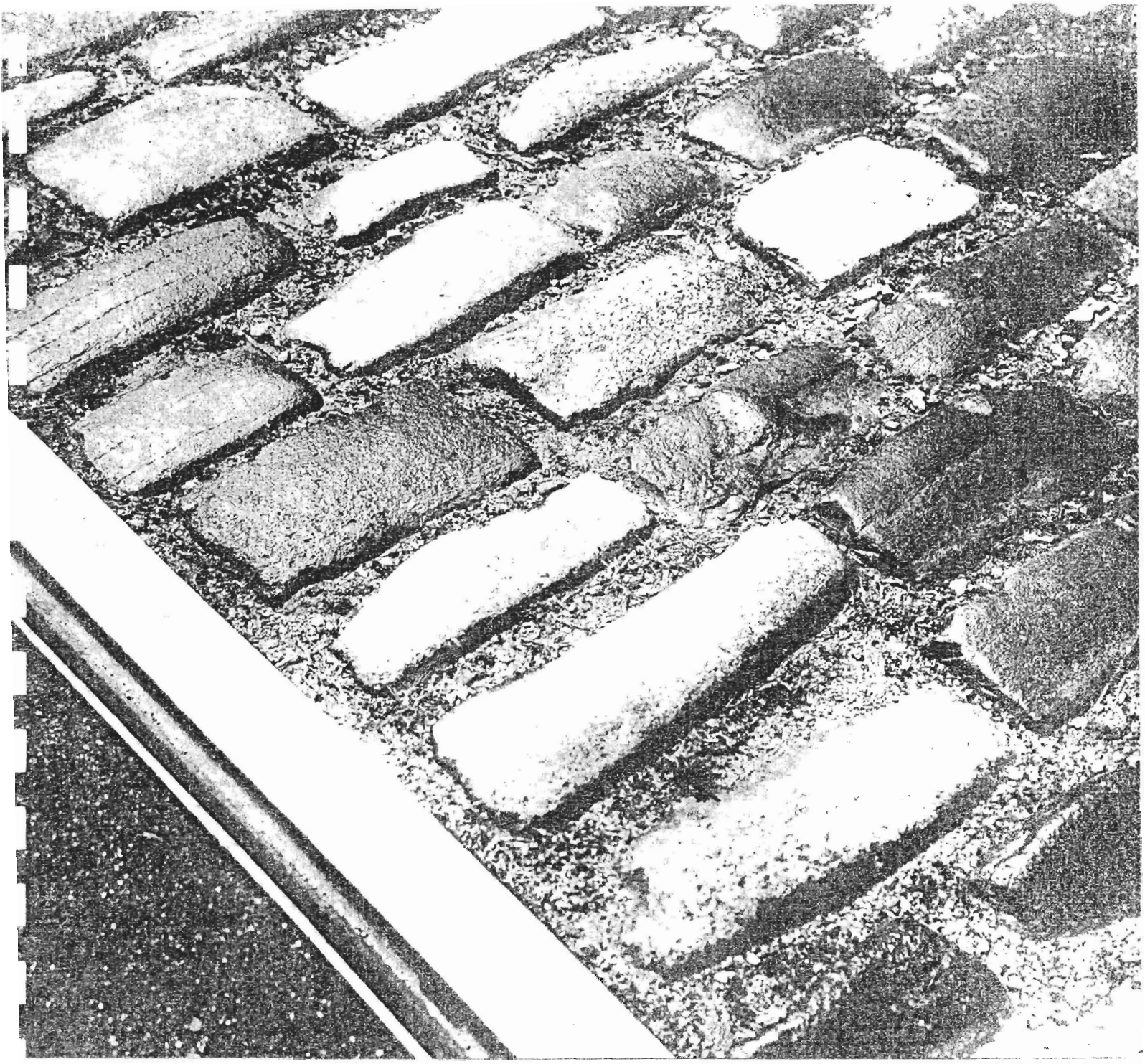

A Paving of Stone Blocks: Basalt and granite, these hand-worked stone blocks made the most satisfactory and durable surface for 19th century San Francisco streets. Karl Kortum photograph

A HISTORY OF PAVING BLOCKS ALONG SAN FRANCISCO'S SOUTH BEACH WATERFRONT

Prepared for the
San Francisco
Redevelopment Agency

by
Nancy Olmsted
Resource Consultants

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July 1991

Author's Collection

William Howard Taft Waves to Crowds Along the Embarcadero, 1911: It was a time when a president was considered safe in an open carriage with two secret service men, officials looked comfortable in opera hats, the city's waterfront was both scenic and lively, and the Embarcadero was paved with hand-made stone.

A HISTORY OF PAVING BLOCKS ALONG SAN FRANCISCO'S SOUTH BEACH WATERFRONT

A HISTORY OF PAVING BLOCKS ALONG SAN FRANCISCO'S SOUTH BEACH WATERFRONT

Context of Study

The Rincon Point-South Beach Redevelopment Plan, adopted by the City and County of San Francisco in 1981, provided for the redevelopment of the deteriorated, under-used industrial South Beach area into a new residential neighborhood. It authorized installation and construction of public improvements by the Redevelopment Agency.

In order to provide a pedestrian scale conducive to the success and quality of the new residential neighborhood, the agency formulated and implemented a streetscape plan. Certain streets were closed to traffic, sidewalks were widened, trees planted and plazas constructed.

As part of this renovation of the public areas, basalt paving blocks were salvaged from the reconstructed streets and placed in tree-wells, widened sidewalk areas, and plazas. This was meant to preserve a bit of the history of South Beach for full public use, as well as to provide an esthetic grounding for the new, largely manufactured, modern materials of the buildings and pavements with these older quarried materials. Another preservation of its history is the demarcation in the sidewalk areas of the bay shoreline as it existed in 1857.

The agency commissioned this study by the eminent local historian, Nancy Olmsted, to document the origin of the basalt paving stones, and to preserve in record something of the flavor of their time.

Edward Helfeld, Executive Director
San Francisco Redevelopment Agency

Scope of Study & Definition of Terms

The South Beach area under study is roughly bounded on the north by Bryant Street, on the east by the Embarcadero and San Francisco Bay, on the south by Berry Street and China Basin, and on the west by Second Street. In San Francisco today, the word "cobblestones" commonly refers to hand-worked stones of a varied texture that are revealed periodically lying just under layers of asphalt in city street excavations. In the 19th century, paving experts distinguished between cobblestones and paving blocks. Cobblestones were small, rounded river rocks laid in sand on the city streets of the 1850s and 1860s. San Francisco's rectangular, dark gray, hand-worked stones that turn up in today's street repairs were called "basalt paving blocks" in the city's municipal reports and engineering studies.

The rock that quarry owners called "basalt," geologists specify as "andesite," is found in most Marin County quarries. Geological reports identify some Sonoma quarries as producing dark gray trachyte, grading into basalt, and other Sonoma stone is classified as andesite. All of these rock types originated as volcanic lava flow. (*California Journal of Mines & Geology*, 1894: p. 396) In the trade they were known as "basalt blocks."

Method of Study

The primary method involved a search of San Francisco archives that included: San Francisco Municipal Reports; San Francisco City Directories; written and photographic archives of San Francisco's Engineering Department of Public Works; archives of the Port of San Francisco. Other sources searched included the Bancroft Library, U.C. Berkeley; the Bechtel Engineering Library at U.C. Berkeley; Geological Studies of the San Francisco Bay Area in the Earth Science Library, U. C. Berkeley; research notes on paving compiled by Karl Kortum (Chief Curator of the National Maritime Museum at San Francisco); Sonoma county histories, Sonoma newspaper accounts on basalt paving and the research notes of Ed Mannion, Sonoma historian; Marin County records of early quarrying; an interview with Marin geologist Salem Rice; and an oral history interview by William Kortum with an Italian stone mason, A.J. Camozzi.

Other research included analysis of historic maps and photographs of San Francisco streets, particularly in the South Beach area.

Research Limitations

The archival history of paving on specific streets is limited by the lack of complete written records. The main information sources on a street-by-street basis are the San Francisco Municipal Reports (1860-1917). Research revealed that the listed city contracts are only partial and are not consistently reported from year to year. Generally, reports on city contracts for paving as well as repairing, were combined, so that it is not possible to ascertain the earliest date specific streets were paved.

Research demonstrated that San Francisco streets paved by private contract are not listed in municipal reports. It is impossible to know what percentage of city streets had these informal contracts with no written records on file or published. The exception to this ad hoc situation is the San Francisco Port Authority which keeps and files all contracts for street paving and repair within its jurisdiction.

