SAKAI NURSERY, GREENHOUSES
99 South 47th Street
Richmond
Contra Costa County
California

HALS CA-6-B
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN LANDSCAPES SURVEY
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street, Suite 700
Oakland, CA 94607

HISTORIC AMERICAN LANDSCAPES SURVEY
Sakai Nursery, Greenhouses

HALS No. CA-6-B

Location: 99 South 47th Street
City of Richmond, Contra Costa County
California

U.S.G.S. Richmond Quadrangle (7.5')
Mercator Coordinates: 559224mE, 4198192mN
559371mE, 4198186mN
559236mE, 4198024mN
559398mE, 4198021mN

Significance: The Sakai Nursery is located at the intersections of South 47th Street and Florida Avenue in Richmond, Contra Costa County, California. The nursery is located on a nearly rectangular 5.59-acre site that is bounded on the north by a Bay Area Rapid Transit (BART) right-of-way, on the east by South 47th Street, on the south by Florida Avenue, and on the west by South 45th Street. The Oishi Nursery (HALS No. CA-5) is located east of the Sakai Nursery on the east side of South 47th Street. The Sakai Nursery site includes the original Sakai family house, another family residence, twenty greenhouses, and various buildings and structures such as a boiler house, water tanks, a flower warehouse for grading and packaging cut roses, storage sheds, worker housing, paved paths, a system of drainage trenches, and overhead steam lines for heating the greenhouses that were associated with the operation of the nursery. Two residences that were originally built for Sakai family members are located across Florida Avenue on separate parcels of land to the south of the nursery proper.

The Sakai Nursery began in 1906 when the Tokaro Sakai family purchased two and a half acres of land, relocated a greenhouse from another nursery in Berkeley to the property, and began to grow carnations for cut-flower production. By 1927, the family had switched to raising greenhouse roses. The Sakai Nursery continued to specialize in growing high-quality roses that sold at premium prices and to be family-owned and family-operated until its closure in 2003. The property was sold to the Richmond Community Redevelopment Agency in 2006.

The Sakai Nursery was determined eligible for the National Register of Historic Places by the California State Historic

Preservation Officer in 2007 under Criterion A at a local level of significance for its significant associations with Japanese American history in Richmond and with the history of the San Francisco Bay Area cut-flower nursery business. When it closed in 2003, the Sakai Nursery was one of the last two remaining examples of the community of Japanese American flower growers which developed in Richmond during the first decade of the twentieth century. The other example was the Oishi Nursery (HALS CA-5) located on an adjacent property on the east side of South 47th Street.

Although not large enough to support the range of local services and organizations that developed in *Nihonmachis* (Japantowns) in cities such as San Francisco and San Jose, Richmond's cluster of Japanese American nurseries were historically significant as a *Nikkei* (Japanese immigrant and their American-born descendants) community centered around the cut-flower industry. By 1910, two clusters of Japanese-owned flower nurseries formed the heart of this close-knit community, and by World War II, approximately twenty nurseries had been established. These nurseries grew primarily carnations and roses, two flower types that were sold every day of the year and thus provided a steady source of income. The cut-flower industry provided an economic means for this ethnic community to survive the initial wave of immigration and to continue to flourish into the late twentieth century. Because a large number of the Japanese nursery owners had purchased their land before the passage of the 1913 Alien Land Law, which forbade property ownership to most Japanese as Aaliens ineligible for citizenship, Richmond's Japanese American community was a remarkably stable and long-lived ethnic enclave. Most of California's Japanese American communities could not be recreated after World War II, and their members dispersed. However, despite their forced removal from homes and businesses during World War II, many of Richmond's Japanese American nursery owners returned to their neighborhood and revived their businesses after the war.

Richmond's Japanese-owned nurseries were part of the larger group of San Francisco Bay Area cut-flower nurseries that developed on the fringes of the urban core in San Francisco, Contra Costa, Alameda, and Santa Clara counties during the late nineteenth and early twentieth century. With a limited capital investment, families were able through intensive cultivation and hard work to utilize small tracts of open land – often as little as one acre – to create profitable floricultural enterprises. After World War II, increasing development pressures in these areas, along

with changing technology and market forces, contributed to the displacement of the Bay Area nurseries. Additionally, in Richmond the extension of the Eastshore Freeway (Interstate 80), located just east of the Sakai Nursery, resulted in many of Richmond's Japanese American nursery owners losing their land to during the early 1950s. The freeway and new commercial and residential development have replaced these nursery operations.

Description:

The twenty greenhouses occupy the greatest land area on the nursery and were used to cultivate the premium quality roses that were the Sakai Nursery's specialty. Although built over the span of two decades and varying slightly in dimensions, the greenhouses all have a similar form. All of the greenhouses are detached (that is they do not share any common walls), even-span, covered in glass, and have both ridge and side vents; all but Greenhouse No. 14 are wood-frame (some have iron frame additions). Detached, even-span greenhouses were the accepted norm for commercial greenhouse Rose production during this period and were recommended in the standard floriculture publications.[1] All of the houses, with the exception of Greenhouse No. 14, were built by 1950 and represent accepted greenhouse forms from the first half of the twentieth century.

Eighteen of the twenty greenhouses at the Sakai Nursery are located in one of four short rows. There arrangement reflects the acquisition of separate parcels of land at different times, the expansion of the nursery over time, and the functional relationships between the greenhouses. The greenhouses in each row are spaced equidistantly (about 10' to 12' apart) and have doors on both ends and in the central portion of each side. The side doors are aligned from greenhouse to greenhouse and are connected by a concrete sidewalk so that cross circulation between the greenhouses is facilitated. One end of each greenhouse is adjacent to the north-south circulation corridor.The principal variations in the Sakai Greenhouses are in their dimensions, i.e. length and width.

