building a retaining wall for the line on the edge of Exposition, so we have to do a little detour—our first of the day.

While following the Metro line construction as much as we can on the roads, at times sawtooth along the track's diagonal path through the city, on our way to the next office trailer stop, we talk more about office trailers, the subject of the tour.

Trailer Talk

Job site trailers are generally leased by construction companies for a few months, then returned to their owner's logistics yards to be cleaned and serviced before being rented out again. In Los Angeles, the three big trailer leasing companies are ModSpace, Mobile Modular, and William Scotsman, and you can tell whose is whose by their color—gray, brown, or white with green trim, respectively.

There are tens of thousands of commercial trailers in the L.A. region, more than 100,000 if you count individual units of multiple-wides and school classrooms. Single wides are the most common though, and are the typical on-site or job site trailers we see scattered all over the place, tucked in corners, in parking lots, or in compounds at big job sites.

They tend to be sized in multiples of four feet, as this is the standard size for plywood and composite sheets. The smallest ones are eight feet wide and 24 feet long. Construction starts with a welded steel base subfloor which sits on removable axles, suspended by leaf springs. A plywood floor is bolted to this frame, then walls are built on top of that. The walls are made of standard 2x4s, 16 inches apart, just like a house. The exterior is usually T1-11 plywood, or some other textured composite wood sheeting (though a few companies use sheet metal). Inside walls are done in a variety of 4x8 foot sheet material, such as smooth wood grain patterned paneling or vinyl coated pressed fiber materials. Ceilings are usually suspended panels, like in an office building, with recessed fluorescent lights. Floors are usually finished with one foot square composite tiles. The roof is rolled asphalt, or metal. Doors, windows, and interior spaces vary, a bit. They can have bathrooms, or not. Break areas with bar sinks and cabinets, or not.

Wiring for lights and plugs is done with junction boxes and romex, strung through drilled holes in the 2x4 wall studs, as it is in normal housing. Heating and cooling is usually by a heat pump unit mounted on the outside wall of one of the narrow ends, and ducted through the building in the space above the suspended ceiling. The walls, ceiling, and floor are insulated with fiberglass.

In Southern California, they all come from the Inland Empire, pretty much, where the leasing yards are located, some with as many as 1,000 units stored on site. The big yards have sheds and spaces outside to work on the trailers. They can strip one down to the frame and build it back up in just over a week, if they need to. Most trailers go through several renovations before they are retired from service. They could, if properly treated and maintained, last as long as a house. But they encounter lots of abuse in the field, and usually are trashed after 20-25 years or so. The main reason to demolish them is a combination of damaged and out of date interiors, rot from a leaky roof, and a rusting frame. Most things, though, can be fixed by replacing materials.

Trailers are built by a variety of modular architecture companies, the biggest of which in Southern California at the moment is Silver Creek in Perris, which mostly makes more elaborate fixed modular

buildings, not trailers. During slow times in the economy, nobody builds new ones, and the used ones pile up at leasing yards.

From Metro Rail to 405 Widening Project

At Pico and Sepulveda, the tour bus leaves the right of way of the Metro Rail construction as we point out an office trailer, located at the Catalina Pacific concrete batch plant that provides concrete for the rail project as well as other local projects needing wet concrete. We head north on Cotner, adjacent to the 405 freeway, and soon features of the next project we are looking at come into view.

In Westwood, we enter into a chaos of concrete formwork, where flyover overpasses are being built to replace road transition ramps, outmoded with the newly widened 405 freeway, also under construction. A new system of cloverleaf-type ramps is being built in the middle of an already built-up place, at one of Los Angeles' busiest intersections, Wilshire Boulevard and the 405. In the midst of this transitory concrete jungle, we point out the first of a few construction yards for the primary contractor for the 405 project, Kiewit Construction. The yard is full of office trailers—their tell-tale brown paint indicating that they came from Mobile Modular—and orange Kiewit pickup trucks, which can be seen up and down the Sepulveda Pass, working on this major urban freeway project.

Just past Wilshire, we turn left on Constitution, going under the 405 and into the Federal Veterans grounds to another Kiewit construction yard, the Bruin Yard, to pick up our first outside briefer. Joel Kriwinski will help us understand what's going on as we get back on Sepulveda northbound for a ride up through the construction in the Sepulveda Pass.

The 405 freeway widening project through the pass has been going on for several years, and is not expected to be done until some time in 2014. It's a \$1 billion project, partially supported by federal dollars from the "shovel-ready make-work project" period of Obamadom. The intention is to widen ten miles of the existing freeway by at least one lane in each direction, in order to add a car-pool lane. To do so, three bridges are being torn down and rebuilt and 28 on and off-ramps are being re-engineered.

But that is not even the hardest part. Because much of it is in a pass through the hills (between the Westside and the San Fernando Valley), there is already a lot of critical infrastructure passing through here. More than a dozen utility lines have to be dug up and relocated, including high voltage power, water mains, communication, natural gas, and a 12 foot-wide storm drain. Some go back more than 60 years—unmapped utilities were located during the construction.

A total of 18 miles of retaining walls and sound walls are being constructed, including specialty glass barriers that enable some highway-adjacent home owners to keep their view. Some of the retaining walls built early on have already started to collapse, and are having to be rebuilt, further delaying the project. All this is occurring in the space bookended by the 101 and the I-10 intersections of the 405, both often rated as the most congested freeway interchanges in the nation, on a stretch of highway with 300,000 cars passing over it every day.

As we head up Sepulveda Pass, traffic slows, enabling the people

OFFICE TRAILERS



Stratigraphic detailing on the retaining walls of the 405 freeway.

CLUI photo

on the bus, elevated above the surrounding traffic, ample time to examine the forms and textures of the various structural and retaining walls around us. Our briefer, Joel Kriwinski, of Drill Tech Drilling and Shoring, knows them well, as he built them. Some of the cuts into the hills to widen the road create shear walls 80 feet high. These have to be faced with powerfully reinforced concrete walls, made with a mesh of steel, covered in shotcrete, held in place by thousands of rods drilled horizontally into the earth behind them. Some of these rods are a few inches in diameter and extend 80 feet into the ground.

Joel explains how his crews trowel the wet surface concrete by hand, sculpting up to two inch-thick relief patterns of simulated tilted rock stratigraphy designed by his company, which creates the effect of massive road cuts through solid rock, while behind them is the loose and fractured ground of Southern California (here Jurassic slate and Cretaceous sandstone), pressing hard.

At the top of the pass, we exit at Skirball Center Drive, and pass over the pass, with its river of traffic below and a good view of the adjacent Carmageddon Bridge, so named as rebuilding it required the full closure of the 405 for more than a 24-hour period (an event that was thought might create mass panic, but which instead led to people sneaking on to the closed freeway to set up dining tables and play frisbee).

Then south, on the west side of the pass, to our destination, the Kiewit construction yard known as the Segment 2 and 3 Office, where we disembark for a briefing about the site and the overall project by Kiewit representative Natasha Jones.

This compound is one of the busiest of the eight or so that Kiewit operates along the construction route. It sits in a kind of side canyon, halfway up the pass, at a place that used to be the access road to the Mission Dump, a landfill that filled-up part of the canyon until it was closed in the 1980s. The former truck scale for the dump remains at the entrance to the Kiewit trailer compound. Beyond it, a group of trailers in a complex configuration runs up the canyon road. All of them brown, leased from Mobile Modular.

The privately-held Kiewit Company was started by a Dutch brick layer in 1884, and is now one of the largest construction and engineering companies in the world. It is headquartered in Omaha,



The group touring the office trailer compound at the Kiewit Yard in the Sepulveda Pass.

CLUI photo

in Kiewit Plaza (which also houses the headquarters for Warren Buffet's Berkshire Hathaway), and generates around \$12 billion in revenue annually, building bridges, tunnels, offshore oil rigs, and other infrastructural projects. In addition to the Sepulveda Pass 405 widening project, it is currently working on the new San Francisco Bay Bridge, reconstructing the large geodesic dome at the Omaha Zoo, building gold mines in Nevada, gas plants in North Dakota, and many other things. Kiewit employees know the inside of construction trailers as much as anyone.

While this is not really what their PR representative Natasha Jones said to us, she did address all of the questions directed at her by the assembled group, who then took a walking tour through the trailers, peeking in on some meetings, reading the OSHA posters, and using the restroom.

South on the west side of the pass again, we pass Kiewit's Half Moon Yard, then the SCS Renewable Energy Mountaingate Plant, which cleans methane from the closed landfill in the pass and sends it via a five mile-long pipeline to UCLA to be turned into electricity. Further down the road we point out the Metropolitan Water District's Sepulveda Canyon Water Control Facility, which reduces pressure and generates electricity from the MWD's water main, cascading down the pass underground into the city from the big filtration plant in the San Fernando Valley. These are some of the utility lines that had to be moved to widen the highway.

Two more Kiewit construction and trailer yards, the Getty View Trailhead Yard and the Kohn Yard. Then we pass the entrance to the Getty Center, the massive cultural complex at the base of the pass. It opened in 1997, after years of construction delays, finally costing \$1.3 billion, about the same as Phase Two of the Expo Line. And with delays and adjustments, the 405-widening car pool lane project may match that as well. It's amazing what can be had for \$1.3 billion these days.

We drop off Joel where we picked him up, at the Bruin Yard, grateful for his interpretive prowess. The yard is next to the pumping yard for the Sawtelle Oil Field, which we are on top of. Here, Brietburn Energy extracts 175,000 barrels of oil per year through 18 wells, drilled laterally from this point outwards in different directions under the city. It is one of a few dozen of such operations like this in the L.A. Basin, much of which is still

an active oil field, despite its appearance to the contrary. We are reminded once again of the Getty Center, looming above us. It's founder, oil-man John Paul Getty, once the richest man in the world, said "the meek shall inherit the earth, but not the mineral rights." Sitting in this bus, paid for with the largess of his legacy, atop an oilfield still pumping away, it's hard not to feel some kind of satisfaction with our inheritance.

From the Freeway to the Beach

Oil, Aerospace, Entertainment: these are the historic pillars of Los Angeles' economy. How to manage housing, transportation, sprawl, and redevelopment, is its future. Our next stop combines all these elements in one place—Playa Vista, which means view of the beach.

Playa Vista is one of the largest redevelopment projects in the L.A. Basin. The site is the former aircraft plant and airport for Hughes Aircraft, owned by Howard Hughes. Hughes reigned as the world's richest man longer than John Paul Getty, and his fortunes similarly came from oil. His father's Hughes Tool Company, a pioneer in oil drilling technology, provided the resources for Hughes to follow his passion for airplanes and movies. More than anyone else he embodied those three historic pillars of Los Angeles—oil, aerospace and entertainment.

Though his fortune mostly went to a medical research foundation and Las Vegas real estate, the legacy of the Hughes Tool Company is today's BakerHughes, a multi billion-dollar company based in Houston that is the leader in oil and gas well stimulation technology, that controversial technology known as fracking.

The legacy of Howard Hughes in Los Angeles is Playa Vista, where he built the Spruce Goose, the world's largest airplane (which after its first brief and only flight, sat for a long time in a hangar in Long Beach, and is now in a museum in Oregon). Playa Vista is also where he took off on a premature test flight of his XF-11, built for the military. He crashed it into a house in Beverly Hills, and became addicted to painkillers during his slow recovery. His plant at Playa Vista had as many as 5,000 workers and dozens of buildings. The largest ones are still there, used by the movies. The site was where Spielberg, Katzenberg and Geffen were going to build their DreamWorks studio, and where these plans were abandoned in 1999.

Today the largest remaining Hughes building and some of the grounds are leased by Raleigh Studios, an independent production operation, with studios and soundstages in Hollywood, Manhattan Beach, Baton Rouge, Budapest, China, and in the Spruce Goose Hangar. Many of the biggest Hollywood productions have used the massive space, including *Batman*, *Avatar*, and *Titanic*.

Essentially an industrial use, large-scale film production has preserved the hangar in close to its original state. But the rest of the former Hughes property has changed dramatically, becoming a master-planned mixed-use live-work new-urbanist upscale high-tech mecca.

The current redevelopment of the site began in 2001, though it has changed hands a few times. It is now being developed by

Brookfield Residential, the fifth largest land developer and home builder in North America.

We begin our interface with the project at the west end, where we enter the property on Concert Park Drive, across from Home Depot, and are immediately surrounded by a dense cluster of new apartment blocks, three and four stories high, each in a different architectural style, iterations of Spanish and industrial, and arranged uniformly into blocks surrounding a green lawn with palm trees. Clean, new, and dense, the sensation is like entering an architectural rendering.

We head to the far side of the property to meet our briefer. In doing so we get to see another common but distinct form of the on-site office trailer, the housing sales office. The office is in a modular structure composed of eight 12x60 foot prefabricated sections, connected together. These multi-wide temporary buildings are common, and built in the same way as single-wides, trucked to the site individually, but designed and built to fit together in their particular configuration at the site. Once inside, it looks like any other office space. They are generally used for longer-term projects and when space is available. The building has been painted a kind of high-tech grey/green and emblazoned with the Playa Vista logo, but it appears to be the type of trailer provided by ModSpace.