San Francisco Department of Public Works written archives relating to streets are scattered and incomplete; those that do exist seldom date from earlier than 1910. By studying collections of dated photographs it was possible to discover which streets in the study area had been paved with stone blocks. Existing data in San Francisco Municipal Reports was then keyed to photographic information.

In the case of the South Beach survey area, map and photographic evidence established the gradual progression of land fill with warehouse and wharf development. This filling and development evolved slowly. Even after sections of the seawall were finished in the early 20th century, photographs revealed incomplete streets alongside puddles large enough to be called ponds.

Observations

Essentially, pavement in San Francisco can be seen as a response to changing technology and available natural resources nearby. For such a large and continuous business it remained informal; many streets were graded and paved privately by residents who had a need to come and go, and by businessmen who depended on reliable access for trade.

From the city's Gold Rush beginnings, municipal assessments were leveled on individual property owners to help pay for grading and paving. This sometimes caused problems for city street workers when local property owners got together and put in the cheapest possible streets in advance of any official action, effectively lowering their assessment costs. The city never seemed to keep up with street and sewer repairs, so that the reports of various superintendent of streets through the years are best characterized as defensive in tone.

San Franciscans were well aware of paving experiments in the rest of the world. For example, Macadam (originating in England as pulverized rock combined with tar) was widely used in the city as a cheap paving solution, but Macadam is never officially recommended by the city engineers, as they considered it, "unsuited to the climate, being too dusty in the summer and too muddy in the winter." Asphalt was used in Paris and London in the 19th century but didn't really catch on in San Francisco until automobile owners demanded the smoothest surface possible.

As long as the horse was the central means of transport—and this was from the city's beginnings in 1848 to about 1914—the choice of pavement remained a response to the needs of horse-drawn, heavy drays and the city's steep hills. The initial higher cost that came with the durability of stone was balanced against the reality of available money and cheaper paving that required continuous repair and replacement.

A BRIEF HISTORY OF SAN FRANCISCO STREET PAVING

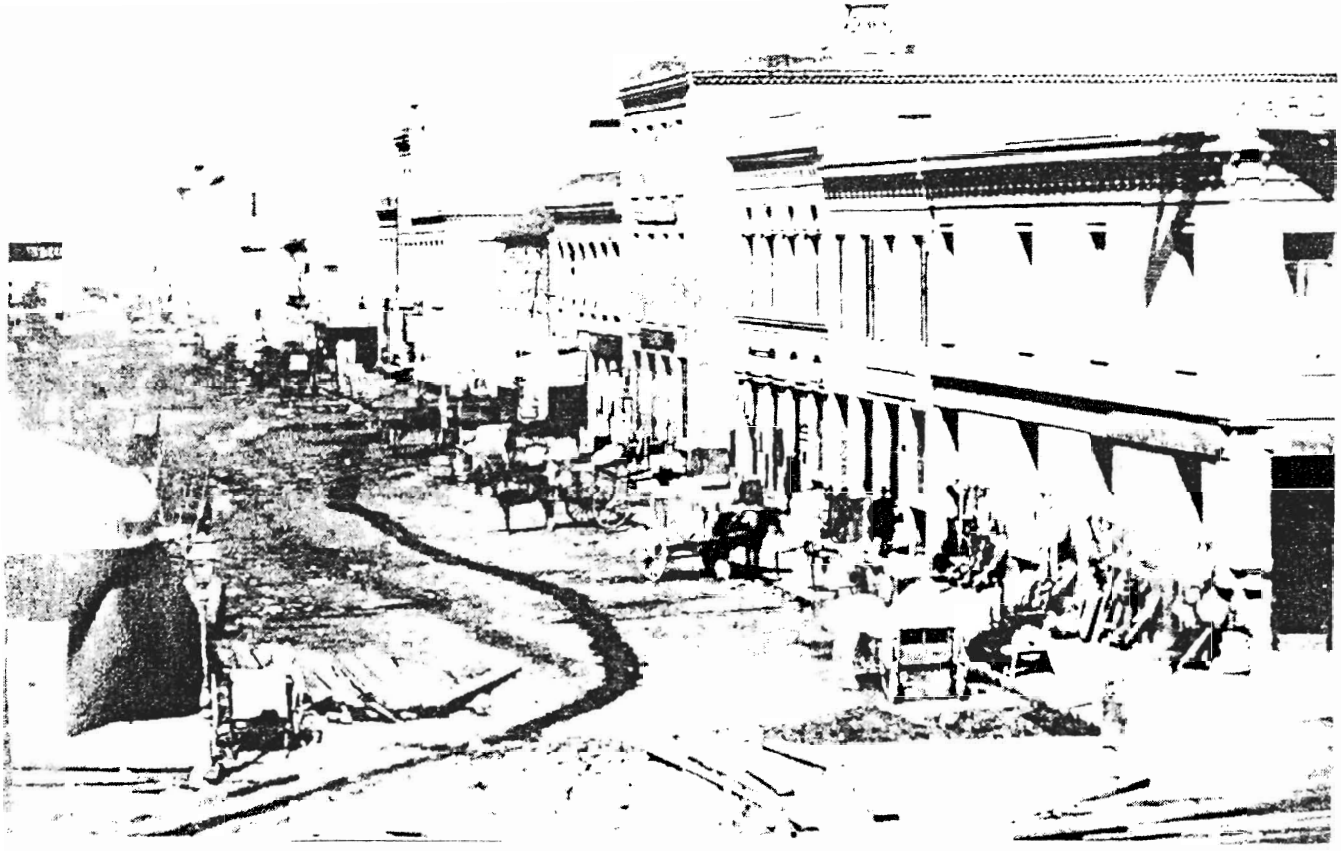
One of the first woodcuts made of San Francisco at the close of 1849 appears in the *Annals of San Francisco* showing citizens struggling in the mud of a city street, some knee-deep, others waist-high. Two men have laid some planks to their tent house over the mud. Admittedly, 1849 was a wet winter—as we know from the floods in Sacramento—but to newly arrived San Franciscans, terrible street conditions were proof of the raw, uncivilized nature of the place.

The writers of the *Annals* describe this scene: "The site on which the town is built was then still covered with numberless sand-hills. The streets were therefore uneven and irregular. By the continued passage of men, and of horses and drays with building materials and goods, while the rainy season (which commenced earlier than usual, and was remarkably severe) was shedding torrents from the clouds, the different thoroughfares were soon so cut up as to become almost, if not quite impassable. Indeed both horse, or mule and dray were sometimes literally swallowed up in the mud and the owner narrowly escaped a similar fate. The town authorities caused numberless cart loads of brushwood and limbs of trees to be cut from surrounding hills, and thrown into the streets; but these only answered a limited and temporary purpose. . . Nobody troubled himself to remove any rubbish; but inmates of tents and houses satisfied themselves with placing a few planks, tobacco-boxes, bags of coffee, barrels of spoiled provisions. . .across the worst parts of the roads, to enable them safely to reach their own dwellings." (Soulé, Gihon & Nisbet, 1854: pp. 244-245)

San Francisco's civic problems were unique. It was an "instant city" with no funds for improvements and no one willing to work at manual labor in the city when gold in the mountains was the urgent reason for his presence. The difficult topography of the city's many hills and the necessity of extending wharves further out into the bay to meet incoming ships, multiplied San Francisco's civic improvement problems. From its beginnings, citizens argued in outraged print about grading and filling streets, keeping up wharves, and paving streets so that horses could better negotiate the city's steep hills.