The wood structural system of greenhouses consists of a central row of posts (4" x 4" posts spaced 10'-0" on center) extending the length of the structure, supporting the ridge-beam. Two 2" x 4" diagonal braces spread out from each post (about five feet up the post from grade), reinforcing 2" x 6" rafters that are in turn supported by 3" x 4" posts along the side walls. The remaining framework consists of slender studs and rafters and thin millions

[1] Including Eber Holme's *Commercial Rose Culture*, first published in 1911, which was considered the "bible" of rose growing, and Alex Laurie's standard text *Commercial Flower Forcing*, first published in 1934.

framing the square panes of clear glass. The dimension of the glass panes varies from 15" x 20" to 16" x 18". Some of the side windows (likely later alterations) are as large as 20" x 36". The long sides have bases of horizontal eight inch wide rustic siding, slightly higher (seven boards vs. four boards) on the north to conserve energy. The east-facing front contains movable glazed panels with bases of horizontal wood siding; double doors are set into the long sides.

The greenhouses incorporate mechanical systems for irrigation, heating and ventilation. Water is provided by hoses connected to an elevated pipe extending across the front. Pipes also are part of the steam heating system to heat the interior during cold weather. Ventilation is provided by louver panels built into the structure. The gable roof incorporates two such panels (one pane wide) extending along both sides of the ridge. Running along the top of each sidewall is a similar panel (two panes wide). The louvers are operated by a mechanism utilizing chains, sprockets, and horizontal bars with braces.

Inside the greenhouses, each side of the dirt-filled beds are constructed of 15"-wide wood boards. The roses were planted in rows and were supported as they grew by a wire and stick system. Rows of thin metal wire run the length of the bed; small sticks are interspersed at regular intervals (corresponding to the spacing of the rose plants) crosswise (perpendicular) to the wires. There are multiple levels of this wire and stick system in each bed which supported the plants as they grew taller. The entire system was held taunt by two metal posts with metal cross bars or pipes that are mounted at both ends of the bed. This system, which along with roses or dead plants remains in many of the greenhouses, was a typical support feature for greenhouse-grown roses. The roses at the Sakai Nursery planted in greenhouses according to colors, and although, the nursery grew a wide range of colors, the Sakais' were known for their red and white roses. "Baby roses" (a common term for varieties of polyantha, floribunda, and miniature roses) were planted on the outer beds in Greenhouse Nos. 8 to 12 where the roof was too low for standard roses. The roses remained in the beds for up to seven years, and at the end of the seven-year cycle, the beds had to be prepared for a new planting. This involved removing the wire and stick supports, pulling out the old plants, cleaning up debris, and steaming the soil (to disinfect it). The plantings were staggered between greenhouses so that this process did not occur in all the greenhouses at the same time. To ensure a continuity of bloom while producing heavy yields for peak demand periods (i.e. Valentine's Day or Mother's Day), roses were planted

in series beginning in March and continuing through June. Roses were "pinched" (flower buds removed) either to encourage blooms or to remove excess blooms. The growth of the roses was a highly controlled process depending on the skill of the grower to regulate the temperature and fertilizer application and this pinching process in order to control when the roses were ready to be cut.[2]

Greenhouse No. 20

Greenhouse No. 20 is wedged into the area between the Boiler House, the ca. 1922 Water Tank, and Greenhouse No. 8. It is the smallest greenhouse on the nursery (25'-0" x 60'-0"). The construction date for Greenhouse No. 20 is unknown. It was identified as possibly being one of the oldest greenhouses on site and dating from the 1920s by William Sakai during interviews for the National Register evaluation in 2004.[3] However, no greenhouse appears in this location on the 1930 Sanborn map. One does appear on a ca. 1940/pre-World War II aerial photograph from the Sakai family's collection and it is possible that Greenhouse No. 20 was moved to this location after 1930.

The wood-frame, gable-roofed structure has a perimeter concrete foundation, with low concrete walls (crudely formed) along the sides, and a base of horizontal wood siding at the ends. The wood structural system consists of a row of posts extending down the center of the structure, supporting the ridge-beam. Two angled braces spread out from each post, reinforcing rafters that are in turn supported by posts along the sides. The remaining framework consists of slender studs and rafters and thin millions framing the square panes of clear glass. Doors with glazed panels are set into both ends of the structure.

Greenhouse Nos. 8 to 13

Greenhouse Nos. 8 to 13 are aligned lengthwise east-to-west approximately 12' apart in the northeast quadrant of the nursery with the west end of each greenhouse adjacent to the north-south circulation corridor. This row of six greenhouses (the oldest at the Sakai Nursery with the possible exception of Greenhouse No. 20) was added between 1927 and 1930[4] and is located on the original parcel of land that the Sakai Family purchased in 1906. Greenhouse No. 8 was expanded on its west end sometime after the original boiler house was removed. An addition to the east end

[2] John Oshige 2010.
[3] Graves, Hill, and Minor 2004, 49.
[4] Dates based on building permits and the fact that all appear on the 1930 Sanborn map.

of Greenhouse No. 13 occurred by the late 1940s, and additions were made to the east ends of Greenhouse Nos. 9 to 12 in 1961.[5]

Greenhouse No. 8 has a rectangular footprint measuring 32 feet by 100 feet. The original Greenhouse No. 9 was 100 feet long (originally in alignment with Greenhouse 8); the metal-frame east addition is 50 feet long, resulting in an overall length now of 150 feet. Both sections have the same width—42 feet—but the ridgeline of the addition is slightly lower.

Greenhouse No. 13 has a rectangular footprint measuring 36 feet by 167 feet. Double-doors with glazed panels and bases of horizontal wood siding are set into each end of the structure. Greenhouse Nos. 10, 11 and 12 have an older, wood-frame west section and a metal-frame east addition. Both sections have the same width—40 feet—but the ridgeline of the addition is slightly lower. The overall length is 170 feet. The structural system of the east addition, with perimeter concrete foundation and base, consists of iron pipe trusses supported by rows of iron posts along the outer walls.

Greenhouse Nos. 1 to 7

Greenhouses Nos. 1 to 7 are aligned lengthwise east-to-west approximately 12' apart in the northwest quadrant with the east end of each greenhouse is adjacent to the north-south circulation corridor. This row of seven greenhouses was added between 1936 and 1940[6] and is located on the parcel of land (west of the original parcel) that the Sakai Family purchased in 1924. Originally, these greenhouses had identical dimensions (36'-0" x 120'-0"); however Greenhouse Nos. 2 to 7 were expanded on their west ends in the 1940s and are now 180'-0" long.