Our group, numbering around 50, flows past the reception kiosk and packs into a meeting room with a conference table in the middle, surrounded by panoramic elevation renderings of the future phases of the project. Once assembled, Derek Fraychineaud, Vice President of Residential Construction, welcomes the group, and tells us all about it. Though Brookfield took over the project just a few years ago, Derek has been involved in it since its inception, working for the previous developers. In fact he pulled the project's first building permit in 1999. His knowledge spans the history of the site to the extensive terrestrial engineering that building here has required.

After an overview of the future of the site, the various home "products" that will be available, and other anticipated amenities like the "seven-eight chef-driven restaurants," we head out in the bus with Derek for a drive-through tour. We are in Phase One, which is complete. It is composed of more than 1,400 units, most of which are occupied, a school, restaurants, Whole Foods, parks, and an interpretive center. A brand new town of 5,000 residents in the middle of the city. We pass by the Mondrian (an apartment complex stylized with the distinct colors and forms of the famous Dutch designer) and other architecturally-themed vertically stacked triplexes and loft-style townhomes. Each block a completely different style, yet all sort of similar.

Phase One ends abruptly at its eastern end with a chain link fence, beyond which is a big flat expanse of mounded earth, construction equipment, drill rigs, and office trailers: Phase Two. Phase Two is expected to have more than 2,500 units, filling in the rest of the property. Though buildings are expected to begin to appear later this year, the landscape is still being prepared.

Every volume of soil at the 1,088 acre Playa Vista site, it seems, has been moved at least once. Former wetlands (Ballona Creek

OFFICE TRAILERS



Derek Fraychineaud, Vice President of Residential Construction at Playa Vista, guides the bus through the construction site. CLUI photo

runs along the base of the bluff along its southern side), and then a former runway; the ground is naturally soft and unsuitable for large scale structures. To make it buildable it has undergone a complex and unusual process of extended compaction known as surcharging, where soil was piled up into rectilinear mounds and sat for years, compressing the ground underneath it. In addition, piles are driven into the ground to support the foundations of future buildings. Drill rigs and pile drivers have been at work on the site for years, installing and load-testing building pad piles.

Derek guides the bus along the grid of new roads of the construction zone, describing the process as we pass through this landscape of terraformation. Underground utilities are also going in, and exotic blooms of bright flexible plastic conduits sprout from subterranean ductwork.

At the east end, we re-enter a more familiar landscape, the already constructed commercial campus and the old Hughes plant. As we loop around it, Derek points out the new and old: there is the Spruce Goose Hangar with its redwood trusses holding one of the largest enclosed open spaces in the city; there, in Building 17, is YouTube's new television production center; the upper corner of that renovated building was Howard Hughes's office; over there are the offices of Riot Games; that building was the former cafeteria, capable of serving all 5,700 employees of the aircraft plant; tenants in that building include Electronic Arts and Facebook; Building 3, over there, was the Skunkworks R&D building for Hughes; over there at the east end is where the L.A. Clippers basketball franchise is based.

The business park at Playa Vista and its immediate surroundings are indeed one of the most impressive concentrations of hip high-tech companies as can be found anywhere. In one row of four new slanty glass office buildings is USC's Institute for Creative Technologies, a famous Army-funded simulation and gaming tech and digital effects lab; the headquarters for Belkin, the computer accessories and cabling company; and the headquarters for the Internet Corporation for Assigned Names and Numbers, ICANN, which controls the top-level domain name system for the internet worldwide. Across Jefferson Boulevard from Playa Vista are the main offices of some of the best known advertising firms, such as TBWA\Chiat\Day, OMD, and Deutsch, as well as those of innovative architecture firms, such as ARUP and Gehry Partners.

The bus parks next to the ICANN building so people can get out and enjoy their picnic lunch on the sculpted grounds of Central Park. Designed by L.A. architect Michael Maltzan, the park has a dramatic bandshell used for occasional performances and film screenings, and a network of curiously vegetated mounds and walkways. We are reminded that the park, like the rest of the development, is private property, when seguey-mounted security guards appear and begin questioning the tourists while they eat their lunch.

Off to the Airport

The next stop on the tour is Los Angeles International Airport, which has more construction trailers than anywhere else in the city (other than the trailer company leasing yards in the Inland Empire), supporting several major construction projects there, including the construction of the new Bradley Terminal, together totaling more than \$4 billion.

To get there we head west on Jefferson Boulevard towards the beach. On the way we pass by wetland restoration projects along Ballona Creek, and the pipelines and vents of Southern California Edison's underground gas storage complex. We enter Playa del Rey, an isolated beach community with elements that remain from an earlier, more laid-back time in coastal real estate.

Left on Vista del Mar, we are right on the coast now, with Dockweiler Beach and the Pacific Ocean on our right, and the bluff between the beach and the runways of LAX on our left. These bluffs, enclosed behind fencing, are covered in an organized street pattern, with curbs and even a few lamp posts, but no buildings. This ghost community is visible to anyone taking off in a plane at LAX with a window seat.

In the 1920s, this was Surfridge Estates (and part of Palisades del Rey), a beach front development with some very fancy homes, owned by the likes of Cecil B. DeMille. As the airport grew, it got louder. Eventually, in the 1960s and 1970s, the area was condemned by the City of L.A. by eminent domain. People sold out to the city. Some refused to leave, but eventually they all did, and the houses, all 800 of them, were moved or torn down. Part of it is now a Blue Butterfly reserve, and there is talk of pulling out the paved streets and restoring the dune.



The group heads into the construction trailer compound at LAX for a briefing by Curtis Fentress, the architect of the new International Terminal. CLUI photo

OFFICE TRAILERS

Nearing our destination, we turn away from the beach on Imperial Highway at the Hyperion Wastewater Plant, the city's largest sewage plant, and are stopped at the next intersection by a row of police cars. It seems the President of the United States is in town and is headed to LAX too, so we have to wait. The motorcade soon appears, coming towards us on the empty street, and turns north on Pershing and in the back door of the airport. After a few more minutes, traffic is allowed to flow, and we turn north on Pershing, then into a construction trailer park at the northwest corner of the airport property.

This is the main contractor yard for the largest project at LAX, the building of the new Tom Bradley International airline terminal. The engineering trailer yard has around a dozen double, triple, and quadruple-wide trailer structures, many of which are used by the prime contractor on the project, Walsh-Austin, a joint venture between the Walsh Construction Company, based in Chicago, and Austin Commercial, based in Texas. This team, along with dozens of subcontractors, have been working on the terminal for a few years already.

The terminal construction is opening in stages, as the old terminal, to which it is connected, has to continue to function. Phase One, opening in 2013, involves 18 new gates on the west side, including gates for a new generation of larger aircraft, and the new Great Hall, full of shopping and dining. Phase Two rebuilds the east side gates, and is expected to be finished in 2015. The original cost estimate was \$1.5 billion (close to the other \$1.3 billion projects we have seen already today), but it's likely to exceed \$2 billion.

Air Force One roars into the air as we arrive at the lot and meet our briefers outside the trailers. After a look at some of the interconnected trailer park, we go inside a conference room where Curtis Fentress, the terminal's architect, gives us a slide presentation about it. He is the founder and principal of Fentress Architects, a large international firm which also designed Denver's airport, with its unique tent-like roof.

Even though it is considered to be the largest public works project in the history of Los Angeles, the new terminal at LAX is hard to see from the usual entrance of the airport, as it is behind a façade at the end of the busy airport passenger pick-up and drop-off loop. A good view of it can be had from the back entrance of the airport, the business end of it, as it were, which is accessed via World Way West. The group gets back on the bus, accompanied by Kevin Handley of Fentress Architects, and heads into the airport's back side.

On the way, we pass a former Nike missile launch complex at the corner of Westchester and Pershing, which is now an animal shipping company called Pet Jets. Then, entering the airport, we see the President's limousine being loaded into a military transport plane, and pass the other large office trailer park at the airport, on the south side of World Way, where contractors dealing with construction equipment, bulk materials and aggregate are based.

Continuing east, we pass the ten-story administrative headquarters building for the airport, aircraft maintenance hangars, the airport's fuel tank farm, and other logistics and service areas. There is also an



The tour group in the blueprint trailer in the Walsh-Austin construction compound at LAX. CLUI photo

airport control tower on this side of the airport, one of the original ones, which is now mostly automated. World Way West dead-ends with a loop that is immediately across from the new Tom Bradley Terminal with its row of soaring metallic arched roofs. From this perspective we can see how the building could cost \$2 billion.

After heading back to the trailer park to drop off our Fentress representative, we pick up an LAX World Airports representative, Tim Ihle, who travels with us to the other side of the airport, where we will see another large construction project going on, and visit clusters of trailers that are tucked into the middle of the densest part of the airport, the Central Terminal Area.

At Westchester and Sepulveda, we pass the O'Neil construction trailer yard, the base for the airport's elevator and escalator upgrade project. Nearly all mechanical people movers are being replaced throughout the airport over a six year period, at a cost of more than \$270 million.

The bus pulls into the loop through the central terminal area with all the other busloads of airport travelers, only we are not going anywhere. At the far end of the loop we pull into a bus holding area



The group gets a briefing from a Clark/McCarthy engineer working on the Central Utility Plant upgrade in the heart of LAX. CLUI photo

OFFICE TRAILERS

between the parking garages, and disembark next to a dumpster. The group walks down Center Way, through the service core of the airport, west of the Theme building, to a trailer encampment. This is one of two contractor yards in this busy part of the airport supporting the Central Utility Plant Replacement project. We meet with Ben Haim, from the Arup engineering company, which is the main contractor on the project. We go up to the top of a parking garage for an overview.

The Central Utility Plant, in front of us, is a circular structure in the middle of the airport that provides heating and cooling, water and power for all the terminal buildings at the airport. The fifty year old plant is being replaced with one that is 60% more efficient, at a cost of nearly half a billion dollars. The trick is building a new one while the old one continues to function, then switching over the systems, with all of their connections, piece by piece. It is described as like doing a heart and lung transplant on a living patient.

Back to the bus, we begin the journey back to Parcel B, pointing out a few things along the way, such as trailer classrooms at the Lutheran school on Sepulveda, and the Howard Hughes Center, a large shopping mall and office park. On Jefferson, we pass the former back lots of MGM, sold to developers in the 1970s when Kirk Kirkorian owned the studio, helping to finance the MGM Grand resort in Las Vegas, the largest hotel in the world at the time. (Howard Hughes did not live to see the new boom in Las Vegas—he vacated his penthouse at the Desert Inn and shuffled off this mortal coil in the 1970s.)

We pass the Baldwin Hills, where more than 400 oil wells still extract bubbling crude, owned by Plains Exploration, based in Houston, which is eager to frack these wells if they are allowed to. We pass National Public Radio's western studio, then the mega-institutional architecture firm HOK's Los Angeles offices. Culver City's waste transfer station, along the now concretized Ballona Creek, is where they used to film *Tarzan* movies, on part of the studio's back lots. It was here, along Ballona Creek, where a hundred years ago Harry Culver ran into Thomas Ince, who was using the bushy creek bed as shooting location for a Western movie, and convinced him to open a studio here, which became MGM.

We pass another cluster of construction trailers at 6000 Jefferson, a four-wide, abandoned by the City of Los Angeles, following the completion of the North Central Outfall Sewer Air Treatment Facility next door, in 2010. The facility cleans the air that vents from a large buried sewer main, on its way to the Hyperion Plant, using charcoal filters. The gates of the facility are adorned with enigmatic atomic symbols made by the public artist Helen Lessick. It is next door to a Herman Miller chair warehouse. Somehow all these things are connected.

Turning onto Hayden Street in Culver City, we drive down a road that is the architect Eric Owen Moss' Appian Way. Several of his signature buildings from the 1990s are here, made possible by his patrons, Fred and Laurie Samitaur Smith, who bought many



View of the Samitaur Tower from the bus.

CLUI photo

of the former warehouses long ago and engaged Moss as part of their redevelopment efforts. This work gained him much acclaim, and helped position a L.A. school of clever post-postmodern, deconstructivist re-use architecture. Moss later became the head of SciArc, Los Angeles' progressive architecture school, and the subject of some of the other programs in the *Getty's Pacific Standard Time: Architecture in L.A.*

An image of his Samitaur Tower is one of the emblems for the Getty program, printed on banners hanging from lamp posts all over town, and on the cover of the printed program schedule listing this very tour. This is mentioned to the audience on the bus, as we approach the end of Hayden Street, where we get out to take a look at the Semitaur Tower, in the Corten steel flesh.

The tower is, unfortunately, closed to the public, and unsafe to climb. It is a piece of architectural punctuation. Wrapped around it is a translucent screen, a projection surface for words and patterns. The tower is a kind of information age lighthouse, marking the shores of high-tech urbanism next to the new light rail line.

Around the bend at the corner of National and Washington, across from the Expo Line Stub, is a big tree, an eddy in the flow of the urban renewal. At the base of the tree is a brass monument to the Hal Roach Studio that used to be right here, producing *Laurel and Hardy*, *Our Gang*, and *Harold Lloyd* movies. This was also the part of town with old jazz joints and speakeasies. Then it became car dealerships. Now they are gone too, mostly, converted to more creative office space, digital effects studios, crafty beer bars, high-end kitchen supplies, reformed jazz bakeries, and whatever else we construct in this place. Not complaining of course, who doesn't want a Trader Joe's a block away from home?