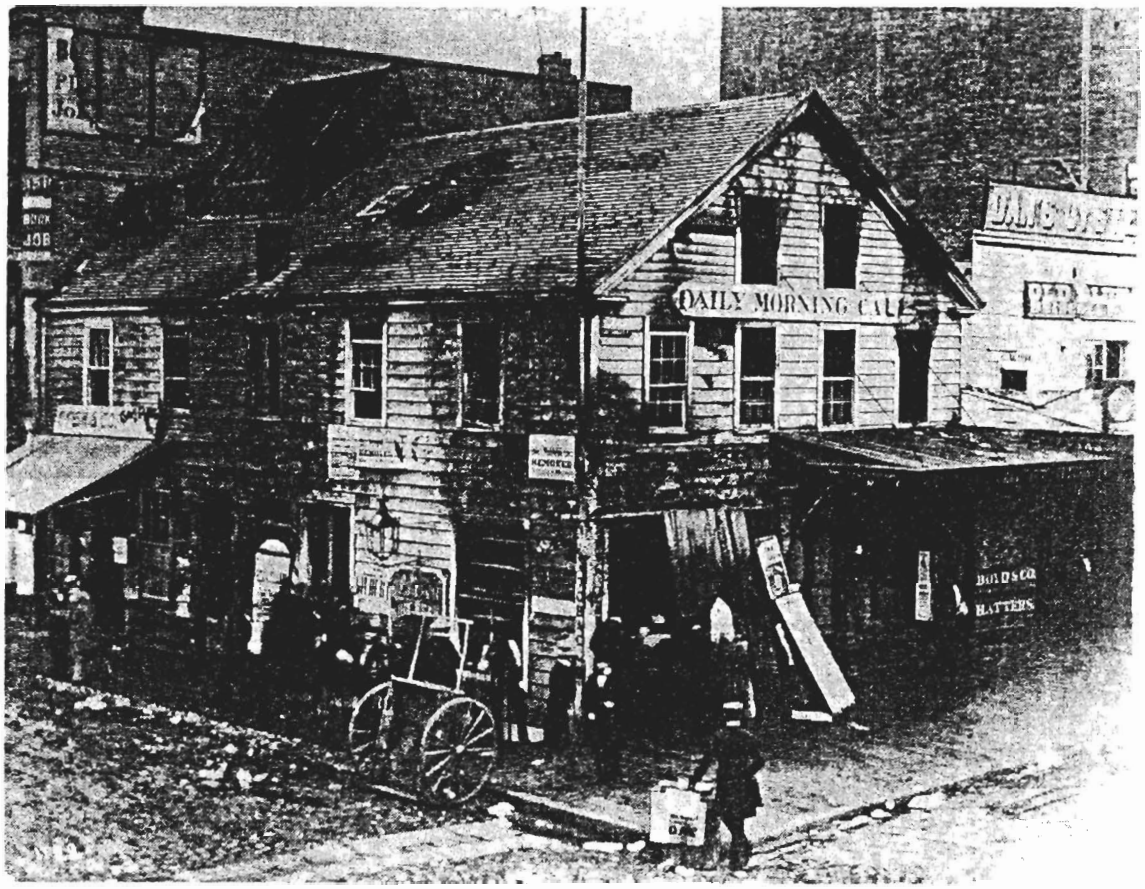
Paving Began with Wood

The Mission Plank Road opened in 1851 as a toll road from Third Street to the Mission Dolores, along the general alignment of Mission Street. (Hittell, 1878: pp. 152) As in the case of many early city improvements, the work was privately done. In this instance it was paid for by a company that received the franchise. "One of the features of the road was a bridge about 100 yards long built across a road at the corner of Mission and Seventh. . . the bridge was to be built on pilings but that plan had to be abandoned, because to the astonishment and dismay of the contractor, the first pile,



(New York Historical Society)

Planked Streets Came First: Battery Street, at the corner of California, is in the process of being nailed down; California already has a wooden street in place, with a heap of dirt where the two streets meet. Under the gas street light on the left, a wagon with lumber waits for the workmen.



Gold Rush Streets: The corner of Montgomery and Clay in about 1859. The daguerrotypist recorded the aftermath of a fire at the *Daily Morning Call*, and incidentally gave us a view of San Francisco's Gold Rush street paving. Montgomery Street is cobblestoned with a flagstone pedestrian walkway to make street crossing safer and more comfortable. Clay Street appears to be brick-paved.

forty-feet long, at the first blow of the pile driver sank out of sight. . .one pile having disappeared the contractor hoisted another immediately over the first and in two blows drove the second one down beyond the reach of the hammer. . .there was no foundation within eighty feet. . .Cribs of logs were laid upon turf but the bridge always shook. . .The company then obtained a franchise for Folsom Plank Road and completed it with much difficulty with sand. In 1854 a high tide floated off the planking between 4th and 5th. . ." These toll roads cost about thirty thousand dollars per mile. Tolls on the roads paid about three percent a month net on the capital invested from 1853 to 1858, when the roads became free. (Ibid., p. 153)

In 1850, the city council "without ordering an careful study" adopted grades for the city streets; the streets were graded at various times between 1850 and 1853. "Most of these streets. . .were planked soon after the grading was finished. Oregon fir [Douglas fir] planks, three or four inches thick, furnished a cheap material for a smooth and strong road-bed that could be put down quickly at little expense and taken up readily whenever any digging in the street was necessary; and though not permanent, still it could be replaced at the end of five years for less than the interest on the extra cost of stone pavement." (Ibid. p. 435)

But filling in Yerba Buena Cove and grading sand hills made it necessary to change the grades of various streets several times. In 1853, Milo Hoadley and W. P. Humphreys were hired to set permanent city grades and did so from the benchmark of a nail driven into the boat stairs at Pacific and Davis at 6.7 feet above the high water mark. The resulting changes in street grades required over a thousand brick buildings to be raised by as much five feet—this at the owners' expense. (Bancroft, 1882; Vol.IV p. 200)

Cobblestones & Rubble

By the end of 1853, the writers of the *Annals* noted, "Many of the new streets were planked for the first time, and some of the old ones were re-planked. Planking has served well in the infancy of the city, but it is probably that so perishable a material will soon give place to cobble-stones or Macadamized paving, or even square dressed blocks of granite or whinstone [defined as "dark gray fine grained rocks such as basalt"]. . . Already portions of Montgomery and Washington streets are finely laid down with cobble-stones." (Soulé, Gihon & Nisbet, 1854: p. 491)

A gold rush daguerreotype taken of the corner of Clay and Montgomery shows Montgomery Street as cobblestone and Clay Street to be brick. The cobblestone street had a flag-stone walkway crossing the street near the corner, making pedestrian footing easier.

The city's early (1850s and 1860s) cobblestone streets were paved with rounded river rocks of varying size interspersed with rubble. A state geological study noted: "Most of the cobblestones used for paving the streets of San Francisco came from the American River near Folsom." (Report of the State Mineralogist, 1888: p. 557)
A comparison of rocks in hydraulic mining tailing beds to photographs of

(San Francisco Engineering Archives)

Cobblestone Paving: Looking north on First Street from Folsom in 1915. Cobblestones presented an uneven, random size that were hard on horses that still did most of the hauling. Notice that paving blocks have been laid in the center of the street car tracks. Granite street curbs like these were laid throughout the city.

San Francisco's cobblestone streets makes this origin clear. Cobblestones were brought down river by steamers towing barges and by scow schooners.

Although an improvement over wooden planks, fist-size rounded cobblestones proved to be a treacherous surface for the city's many horses, especially as they climbed San Francisco's hills, hauling everything from heavy drays to fire fighting equipment. Because of this important shortcoming, city engineers continued to experiment with different kinds of paving.

Later Experiments in Paving

By 1871, Langley's city directory discussed the city's paving problem in detail: "From the earliest dawn of civilization, when mankind have congregated in cities the greatest desideratum of street-engineering has been to prepare such a kind of pavement as would nearest approach indestructibility and fulfill the many other requisites. Massive granite and lava blocks were anciently used . . .There seems to have been a "dark age" of a very long period in the matter of paving. . .During this long "dark age" the standard pavement has been of cobblestones, the rounded boulders of the glacial period. This. . .came to be considered the non-plus ultra paving, and the "car rattling over the stony street" was a punishment deemed unavoidable by those living in cities. Within the last quarter of a century [1855-1871] reflecting men have concluded that the noise and unpleasantness of the cobble pavement could be avoided, and all immediately saw the desirability of a change, also that a great fortune awaited the successful inventor, many have entered the field and numerous experiments have been made.

"In the elegant pleasure cities of Paris and Vienna, the clean noiseless asphalt pavement is the favorite. This is a concrete of gravel, cinders, broken rock, etc., cemented with bitumen, laid while in a semi-plastic condition, pressed and cut in grooves by enormous iron rollers . . .The abundance in which bitumen exists in California has drawn to it the attention of the scientist and inventor. . .and it bids fair to resume its place in the arts it formerly held.

"The Belgium, Russ, Macadam, and several kinds of wooden pavement have been tried. . .A section of Battery Street in front of the Custom House, was laid with Russ Pavement, and while lasting well, is objectionable from its slippery surface, noise and cost. The Macadam is used on Mission and several other streets, and while answering well in the country, becomes too dusty in the summer and too muddy in the winter for a city like San Francisco.

"Stow Pavement, an invention of this city, has superseded the Nicholson, and bids fair to have equal popularity. This pavement is blocks of wood, the grain of the wood fiber standing vertical, resting on a smooth bed of sand, into which is driven a wedge made of board the length of the block, holding the latter in place. Gravel and hot coal tar or bitumen is spread on the surface and the spaces between. It is simple, neat, easily laid but the question of durability, contraction and expansion, must be tested by time."