Greenhouses 2–7 form a row of identical wood-frame structures fronting on South 45th Street. Each has a long rectangular plan, a gable roof, and a perimeter concrete foundation. The older east section (identical to Greenhouse 1) has glass-enclosed walls and roof and the west addition is clad primarily in translucent corrugated fiberglass.

Greenhouse Nos. 15 to 19

[5] The dimensions vary slightly from greenhouse to greenhouse. Refer to the architectural data form in HALS No. CA-B for dimensions.
[6] Dates based on building permits.

Greenhouse Nos. 15 to 17 are aligned lengthwise east-to-west approximately 11' apart in the southwest quadrant with the east end of each greenhouse is adjacent to the entrance road that connects to Florida Avenue. This row of three greenhouses was added between around 1940;[7] they have identical dimensions of 38'-0" x 240'-0". Greenhouse Nos. 18 and 19 are aligned lengthwise east-to-west approximately 10' apart on the opposite side of the entrance road in the southeast quadrant. These two greenhouses were likely added within a couple of years following the Sakais' return after World War II.[8] They have identical dimensions of 35'-0" x 150'-0". These last five greenhouses are located on the parcel of land (that stretches from South 47th to South 45th along Florida Avenue) that the Sakais purchased in 1932.

Greenhouses 15–17 each has a gable roof and a perimeter concrete foundation combined with concrete footings. Greenhouses 18 and 19 form a pair of identical wood-frame structures similar to Greenhouses 15–17, though with lower profiles. Each has a long rectangular plan, a gable roof, and a perimeter concrete foundation combined with concrete footings.

Greenhouse 14

The modern Greenhouse No. 14, the largest in the Sakai Nursery, is located in the northeast quadrant in a narrow strip of land between the east ends of Greenhouses Nos. 8 to 13 and the east edge of the property next to the South 47th Street. Due to its location, it is the only greenhouse to have its lengthwise side oriented north-south. This modern greenhouse structure (glass, even-span, aluminum frame) was built in 1970 and has overall dimensions of 44'-0" x 280'-0". It replaced an older wood-frame greenhouse that occupied the same footprint from as early as 1930.[9]

The aluminum-frame structure with glass walls and roof has a perimeter concrete foundation and dirt floor. The base of the building along the sides is clad in corrugated aluminum. The structural system consists of wide trusses supported by posts along the sides. The walls and roofs consist of square panes of clear glass framed by thin mullions. The wood-frame addition, with lower

[7] Date based on the fact that all appear on a ca. 1940/pre-World War II aerial photograph from the family's collection.
[8] Date based on review of ca. 1945/post-World War II aerial photograph from the family's collection and a 1949 aerial from Pacific Aerial Surveys.
[9] A greenhouse appears in this location on the 1930 Sanborn map and in subsequent aerial photographs.

ridgeline, has a base of horizontal wood siding and two sets of double-doors at the front. The structural system consists of a central row of posts supporting the ridge-beam. Two angled braces spread out from the posts, reinforcing rafters that are in turn supported by posts along the sides. The remaining framework consists of slender studs and rafters and thin millions framing the square panes of clear glass.

Historical Context: The Sakai Nursery Greenhouses were central to the operation of the Sakai Nursery in that they are buildings were the flowers were grown. The Greenhouses date from the twenties to the late forties.

Historical Background: The Sakai Nursery

Like all Japanese immigrants in the late nineteenth century, Kotaro Sakai came to the United States in 1898 in search of economic opportunities. Born in 1873 as Kozaburo Oishi, he was adopted by the Sakai family at age two after the Sakai's oldest son had died. In the *yoshi* tradition that shaped many Japanese families, those without sons adopted younger boys from nearby families to ensure a male inheritor of the family's name and property. Descendants describe the Oishis as samurais who later turned to education, while the Sakais were farmers cultivating small plots of land. Kotaro's birth father, Sadamoto Oishi, was a secondary school teacher and teacher of Confucian ethics.[10] Kotaro moved back to the Oishi family home to attend high school. *Yoshi* sons often married a daughter of the family in which they were adopted, and Kotaro married Chu Sakai in 1897 in their hometown of Sasayama in the prefecture or state of Hyogo-ken.[11]

Kotaro left his wife and infant daughter, Chizuru, in 1898 and immigrated to the San Jose area, where his two older brothers, Tokutaro and Seizo Oishi, were already in business. According to family accounts, he farmed and cleared land to support himself before his wife left their daughter with her mother and joined him later that same year. Starting a new life in the United States meant great effort for the couple. Chu worked for several years as domestic help for a German family, while Kotaro continued as an agricultural worker, sometimes for his brothers' operation. By approximately 1902, they had gained the resources to lease land in the Alviso area and grew strawberries while Chu gave birth to a second daughter Shizue (Sue) in 1903 and son Tetsuma in 1906.

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[10] Names, birth dates, and some details are from an unpublished genealogy supplied by Charlotte Sakai titled "Sadamoto Oishi Family."
[11] "The Way We Were . . ." 1996, 44-45, 49.

Chu would leave the baby in a basket alongside the fields while she worked with her husband.[12]

In 1906, the Sakais purchased two and a half acres of bare land in Richmond and soon relocated a broken-down greenhouse from a nursery in Berkeley to the property. Sam Sakai, son of Kotaro and Chizuru, described their setting down roots in Richmond:

> *The location was cheap property and about a half mile to the street car line. In those days back in 1906, the distance to transportation became a big factor. In Richmond, Adachi family and Nabeta Brothers were operating the nursery. My parents were given much help in building their home and in digging a well by hand. Much help was given over how to grow the flowers as well as how to build the greenhouses.*[13]

The nursery started out with carnation stock, and the Sakais soon hired a knowledgeable *Issei* from the Adachis who added needed expertise to the nursery. The first fifteen years in Richmond were marked by hard work and slow growth, with some periods of profit when new greenhouses and a boiler were added to the operation. Eldest son Tetsuma described some of the family's struggle during this period:

> *After the Issei quit* (in 1918) *we had a series of men working for us, but none knew how to grow carnations. The business started to go downhill. Many of our neighbors who had been farming in Japan . . . were doing very well growing carnations. [Kotaro] never had any farming experience (or a green thumb!).*[14]

While Kotaro concentrated on selling their flowersXcarrying up to fifty bunches of carnations on his back as he set out to the San Francisco Flower Market at 4:30 a.m. three times per weekXhe left the nursery management to Chu and hired workers. Sakai family members have described Chu as the "brains and energy" behind the nursery; her drive, ambition, and family background in farming apparently made her a critical foundation to the success of the Sakai nursery.[15] Although often overlooked, the contributions of

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[12] Ibid.
[13] Ibid.
[14] "The Way We Were . . ." 1996, 52.
[15] "The Way We Were . . ." 1996, 51; Kawaguchi 1995, 46-47; Sam Sakai 2004; William Sakai 2004.

immigrant women were often a critical factor in the establishment of family businesses. A 1929 publication titled "The History of Japanese Floriculture in California" included an essay describing the myriad roles that wives and mothers played in the establishment of nurseries. Along with their own domestic chores and childcare, *Issei* women's work included many greenhouse tasks as well as supervising the feeding and care of hired employees.

The Sakai family grew as Sam, Roy, and Ruby was born in 1909, 1912, and 1922. Kotaro and Chu also took in Jun Agari, the young son of their first daughter who had remained in Japan when they emigrated and who died at an early age.[16] In 1922, a two-story home replaced the collection of structures that had previously provided the family living quarters. Sam Sakai described the family as living in "a little bunkhouse" with "a kitchen in one corner, bedroom and shelving." A shed holding a Japanese bath was nearby, yet spaced to keep the fire that heated water from spreading to other buildings.[17] The City of Richmond building department file for 99 S. 47th St. includes a permit to K. Sakai dated "5/10/22" for a "cottage" valued at $3,500 with the builder listed as J.F. Walden. (This simple Craftsman Style house and the water tower near it may be the oldest structures extant on the current property.)

Sometime in 1924, the Sakais bought an adjoining two and a half acres and began to grow roses. Tetsuma described the shift as difficult for the business, with his parents still dependant on hired workers for floricultural expertise, which was not always on hand. The quality of the roses suffered in the first few years, and business was so slow that Chu convinced Tetsuma to drop out of college in 1925 to help with the family enterprise.[18] Tetsuma took on the huge task of renovating the original greenhouses, which were now nearly two decades old. He described them later as "too low, and of poor quality. They had to be modernizedXthey had no salvage value so we tore them down and put up new greenhouses." Tetsuma assisted a hired carpenter in building the first new greenhouse, and then built the rest himself with help from family and hired hands.[19] "We were able to put up close to 100,000 square feet," Tetsuma later recalled. Permits in the City of Richmond building department show six greenhouses were

[16] "The Way We Were . . ." 1996, 11.
[17] Sam Sakai 2004, 21.
[18] Ibid., 52-53.
[19] Ibid., 53.

approved for Mikado Nursery, as the property was briefly listed, and later Sakai Brothers, between 1927 and 1931.[20]

According to historian Gary Kawaguchi, nurseries specializing in roses and carnations weathered the Great Depression better because their flowers could be cut and sold on a daily basis unlike chrysanthemums, which only sold a few months of the year and were more dependent on out-of-state business.[21] The Sakais continued to prosper enough to add to their nursery throughout the 1930s. They bought an additional two acres of land in 1932, and added seven more greenhouses to the property by spring of 1940.[22] As their sons reached adulthood and married, they built modest homes for their new families on or near the nursery. A one-story stucco house was built on the western edge of the property for Tetsuma in 1938. Sam and his bride Nellie built a similar home in 1940 just across from the Oishi property at 223 S. 47th St. in which Sam still resides.[23] A home for the youngest son, Roy, was built in 1941 just across from the southwest corner of the nursery at the corner of Florida and South 45th Street.[24] All of these homes are still standing, but the house at 200 S. 45th St. (Roy's home) is no longer owned by the Sakai family. Their construction within and adjacent to the nursery property attested to the importance of the intergenerational management for the nursery, and the commitment family members had to building upon the foundations laid by *Issei* pioneers.

This foundation was threatened by the build-up to wartime relocation. A lease arrangement for the nursery was made with Mr. Brunetti from the Oakland Flower Shop, and the Sakais, unlike most of their Richmond neighbors, made the choice to move to Central California before "enemy aliens" were forcibly removed. "We went to Stockton first thinking it wasn't coastal and would be okay," recalled Tetsuma's wife Kazue. They were encouraged to relocate to Stockton by the husband of the family's eldest daughter, Sue, who owned a store and large home in that town.[25] Japanese and Japanese Americans in the Central Valley were sent to Rowher Relocation Camp, rather than Topaz where the rest of

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[20] Ibid. Permits in the city's building department for new or rebuilt greenhouses at 99 S. 47th St. are dated 8/12/27, 8/3/28 (for two greenhouses), 9/11/30, and 8/13/31 (for two greenhouses); these permits were for Greenhouse Nos. 8 through 13 which are located in a row on the northern portion of the nursery property.
[21] Kawaguchi 1993, 49.
[22] Permits found in the city's building department for additional greenhouses are dated 6/30/36, 9/24/36, 6/28/37, 10/2/37, 9/1/39 (for two one-story "garden houses"), and 4/12/40; these permits were for Greenhouses Nos. 1 through 7 which are located in a row on the northern portion of the nursery property.
[23] Mr. Sakai died on 30 January 2008, after this historic context was prepared.
[24] Permits in the city's building department for these three buildings are dated 1/25/38, 3/5/40, and 7/18/41.
[25] Sam Sakai 2004; "The Way We Were . . ." 1996, 53-54; William Sakai 2004.

Richmond's families were assigned, so the Sakais made the three-day train trip to Arkansas after temporary incarceration at the Stockton fairgrounds.