Then the bus pulls into Parcel B, our temporary home in the heart of the heart of screenland, our little paved paradise, where nothing has happened, yet, and maybe won't for a while, so anything can happen, for the time being—even a base for a bus tour and exhibit about office trailers. ♦

OKLAHOMA

GONE ACROSS OKLAHOMA THE GREAT STATE OF TRANSITION

OKLAHOMA IS A state that just keeps going. From the evacuated mining towns of Tar Creek, to the historic Dust Bowl departures on the Panhandle, to the oil and gas pipelines coursing under its rolling terrain, Oklahoma is a state of transition. From east to west, it is the third widest state in the lower 48, after Texas and Montana. Looking at a map of the USA, Oklahoma looks like a failed attempt to keep Texas from being simply too damn big. The Red River is the wiggly line along the bottom, separating it from Texas, but the rest is straight lines of longitude and latitude.

Initial Point

A close inspection of the state lines at the western edge Oklahoma's panhandle shows that the 35 miles of its boundary shared with New Mexico do not line up with the otherwise straight 300 mile line dividing New Mexico from Texas. This is because the boundary between New Mexico and Texas was set along the 103rd Meridian, as located by a Spanish survey in 1819. When Oklahoma Territory's panhandle was surveyed in 1890, using more modern and accurate methods, it was discovered that the 103rd Meridian was actually more than 2 miles east of where the early Spanish survey had it. New Mexico was quite upset about this discovery, as it meant that it had lost more than 600,000 acres to Texas. Over the years the state legislature has made demands for reparations, including monetary compensation, even as recently as 1991, though no action has been taken.

Panhandleland

The west side of the state is that curious cartographic appendage, a 165 mile-long, 35 mile-wide panhandle sitting atop Texas' panhandle (which, being square, looks alot less like a panhandle). These overlapping panhandles are similar terrain, blanketed by cattle, cotton, and wheat, irrigated by the Ogallala aquifer, below which is gas extracted and circulated in a subterranean highway of pipelines. Oklahoma's panhandle is a remnant, and the last piece of federal land in the contiguous United States to be surveyed by the federal government. Texas would have covered it, joining Kansas, Colorado, Utah, Arizona, New Mexico, and Oklahoma, all lined up along the 37th parallel of latitude, but when Texas joined the Union in 1845, a federal statute known as the Missouri Compromise was in effect, outlawing slavery north of 36 1/2 degrees. Texas, wanting to stay a slave state, ceded its terrain north of that line to the federal government in 1850. Half a degree of latitude, 35 miles. By 1861, the boundaries of New Mexico, Colorado, Kansas, and the Oklahoma Territory were established along the 37th parallel. That left this rectangle, the former top of Texas's panhandle, a no man's land, a state without a state, a hole near the middle of the nation. A federal survey was finally made of this area in 1890, and the unassigned Public Land Strip, as it was known, was officially added to Oklahoma Territory, which joined the Union in 1907 as the 46th state.

Kerr McGee Cimarron Plant

This plant, located in north central Oklahoma, once made plutonium pellets for nuclear reactor fuel rods. It is famous as the site where Karen Silkwood worked and was exposed to radiation that threatened her life. She gathered what she said was evidence of corporate wrong-doing at the plant, including the possibility that she, an outspoken activist for workers at the plant, was being intentionally poisoned with radiation. In November 1974, she was on her way to a meeting with a reporter from the *New York Times*, when her car veered off the road and crashed into a culvert, killing her. Suspicions of foul play abounded, and *Silkwood*, a film made in 1983 about her, supported them. Kerr-McGee closed its nuclear fuel plants in 1975, and this one was officially decontaminated and shuttered in 1994. Some of the buildings remain, but nobody works on-site.

Oklahoma Salt Works

Just after the panhandle connects to the pan of Oklahoma, near the town of Freedom, is Cargill Salt's solar production plant. It is one of only a few places in the country where salt is produced in large quantities by solar evaporation (most salt that is consumed is mined from large deposits underground). Solar evaporation requires a large amount of surface area and water to make shallow ponds, a dry and sunny atmosphere, as well as a source of salt to extract. Cargill, the largest salt company in the country, only operates in this manner at two other locations in the country: in the San Francisco Bay and at the Great Salt Lake in Utah, where the source of salt is the naturally salty water. Here, in high and dry western Oklahoma, the salt in the groundwater along the Cimarron River is high enough to be used to make salt by evaporation.

Lone Mountain Waste

Remoteness from anything but the local is a quality of northwestern Oklahoma, and an attraction for things that support the industries of *away*. It is not surprising then to find the Lone Mountain Landfill there, a hazardous waste site operating on a national scale. Operated by Clean Harbors LLC, the nation's largest hazardous waste company, Lone Mountain treats materials on-site, including liquids and PCBs, to help stabilize them before they are buried in the expansive mounds on the property. The site, near Little Sahara State Park and Wayonka, is one of seven commercial chemical waste landfill sites operated around the country by the company. Two are in California, one each in Colorado, Texas, Utah, and North Dakota.

Southard Gypsum Mine and Plant

Oklahoma is sometimes ranked as the largest domestic producer of gypsum, and this facility in the northwestern part of the state is one of a few major mines and plants for the material in the state. It is operated by U.S. Gypsum, the largest manufacturer of gypsum products in the country, which includes wallboard, joint compound, and ceiling panels, some of the most common materials used in building construction. Despite the nationwide reach of the company, it operates only eight mines and quarries in the USA.

Will Rogers Airport

Will Rogers Airport, the airport for Oklahoma City, is the location for the Federal Aviation Administration's training air traffic controllers. The campus, called the Mike M. Aeronautical Center, is on the east side of the airport, and has a training and technology program, as well, employing up to 5,500 people. The airport is named after a famous entertainer, who was born in Oklahoma. The city also operates the Wiley Post Airport north of the city, named after the celebrated aviator. Will Rogers died together with his wife in a plane crash.

Fort Sill

Fort Sill is a major artillery test and training center for the Army, located on 94,220 acres (147 square miles) in southwestern Oklahoma. It was originally established in 1869, as an outpost to fight the local Plains Indians. The legendary Apache Geronimo was among the hundreds of Native Americans imprisoned here, and he is buried on the base. During World War II Japanese Americans were held here, as well as German POWs. Today at least 20,000 military and civilians work and train here every year.

Oklahoma City
The Alfred P. Murrah Federal Building in downtown Oklahoma City was the site of a 1995 bombing. The Oklahoma City National Memorial, dedicated in 2001, commemorates what was once the site of the building. The Oklahoma City Bombing Memorial, a set of explosives and chairs, one for each person who died, stands on the ground where the building once stood.

OKLAHOMA

Tulsa Aircraft Maintenance Center

Tulsa's Airport is a major maintenance center for civilian aircraft. It is the site of American Airlines' aircraft maintenance and engineering center, likely the largest aviation maintenance facility in the country. It is the principal facility for the airline's global operations, and employs 6,400, including 4,700 licensed aircraft mechanics. Next door, Spirit Aerosystems makes wings and other parts for Boeing, in a former Rockwell aircraft plant. Next to that is a ¾ mile-long building once used to make bombers, now mostly used to make school buses.

Tar Creek

The northeastern corner of Oklahoma was once the largest lead and zinc mining district in the nation—perhaps half the bullets fired by Americans in World War I were made of lead from here. The mines, shut down in the 1960s, undermine the district, leading to surface collapse. Dusty piles of tailings contaminated with lead cover many square miles. These unsafe conditions, and proven health problems with residents in the area, including a high concentration of children with cognitive disabilities as the result of lead poisoning, eventually led to the evacuation of several towns. The federal government declared the region, the Tar Creek drainage area, a Superfund site in 1983. The EPA started buying out residents in 2006. Homes and businesses were moved and torn down over the following years, a process which still continues. Some refuse to leave.

Interstate-Spanning McDonalds

What has been called the largest McDonalds in the world spans an interstate highway in Oklahoma known as the Will Rogers Turnpike. The first restaurant to operate inside the building was the Glass House, an early chain specializing in highway travel plazas. A Howard Johnson's also operated there for a while. McDonald's has been the primary tenant occupying the 29,000 square foot space for a few decades, though it shares the space with other tenants, thus possibly disqualifying it from the "largest McDonald's" claim. A McDonald's in Orlando, Florida is said to have 25,000 square feet.

Totem Pole Park

An unusual park with a dozen brightly painted and sculpted totem poles made of concrete. It is the work of Ed Galloway, a former teacher at a nearby orphanage, who retired to this small farm property in 1937. He began work that year on the largest structure on-site, which he completed 11 years later when it was 90 feet tall. There are chambers inside the concrete tower, which was called "the largest totem pole in the world." Galloway died in 1962, and much of his work at the site fell into disrepair. Preservationists arrived in the 1990s, and the sculptures were repaired and repainted. It is now an officially recognized historic site. Though Ed Galloway said he made all these things just as something to do, Totem Pole Park is another landmark in the "Cowboys and Indians" identity of Oklahoma.

Sequoyah Fuels Gore Plant

A uranium processing plant near the town of Gore, in eastern Oklahoma, originally operated by Kerr McGee. It opened in 1970, as one of only two non-government plants in the nation processing uranium hexafluoride for the nuclear industry. A depleted uranium metal facility operated for seven years on the site as well. It became famous for an industrial accident in 1986, where a cask of material exploded, killing one worker and hospitalizing dozens more. The plant was sold to General Atomics in 1986, and was forced to close in 1992, following another accidental release of radioactive material. Clean-up of the site continues.

Cushing Tank Farm

Though the refineries from its boom years earlier in the century are gone, the town of Cushing, northeast of Oklahoma City, is a major storage site for crude oil and gas that comes and goes by pipeline. Cushing also became famous as a trading benchmark for the industry, when in 1983 the New York Mercantile Exchange selected the price that a 42-gallon barrel of West Texas Intermediate Crude is trading for at Cushing, as an amount reflecting the general price of oil in the global marketplace. Cushing developed as a holding point between supply coming principally from Texas, and demand, the markets of the north and northeast, like Chicago, to which it is connected by transcontinental pipeline. Cushing would be the southern terminus for the Keystone Pipeline from Alberta, should it be built. Several companies operate tank farms south of town, including Magellan, Enbridge, and PXP, with a total capacity of more than 30 million barrels in around 300 above-ground tanks.

McAlester Ammunition Plant

An active Army ammunition plant in southeastern Oklahoma, and the principal manufacturing location for the bombs dropped by the Army, Navy, Air Force, and Marines in America's wars since at least 2002 (McAlester has grown as other federal ammunition plants have moved the work here over the years, such as Illinois' Savannah Army Depot). It was established in World War II as one of a network of Army Ammunition plants around the USA. During the Vietnam War it produced 6,000 bombs a day. Today, production amounts are classified and fluctuate based on current demands. Most of the bombs made here are outfitted with guidance control systems that are added at contractor facilities elsewhere by Boeing, Raytheon, and other weapons makers. The 45,000-acre installation has over 2,400 explosives magazines, most of which are in use. The facility also has disposal and training functions. Around 3,000 civilian and contractor personnel are employed here.

Port of Catoosa

The Port of Catoosa is an industrial park northeast of Tulsa, at the end of a constructed waterway known as the McClellan-Kerr Arkansas River Navigation System. The system is a re-engineering of the Arkansas River and portions of other rivers with dams, canals, and locks, completed by the Army Corps in 1971. It extends for 445 miles, from the Mississippi River to the Port of Catoosa, enabling ocean-going barges to travel more deeply into the interior of the country. The industrial park at the Port of Catoosa has around 60 companies and around 3,500 people working there. It is referred to as the most inland ocean going port in the nation.

City Memorial

P. Murrah Federal Building in Oklahoma City was destroyed in the bombing that took 168 lives. A memorial was built in 2000, and includes a reflecting pool on the street where the Ryder truck full was parked, and the Field of Empty Chairs for each of the people killed, on the site of the damaged building once stood.

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GEORGIA'S LOST COAST
BEYOND THE NATION'S SHORE

Members of the CLUI have been back and forth to Georgia over the past year, traveling through, giving talks, and meeting with students at Georgia Tech and the Savannah College of Art and Design. You will find more images and sites throughout the state in our online Land Use Database.

GEORGIA'S COAST IS a romantic and exotic locale. It can be considered as a contiguous, autonomous region, 10-15 miles wide, and 100 miles long. On the inside edge is the hard ground of the continent, with Interstate 95 running the length of it. On the outside is a continuous chain of lush barrier islands. Between them, a marshy swamp of meandering tidal drainage.

This configuration has been more or less sustained over the past century. Only a few roads make it outwards, connecting the continent to the actual coastline. This separation has enabled the zone, mainland, marsh, and islands, to evolve into a hiding place of exclusive resorts, military bases, industries, and others seeking isolation. It was here that writer John McPhee had encounters with the Archdruid, David Brower, and where our nation's nuclear submarines slip in and out from their nidus on secret perambulations around the globe.



CLUI/Google map



CLUI photo

Tybee Island Broken Arrow Site

Somewhere in the sediment under the waters near Tybee Island is a 12 foot-long nuclear bomb, lost in an accident in 1958. The bomb was intentionally jettisoned by the pilot of a B-47 bomber, following a 2am mid-air crash with a fighter jet. The damaged B-47 landed safely after the crash. This was one of several Broken Arrow incidents in the USA (the technical name for an accident involving a nuclear weapon where the weapon is lost or destroyed but does not explode critically). Crews from the Air Force and the Navy were deployed the next morning to look for the bomb, but gave up after two months. There have been other official attempts to locate it, most recently in 2004, but without success. The Air Force says that the nuclear capsule, the plutonium pit, was not in the bomb when it was lost, but some records differ. Either way, the 7,600 lb Mark 15 bomb has hundreds of pounds of high explosives and enriched uranium. If it emerges from the sediment and becomes exposed to seawater, it will corrode, which will release radioactivity, which will no doubt aid in its discovery.