In 1869, a promotional pamphlet for Henry W. Stowe, claimed: "Basalt and granite

(San Francisco Engineering Archives)

Street Machines for Bituminous Rock: The rotating drum held hot, plastic bituminous tar that was combined with gravel and rubble for the city's cheapest surface.

(San Francisco Engineering Archives)

Experimental Wooden Block Pavement, 1916: On the far left, basalt blocks are still in place, but the pavement being laid is Nicholson wooden paving, sealed with melted tar. It was a resilient surface, but not very durable. In 1915, wood and labor remained cheap enough to consider for paving. Piers along the new seawall were paved with wooden blocks as late as 1919.

resist traffic, therefore it wears out, but wood from its elasticity yields and is the most saving on horses shoes and carriage tires." The difference between Stow and Nicholson wooden pavement was the technique for laying it. Stowe had patented a herring-bone pattern which he claimed to be superior.

Wooden paving in San Francisco did have great appeal as free fuel.

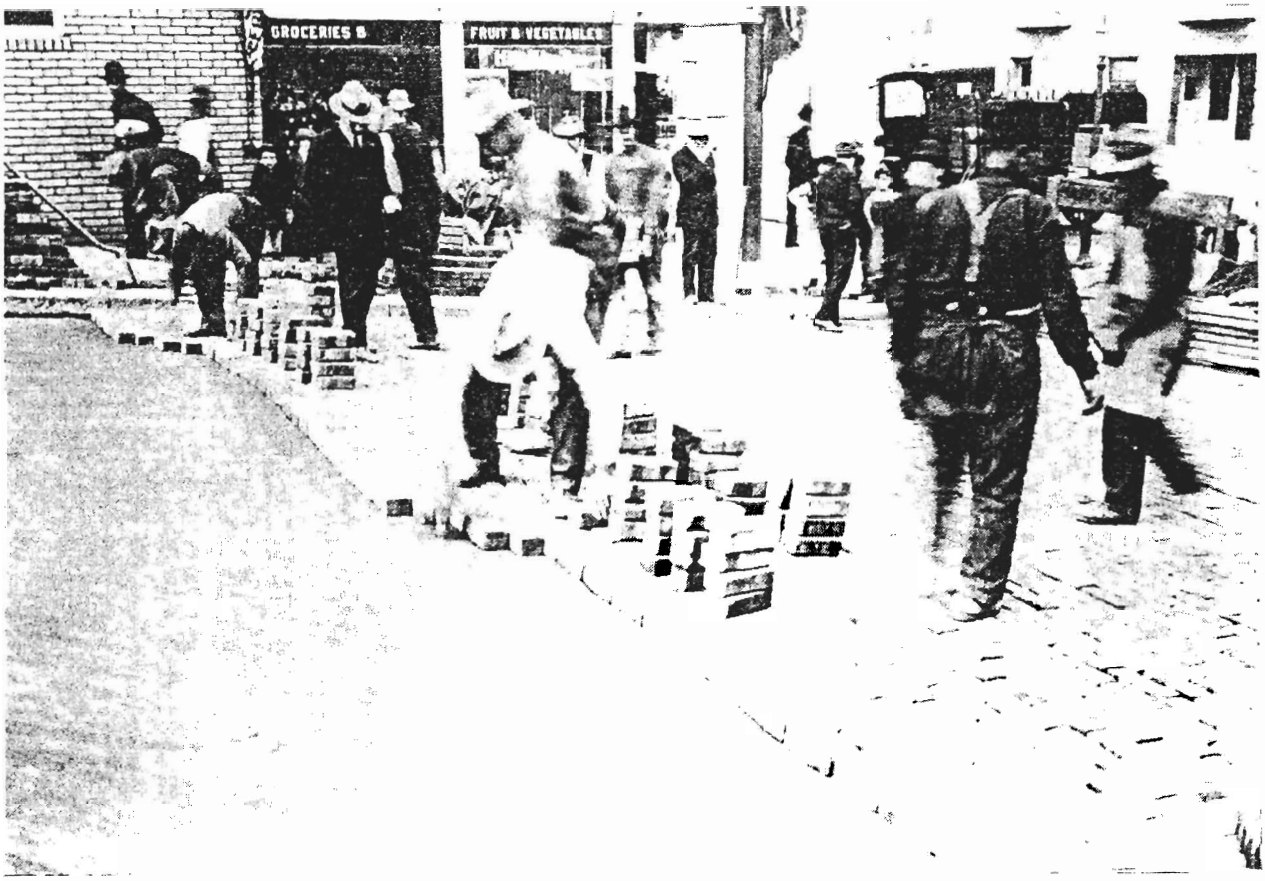
According to a *South of Market Journal* reminiscence that dates to the mid-1870s, "Howard Street between 5th and 6th was paved with what was known as Nicholson pavement, being wooden blocks dipped in tar and set on edge. This was San Francisco's first noiseless pavement. It was fine during the summer and the winter but the following spring, when the April showers came and wet it, and the sun came out, it caused the blocks to rise like mountains and then, like a volcano, they would burst and scatter the blocks. It was then that the kids would rush out with sacks and gather in firewood for the next month." (*South of Market Journal*, April 1926). Wooden street paving as a base for bituminous tar was still being installed as late as 1919, but its use was never widespread.

Langley's 1871 City Directory mentions an alternative experimental paving, "The "Imperishable Stone Paving Block Company" is a new organization in San Francisco founded on a species of pavement . . .This is concrete of 80% crushed rock and asphaltum, heated and mixed together, and while plastic formed under great pressure into blocks similar to those used in wooden pavement, but with corrugated sides, and is laid on a bed of the same material as the blocks. . ."

The Imperishable Stone Company owned two 50-vara lots at the corner of Bryant and Fremont in 1871. They had started their operation but needed to raise capital to continue. The men who signed the prospectus as investors included Peter Donahue, and H.B. Tichenor. No mention is made of Imperishable Stone in the City Municipal Report contracts but references to its use appear sporadically over the subsequent five years.

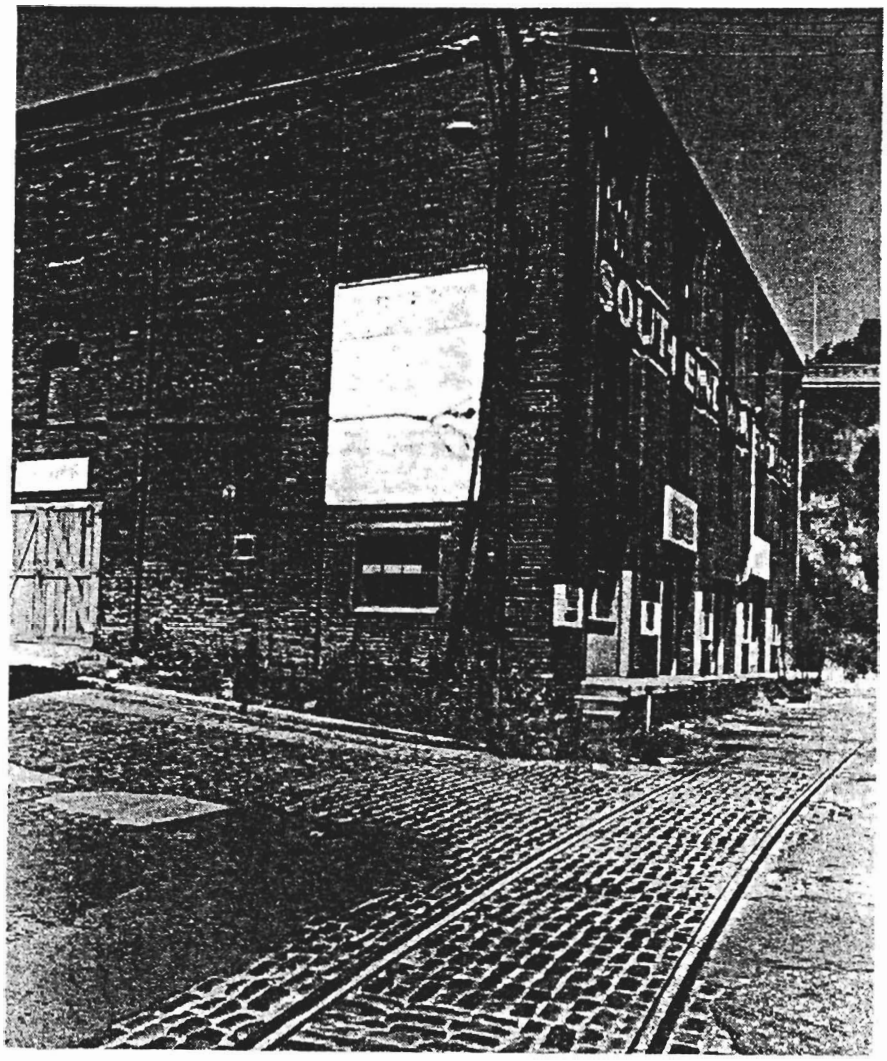
Langley's Directory of 1871 made paving recommendations: "Many of the streets were formerly planked but the rapid and irregular wear of this style of pavement has forbidden its extension or reconstruction. The pavement now [1871] in use are Cobblestone, Macadam, Stowe, and Imperishable Stone. Recommendations of the city's investigating committee on pavement: **Cobble Pavements**—Your committee recommends a thorough investigation be made of the hitherto costs of repairs of cobblestone streets with a view to replacing them all. **Asphalt**—We recommend that the present popular plan of making sidewalks of this material be continued and encouraged. **Planking Streets and Sidewalks**—that all sidewalks hereafter be laid down by property holders within the fire limits, shall be of material that will not decay. **Belgium Pavement**—This pavement has never been laid down in this city, and your committee hopes to see the experiment with Amador County rock tried by some property holders." (Langley 1871: pp.24-26)