The Sakais spent a relatively short time behind barbed wire. By spring of 1943, Sam Sakai had found employment in a Denver nursery through a Bay Area nursery colleague who had relocated to Colorado as internment approached. Sam and his wife Nellie both worked at the nursery and lived in an apartment supplied by the business. When his older brother Tetsuma and his wife decided to join them, Sam and Nellie found and purchased a house in Denver with savings from the Richmond nursery. A year or so later, Nellie's parents joined them when the Sam and Nellie rented about sixty acres near Greeley, Colorado, where they grew vegetables.[26] The youngest son, Roy, left Rowher to serve in the U.S. armed forces.

Tetsuma Sakai was able to return to Richmond shortly after the New Year in 1945 and stayed for a month with their friends and neighbors John and Clara Heinemann. In an apparent attempt to pressure the family to extend the lease or even sell their business, the representative from the Oakland Flower Shop told Sakai that the family would not be able to find workers and their business would fail. Tetsuma and his parents reclaimed the family property but only received a portion of the profits entitled to them. Sam Sakai reported that the nursery workers did quit their jobs, but Clara Heinemann came back to her pre-war job in the packing shed, and the family brought in a new crew by recruiting workers from the relocation camp.[27]

The Sakai facilities and plant stock were in a healthy enough condition so that the family began making profits shortly after the war ended. By the late 1940s, enough money had been saved for Tetsuma to purchase land for a Sakai nursery in Hayward that was at one time, according to his son William, the largest rose nursery in the U.S. As the Richmond nursery revived and flourished, they added new structures including a substantially larger boiler house in 1947. The boiler house was subsequently expanded twice- in 1950 and 1957 - reflecting the expansion of the nursery's business. In 1950, an incinerator and separate quarters for nursery workers were constructed. Reflecting an increased activity of production, the Sakais added extensions to their sorting and storage shed in

[26] Sam Sakai 2004.
[27] "The Way We Were . . ." 1996, 46; Sam Sakai 2004.

1952 and 1957.[28] They also built another house at 4606 Florida Ave. in 1958 for Chu Sakai.[29]

As the *Nisei* took over nursery operations, Tetsuma remained in charge of production for the Richmond nursery, while Sam Sakai concentrated on marketing their flowers and continuing to serve as president of the California Flower Market board. The re-transfer of the California Flower Market operations and facility to returning *Nikkei* and the reconstitution of the Flower Market Board were largely due to Sam's efforts. Sam was a founder of the floral Trade Council, which worked to aid domestic flower growers as foreign competition increased, and was a primary force behind the large new facility the California Flower Market opened in 1956. When he retired from the Board in 1968 he was still appearing early in the Market to sell Sakai flowers. California Flower Market historian Gary Kawaguchi described Sam Sakai as a "man of few words and deliberate action [who] made his mark on the Market and the industry, serving on many industry-related boards in addition to his duties as president and his responsibilities to a thriving nursery."[30]

The Sakai Brothers nursery continued to prosper long after other family nurseries floundered by concentrating on growing high-quality roses that sold at premium prices. Because cut roses were extremely perishable and Northern California growers could control temperatures and time their harvests for holiday sales more accurately than South American growers, initially foreign imports took somewhat less of a toll on the Sakais' business than it did on growers of other types of flowers. Yet, despite the efforts of Tetsuma, Sam, and Roy to plan for succession, only a few of the *Sansei* generation were interested in the family rose business.[31]

The nursery quit cultivating roses around 2003.[32] After then several of the greenhouses were rented to an orchid grower.[33] Then in 2006 the nursery property and the parcels with Sam Sakai's

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[28] The City of Richmond building department files hold permits for a new boiler house dated 1/3/47; a brick incinerator was permitted on 7/6/50; worker's housing from 8/24/50; an addition of 20'-0 x 28'-0 to the sorting shed was permitted on 8/28/52 and another addition of 28'3 x 30'-0 appears on a permit dated 10/31/57.

[29] Sakai, William, Letter to City of Richmond Public Works (5 October 2006) in the City of Richmond Building Department files; Oshige, John (retired Sakai Nursery manager) and Mary, Interview by Denise Bradley, 1 March 2010.

[30] Kawaguchi 1993, 67-76.

[31] Ibid., 88-89.

[32] PES Environmental Inc., *Phase I, Environmental Site Assessment: Miraflores Housing Development, Richmond, California* (23 July 2004), 4.

[33] Charlotte Sakai, Interview by Denise Bradley, 2 March 2010.

house at 223 S. 47th St. and the house at 4606 Florida Ave. were sold to the Richmond Community Redevelopment Agency which planned to develop the Miraflores Housing Development project on the Sakai property and on the adjacent property of the former Oishi and Maida-Endo nurseries.[34]

Historical Background: The Greenhouse as Building Type

The building of structures for the growing and display of plants – now known as the greenhouse - dates back to the ancient world of Greece and Rome. A greenhouse is also defined as any structure built to provide a climate appropriate for growing crops during the entire year. Greenhouses are also referred to as 'forcing houses' because they 'force' or stimulate plants to grow earlier than they would in an open garden. The most important function of a greenhouse covering is allowing the maximum amount of available light to reach the crop while maintaining an optimum interior temperature[35]. Historically, the purpose of the greenhouse has not changed over time, but the technology has made many advances.

The Romans had the technology to make glass, made principally of sand, lime and soda melted in clay pots, but only in small pieces. They used translucent rock, like alabaster, rather than glass in their greenhouses. One of the earliest known greenhouses was built to grow cucumbers out of season for Emperor Tiberius around 30 A.D[36].

The development of the modern greenhouse followed upon the development of inexpensive sheets of glass. In the Medieval period, glass making technology focused on stained glass for the great cathedrals. The high cost of glass made it relatively rare in more common structures; window openings in homes were usually covered with linen or paper rather than glass[37].

The development of the modern glass making began in Venice, Italy, and later in Genoa, in the late Middle Ages. The quality of Venetian glass became famous in Europe and its glass makers were

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[34] Katie Lamont (Associate Director of Real Estate Development, Eden Housing, Inc), Email communication with Denise Bradley, 19 August 2010.

[35] James W. Boodley, *The Commercial Greenhouse Handbook* (New York: Van Nostrand Reinhold Company, 1981), 35.