CLUI photo

Glynco Federal Law Enforcement Training Center

This is a major campus for law enforcement training, operated by the federal government's Department of Homeland Security. It is located north of the coastal town of Brunswick, at a former Naval air station, converted to this new function starting in 1975. On site is a training neighborhood with 34 buildings: classrooms with mock libraries, court rooms, and interviewing suites, vehicle training tracks, shooting ranges, an explosives range, and a fully functional simulated port of entry training facility. It has dormitories and a cafeteria capable of serving 4,000 meals. Glynco is one of four sites in the USA operated by the FLETC (the others are in Artesia, New Mexico; Charleston, South Carolina; and Cheltenham, Maryland). Glynco is the headquarters.



CLUI photo

Jekyll Island Club

Jekyll is one of the Golden Isles of Georgia, the barrier islands used as resorts by America's Gilded Age elite. The Jekyll Island Club, in the middle of the island, has dozens of structures preserved as historic sites, including the hotel, one of the grandest old resort buildings in the USA. It is surrounded by mansion-sized winter vacation homes. Privately developed in the late 1800s, the club included Vanderbilts, Astors, Whitneys, Goulds, Goodyears, and Rockefellers in its membership. The Island is famous as the place where the Federal Reserve System was born, due to a secret meeting of private bankers that took place there in 1910, arranged by Senator Nelson Aldrich, the outcome of which was the Aldrich Plan, used to restructure the nation's monetary system in 1913. Despite the new system, the club, like the country, was soon devastated by the Great Depression, and never recovered. The Island was bought by the State of Georgia in 1947 and is now managed as a privately operated public park. The current head of the Federal Reserve, Ben Bernanke, visited the island in 2010 to commemorate the Fed's centennial.



CLUI photo

Woodbine Chemical Plant

Woodbine is a former chemical complex in a remote coastal lowland area of southern Georgia, past the gates at the end of Union Carbide Road. The site is famous for a large explosion that occurred in 1971 when the facility was making flares and explosives for the Vietnam War. A small fire quickly spread through an assembly and storage building, culminating in an explosion that broke windows more than ten miles away, and was heard as much as 50 miles away. 29 people were killed and more than 50 suffered major injuries. The plant, with 34 buildings, was built by Thiokol in 1964, to make solid rocket propellant motors. It evolved into chemical production, and was sold to Union Carbide in 1976. It produced agricultural chemicals and insecticides for the next 35 years, passing through several corporate owners, including Rhone-Poulanc and Aventis. Woodbine's current owner, Bayer Crop Science, closed the plant in 2012, and the site is undergoing environmental assessment.



CLUI photo

Kings Bay Submarine Base

Located in the southeastern corner of Georgia on 16,000 coastal acres, Kings Bay is a major submarine base, providing operational support for all the East Coast's Trident nuclear submarines. The 25 square mile site was originally developed as a munitions storage and loading facility by the Army in the 1950s. After installing numerous munition areas, a long wharf, and over 47 miles of railroad tracks, the Army abandoned the site, and it wasn't until the late 1970s that the base was reactivated by the Navy. Kings Bay has been expanding quickly in recent years, to include the addition of facilities for handling the Trident strategic nuclear missiles associated with Trident submarines.

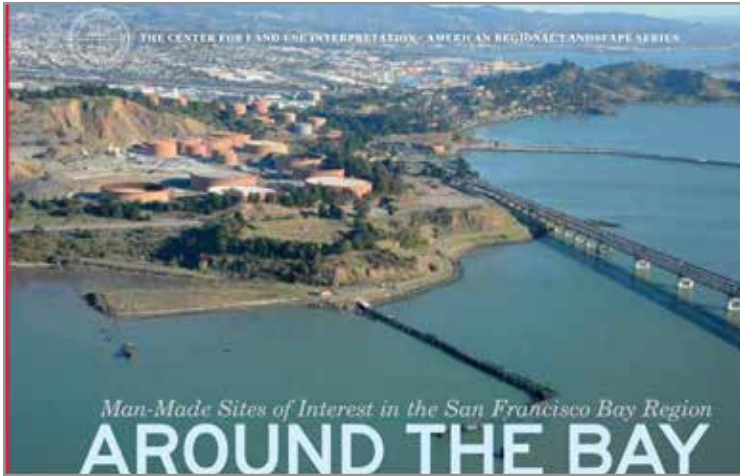


CLUI photo

St. Marys Submarine Museum

A small, dense, and homegrown museum, housing the history of military submarining, especially related to Kings Bay, the sub base located at the north end of town. The museum has artifacts such as control panels from relatively recent nuclear subs, sub models, paintings of subs, and a working periscope which pokes out of its roof, offering views of Florida on the opposite bank of the St. Marys River. Across the street from the museum is the dock where boats depart to take people to Cumberland Island, the southernmost island along Georgia's lost coast. Cumberland was saved from development (part of the story is covered in John McPhee's book, *Encounters with the Archdruid*). Ruins of a Carnegie family mansion remain on site.

CLUI PUBLISHES BOOK ABOUT THE BAY AREA
SECOND IN AMERICAN REGIONAL LANDSCAPE SERIES



THE CLUI PROUDLY announces the release of a new publication, *Around the Bay: Man-Made Sites of Interest in the San Francisco Bay Region*, the second book in the Center’s American Regional Landscape Series, published with Blast Books.

The first book in the series, *Up River: Man-Made Sites of Interest on the Hudson from the Battery to Troy*, published a few years ago, was about the Hudson River shoreline, from New York City’s Battery Park to the river’s first dam, north of Albany.

It made sense to have the second book in the series be about San Francisco, as these two cities, New York and San Francisco, are like continental bookends. Spread out over the historic rail lines and modern Interstate between them, is America.

Also, the Bay Area shore and the Hudson River house historic portals for the nation’s connections overseas, one for the Atlantic, one for the Pacific. New York’s waterfront, developed during the 18th and 19th centuries, traded mostly with Europe, and reached westward into the new country through the Erie Canal. The San Francisco Bay’s shore was developed in the 19th and 20th centuries, helping the developing West to disgorge its spoils and spread the nation’s commerce across the Pacific.

These city’s watery fringes, extending into their hinterlands, contain things like the industries, quarries, power plants, and sewage plants that make the urban areas we enjoy possible. They both also contain latent and potential sites of meaning and revelation, and overlooked histories.

San Francisco’s scenic landscape has made it a frequent target for aerial photography. The most famous aerial image is likely the one by George Lawrence, who used a kite to suspend a 50-pound camera 2,000 feet in the air to capture the extent of the city’s destruction after the earthquake in 1906. The city was also covered with no less than four editions of Robert Cameron’s *Above* series of large-format aerial photography books. Cameron, who lived in San Francisco, published a total of 19 *Above* books, depicting cities all over the world, which defined the genre.

While aware of these precedents of local aerial photography, *Around the Bay* is not really a book of aerial photography. It is a book about 73 places, described through images and text, and located on a fold-out map in the back. But the book is not really about these places either, but about the portrait of the region they create when considered collectively. ♦

CLUI CREATES BAY AREA SHORESCAN
3.5 HOUR-LONG VIDEO OF THE SHORESCAPE



The Bay Area Shorescan is visible in the exhibit *Above and Below: Stories From Our Changing Bay*, on view at the Oakland Museum of California, August 31, 2013 to February 23, 2014. CLUI photo

WITH OUR HISTORY of programming about the Bay Area, curators at the Oakland Museum of California asked the CLUI to be involved in the production of material for their exhibit *Above and Below: Stories From Our Changing Bay*. The proposal we came up with was to create an aerial portrait of the entire Bay Area shoreline, to try to capture the whole of the region in a single, kinetic image.

The resulting video is in some sense an extension and inversion of Edward Muybridge’s famous 1878 panorama of the city. While not technically an aerial photo, as it was taken from a building on the ground, Muybridge’s multiple-framed image, from the top of Nob Hill, shows a sweeping vista of rooftops and streets extending outwards to the Bay, where islands and distant shores are visible, fanned out in the grey horizon. It is a point of view from a central point, an epicenter locked on the ground, a fixed perspective, radiating outwards.

Conversely, the CLUI image is taken from without, looking in from a big loop, and from a continuously moving perspective. It extends the notion of what this city is now, more than a century after Muybridge—a regional megalopolis, always moving, along a transformed shore—no longer a centralized node.

Delivering a sense of the regional was part of the goal, to see the whole of the Bay Area as a place, a nine-county mega-city of 7 million people, divided and united by the big wet space in the middle.

SAN FRANCISCO BAY

One of the effects of an awareness that one is living in a vast, regional place is a heightened possibility of the unknown. Incorporating a beyond into our midst permits other things, unfamiliar things, to enter one's perceptual sphere, and habitat. Changing the scale in this way also leads to an increased sense of connectivity to the national and continental fabric.

The great city around the bay, encompassing Oakland, Fremont, Palo Alto, Tiburon, Martinez, Benecia, Pittsburg, and so on, is indeed vast, unknown in the aggregate, and most definitely connected to the national fabric. Half the coastline of California, they say, is in the Bay Area, something that could even be an understatement, if you measure the fractal-like shoreline in the marshes and the delta.

The CLUI video, showing the whole of the shore of the Bay, is broken down into chapters. It starts with entering the Bay at the Golden Gate (going under the bridge), and follows the shoreline south, and around the Bay in a counter-clockwise direction, turning around at the bridge at Antioch, where the Delta begins, and heading back out the Golden Gate. It's a journey of around 250 miles, at 70 miles per hour. Whether you sit there the whole time, or just do the math, it's the Bay Area shoreline in 3.5 hours. ♦

THE NEW EXPLORATORIUM AN INTERPRETIVE REVIEW



The Exploratorium's new home on the San Francisco Waterfront. CLUI photo

SAN FRANCISCO'S PIONEERING science and perceptual phenomenology museum opened at its new location on the San Francisco waterfront in April 2013, the biggest change for the institution since its inception.

The museum had been located inside a cavernous pavilion at the Palace of Fine Arts, left over from the Panama-Pacific Exposition, where it originally opened to the public in 1969, the vision of Robert Oppenheimer's blacklisted younger brother Frank. The original location served the needs well, a big open space where visitors could wander amongst the hundreds of creative and interactive physical contraptions that revealed the dynamics of the physical world in startlingly clear, engaging, and fundamental ways. The giant windowless shed enveloped an inward looking environment, like a laboratory, or a science fair in a conference hall.

The new building, a former warehouse on a pier on the Embarcadero, could also have easily been left as a cavernous windowless shed, but it seemed that, as a projection from the shore, surrounded by the Bay, whose waters ran even underneath, that it might be time for the Exploratorium to look up, and out, and embrace the actual world around it.

The new location at Pier 15, which has been undergoing a complete reconstruction for a number of years, still maintains a bit of the cavernous hall effect, though with three times as much space inside and out. More than 600 exhibits can be on display. It is divided into six thematic areas, such as Human Phenomena, Tinkering, Seeing and Listening, and Living Systems. The last two areas, the Bay Observatory, and the Outdoor Gallery, are where the new Exploratorium looks outward in a direct way.

The Outdoor Gallery is the space around the building, including its street front, which has some fun kinetic and climbable sculptures, enjoyed especially by the throngs of school kids that swarm the museum on a daily basis. Around the edge of the building, extending along its open side, are displays that talk about different sediments in the bay, with four circular rotatable windows that stir up samples of sediment into cross-sectional clouds.

The Bay Observatory is a second floor gallery, with glass walls facing the city and the bay. It is an indoor and outdoor exhibition space focusing on landscape observation, and the history, geography and ecology of the bay. The Bay Observatory is set up with moveable displays, viewing devices, books, maps, and a nine-monitor high-resolution master screen. There are also numerous cameras, antennas, and other devices gathering data from the roof of the Observatory, and a display of real-time vessel tracking for all the commercial shipping in the bay.

Curated by long-time Exploratorium artist and designer Susan Schwartzenberg, the Bay Observatory is a new and exciting kind of space—an open-minded, objective, research-oriented perspectival focal point, backed by the creative pedigree and humanism of the Exploratorium, but looking outwards over the actual land and waterscape outside, towards the uncertain future we will all have a hand in making. ♦



The Bay Observatory looks outward from the new Exploratorium. CLUI photo

DOWN TO EARTH

CLUI PROGRAM EXPLORES AIRPLANE CRASH SITES



The exhibit *Down to Earth* at CLUI Los Angeles, in February 2013. A version of the exhibit is on display at the Center's Desert Research Station near Barstow, and on the CLUI website. CLUI photo

EXPERIMENTAL AIRPLANE CRASH sites in the Mojave were the subject of a CLUI program consisting of an exhibition, public presentation, and a field trip, in January and February of 2013. *Down to Earth: Experimental Aircraft Crash Sites of the Mojave* focused on eleven incidents, selected to represent a range of aviation technology over 70 years of jet-powered flight, from a 1948 crash of a flying wing to a 2009 crash of an advanced fighter plane.