In 1871, asphalt was not considered heavy and strong enough for street paving, even though it was already in place in Paris and Vienna, but asphalt was used extensively



(John Hamamura photograph)

(City Engineering Archives)



Laying Brick Paving: 1920 is a late date for this style of paving, but on Pacific Street, west of Taylor, the street is being surfaced with bricks delivered by a truck instead of a wagon. Adjoining the South Beach area, Federal Street starting from the corner of First Street, is a rare surviving brick street

Cape Horn Warehouse & Federal Street: One of San Francisco's few remaining brick streets is Federal Street, beginning on the left. Basalt paving on First Street is revealed by the spur track along the front of the warehouse. Federal Street remained an enclave of small residences as late as 1929, as shown on the Sanborn Insurance Company's maps.

for San Francisco sidewalks. At that time, asphalt paving used a bituminous rock quarried in Santa Cruz and shipped to San Francisco. "The material is broken into lumps not to exceed ten pounds in weight and thrown into an iron tank, where it was steamed until semi-liquid. It is then spread evenly, two inches in thickness, over a prepared bed of concrete and afterwards rolled with a steam roller weighing about ten tons." (*California Journal of Mines and Geology*, 1886: p. 51)

The difference between macadam and asphalt paving appears to be in the matter of its base mixture. John Louden MacAdam, an early 19th century Scottish inventor, had created roads made of broken stones then treated with asphaltic dressings gritted with stone chippings. Macadam was considered only useful for lightly traveled roads.

Macadam was the cheapest street paving but there were problems with its durability. For example, in 1886, Macadam cost $2 per lineal foot and basalt paving cost $7 per foot. That same year, the Superintendent of Streets commented: "There is very little improvement in the condition of macadamized streets. Re-macadamizing those out of repair is no improvement. The rock rapidly pulverizes under constant traffic and in winter large quantities are washed into sewers. Should bituminous rock recently introduced prove durable it would be the best pavement for streets not subject to heavy traffic." (Municipal Reports, 1886-87: p. 410)

The nature of Belgium pavement remains obscure. In the above context it is "not unlike Amador County rock," but occasional references to "Belgium blocks" are not specific as to the type of stone.

For some property owners, the difference in price was all important. Part of the cost of the street in front of their property was an assessment they had to pay. The Superintendent of Public Streets explained: "In many cases when new streets are opened and ordered improved, the work of grading, if added to a more expensive improvement would exceed by one half the assessed value of the property affected. It could not be performed unless the City paid the difference in cost. . . Property owners entered into private contacts with parties engaged in laying Macadam to avoid a high assessment." (Municipal Report 1888-89, p. 3)

By 1875 the Superintendent of Public Streets, Highways and Squares was lamenting that when he took office in December of 1873, "Everyone who was in the city knows that there was hardly a single block that was passable . . . the adoption of stone block pavement is good." (Municipal Report, 1875: p. 133) San Francisco was using both granite and basalt paving blocks, but the San Francisco Superintendent of Streets now recommended "My experience with stone is that granite is the best. We have the finest basalt in the world but the best quality is too hard and will soon wear smooth and slippery." (Ibid.) The *Petaluma Weekly Argus*, alarmed at the prospect of lost business, noted, "San Francisco voted to use granite instead of basalt, the latter abundant around Petaluma." (*Petaluma Weekly Argus*, Feb. 18, 1876)

Granite was used extensively in San Francisco for curbstones with chiseled street names. More difficult to quarry and finish than basalt, therefore more expensive, granite offered a handsome textured surface that has proved to be extremely long

wearing. The expense of quarried granite generally limited it to "fancy uses" in buildings and on city curbs, although the occasional granite paving block turns up. San Francisco's granite curbs came from Folsom quarries. (*California Journal of Mines & Geology,* 1888: p. 557) If entire streets were paved with granite there is no mention of this the city's municipal reports.

Basalt became the paving stone of choice in San Francisco from the mid-1870s until after the 1906 earthquake.

(San Francisco Engineering Archives)

Getting Ready to Pave in 1913: The paving gang is working its way up the street. Big dray wagons have dumped the blocks to be laid on a sand foundation. It was still a gaslight era and sidewalks appear haphazard, although granite slabs are waiting to become curbs along Seventh at Folsom.

BASALT PAVING

The earliest use of basalt paving in San Francisco, that we have discovered, was on Third Street, which was first paved with basalt blocks between 1864 and 1867 and not replaced until 1913. (Board of Public Works, 1914: p. 387) The use of basalt paving had many advantages hitherto elusive: stone blocks were long lasting, could not be burned, could hold any weight encountered when laid properly, provided a smoother ride for carriages and better footing for horses. Nevertheless basalt paving was not in general use in San Francisco until the mid-1870s.

In November of 1873, San Francisco Municipal Order #1127 officially adopted cobblestones and stone blocks for construction of the pavement of streets. The order did not specify a preference of stone to be used. Any stone pavement was comparatively expensive, but basalt was easier to quarry than granite, and therefore cheaper. The year 1878 saw 1,028,014 square feet of paving laid at a cost of $361,925.38. With the exception of 212,765 square feet of cobbles and carbonized brick pavement, amounting of $2,127.65, the rest was basalt and granite paving blocks. (Langley, 1878, p. 11) In 1878, from Petaluma alone, 1,456,500 basalt paving blocks were shipped to San Francisco.

Rectangular finished stone block paving was durable and fairly smooth, an immense improvement over the earlier bumpy cobblestone and rubble paving, but resounded with a clattering noise from wheels of wagons, drays, and buggies. In Santa Rosa, for example, the city council in the 1880s ruled out basalt paving for use in front of the court house because the noise of wheels on hard basalt "was disruptive to the conduct of justice." (Gaye LeBaron, 1980: *Press-Democrat*)

Noisy or not, the municipal decision (Order #2121 Nov. 1889) was to re-pave San Francisco's streets in paving blocks and that decision entailed great costs, as the Superintendent of the Bureau of Public Streets Report explained: "The work of replacing with basalt blocks on that portion of the accepted city streets heretofore paved with cobbles has progressed as far as moneys available. . .this is a work of great magnitude and cannot be accomplished within one year. . .in some places I was forced to re-pave with cobbles. . .(Municipal Report 1889-90, pp. 89-90)

The Board of Supervisors Order #2121 had required that six inches of concrete be laid as a foundation for basalt paving blocks and also for bituminous paving. This ordinance made stone block paving so much more expensive than bituminous that the paving block market took a temporary nose-dive. However the Superintendent of Public Streets admitted, "Only a small portion of the streets paved with basalt blocks during the past year has been laid with a concrete foundation." (Ibid. p. 90) Sand was the cheaper and quicker base for laying basalt paving blocks. Typically, the city's goals for improvement rarely matched available funds.

The following year the ordinance was revised to read: "For the basalt pavement, it is provided that the roadbed shall be first excavated to a depth of fourteen inches, and the blocks set thin edge up, on a six inch layer of sand. For bituminous rock pavement it is provided that the roadbed shall be excavated to a depth of eight and one half inches, a six inch layer of concrete being first laid down. . .and upon this laid a coating of bituminous rock two and one half inches deep." (Municipal Report, 1891: p. 345)

The theoretical model of the ideal paving foundation versus realistic costs of keeping San Francisco's city streets repaired was not reconciled. In 1902 the *Merchants Association Review* pursued the subject: "Real pavement is the foundation. The upper surface, whether it consists of asphalt, brick, wood or stone blocks is only a wearing surface constructed to meet certain needs of traffic. . .Our pavements are so poor and require so much money to keep those in the business district fairly decent that we can never catch up." (*Merchants Association Review*, Oct. 1903)

The time period in which basalt paving blocks replaced cobblestones and the various experimental wooden street pavements lasted from the mid-1870s up until 1914. Repairs to existing basalt streets was still being carried out as late as 1920. (Municipal Reports: 1870-1917) A 1923 map of San Francisco paving reveals that all of the streets in the survey area remained basalt paved in contrast to most San Francisco streets, by the 1920s asphalt had been laid on most city streets, in many cases over existing stone block paving.