[36] Robert Aldrich, "Greenhouse Evolution" in Commemorative edition "History of U.S. Floriculture" *Greenhouse Grower* (Fall, 1999) 70.

[37] Charles Elliot, *Technics and Architecture* (Cambridge, Massachusetts: MIT Press, 1992) 112.

attracted throughout the continent to make glass outside of Italy. The development of new glass making technology, especially of furnace design, in the seventeenth and eighteenth centuries made it more economical to produce larger sheets of glass. Cylindrical glass, made by blowing a round ended cylinder, trimming off the ends to form a simple tube, then cutting the tube lengthwise to form a sheet a glass, permitted the production of larger sheets of glass[38].

The greenhouse for plants became popular in Northern Europe to capture the warmth of the short growing seasons in otherwise cold, inhospitable climates. Hot house fruit and orangeries (the indoor display of tubbed orange trees) developed in greenhouses were primarily extravagances of wealthy aristocrats. The orangery at the palace of Versailles was more than 500' long, 42' wide and 45' tall[39]. The orangery had a southern exposure for heat and light. The first greenhouse in America was for a wealthy Boston merchant, Andrew Faneuil, in 1727[40]. Boston was also the site of the first glass manufacturing plant in this country. In the 1780s, George Washington had a greenhouse at Mt. Vernon for growing pineapples. During the early nineteenth century large public conservatories (like the Conservatory of Flowers in Golden Gate Park) were developed, often in public parks, as places to stroll, eat refreshments and listen to music.

By the mid-nineteenth century, manufactured glass was plentiful ushering in what is considered to be a golden age of greenhouse building, particularly in England. English horticulturist Joseph Paxton played an important role in developing the form of the modern greenhouse, plus its heating and ventilation systems, in the period 1830-1850. Paxton first major greenhouse was for Kew Gardens in 1842. Paxton also developed various prefabrication systems for greenhouses where the parts could be manufactured then assembled on-site. The ultimate indoor glass pleasure garden designed by Paxton was the Crystal Place built for the 1851 London Exhibition. Constructed with an iron and wood frame, the all-glass building constructed of over 300,000 panes was almost a third of mile long, covering an area of over 18 acres[41].

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[38] Elliot, *Technics and Architecture*, 120.

[39] Sun Country Greenhouse Company, "The History of Greenhouses" (June, 2010), http:\www.hobby-greenhouse.com.

[40] Robert Aldrich, "Greenhouse Evolution", 70.

[41] Elliot, *Technics and Architecture*, 131.

In the second half of the nineteenth century, the number of greenhouses on farms and nurseries increased substantially because of the prefabrication techniques developed by innovators like Paxton. In 1860, only 178 commercial greenhouses operated in the United States but by 1909, the number reached several thousand greenhouses, primarily for growing cut flowers for their local market[42]. Several greenhouse manufacturing firms helped commercial floriculture take shape in the late nineteenth and early twentieth century. Companies developed specializing in the construction of greenhouses, like Lord & Burnham in Buffalo (who built the Golden Gate Park Conservatory of Flowers – a replica of the Kew Gardens greenhouse - in 1877) or Hitchings and Company in New York[43]. These larger greenhouses, typically combining structural ironwork with wood framing, were primarily built for wealthy patrons or municipalities.

In the United States, approximately 78% of the greenhouse crop today is used for the production of flowers, 9% for vegetables. By contrast, vegetable crops constitute 2/3 to 3/4 of the greenhouse space in most European countries.

Commercial Greenhouse Construction

Commercial Greenhouse Types: Architectural Form & Framing

According to the standard books on greenhouse construction, the greenhouse types are classified according to primarily architectural form and framing material[44].

The three basic types of greenhouse forms are[45]: 1) the lean-to greenhouse, 2) the detached or single-span greenhouse and 3) the ridge and furrow green house. The lean-to greenhouse is attached at the ridge to another building or another greenhouse. The various types of detached greenhouses are differentiated by their roof

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[42] Marvin Carbonneu, Carolynn Van Namen & Susan Ashbridge, "Growing, Wholesaling & Importing," in *A Centennial History of the American Florist* (Topeka, Kansas: Florist's Review Enterprises, Inc., 1997), 36.

[43] Michael Corbett, "Historic and Architectural Assessment of the Kuramoto Nursery (Kent Gardens project) (2004) 10. Unpublished manuscript prepared Mercy Housing, San Francisco, California.

[44] Alex Laurie & L.C. Chadwick, *Commercial Flower Forcing* (Philadephia: P. Blakiston's Son & Company, 1934) 41-46; Alex Laurie, D.C. Kiplinger & Kennard S. Nelson, *Commercial Flower Forcing* (New York: McGraw –Hill Book Company, 1979) ; Paul V. Nelson, *Greenhouse Operation and Management,* second edition (Reston Virginia: Reston Publishing Company, Inc., 1981); John W. Mastalerz, *The Greenhouse Environment* (New York: John Wiley & Sons, 1977).

[45] John W. Mastalerz, *The Greenhouse Environment* (New York: John Wiley & Sons, 1977) 3.

shapes: even-span, uneven span, lean-to, Quonset, Gothic Arch, curvilinear shaped and dome shaped. The Quonset, Gothic, curvilinear and dome shaped have various curved or arched shaped roofs. The framework for the Quonset type greenhouse consists of curved roof bars in the shape of semicircles. The uneven span greenhouse has one side covering 2/3 to ¾ of the width of the building. The even-span greenhouse, the two sides of usually a gable roof equal in width and pitch, is the most commonly built today. The detached even-span greenhouse became most common type because it is easier to program and maintain the temperature for specific crop requirements, easier to ventilate, light is evenly distributed over the entire growing area, and it is easy to maintain.