The exhibit included historical video and sound recorded by on-board cameras, and flight control communications, as well as video from high-powered tracking cameras, following the airplanes as they fell to the ground after the pilots ejected.

A CLUI team visited each crash site and photographed it from above, using kite and balloon-mounted cameras, in order to show the impact area from an elevated perspective in considerable detail, whether there was anything to see, or not. While these are sites of high drama and damage, they also can be very subtle.

Since the *Right Stuff* era, Edwards Air Force Base, north of Los Angeles, has been the principal place for testing experimental aircraft. The other bases in the region make it a busy military training airspace as well. As a result, the region is peppered with crash sites—more than 600 in the western Mojave Desert alone.

While many of them occurred inside restricted military spaces, many more occurred on private and public land outside the reservations. Some crashes occurred next to homes and state highways. Sometimes the pilot ejected safely, sometimes not. These are complicated and often tragic places. In all cases, though, despite having been cleaned up by authorities immediately following the crash, fragments of the planes can still be found on site. These sites are monuments of disintegration, dissolving back into the ground.

The exhibit was based on the work of Peter W. Merlin and the Aviation Archeology Field Research Team. Over the past 25 years, Merlin, often aided by his friend Tony Moore and others, has located and visited more than 100 crash sites of historic aircraft



CLUI program managers Ben Loescher and Aurora Tang launching a balloon-mounted camera above the crash site of a B1A bomber prototype, near Cuddeback Dry Lake. CLUI photo

flown out of Area 51 and Edwards Air Force Base. In nearly every case he was told the site was lost and that everything had been removed anyways, so there was no point in trying to find it.

But he persisted, and found them using clues from interviews with pilots, FOIA requests, and research in archives. Mostly though by days of repeated searches in the field, wandering around, lining up historic photos with subtle geographic features, like hills in the distance, or small desert washes, while looking at the ground for incongruous fragments.

There is an established subculture of wreck-finders, some of whom publish books and blog about their discoveries on the web. Pat Macha, for example, has been leading excursions into the mountains and deserts of California to find wreckage, mostly of civilian and old military training aircraft, for decades. Peter Merlin, however, is truly an aviation historian, and was finally recognized for his dogged and pioneering work when he was hired as an archivist at NASA's Dryden Flight Research Center at Edwards Air Force Base. His wreck-finding partner Tony Moore also works on base now, at the Air Force Flight Test Center Museum.

As part of the CLUI program, Peter Merlin gave a public presentation to a standing room-only crowd at the CLUI in Los Angeles about his work, and how he and Tony evolved from weekend explorers to the acknowledged experts, founding the Aviation Archeology Field Research Team, now frequently sought out by History Channel-type TV productions.

There was also a public bus trip to crash sites, organized by the CLUI, with Merlin and Moore on board. The bus left from the Center's office in Culver City, and made a long loop through the Antelope Valley, visiting a number of sites. Due to the arbitrary, back-country location of the crash sites, the tour had to be conducted with a high-clearance bus, capable of traveling on bumpy dirt roads, instead of the usual, more comfortable motor coach used by the CLUI for its tours. This gave the trip more of an expeditionary feel.



Pete Merlin (left) explains to the group what happened to cause an X-15 to crash at this location, in 1967. Merlin helped to have this monument constructed at the crash site. CLUI photo

After a stop at Edwards Air Force Base to look at the static displays and get an introductory briefing from the crash experts, the bus headed east from Mojave, over dirt roads, to visit the 1948 crash site of the YB 49, a remarkable plane that was the first jet-powered flying wing. All the crew perished in the crash, including the pilot, Colonel Edwards. The air force base was later renamed in his honor.

The bus then visited the crash site of an X-31, a highly maneuverable prototype plane that crashed here in 1995 on the last flight of its testing period. It was one of only two versions of the plane. The pilot in this case ejected safely, but the plane landed a few hundred feet from a busy highway and a house.

The CLUI group stopped for lunch at Domingo's, a Mexican restaurant in Boron full of aerospace memorabilia, and then headed north of Johannesburg and visited the only crash site of an X-15, the fastest plane ever made, which crashed here in 1967.

Back down Highway 14, in the dusk, the last stop was at the 1963 crash site of Chuck Yeager's NF-104A. This flight was romanticized in the movie *The Right Stuff*, though what *is* real is that after he ejected from the plane, he went back to the burning wreckage to get his notebook. ♦

Down to Earth: Experimental Aircraft Crash Sites of the Mojave was a co-production of the Center's Desert Research Station in Hinkley, California, the Aerospace Archeology Field Research Team, based out of Palmdale, and the Center's Independent Interpreter Series, supported by the Andy Warhol Foundation for the Visual Arts.

For more about Peter W. Merlin's work, see <http://www.dreamlandresort.com/team/peter.html>. Books published by Merlin include: X-Plane Crashes: Exploring Experimental, Rocket Plane and Spycraft Incidents, Accidents and Crash Sites (Specialty Press, 2008), Breaking the Mishap Chain: Human Factors Lessons Learned from Aerospace Accidents and Incidents in Research, Flight Test, and Development (NASA, 2012), and Crash Course: Lessons Learned from Accidents Involving Remotely Piloted and Autonomous Aircraft (NASA, 2013).

MERLE PORTER REPHOTOGRAPHY PROJECT
THE LEGACY OF THE "POSTCARD KING OF THE WEST" LIVES ON



Merle Porter Postcard, Lone Pine, California, c. 1960s
Though the cards are undated, vehicles are helpful in getting an approximate vintage. The 1960 Plymouth parked on the left, and other cars from the 1950s, suggests that this postcard shows Lone Pine as it looked 40-50 years ago.



CLUI Archive Image, Lone Pine, California, 2012
In the new image two old fish-shaped signs are still there, above the still-functioning hardware store and sporting goods store and the addition of rustic wood cladding.

THE CLUI LAUNCHED a new feature on our website that compares old postcards, produced by Merle Porter, with contemporary images taken recently by the CLUI, to see changes that have occurred in some small downtowns in the American West.

Merle Porter was a postcard producer and distributor who captured a few hundred views of small town downtowns, as well as roadways and other landmarks, throughout California, Nevada, and Arizona, from the 1950s to the 1980s. He tended to depict not the great vistas, but ordinary landmarks like roads, bridges, and buildings, often taken from everyday points of view, like from the middle of an intersection. This makes his postcards an especially immediate and familiar visual record, and time capsules with a consistent perspective.

Over his career, working with his wife Bessie, Porter produced and distributed thousands of unique cards, available at small shops and souvenir stores in the Southwest. After he died in the 1980s, the cards were no longer being distributed, and by some time in the 1990s, even the most out of the way stores had run out of stock forever.

The CLUI exhibited Merle Porter's work in 1999, and pledged to continue to make his cards available for sale to the public as long as they continue to exist, which we do. By comparing his present, now past, to our present, the new feature on our website helps his unique vision have even more relevance and value in the future. ♦
See <http://clui.org/section/a-selection-merle-porter-postcards>

MORGAN COWLES ARCHIVE GROWS MORE THEMATIC TRANSECTS THROUGH CLUI IMAGERY

THE CENTER'S MORGAN Cowles Archive continues to grow, and now has more than 2,000 images online, arranged into an expanding list of dozens of categories, each exploring some phenomenology or process of land use. There are some self-explanatory categories such as Bridges, Globes, and Towers, as well as some that depict interpretive and behavioral control methodologies, such as Photo Op (about staged photographic opportunities), Traffic Cones, and Blank Plaques (showing how blank interpretive panels can still have much to say).

These images are being discovered as photo archivists at the CLUI go through the Center's digital and film collections organizing, scanning, and preserving the images for posterity.

Of the thousands of images members of the CLUI have taken over the years, most of them are of specific sites, taken to document places for our Land Use Database. These images are indexed, linked, and stored to correspond to the geographic locations and sites they depict.

Along the way, though, many thousands of other photos have been taken, showing things that are not so linked to specific places, like ephemeral events, signage, and details in the landscape. Developing a separate system for selecting and presenting CLUI imagery along thematic, as opposed to locational criteria, enables many images to find a place.

Like our Land Use Database images, these are generally documentary photographs, meaning they depict things as they are found in the world, and not constructed for the photograph (though they may depict staged events, they are not staged by us at least). The images show found objects in their existing context. The images themselves are also a kind of found object. Many of them are taken without knowing how exactly they will be used or contextualized. Themes emerge in retrospect as the images accumulate, and patterns and typologies appear. Each theme is a kind of evolving exhibit, following a subject, to see how it plays out.

This program is the most visible of the larger image management and storage initiative at the CLUI, the Morgan Cowles Archive. The archive is named in memory of Morgan Cowles, an archivist, geographer, explorer, and friend of the CLUI, who passed away in a skiing accident some years ago. Though none of the images in the archive are his, his spirit helps guide the process. ♦

NEW MEXICO'S BLACK HOLE CONTINUES TO ATTRACT



Los Alamos National Laboratory Rolodexes in the exhibit *Curiosity: Art and the Pleasures of Knowing*, Turner Contemporary, Margate, Kent (May 24–September 15, 2013) later traveling to the Norwich Castle Museum in Norwich, Norfolk. CLUI photo

BELIEVING, AS SOME of us do, that contemporary America, and the post-modern, post-industrial, anthropotechnogeomorphological age was born in the big bang of the manmade sun, the CLUI has had a long interest in Los Alamos Lab and its legacy.

Part of this legacy is the Black Hole, a place that operated in the town of Los Alamos, selling surplus equipment and parts from the lab, selected and collected in a former grocery store by its founder and owner, Ed Grothus, a former lab worker. After he died, the Black Hole stopped sucking things in, and has slowly been spewing its remains into the world without replenishment, in an effort by his heirs to vacate the property.

The impact of the fantastic array of material the Black Hole has helped release into the world over its decades-long existence is unmeasured, yet surely profound. One set of material from the Black Hole, now in the Center's Radioactive Archive, is a set of rolodexes. They contain hundreds of business cards kept by some unknown office in the lab, over a period around the 1960s and 1970s, the peak of the arms race and its technological development. They are a physical record of everything from major military contractors to obscure high-tech software widget suppliers—many of which are no longer extant, or have evolved. It's an indexical inventory of obsolete technology and broken business contacts, from the recent past. They are also a minutely definite printed historical record, still potentially relevant to an understanding of the present.

Seven of these rolodexes are currently traveling around the United Kingdom, in a Hayward Touring exhibition called *Curiosity: Art and the Pleasure of Knowing*. The legacy of the Black Hole was also recently acknowledged in an exhibition at the Center for Contemporary Art in Santa Fe, called *Atomic Surplus*. It contains work selected by the curator, Erin Elder, from various sources, such as sculptures by Tony Price, a friend of Ed Grothus, who often made things from surplus from the lab and the inventory of the Black Hole. The exhibit also featured photographs from the CLUI exhibit *Perpetual Architecture: Uranium Disposal Cells of America*. ♦

WENDOVER REPORT

FROM THE CLUI COMPLEX IN THE GREAT SALT LAKE DESERT



Students from Milwaukee visiting CLUI Wendover get their feet wet at the Bonneville Salt Flats. CLUI photo

THE CLUI HAS had another active year at our complex in Wendover, Utah, hosting several classes and group visits, operating the residence program, and working on several long-term regional projects.

Classes included a group from the Milwaukee Institute of Art and Design, who were doing a week-long tour of land art sites in the region and spent a couple of days at CLUI Wendover; a class from Montana State University; and the Land Arts and the American West program out of Texas Tech, which spent a week at CLUI Wendover doing projects all over the area.

New residents this year included Sarah Luria, a writer and photographer based in Worcester, Massachusetts, who is working on a project involving re-photographic comparisons of Timothy O’Sullivan’s early photographs in the region; Cezanne Charles and John Marshall, architects/designers from Ann Arbor, Michigan, who worked with drone-mounted cameras and constructed an preparedness/response system called a BOLTS tactical shelter; Bryon Darby, who came from Lawrence, Kansas, and spent a few weeks in Wendover studying and documenting casino junket flights and did high-resolution imaging of the ground; and Jeremy Bolen, a teacher at the School of the Art Institute of Chicago, who employs experimental photographic techniques including using the actual ground as a lens for capturing imagery.

Several other residents from previous seasons returned to install projects, or to work on longer-term projects they have developed since their residency, such as Mikael Lindahl, Rob Ray, Lisa Blatt, and William Lamson.

We had a great group of around 25 people for the annual Wendover Work Party in early August, with people coming from New York, Colorado, San Francisco, Los Angeles, Pittsburgh, Miami, Santa Fe, San Diego, and even Istanbul (where Phil lives now). Helpers included Dan Torop, Rich Pell, Lauren Allen, Rob Ray, Jen Hofer, Jed Lackritz, Philip Weil, John Hogan, William Keddell, Hikmet Loe, Cris Benton, Jenny Lion, Steven Matheson, Kate Moxham, Doug Tausik, Aurora Tang, Matthew Coolidge, Wendy Wischer, Paul Stout, John Mack, Igor Vamos, Sadaf Rassoul Cameron, John Fitchen, Stuart Anderson, Scott Vermeire, and Annie Vought. Thanks to all of you!