The 1906 earthquake seriously damaged many of the streets paved with basalt paving, throwing the blocks out of alignment. In 1914 the San Francisco Superintendent of Public Streets reported: "Following the conflagration of 1906 the city streets were left in deplorable condition. The pavements, regardless of character, were burned to the extent of requiring complete reconstruction. . . Every block seemed to give away at the same time. . . The monthly appropriation of forty-five thousand dollars was increased to sixty thousand, the intention being to concentrate on reconstruction work and repair only the more passable of the blocks until such time as they could be entirely reconstructed. . . Many of the streets were reconstructed from old basalt blocks taken from other streets that were being converted from paving blocks to asphalt over concrete. The necessity of buying new blocks was almost entirely averted. . . Basalt block pavement constructed with old selected blocks will last almost as long on a sand foundation as if constructed with new blocks. It is not so much that the blocks wear out but that the unstable base allows ruts to form. This, of course, permits an undue "hammer" from the wheels of heavily loaded trucks which will soon destroy any pavement." (Municipal Reports, 1914; p. 385-6)

The Superintendent of Streets went on to report that one hundred and seventeen blocks in the city were re-surfaced in 1913, forty six of which were changed from cobblestone and basalt blocks to asphalt over concrete. In 1909 the city had built a Municipal Asphalt Plant in an effort to cut costs of contracted labor. It partially burnt, but was replaced in 1912 with a new plant showing the city's engineers commitment to asphalt and concrete technology. This decision shows also the city's new found

determination to construct public works without private contractors. With basalt blocks then estimated at $60 per thousand, and vitrified brick at $47.50 per thousand, municipally produced asphalt became the cheapest uniform surface. (Ibid. p.387)

As well as economy, the proliferation of automobiles made the smoother surface of asphalt highly desirable. Asphalt streets were quieter. Initially, many basalt paved streets were torn up and the stones saved for repair work and future street reconstruction, but in time the simple expedient of laying asphalt directly on top of the basalt blocks became the cheapest and easiest way of re-surfacing the existing basalt streets.

By the early 20th century the city had developed an extensive network of many busy street car and cable car lines. It became a common practice to asphalt both sides of a street for automobile use while keeping the center paving blocks exposed to protect the tracks and simplify repairs. (See Camozzi interview on cutting stone flanges for rail tracks.)

Other technological changes also affected the paving of city's streets from about 1910 to 1916. Overhead electrical lines began to be buried under the streets, involving massive disruptions of existing paving. "Public service corporations were spending in the neighborhood of four hundred thousand dollars a year for street openings alone." (Ibid. p. 387)

Sources of San Francisco's Paving Blocks

One possible source of San Francisco's early basalt paving blocks could have been as ballast on ships coming in from Europe. Ships carrying general cargo could have used paving blocks as ballast. No records of paving block ballast have yet been discovered but we do know that ships were carrying French and English bricks into the city, as San Franciscans showed a decided preference for bricks fired in England and France.

By the 1880s the extensive use of block paving in San Francisco required an immediate and continuous large supply for newly paved streets and repairs. Paving the city streets had become a big business.

Geologists reported that from "1887 to 1913 at least 136 million paving blocks for the streets of San Francisco, valued at $5,712,000 were produced from numerous quarries in Marin, Napa, Solano and Sonoma quarries." (Turner, 1951: p. 245)

Consider the scope of San Francisco's use of stone blocks, the fact that they are hand-worked stones, and that they are heavy to transport. Their source had to be relatively near so that the blocks could be delivered in quantity either by water or by rail. Quarries required crews of men willing and able to work the stone.

The earliest date that we have found as a source for quarrying stone for San Francisco is from the *Petaluma Argus Courier* of September 25, 1857: "On the summit of a hill some three-quarters of a mile to the south of Petaluma, a very singular ledge of rocks has recently been discovered by some persons engaged in quarrying stone for building purposes. The singular structure and wonderful uniformity prevails

throughout the ledge. . .the ledge is composed of regular prismatic columns, inclined but a few degrees from the perpendicular toward the center of the hill. The columns generally have five sides. . .are usually about twenty inches in thickness, and are divided into blocks varying from one to four feet in length. . .the rock is very hard and of a dark color that belongs to that class of rocks denominated basalt by geologist. . . The discovery of this ledge or rocks to close to town is particularly fortunate for Petaluma. The rocks are easily quarried and brought to town, the greatest advantage of all is their thorough adaptability for fireproof buildings—neither fire nor water affects it in the least." (*Petaluma Argus Courier*, Sept. 25, 1857)

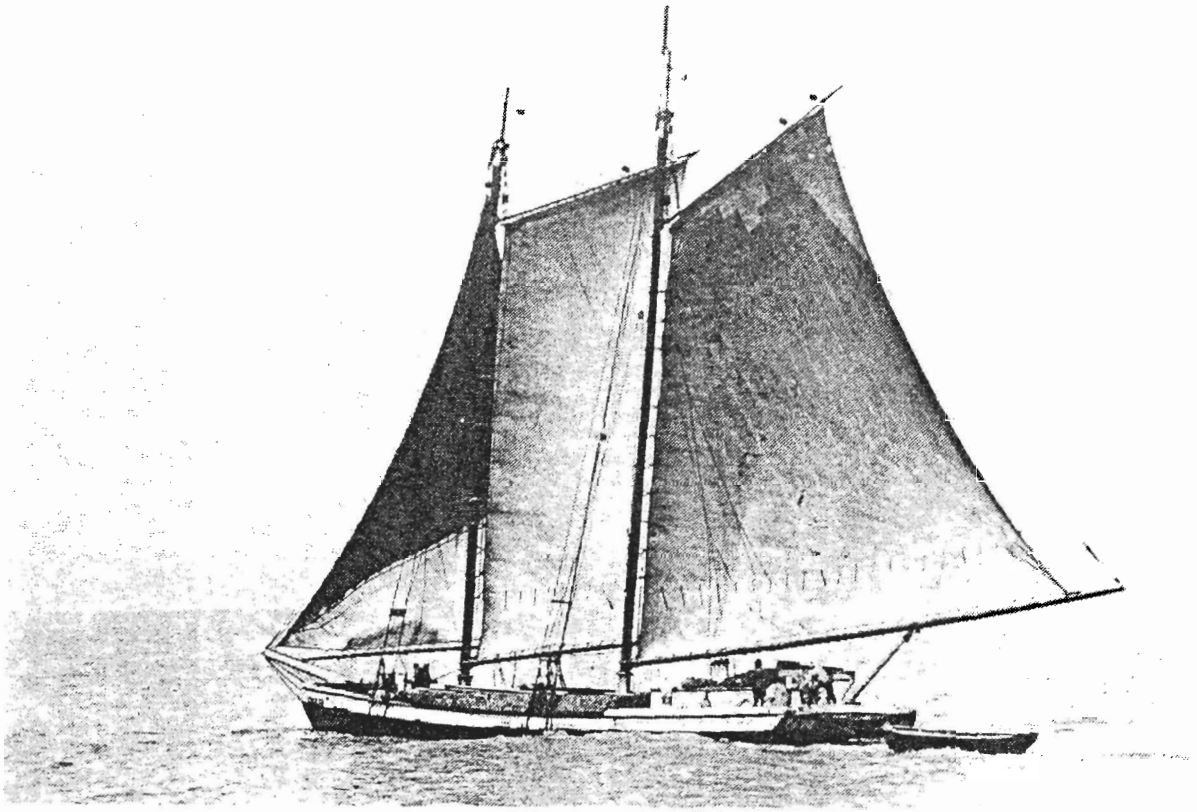
The description of this 1857 quarry is repeated in a Bancroft Scrapbook and the site is identified: "It has been used to some extent as a building material at Petaluma; its hardness and difficulty of obtaining stones of a large size render it undesirable for that purpose but it makes a durable material for ballasting roads. . .this being the most accessible point to the city of San Francisco, where such materials can be obtained in large quantities. Eruptive rock also occurs at points between Petaluma and San Rafael but not as favorably situated for shipment as the basalt near Rudesill's Landing." The Petaluma River flowed near the foot of the large rock outcrop, just short of the landing. (Bancroft Scraps, 1858)

Rudesill's Landing was more generally called Haystack Landing. Riverboat operators found this place on Petaluma Creek to be the highest point that river steamers could navigate without waiting for the tide to change. Farmers left their hay stacked here for scow schooners and barges, towed by riverboats, to pick up and deliver to San Francisco to feed the city's horses. The close proximity of Haystack Landing to the quarry meant that scow schooners and other craft could float their heavy cargo to San Francisco.