The ridge and furrow (or gutter connected) greenhouse consists of several greenhouses (usually each with a gable roof) connected at the eaves. The internal walls beneath the gutters are generally omitted with only the posts supporting the weight of the roof remaining. The advantages of the connected or ridge and furrow greenhouse is that it occupies less land area, fewer construction materials are used with fewer sidewalls, less heat is required because there is less wall surface where heat loss can occur and the easy passage between the different greenhouses

Basically three frame types were used but there were many combinations of these types[46]. Construction materials of early commercial greenhouses included all wood-frame, semi-iron or all iron-frame. Iron is more durable but more expensive than wood. Before World War II, iron was used for larger structures (over 35' in width). The sash bars holding the glass in wood-frame greenhouses were also made exclusively of wood, which required periodic painting to protect them from rot. The roof was supported by side posts and a center posts under the roof ridge. Wood frames were used for narrow greenhouses 20' or less in width. Side posts and columns were constructed of wood without the use of a truss.

Generally wider greenhouses required using pipe or truss steel or aluminum frame construction. The pipe frames serve well for greenhouses that are up to 40' in width. The side posts, columns, cross ties and purlins are constructed of pipe. The width of the houses usually depends on the crops grown. Greenhouses over 40' in width are built on a truss frame. Steel, iron or aluminum are welded together to form a truss encompassing rafters, chords and struts. Columns are used only for very wide, i.e. over 70' wide, truss frame greenhouses. Glass greenhouses are today primarily

[46] Paul V. Nelson, *Greenhouse Operation and Management,* second edition (Reston Virginia: Reston Publishing Company, Inc., 1981) 36.

truss frame because they are best suited to prefabrication, thus more economical. The wide houses – i.e. 40' to 60' - became more popular for cut flower crops because they were easier to heat and ventilate, the framing cast less shade (the glass or other covering material did not require sash bars) and they cost less per square foot to erect.

In the post-World War II period, the introduction of aluminum framing allowed for further prefabrication of the building process and the construction of larger greenhouses with a free-span interior. Wider houses require sturdier frames. Aluminum sash bars and ventilators replaced wood in the 1950s also because they are sturdier and no painting is required, thus reducing maintenance costs. Panes of glass could also be larger with stronger materials thus increasing interior light intensity. The prefabricated aluminum framing worked well with the various types of plastic film materials that have increasingly replaced glass as the exterior covering on modern greenhouses.

Commercial Greenhouse Glazing or Covering Materials

The glass used for a greenhouse works as a barrier to air flow and its effect is to trap energy within the greenhouse which heats both the plants and ground inside it. This warms the air near the ground and this air is prevented from rising and flowing away. The glass panes opened out for side and top ventilation in separate houses[47]. Opening even a small window near the roof and the temperature drops considerably.

Horticultural magazines or agricultural handbooks (often published by local agricultural extensions) often provided greenhouse designs for small nursery operations[48]. L. R. Taft's *Greenhouse Construction,* 1892, described the typical greenhouse as 10' wide with wood walls except for a line of glass at the top, glass roof and heated with a stove. Glass panes used in greenhouses in the early 1900s were typically 16" to 20" wide or long[49].

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[47] Alex Laurie, D.C. Kiplinger & Kennard S. Nelson, *Commercial Flower Forcing* (New York: McGraw – Hill Book Company, 1979) 28. The glass panes in pre-1945 greenhouses typically measured 16 by 24 inches.

[48] In the 1920s, grower schools and short courses helped greenhouse growers with methods to improve production practices. Tom Oishi recalls his family obtained publications from New England colleges, Ohio State University and Michigan State University Publications on greenhouses and growing carnations (Tom Oishi Interviews, 2002, 2003).

[49] Robert Aldrich, "Greenhouse Evolution", 71.

As wider glass sizes became available and more economical, the 24" wide glass panes became standard for commercial greenhouses; some glass panes as wide as 6' wide are now used[50]. Specialty cut flowers such as roses and carnations were grown in the larger greenhouses. By the 1960s, various types of plastic film exterior materials (primarily polyeurethane) provided a more economical alternative to glass.

Environmental Control Systems (Heating and Cooling)

Temperature control in a greenhouse allows certain crops to be grown throughout the year. After labor, the cost of heating the greenhouse was the greatest expense for the grower.[51] Greenhouses are designed to be solar collectors since the sun provides the primary source of heat in the greenhouse. However, an additional heat source was required to supplement the solar radiation at night and during times of the year when there was too little heat from the sun.

Early commercial greenhouses were typically heated by wood or coal fired boilers. Coal was shoveled into the boilers by a crew that worked all day and night in winter to maintain the interior greenhouse temperature. The greenhouses were heated by moving hot air through flues on the ground. Hot water and low pressure steam systems (supplied by a central boiler house) also appeared early in the commercial greenhouse systems.

The greenhouse became larger, wider (20 to 50 feet) and longer as heating systems, especially low pressure steam heating using natural gas, improved[52]. Natural gas became plentiful in California by the late 1920s with the improvement of distribution pipes for sending gas long distances. In other areas of the country, oil replaced coal as a heating fuel. Until air conditioning systems became more widely available in the early 1960s, greenhouses in warmer areas of the country did not operate during the summer months.

The two most common ways to supply additional heat greenhouses during the early-to-mid twentieth century, the period when the

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[50] Robert Aldrich, "Greenhouse Evolution", 71.

[51] James W. Boodley, *The Commercial Greenhouse Handbook* (New York: Van Nostrand Reinhold Company, 1981), 69.

[52] The heated water carried in pipes with 1/3 piping overhead in the greenhouse and 2/3 around the perimeter. Robert Aldrich, "Greenhouse Evolution", 76.

Sakai Nursery greenhouses were built, were hot water or steam heat systems. Steam heat, which was twenty to thirty percent cheaper than a hot water system, was used at the Sakai Nursery.[53] Compared to hot water, the steam could be more quickly moved over a greater distance in smaller pipes.[54] Steam generated by a boiler was sent to the greenhouses by a system of insulated overhead steam mains or pipes. Inside the greenhouse, a series of pipes provided a radiant heat source and ran in a horizontal direction (along the length of the greenhouse) under the benches, at the sides of solid beds, or in coils on the sides of the greenhouse and heated the greenhouse. As the steam cooled and gave up heat, it condensed to water, and this water was returned to the boiler by pipes. Greenhouse manuals, such as Alex Laurie and L. C. Chadwick's standard text *Commercial Flower Forcing: The Fundamentals and Their Practical Application to the Culture of Greenhouse Crop*s first published in 1934, devoted considerable space to describing piping systems and providing formulas for determining the amount of piping that was required for different situations

"Controlling greenhouse temperatures in the early 1900s was not done using a complicated system. Growers opened doors during hot weather and supplied heat during cold periods."[55] The initial modifications to early greenhouses to improve air circulation and cooling included adding hand-operated ridge vents and later sidewall vents. In the 1940s, motorized fans were added to force more air through the greenhouse. Thermostats that controlled the opening of motorized vents and that automatically turned on fans were also introduced in the 1940s. In the 1950s, irrigated fiber pads (initially composed of aspen shavings) were added to one end of the greenhouse and in combination with large exhaust fans mounted at the opposite end moved water-cooled air across the top of the crop.