Over the last year, members of the Center worked on several aerial documentary projects in the region, including the *Great Salt Lake Landscan*, commissioned by the Utah Museum of Fine Arts, which will be on view there from January 24 to May 4, 2014. It will be shown with two other Salt Lake-related projects, Tacita Dean’s film *JG*, which she shot in 2012 at Death Valley, Spiral Jetty, and around the potash works at Wendover; and paintings of the Great Salt Lake by Alfred Lambourne (1850-1926), a painter and writer who lived for a while on one of the remote islands in the lake.



The Bingham pit landslide went from top to bottom of the 3,000 foot deep pit, forming a half mile-wide gash in the stepped slope. It took out part of an equipment maintenance building, and buried nine giant yellow dump trucks. CLUI photos

In April, 2013, members of the CLUI documented the Bingham Pit landslide, 10 days after it occurred. The slide, which happened at 9:30pm on April 10, and involved around 55 million cubic meters of earth falling into the pit, was the largest non-volcanic landslide in the history of the country (a slide occurring as part of the Mount St. Helens eruption displaced a lot more material, hence the “non-volcanic” qualifier). Bingham’s superlative is even more remarkable as it was entirely a product of human activity, taking place inside the largest open pit mine in the country.

The slide, though unintentional, was expected, and no one was harmed. But it was larger than they anticipated. Rio Tinto, the company operating the mine, uses interferometric radar to measure strain and changes in stability on the pit walls. In February, movements on the scale of fractions of an inch per day were detected, and the engineers made plans for a possible slide by moving some roads, equipment, and the visitor center. In April, movement of few inches per day was detected, and the mine was evacuated. The company issued a press release about an imminent slide seven hours before it happened.

The Center’s images, taken from a helicopter flying inside the pit, will be part of an exhibit called *Creation and Erasure: Art of the Bingham Canyon Mine*, at the Utah Museum of Fine Arts, May 30 to September 28, 2014. ♦

REFRIGERATED NATION

continued from page one

Of the 2,000 pounds of food consumed by the average American every year, more than half is directly dependent on refrigeration, such as meat, vegetables, dairy, fruit, and frozen foods. Another 20% is at least partially dependent on refrigeration at some point in its processing. The rest, things like noodles, corn chips, syrups, oils, bread, sugars, and cereal, are manufactured, distributed and stored at room temperature.



Fruits and Vegetables

Most harvested fruit and vegetables quickly find their way into the cold chain, to be shipped fresh and whole, or headed to processors to be turned into juice, paste, and other chilled and unchilled products. Americans eat around 225 lbs of fruit per person, per year, though much of that is as fruit juice. The top three fresh fruits are oranges, bananas, and apples.

Almost 45 lbs of oranges are consumed per person per year, making this the most consumed fruit in the USA. Most of it (35 lbs) is processed into juice, which is chilled until it is pasteurized, and even sometimes after that. Two thirds of this goes on in Florida, though California produces a lot of oranges too, especially those which end up being consumed whole.

Juice is shipped in bulk via the Tropicana Juice Train to one of three primary packaging and distribution centers. The largest facility, in Greenville, New Jersey, serves the northeastern USA, and handles half the company's product.

Several other large juice companies dominate the industry in Florida, such as the Brazilian company Citrusuco, which processes 30 million boxes of oranges a year at its plant in Lake Wales, Florida. Citrusuco is the largest orange juice company in the world, and operates a major juice storage terminal at the Port of Wilmington, Delaware, where more than ten million gallons of chilled juice can be stored for distribution to the Northeast. The juice arrives via a fleet of four refrigerated juice ships.

Florida's Natural is the third largest orange juice maker in America, with a 21% share of the not-from-concentrate market. The company's Lake Wales facility can juice 11 million pounds of fruit every 24 hours. Minute Maid, another popular brand, got its start in Plymouth, Florida, where it still operates an R&D center that helped boost the nation's thirst for orange juice.

In the USA, bananas are the fruit that is consumed most whole: 26 lbs of them per person per year: more than whole apples (16 lbs), watermelons (15 lbs), and whole oranges (9 lbs). Unlike



Port Hueneme, north of Los Angeles, is a major fruit importation site, especially for bananas. Facilities there include Del Monte's Western Distribution Center, and other cold storage warehouses. CLUI photo

these other fruits, there is no commercial banana production in the United States. All of the fruit is imported, largely from Central and South America.

Dole and Chiquita dominate the banana industry in the USA, importing the fruit primarily through ports at Wilmington, Delaware and Port Hueneme, California. The banana and fresh fruit trade favors small niche ports that are not subject to the delays and congestion of the larger ports like Los Angeles and New York. Chiquita is the successor to the United Fruit Company and is the leading distributor of bananas in the United States. It is headquartered in Charlotte, North Carolina.

Bananas are shipped unripe, and are held in specialty storage facilities near major cities and distribution points. Banana Distributors of New York for example, has 22 ripening rooms, where up to 20,000 boxes of bananas are stored to within half a degree of 62°F. The facility ships a million boxes of bananas every year, or nearly two million bananas each week, throughout the NYC area.

A Coast Tropical facility in Los Angeles, near the wholesale produce distribution center south of downtown, operates North America's largest banana ripening facility, with fifty pressurized rooms.

Apples are the third most consumed fruit in the US, after oranges and bananas. Like oranges, most apples are consumed as juice, and processed into other forms (such as dried, canned, or processed sauce). Around 16 lbs of fresh apples, whole, sliced, or in baked goods, are consumed per person per year in the US.

Washington State is the primary source of apples in the United States, providing almost 60% of the apples produced domestically. The eastern Washington city of Wenatchee claims to be the center of apple production. It at least is the home of the Washington Apple Association, a major marketer of apples.

There is a large Tree Top plant in town, one of a few in the region. The Tree Top brand of apple juice is one of the largest nationally distributed brands. One third of Washington's apple crop goes into juice, but the rest is distributed as whole fruit.

30 miles up the Columbia River from Wenatchee is Chelan, where the Chelan Fruit Cooperative is based. This is one of the largest cooperatives in the state, packing four million boxes of apples a year. Apples are picked by hand, and collected in large wood or plastic bulk bins, which are transported from the orchards to the plant. At the plant the apples are sorted, waxed, and stored, then eventually boxed for shipping.

THE COLD CHAIN

Because the harvest is seasonal, most apples are stored for months before being boxed and shipped. They are held in sealed rooms within vast warehouse buildings, in what is known as Controlled Atmosphere Storage (CA). These rooms are chilled to around 34°F, and most of the oxygen is removed and replaced with nitrogen. This slows the ripening process nearly to a halt.

Washington growers developed this process to be able to provide a continuous supply of apples year round. The buildings are vast—some Controlled Atmosphere buildings can hold 100,000 boxes in one room. The total capacity that can be held in suspension is 121,000,000 boxes, more than the entire annual output of apples from the state.

After the big three (oranges, bananas, and apples), the major fruits distributed and consumed in the USA, including other citrus, various melons, grapes, and berries, are generally imported or grown on diversified farms, mostly in California. They are packed and stored in warehouses near the farms, and shipped through national cold storage distribution networks to the rest of the country.

With seven billion dollars in annual revenue, Dole, headquartered in Westlake Village, California, north of Malibu, is the largest producer and marketer of fresh fruit and vegetables in the nation. Chiquita, famous as a banana brand, is the second largest producer and marketer of fresh fruits and vegetables in the country.

Americans consume around 7 lbs of strawberries per person per year, and California produces more than 80% of the domestic fresh strawberries consumed in the USA. Much of the strawberry harvest is turned into pastes for flavoring processed foods.

The Driscoll's Company is probably the largest fresh strawberry producer in the country, with a 20% share of the market, and a major packing house in Watsonville, California. Frozsun Foods is the largest producer of frozen strawberries, making some of its 130 million lbs of processed fruit products at a plant in Santa Maria, California.

Though most grapes produced in the country are for wine, eight pounds of table grapes are consumed per person per year in the USA. The Guimarra company of California is the nation's largest table grape producer. The diversified grower Sun World is also a major storer and packager of grapes. Grapes can be held in cold storage for up to five months, in order to be sold to store buyers and exporters as needed.

Melons are grown in a number of states, but California produces the vast majority of them. Cantaloupes are among the most popular melon, with consumption per person around nine pounds per year.

Lowly Potato is King of the Vegetables

Potatoes are the leading vegetable crop in the USA, with most coming from Washington and Idaho. After harvesting, potatoes are held in chilled storage warehouses until they are distributed. Almost 40% of the nation's potato output is cut, processed, frozen, bagged, and distributed as fries, 90% of them to restaurants. The average American consumes around 29 lbs of frozen French fries per year.

The Idaho-based J.R. Simplot Company is said to have invented the modern industrial French fry in the early 1950s, and has been the largest French fry supplier for McDonalds since the 1960s. Simplot is also a major industrial fertilizer and cattle company,



Potatoes awaiting shipping and processing are stored in chilled storage sheds like Lamb Weston's in Quincy, Washington. CLUI photo

and one of the largest privately held companies in the USA.

Simplot's plant in Nampa, Idaho is one of six frozen potato plants operated by the company. It makes frozen shoestrings, thin cuts, regular cuts, wedge cuts, batter-coated, tater gems, and hashbrowns. The company's plant in Caldwell, Idaho, makes the same lineup, minus the batter-coated and wedge cuts.

Ore-Ida is another major frozen food and French fry company, and is a division of Heinz Foods. Its plant in Ontario, Oregon is just over the line from Idaho, and gives the brand its name: Ore-Ida. Ore-Ida claims to have invented the tater tot, which is manufactured at the plant in abundance. With around 1,000 employees, the plant may be the largest French fry factory in the world.

Lamb Weston has seven frozen potato plants in the Columbia River Basin, and employs nearly 5,000 people in the region. ConAgra Foods, the food processing giant, owns Lamb Weston now.

Most vegetables other than potatoes produced in the USA are grown by large and small farms that grow a variety of crops, and alternate their products according to season, demand, and soil conditions. Some companies specialize in packing and storing certain types of produce, while others emerge as superlative packers simply due to their overall high volumes of production.

Though northwestern and midwestern states generate produce in the summer, most fresh vegetables come from the Central Valley of California, which is productive year round. Many major growers also have operations in the Imperial Valley too, in the low desert next to Arizona and Mexico, which is one of the few places fertile and hot enough to be productive in the dead of winter.

Americans eat around 20 lbs of tomatoes a year, per person, in their fresh form—mostly in salads and on sandwiches. Around 80% of tomatoes that are grown in the USA are turned into paste, sauce, juice, and catsup. The vast majority of processed and fresh tomatoes are grown in California, but Florida is a major producer of fresh tomatoes as well. Tomatoes are generally picked when green, and ripened with ethylene gas.

Major producers include Morning Star, whose plant in Los Banos, California, is one of the largest tomato paste processing plants in the nation. J.G. Boswell of Corcoran, California, one of the largest overall growers in the west, has around 23,000 acres of tomatoes, and processes most of them in plants around Corcoran. Hunt's Tomatoes, owned by ConAgra, is likely the largest tomato processor, and has a major facility in Helm, in the Central Valley of California.

THE COLD CHAIN

Americans consume around 20 lbs of lettuce per person per year, much of it as garnish on burgers. Nearly all domestic lettuce is grown in California, and shipped nationwide in chilled trucks. The Salinas Valley in California is the largest lettuce producing area, and River Ranch Fresh Foods is possibly the largest grower and packager of lettuce there.

Onions are the second highest valued vegetable crop in the USA, with Americans eating 20 lbs a year per person. River Point Farms, in Hermiston, Oregon, is probably the largest grower, packer, shipper, and processor of onions, producing almost half a billion pounds per year.

There are of course other vegetables beyond lettuce, tomato, onions, and potatoes—the most consumed vegetables in the American diet, not coincidentally commonly found around a cheeseburger.

Americans eat around seven pounds of carrots per person per year. With as much as 40,000 acres of carrots in cultivation at times, Grimmway Farms, based in Lamont, California, is likely the largest producer of carrots.

Americans eat around six pounds of broccoli per person per year. Mann's, in Salinas, California, is probably the largest shipper of broccoli. Americans eat around nine pounds of bell peppers per person per year, most of it imported from South America, or grown in California. Duda Farms in Salinas may be the largest producer of celery, which Americans consume at the rate of six pounds per person per year.

While many of the diversified growers and packagers of fresh fruits and vegetables in California also freeze their products, others specialize in flash-freezing, such as Inn Foods in Watsonville, which is one of the largest packagers of frozen vegetables, mixing and blending some 157 million pounds per year. With the shorter growing seasons in the rest of the country, growers and packagers in other states are more prone to freeze their produce, so they can distribute it year round.

Pictsweet, for example, based in Tennessee, is among the largest frozen vegetable packers and distributors in the nation. Green Giant, with roots in Minnesota, is another major frozen vegetable brand.

Birds Eye is an early and famous brand of frozen foods, with several frozen vegetable plants in the upper Midwest. Birds Eye was founded in 1923 by Clarence Birdseye, who is credited for developing the flash freezing technique that created the frozen food industry (though he did so while working on frozen fish, in Gloucester, Massachusetts).



The Birds Eye facility in Darien, Wisconsin packs and freezes vegetables in the summer, and makes frozen meals and side-dishes throughout the year. It has an Americold Warehouse next to it, additional cold storage for its wares. CLUI photo



Like many of the old urban stockyards, those in Omaha have mostly been redeveloped, though there are still several meatpackers still operating on its periphery, such as the Greater Omaha Packing Company, which processes 750,000 steers annually. CLUI photo

The Meat of the Matter

Americans eat more than 200 lbs of meat per person per year. 3/4 of this is beef, chicken, and pork, with the rest mostly in the form of turkey and seafood. All of this is of course processed, housed, and transported to consumers in the cold chain.