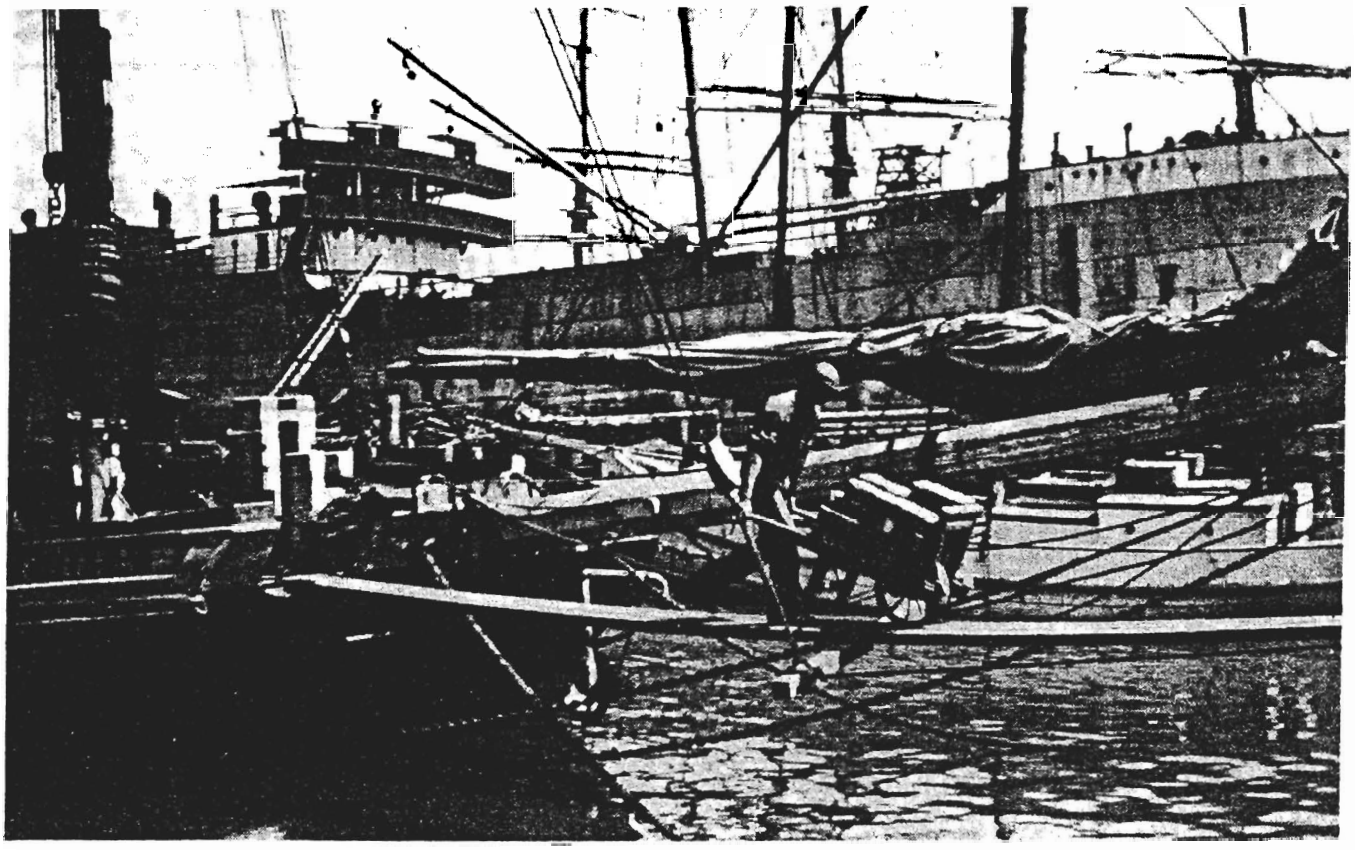
Haystack Landing caught the interest of riverboat capitalist Charles Minturn who had made his gold rush fortune as owner of the famous *Senator* and *New World* steamers on the profitable Sacramento run. In 1860, Minturn started a steamboat run up Petaluma Creek to Lakeville with stagecoach connections to Petaluma and Santa Rosa. Looking for a quicker connection, he dredged a channel to Haystack Landing, and used Chinese labor to straighten some of the twists in the slough. In 1864, Minturn built the Petaluma and Haystack Railroad that ran all of five miles from Petaluma to Haystack Landing where the little steamer *Petaluma* picked passengers and freight for San Francisco. The railroad, the third to be built in all of California, operated from 1864 to 1875—but from after a murderous explosion of the engine in downtown Petaluma in 1866, a team of horses pulled the railroad cars along the tracks to Petaluma.

The 1858 quarry owners at Haystack Landing, Mr. and Mrs. Jens P. Olaassen, left the rock business to their daughter May Lauritzen. Her heirs, Captain John Lauritzen, a scow schooner captain, and his brother, Carl Lauritzen, leased Mays Hill Quarry to the Hein Construction Company in 1925, which later incorporated as Hein Brothers Basalt Rock Company. In 1948, the Hein Quarry was described as "one of

(Both Photographs, National Maritime Museum at San Francisco)



Cargoes of Bricks & Paving Blocks: Flat-bottomed scow schooners were built to carry bulk cargo from river ports like Petaluma and Napa, to San Francisco. The scow *Mary* had a draft of three and a half feet, was 72 and half feet long and 24 feet across. Here she rides close to the water with a deck load of bricks. From December of 1878 to November of 1879, *Petaluma Argus Courier* estimated 1,456,500 paving blocks were shipped by water from Petaluma to San Francisco.



Unloading the Scow Schooner *Erma*, ca. 1906: Although paving blocks and bricks were sometimes loaded onto a scow schooners with the help of a conveyer belt, all evidence of unloading seems to point to a balancing act on a narrow gang-plank with a hand-cart carrying about 240 pounds. Considering that neither the boat or the plank were steady, it took cool expertise to move along smartly to the pier.

Petaluma's top rated industrial plants." (*Petaluma Argus Courier*, Jan. 9, 1948) In 1962, crushed rock from the big quarry was still being loaded on barges at Haystack Landing and shipped to San Francisco. At that time a series of conveyers carrying the rock 900 feet to reach railroad cars and trucks. (*Mining in California*, 1962: p. 357)

Hein Quarry is the oldest known basalt quarry in the bay area. Although the quarry operation moved about as the hill was gradually being taken down—basalt was still taken from the original outcrop. Quarry operation here followed a typical pattern adapting to technological needs of different generations; first, using the basalt for building stone, then as paving blocks, and by the mid-20th century, as crushed rock for highways.

All of the early quarries of 1870s in the north bay had to have easy access to water transportation to San Francisco. One of Marin's earliest basalt quarries was at McNear's Point and belonged to Dennis Jordan who began production in 1876. The Jordan quarry was later operated by the San Francisco Bay Improvement Company and acquired by San Francisco Quarries Company early in the 20th century. (Ver Planck, 1955: p. 247) The McNear family in 1991 still operates the quarry. George McNear recalled when at least three or four scow schooners were moored at the beach, ready to load stone blocks and brick for San Francisco. (McNear interview, 3/6/91). The McNear's still run a large brick kiln operation and make cinder-blocks—all shipped by truck.

Other early Marin quarries on the water were Escalle's Quarry on the Greenbrae Slough between Larkspur and Kentfield, and the Greenbrae Quarry near the present-day Larkspur Landing. (Ver Planck, 1955, p. 247)

McNears Point Quarry used Chinese labor from China Camp at nearby Point San Pedro. The 1880 county history noted: "Fishing grounds are located at Point San Pedro. This industry [dried shrimp] is entirely in the hands of Chinamen . . . 225 men. The land occupied by the fishermen is owned by McNear Brothers." (Munro, Fraser, 1880: p. 346) The Chinese also fired bricks at the Patent Brick Yard at McNears Point in 1870, and we can assume that they also quarried basalt paving at Jordan's Quarry. From 1885 until 1894 Chinese workers quarried paving blocks at Mt. Burdell, two miles north of Novato and half a mile west of Highway 101. Paving blocks quarried on Mt. Burdell were "finely porphyritic andesite." (Ver Planck, 1955, p. 242) These paving blocks were transported by wagon to a nearby slough and then by scow schooner or by barge to San Francisco.