By the late 1950s, misting and fogging systems, which provided evaporative cooling with more precise temperature control, were

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[53] Laurie and Chadwick 1934, 64.

[54] Alex Laurie, D. C. Kiplinger, and Kennard S. Nelson, *Commercial Flower Forcing: The Fundamentals and Their Practical Application to the Culture of Greenhouse Crops*, Sixth Edition (New York: McGraw-Hill Book Company, 1958), 37.

[55] Greenhouse Grower Magazine, *History of U.S. Floriculture: The People, Events, and Technology That Shaped the Past 100 Years* (Wilboughby, OH: Meister Publishing Company, 1999), 75.

introduced.[56] Another strategy was to shade the greenhouse. The first shading for temperature control was liquid whitewash applied to the outside of the roof annually in the spring. When flexible plastic films began to replace glass as the primary glazing material for greenhouses, exterior shade cloths, made of various materials, replaced the application of liquid whitewash.[57] Internal curtains were introduced in the 1960s which could be moved across the greenhouse interior to block solar radiation and then retracted when not needed; they also served as a blanket to reduce heat loss from the greenhouse at night.[58] Computer technology has in recent years provided the means for even more precise temperature controls, although at greater upfront costs.

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[57] Greenhouse Grower Magazine 1999, 76; Marvin Carbonneau, Carolynn Van Namen, and Susan Ashbridge, AGrowing, Wholesaling & Importing,≅ in *A Centennial History of the American Florist* (Topeka, KS: Florists= Review Enterprise Inc., 1997), 43.

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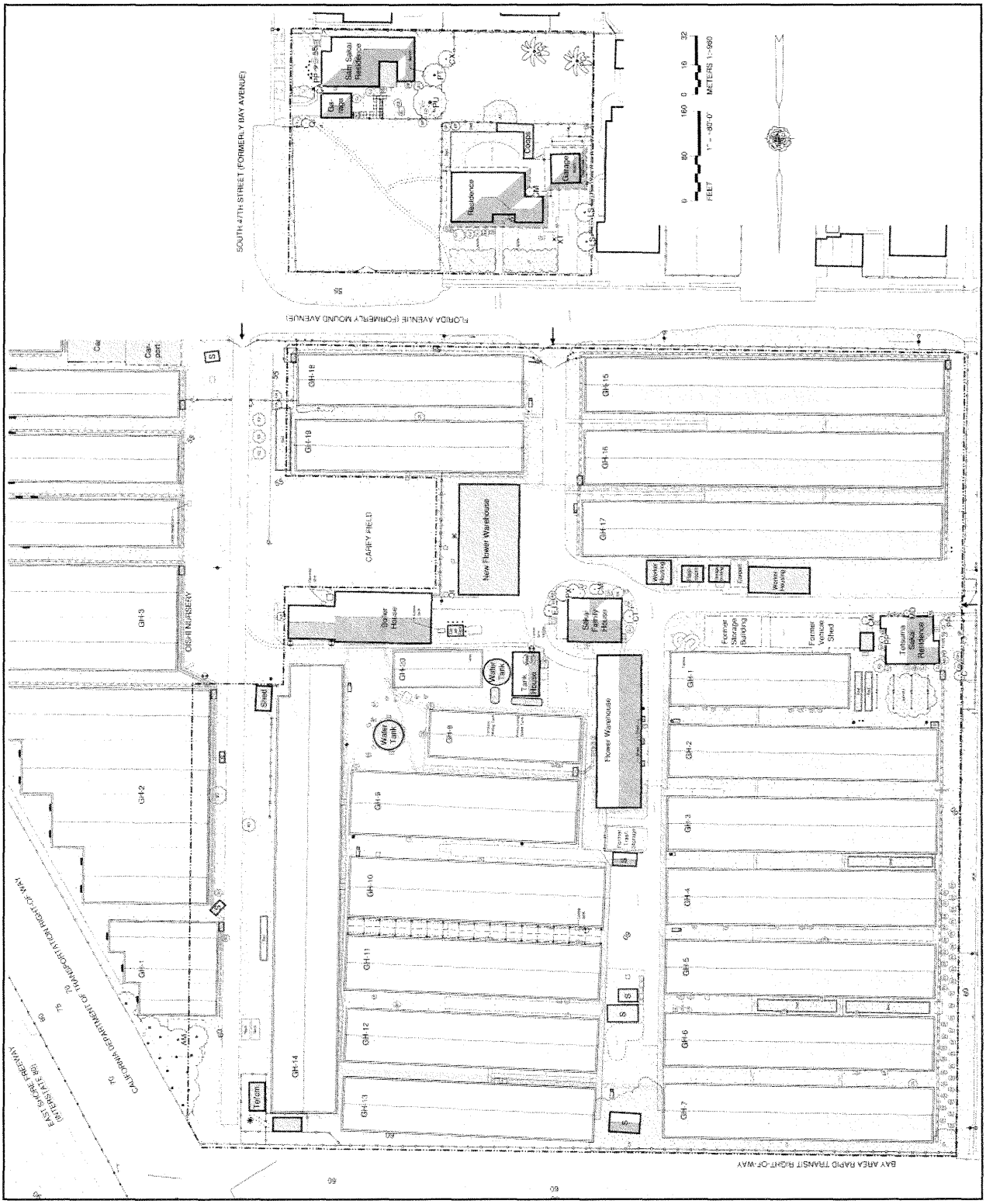

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