Beef and chicken are still the largest segment of the American meat industry, with around 65 lbs consumed per person per year of each. There are nearly 100 million beef cows in the USA, 30 million or so of which are slaughtered annually. Around half of these are in Texas. Four companies produce 80% of the beef in the USA: Tyson, Cargill, JBS, and National Beef.

Tyson Foods is the largest meat company in America, with around 25% market share. It became the largest beef company when it purchased IBP in 2001, and it now has 13 beef packing plants in the country, including some of the largest, at Dakota City, Nebraska and Amarillo, Texas.

Cargill, the second largest beef company, is based in Minnesota, and is better known for its diverse agribusinesses, such as flour milling, corn syrup, and soybeans. It is the largest privately held company in the USA, and would likely rank as the 9th largest company if it were publically traded.

JBS bought Swift, the nation's third largest beef packer in 2007, and is now the third largest beef company. It is based in Greeley, Colorado, where it operates one of the largest packing plants in the country. JBS is owned by a Brazilian parent company, which is the largest meat company in the world.

National Beef, the fourth largest beef company in the USA, is based in Kansas City, and has seven major packing plants, generating \$6 billion in annual sales.

Smaller beef companies and distribution centers around urban areas hold and age meat for local and regional distribution. Master Purveyors, for example, is a distributor in New York City. Its dry aging meat lockers house around 10% of all USDS-certified prime Angus beef.

The Vernon Beef Company, in the industrial city of Vernon, California, is one of several meat packaging and distributing plants in the Los Angeles region. Local grocery distributors like Kroger use it to supply their in-store meat departments.

At 60 lbs per person, per year, chicken consumption in the USA is

rising, while the consumption of beef is falling. Around 8.6 billion chickens are slaughtered in the country annually, producing almost 50 billion pounds of meat. Top-producing states, with more than a billion each, are Georgia, Arkansas, and Alabama.

Tyson, America's largest distributor of meats overall, started out as a chicken company, and it still dominates the industry. The company is headquartered in Springdale, Arkansas, 20 miles from Walmart's world headquarters. There is a Tyson chicken plant in Springdale too, one of 36 the company operates in the USA.

Pilgrim's Pride is the second largest chicken producer in the country, with 25 plants, including six in Georgia. Pilgrim's Pride was purchased by JBS in 2009. Less than half as large is Purdue Farms, the nation's third largest chicken company, based in Maryland.

Americans eat around 46 lbs of pork per person per year, from around 110 million pigs slaughtered every year. Top-producing states are Iowa, North Carolina, Minnesota, and Illinois.

Tyson, the largest meat company, is also a major player in the pork sector, with six pork processing plants, including one in Logansport, Indiana, that employs nearly 2,000 people.

The largest pork processor in America—by far—is Smithfield Foods, whose massive plant in Tar Heel, North Carolina is known as “porkopolis.” The million square-foot plant, said to be the largest slaughterhouse in the world, is a heavily automated disassembly line, processing up to 32,000 hogs per day. Smithfield Foods was sold in 2013 to the Shuanghi Group of China.

Turkey is a distant fourth in the meat world, around 16 lbs per person per year consumption. It's still a significant industry, producing \$5 billion annually, at the farm level, and 6 billion pounds of meat, from 250 million birds. Most production is in Minnesota, North Carolina, and Arkansas.

Turkey producers include Jenny-O in Minnesota, Cargill, Farbest Foods, and many small local producers. West Liberty Foods has three turkey plants in the USA, including its first one in West Liberty, Iowa, and a new plant in Tremonton, Utah, built to serve markets in the West.

Butterball is the largest turkey processor, with five plants in the USA, and its facility at Mount Olive, North Carolina is the largest turkey plant in the world.

Fish Stories

Americans eat 16 lbs of seafood per person per year. 86% of it is imported, though some of it is actually exported from the U.S., processed elsewhere, and then re-imported. U.S. production is dominated by Alaska, where the port in Dutch Harbor lands more than 500 million pounds of fish per year. The relatively small port of Reedville, Virginia is currently the largest East Coast fishing port, measured in the weight of its landed catch.

The port of New Bedford, Massachusetts had the highest value of landed seafood of any port in the lower 48: \$306 million in 2010. This is due to the high value paid for scallops, and because New Bedford is the largest scallop port in the nation. The Eastern Fisheries Company, based there, is the largest scallop harvester and packer in the world. Most scallops are exported.

Gorton's, in Gloucester, Massachusetts is the largest national

brand of frozen fish, and a major provider of breaded whitefish to supermarkets and restaurants, including McDonald's. Gorton's is believed to be the inventor of frozen fishsticks, part of the legacy of food freezing innovation started by Clarence Birdseye, who began the frozen food industry by developing a flash freezing system at the General Seafood Company in Gloucester in 1926.

Though located at the port in Gloucester, Gorton's now uses mostly Pacific Pollock from Alaska, as local stocks of whitefish are now depleted. Gorton's is owned by a Japanese company. Japan and other Pacific nations consume much more fish per capita than Americans, and their companies dominate the industry.

On the West Coast of the USA, companies like International Pacific Seafood in Fullerton, California are a major importer and exporter of fish around the Pacific, dealing mostly with frozen products shipped between the Port of Los Angeles and Japan. Advanced Fresh Concepts in Compton, California is the largest sushi provider in the USA. The company provides packaged sushi meals to retailers such as Costco and other national chains.

Eggs and Dairy

Of the 33 lbs of eggs consumed per person per year in the USA, around ten pounds is from egg products in processed foods. That leaves around 90 billion shell eggs to be scrambled, omeletted, boiled, fried, or mixed into foods. Iowa is the major producer, with 52 million egg-laying chickens, followed by Ohio, Pennsylvania, and Indiana.

Major egg producers have farms with long sheds, containing thousands of birds, and cold storage sheds for holding the eggs. Rose Acre Farms is one of the largest egg producers in the nation, with 24 million birds, at several large farms. Its facility in Guthrie Center, Iowa may be the largest egg farm in the nation. Cal-Maine foods, Moark, and Spartoe farms are also major national egg companies.

Dairy products seem to be everywhere in our diets, and are nearly entirely dependent on refrigeration, unless they are so processed that they become inert. Americans consume more than 80 lbs of cream, butter, yogurt, ice cream, and cheese, per person per year, and another six gallons of liquid milk. All of this, with the exception of some cheese, is dependent on the cold chain.

There are nine million milk cows in the USA, at 65,000 dairy farms. California leads with 39 billion pounds of milk generated per year, followed by Wisconsin, with 25 billion. New York is third, with 12 billion. Many of the dairy staples, such as milk, butter, cream, yogurt, and cheese, are processed and packaged at the dairy farms themselves. Mostly though, it occurs in creameries and processing centers in towns and cities, supplied with milk from dairies. Large factory-type creameries sometimes specialize in just a few of these products.

Fair Oaks Farms, in northern Indiana, is one of the largest dairies in the nation. It is close enough to metropolitan Chicago to attract school children and the public for tours. It is increasingly common for dairy operations to develop a public face, though most of the 30,000 cows at Fair Oaks are in a few dozen large sheds, far from the playschool farm displays and gift shops, off limits to the public.

Large scale production of dairy products often occurs at urban creameries, where milk is delivered by tanker truck, and perishable products are quickly shipped to retailers. Such is the case at the Alta Dena Dairy in the City of Industry, in Southern California,

THE COLD CHAIN



Ben and Jerry's, owned by the large European food conglomerate Unilever, produces most of its ice cream not in the touristed plant in Waterbury, Vermont, but in an industrial park in St. Albans, Vermont. CLUI photo

one of the major suppliers of milk, cream, and butter to Los Angeles' retail grocery stores. Grocery store chain Kroger operates the Compton Creamery, south of Los Angeles, another major source of dairy for the region.

Specialized regional mega-plants also develop, such as the Dannon Yogurt plant in Minster, Ohio, which until recently was the largest yogurt plant in the nation. A few bigger facilities have recently come on line, responding to rapidly increasing demand for greek yogurt. Dannon itself recently converted its water bottling plant in West Jordan, Utah, into a yogurt plant, to serve western markets.

1,100 plants in the USA supply the 24 lbs of ice cream that Americans consume per person every year. California has more than 200 ice cream plants, and makes more ice cream than any other state. Dreyer's operates what may be the largest ice cream plant in the nation in Bakersfield, California.

Most ice cream is produced close to its market. Ben and Jerry's, though, is entirely made in Vermont, and is shipped nationally in small cartons that have to stay frozen. Tourism is built into their first plant and their headquarters in Waterbury, Vermont, though most of their product is made at a much bigger un-touristed plant in an industrial park in St. Albans, north of Burlington. Ben and Jerry's is owned by Unilever, a British conglomerate, and is the biggest ice cream company in the world.

In dairy, localism can be as important to a brand as terroir is to wines. Consider Tillamook, a nationally distributed cheese brand, based in a small Oregon town, and Cabot Cheese, also distributed nationally, but based conceptually and physically in Vermont. Their original plant in the scenic small town of Cabot is a Vermont dairy business tourism destination, like Ben and Jerry's. Similarly too, most of their product is made in an industrial park elsewhere (in Middlebury).

Though these small national/local brands have high visibility for some, they still represent a small fraction of the 31 lbs of cheese consumed by each of us Americans, per year, mostly through consumption of prepared foods like pizza.

Mega-cheese company Schreiber claims to put the cheese on nine out of every ten fast-food cheeseburgers in the USA. One of its principal plants and distribution centers is in Fairview, Missouri, a central part of a distribution network of 16 plants that puts its product within one day of all major markets in the lower 48.

Schreiber's facility in Logan, Utah is currently the company's most

productive plant. It handles over 170 million pounds of cheese a year, and is expanding.

Mozzarella is the most consumed type of cheese in the country, and Leprino makes more of it than anybody. Their factory in Lemoore, California, is one of the largest cheese plants in the country.

Though California surpassed Wisconsin in milk production, Wisconsin still produces slightly more cheese. Land O'Lakes is a major dairy company with a number of cheese plants in Wisconsin, including one in Kiel, an industrial cheese-making center. Sargento Foods has one of its four Wisconsin cheese plants in Kiel. The company specializes in shredded and snack cheeses, and in custom cheese products for national restaurant chains and manufacturers.

The king of cheese in America, of course, is Kraft, headquartered in Northfield, Illinois, near Chicago. The company started when James Kraft figured out how to put cheese in a can to increase its shelf life. In doing so, he invented a new product known as embalmed cheese. Based out of its R&D center in nearby Glenview, the company continues to engineer cheese into new dimensions.

There are around a dozen Kraft plants in the USA, including one at Upper Macungie, Pennsylvania, which makes Velveeta and other cheese products. Another in Springfield, Missouri is the principal Kraft Macaroni & Cheese producer, though it also makes Cheez Whiz, Philadelphia Cream Cheese, Velveeta, and Kraft Singles.

Nearby is an unusual cold storage facility known as Springfield Underground. Kraft is a major customer there, storing millions of pounds of product in this underground cheese cave. This is not to be confused with a more legendary cheese cave in Kansas, where a few decades ago millions of pounds of government subsidized cheese rotted away until President Reagan changed Federal cheese policy.

Due Process: Manufactured Foods

The cold chain has enabled a whole new form of food to be created—the frozen dinner. This delight is perhaps the apogee of the whole genre of substantially processed foods that emerged in the post-war industrialization of food production.

At least 70% of the food Americans eat is substantially processed, meaning, basically manufactured, rather than simply washed, peeled, cut, and cooked at home. This includes prepared foods that are removed from the cold chain, such as cookies, canned soups, bags of chips, and cereals. But it also includes luncheon meats, frozen dinners, and other prepared foods that must remain chilled or frozen.

These manufactured foods are made by mechanically and chemically deconstructing and merging components derived from basic foods and edible non-foods, such as dairy, meats, fats, oils, grains, legumes, minerals, and petrochemicals, treated to a nearly infinite variety of industrial processes to form food-like material, which is packaged, sold, and consumed. It's about breaking food down, in order to build it back up in a more appealing and economical form.

Cargill dominates this form of food manufacturing in America, and operates on an industrial supply level, generating animal feed, meats, glutens, starches, salt, and ingredient systems.

Archer Daniels Midland is another major industrial food components company, extracting compounds from corn and soy to make additives and ingredients, mostly outside the Cold Chain.

Tate and Lyle is another major food additive supplier, providing processed food makers with starches, acidulants, fructose, dextrose, and proteins.

ConAgra is among the largest prepared food companies in the country, using these building blocks to make foods for industry, and for consumers, though familiar brands. ConAgra is based in Omaha, and claims that its food is found in 97% of American households. Much of its products are grains, sauces, oils, and canned goods, which exist outside the cold chain. But the company is also one of the largest manufacturers of frozen entrees and other chilled prepared foods.

ConAgra's plant in Marshall, Missouri, for example, makes frozen pot pies and nuggets under its Banquet brand, supplied partially by Cargill's case-ready meat plant, nearby.

The company's Council Bluffs, Iowa plant makes packaged and frozen entrees for its Marie Callender's, Healthy Choice, and Rosarita brands. Its Indianapolis facility is a major margarine plant, producing for the company's Blue Bonnet, Parkay, and Fleischmann's brands.

In Russellville, Arkansas, the company makes frozen pizzas for its Bertolli brand, and frozen Chinese-style entrees for its P.F. Chang's brand. In Troy, Ohio it makes The MAX product line of frozen pizzas, and Slim Jim meat sticks.

Nestle is another big player in the frozen prepared foods industry. Based in Switzerland, it is the world's largest processed food company. Its U.S. headquarters is in Glendale, California. The company makes Stouffer's and Lean Cuisine frozen dinners at its plant in Solon, Ohio, the headquarters for the company's prepared foods division. It makes Hot Pockets, another popular frozen food product, at a plant in Chatsworth, California. Nestle purchased Kraft's frozen pizza division, headquartered north of Chicago, in 2010, acquiring the leading DiGiorno and Tombstone brands, among others.

Kraft specializes in cheese, but has other chilled deli foods brands, like Oscar Mayer. A Kraft plant in Fullerton, California is the principal production site for Lunchables, one of its most popular chilled prepared foods.

There are hundreds of lesser known national and regional prepared foods brands operating all over the country as well. Companies like Pinnacle, of Parsippany, New Jersey, which builds processed foods and markets them through their well-known brands, like Hungry Man and Duncan Hines. Or Schwan Foods, which makes Mrs. Smith's frozen pies in Stillwell, Oklahoma. Or On-Cor's plant in Fort Atkinson, Wisconsin, which makes familiar frozen dinners and fully cooked meat products for the frozen food aisle.

Most of the tamales and burritos made by Ruiz Foods, the 12th largest prepared meal company in the country, are made at a plant in Dinuba, California. They can be found in grocery freezer cases, vending machines, and convenience stores across the country.

There are many wholesale and custom prepared food companies operating in industrial parks all over the country, supplying food service companies, institutions, and products for others to brand.

Haliburton International Foods, in Ontario, California, for example, makes fresh salsa, hummus, and other vegetable-based products for national restaurant chains. Van Law Foods of Fullerton, California



Nestlé's Prepared Foods division in Solon, Ohio, makes Stouffer's and Lean Cuisine products, and is possibly the largest single source of frozen dinners in the country. CLUI photo

is another private label food manufacturer and packager, supplying retailers and restaurant chains. Little Lady Foods in Elk Grove, Wisconsin is a custom frozen food manufacturer, specializing in things made of "flour, water, and stuff" such as sandwiches and pizza.

Massachusetts-based Richelieu Foods makes frozen pizza for other brands at its plant in Beaver Dam, Wisconsin. Kettle Creations makes mashed potato meals and casseroles for food service and institutional customers, out of its single plant in Lima, Ohio. And so it goes.

Distribution: The Links of the Cold Chain

In the cold chain, as in all things, distribution is the fulcrum between production and consumption. In some cases distribution is handled from the production side, by the manufacturing and packaging companies themselves. In other cases it is handled from the consumption side by retailers and grocery distributors.

Often though, in the middle, are cold storage companies, like Americold, providing warehousing for our food when it is between here, and there. There are more than a thousand large cold storage warehouses spread out all over the country, next to food plants, but also in suburban office parks and in regional logistics areas.

Hundreds of thousands of refrigerated trucks hold the cold chain together, linking packing house, plant, warehouse, distribution center, and retailer. In particular, it is long distance semi-trucks hauling reefers—trailers with the refrigeration unit mounted on the front—manufactured by one of two companies: Carrier or Thermo King.

Two companies dominate the long haul reefer trucking business. C.R. England trucking, headquartered in Salt Lake City, has the largest fleet of reefer trucks in the country. Its trucks are all over the nation's highways, dispatched out of terminals in California, New Jersey, Indiana, Texas, and Salt Lake City. Marten, headquartered in Mondovi, Wisconsin, has the second largest fleet of reefer trucks.

These thousands of trucks move between loading bays at food plants, packing houses, and cold storage warehouse companies, the largest of which is Americold.

Americold is based in Atlanta, and owns and operates more than 100 cold storage warehouses in the USA, providing a total of nearly 900 million cubic feet of chilled storage space, more than three times that of its nearest competitor.

THE COLD CHAIN



An Americold cold storage warehouse outside Atlanta, Georgia, with a reefer trailer from Central Refrigerated, of Salt Lake City, and the tell-tale orange windsock that all refrigerated warehouses have, to indicate wind direction in case of an accidental release of the refrigerant, ammonia. CLUI photo

Americold has warehouses in the upper Midwest, supporting the cheese, processed foods, and vegetable industries in the region. Its warehouses are often next door to food plants. Americold operates one of the largest underground storage warehouses in the country, in Carthage, Missouri, where the company uses three million square feet of the former limestone mine, which has tunnels that run for miles. The cold storage there is further chilled with refrigerant plants on the surface that pump air into the caverns.

Lineage Logistics, based in Southern California, is the second largest cold storage warehousing company, with around 45 chilled and frozen warehouses around the country, and a total of 290 million cubic feet of chilled space. Like Americold, some facilities are dedicated to specific production sites, usually adjacent or at least nearby to the plant or packing house. Others are public, meaning they are used by a variety of paying customers. Lineage also operates seven public cold warehouses at ports on the East and West Coasts.

Millard is the third largest cold storage company in the country. It has 33 U.S. locations, including one near its headquarters in Omaha, near the stockyards. It is followed by Preferred Freezer Services, the country's fourth largest, which has 31 facilities in the USA, including in Chicago, New Jersey, and California. And United States Cold Storage, the fifth largest cold storage company in the nation, with 31 locations, including one in Bakersfield, California, near the Dreyer's ice cream plant.

All told there are around 10 cold storage companies that offer more than 50 million cubic feet of warehousing and multiple locations in the country, and another 15 or so with between 16 and 50 million cubic feet.

In the old days, things were a lot more centralized, with downtown cold storage buildings next to in-town wholesale markets. Some of these places still hang on, like Hall Street Cold Storage in New York City, and Los Angeles Cold Storage, near downtown LA.

Food Service and Grocery

Commercial food service companies supply food to restaurants, hotels, schools, hospitals, and government facilities. Sysco is the largest of these companies, with 180 locations in the USA. The company employs 45,000 people and does nearly \$40 billion in business every year. Most of its production and storage locations have significant cold storage facilities.

US Foods is number two in the food service industry, and is half as big as Sysco. It has 60 locations in the USA.

Many large cities still have wholesale markets, like New York City's Hunts Point. These are places where suppliers and wholesalers meet to do business in perishables. In Philadelphia, the Philadelphia Wholesale Produce Market opened in 2011, with a quarter mile-long sales floor, used by around 26 wholesalers. The entire building is chilled to 50°F or less.

In Los Angeles, the wholesale produce market near downtown has more than 100 individual wholesale bays, each with its own few hundred square feet of cold storage. Sales to restaurants and retailers is conducted mostly in the pre-dawn hours, when produce is displayed in the front of the stall. After that it is moved back into storage.

Most retail grocery distribution goes through retail cooperatives, such as Associated Wholesale Grocers. One of the largest, they serve 2,900 retail stores in 24 states, from nine distribution centers, including a central one in Springfield, Missouri.

Often the grocery distributor is not a co-op, but a branded wholesaler and retailer like Supervalu, which supplies 3,400 stores. Supervalu, based in Minnesota, also supplies the stores it serves with their house brand of products. Supervalu is the third largest grocery retailer in the country. It has stores under its own name, and operates under several other retail brands, like Shop n' Save (though it is currently in a deal to sell its Albertsons, Shaw, and Star Market brands).

Safeway is the second largest grocery chain in the country, and its warehouse in Tracy, California, near the company's headquarters in Pleasanton, is one of its largest. The dominant grocer in the nation is Cincinnati-based Kroger, which has almost 2,500 stores under its Ralphs, Food for Less, Smiths, Dillons, FredMeyer, and Kroger retail chains, generating nearly \$100 billion in sales annually. Kroger is second only to the still-reigning king of American retail, Walmart.

As it does with other segments of retail, Walmart dominates the grocery trade. More than 3,000 of its stores sell a full line of groceries. 15% of the perishable foods sold in the USA are from a Walmart or one of its club stores, more than its top three competitors—Kroger, Safeway, and Supervalu—combined. ♦

Perishable: An Exploration of the Refrigerated Landscape of America was created by the staff of the CLUI and Nicola Twilley, author of the blog Edible Geography, and was supported by a grant from the Grabam Foundation. View a map of sites from the exhibit at www.clui.org.



CLUI photo

BOOK REVIEWS

BOOKS NEW TO THE SHELVES OF THE CLUI LIBRARY

Spoil Island: Reading the Makeshift Archipelago, by Charlie Hailey, Lexington Books, 2013

It's exciting to see a book on the array of intentionally incidental landmasses that line our channels and dot our harbors. Focusing mainly on Florida—that most constructed and tenuous state—Hailey's detailed histories of a few selected sites assert that the things we make without much thought give us a lot to think about.

Las Vegas Periphery: Views from the Edge, by Laurie Brown, George F. Thompson Publishing, 2013

Epic, wide, panoramic views exposing the remarkable terraforming that is going on at the expanding and crumbling outward edge of the great city of Las Vegas. Hard to do Laurie Brown's large images justice in book form, but if this book were any wider it would stick so far out of the shelf that it would become a hazard to navigation.

The Whole Earth: California and the Disappearance of the Outside, by Anselm Franke and Diedrich Diederichsen, RAM Publications, 2013

This dense and rich tome is a catalog of the large exhibit shown in Berlin in 2013, curated by the authors. The show was a kind of contemporary re-manifestation of the encyclopedic ecotopic cornucopia of the original *Whole Earth Catalog*, at the same time as being a savvy assessment of its effects on the present. Dozens of projects were represented, by the likes of Eleanor Antin, Jordan Belson, Bruce Conner, Sharon Lockhart, Adrian Piper, Richard Serra, Bruce Yonemoto, and even the CLUI, which contributed images of landfills in Los Angeles.

Introduction to Energy in California, by Peter Asmus, University of California Press, 2009

These new(ish) "California Natural History Guides" sometimes stretch beyond the edge of the genre, which is why they are interesting, like this one, about energy, which is more about industry than nature. Be fine with us though if the format grew to coffee table proportions, since it's not really something you would put into your backpack and take into the field with your binoculars.

Sci-Fi, CLOG, 2013

CLOG is a quarterly journal that publishes, defiantly, in a physical, printed book form. It has been doing so since the last quarter of 2011, each time on a different theme, and has been pretty great from the get-go.

Local Treasures: Geocaching Across America, by Margot Anne Kelley, Center for American Places, 2006

Geocaching is a curious activity at the crossroads of the virtual and real worlds. It started in 2000 (when the government stopped scrambling the GPS signal) as a form of community gaming, using hand held-GPS and other way-finding means to find physical places described on the internet where little keepsakes are stored to be discovered. It's a scavenger hunt with the landscape as a game board. But it is also a form of ground truthing and destination-making that is remarkably popular. The author, a geocacher and photographer, uses the randomness of geocaching locations to muse about places and her experiences as a geocacher.

Living Oil: Petroleum Culture in the American Century, by Stephanie LeMenager, Oxford University Press, 2014

A self-described hard-left leaning, academic, feminist's exploration of the role of oil in American culture, focusing mostly on the negative effects of the extractive side of the industry. Though this may seem like preaching to the choir while fishing for petroleum in a barrel of West Texas' finest,

the author covers a lot of interesting and physical ground. She even finds her way to the CLUI oil exhibit in an almost abandoned office trailer at a former junkyard in Houston.

The Western Town: A Theory of Aggregation, by Alex Lehnerer, Jared Macken, Jayne Kelley, Lorenzo Stieger, Hatje Cantz, 2013

The idea and form of Western towns of the 1860s to 1890s, in reality, myth, and movies, is the subject of this large format, illustrated, architecture book, by a Swiss architecture professor and his students. Though the book focuses on places depicted in films by Sergio Leone, Sam Peckinpah, John Ford, and Robert Altman, this is not a movie location book, but an investigation of the theoretical and physical structures of these places.

Internet Alley: High Technology in Tyson's Corner, by Paul E. Ceruzzi, MIT Press, 2008

Written by a curator at the Smithsonian's Air and Space Museum, and looking at the history and development of this area near Dulles Airport in a broad and general way, this book holds the key for understanding the history of the Internet.

Manufacturing the Future: A History of Western Electric, by Stephen B. Adams and Orville R. Butler, Cambridge University Press, 1999

For over 100 years, AT&T built and operated the nation's communications system, capitalizing on its government-supported monopoly, until 1983, when it was finally broken up. Near the end, it was the biggest company in the world, with a million employees. Bell Labs was its R&D division, designing the technology, and Western Electric was the manufacturing division, building the equipment. While there are good books about AT&T and Bell Labs, this was the first corporate history of Western Electric, and is still the best.

Up on the Roof: New York's Hidden Skyline Spaces, by Alex MacLean, Princeton Architectural Press, 2012

The terrain of the aerial photographer is shifting as online imagery systems expand and improve, but there are still levels of resolution that remain outside Google and Bing's range. This book of close-ups of rooftop spaces in Manhattan, from aerial photography legend Alex MacLean, shows that the tops of buildings are an architectural niche all their own, like sky islands in an urban sea.

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The East Sylmar HVDC Converter Station.

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