Sonoma Quarries Connect by Water & by Rail

Sonoma stone quarries were earlier in operation and far more extensive than those in Marin. The volume of stone shipped to San Francisco was so very large that it used all available transport.

In the 1870s, ox teams and mule teams hauled the heavy loads of paving blocks from Sonoma quarries to railroad sidings of the San Francisco and Northern Pacific Railroad in Penn Grove. From Penn Grove to Petaluma the blocks traveled on flat

cars to Petaluma's turning basin where they were loaded in scow schooners for the trip to San Francisco. This was no small tonnage.

On Nov. 26, 1875, *Petaluma Weekly Argus* reported: "700,000 paving blocks were made this year, two-thirds going to San Francisco, with the balance being at the quarries, the railroad station at Goodwins, and at the wharves of this city [Petaluma]. 1,200,000 blocks will be made on the lands of E. W. Davis, T. Hopper, and J. Barnes. About 300,000 will be made at other quarries."

And from the same press, "May 10, 1878—A new spur has been placed on the rail track at Penn's Grove station to accommodate shippers of stone paving blocks. Last Monday, four [scow] schooners were loading basalt paving blocks just below the Washington Street bridge." From December of 1878 to November of 1879, 1,456,500 paving blocks were shipped from Petaluma, according to the *Petaluma Argus Weekly*.

In 1870, Peter Donahue took control of a Sonoma railroad, the San Francisco and North Pacific Railroad. By 1879, the railroad by-passed Donahue's Landing, north of San Pablo Bay and extended to San Rafael with ferries from San Quentin to the city. By 1884, his Tiburon operation made the water connection to San Francisco. Sonoma quarried stone blocks could be loaded and shipped by rail to Tiburon where railroad ferries trans-shipped freight cars to the foot of Second Street in San Francisco.

Many of Sonoma's volcanic stone outcrops were located on a north-south ridge west of Rincon and Sonoma valleys. They were not close to water and at first they had no easy rail connection to Santa Rosa or Petaluma, but given the constant demand for basalt blocks transport had to be arranged.

The rail link from the basalt quarries to San Francisco was forged by two brothers, James and Mark McDonald. Mark McDonald was a fruit broker in Santa Rosa who had friendly connections with the "Big Four" in control of the Central Pacific, later the Southern Pacific. James McDonald was heavily invested in stone quarries close to Santa Rosa [now Annadel State Park]. As right-of-way agent for the Southern Pacific, Mark McDonald was able to route a spur line railroad by way of his brother's quarries, establishing stations at Annadel, Melitta, and Kenwood in 1888. These stations became the major shipping points for stone paving blocks headed for Santa Rosa and San Francisco. (LeBaron, *Press Democrat*, 3/30/80)

Gaye LeBaron, a local historian who writes for the *Santa Rosa Press Democrat*, interviewed blockmakers Peter Maroni, Massimo Galeazzi, Angelo Sodini and Natale Forni in the 1980s. As part of the large Italian immigration to California they had arrived in Sonoma in the 1890s and early 1900s. Much information that follows is from LeBaron's published interviews.

Getting the heavy stone from quarries high up on Annadel Ridge was improved upon in 1911 by the installation of a gravity operated railway that brought ore cars loaded with paving blocks down the ridge to be dumped into freight cars headed for San Francisco. As the heavy ore cars descended, they moved empty cars up to reload. Italian stone workers estimated that each day two freight carloads were shipped to the city from Melitta Station, assuming a like amount from Annadel and Kenwood, it

would have been a total of 10,000 stone blocks a day. (Le Baron, opus. cit.)

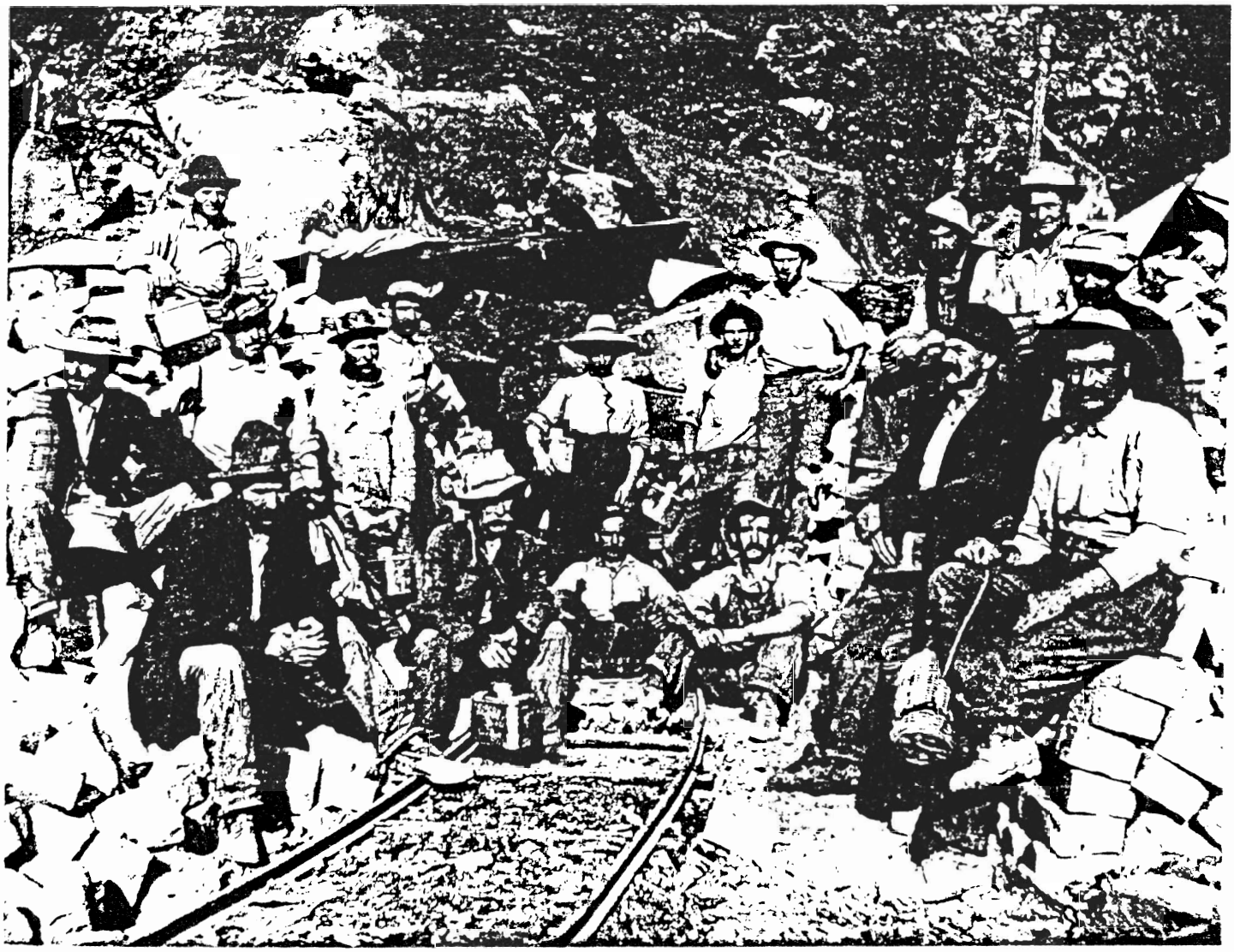
By 1894, the state mineralogist lists twenty producing Sonoma quarries, some with as few as two or three workers, others with 60 or more. Some of the larger quarries were: Manuel's Quarry, between Santa Rosa and Kenwood, that produced 400,000 blocks in 1893 and shipped 100,000 to San Francisco; Landgren Quarry, between Santa Rosa and Melitta which shipped 20,000 blocks that same year; Pinelli Quarry, on the Vallejo estate half a mile northwest of Sonoma, shipped 130,000 blocks; Schocken's Quarries, north of Sonoma produced 600,000 blocks in 1893 and shipped 500,000 to San Francisco and Oakland. (Report of State Mineralogist, 1894: p. 396-397) By 1913-1914 the number of Sonoma quarries listed in the official reports had grown to fifty but "many of them were idle."

According to Italian stone cutters who were interviewed in 1960s-80s, some of the stone cutters they recalled were born in Ireland, Wales, Scotland and Sweden, but by 1900 the largest group to work the Sonoma County quarries were Italians. Young single Italian men from northern Italy found work in Sonoma growing grapes, making wine and working in quarries. Sonoma quarries had some stone cutters from Tuscanny, workmen who learned their trade in the marble quarries at Carrara.

On the other hand, quarry owners were seldom Italian. For example, this big sale of paving blocks was noted by *Petaluma Argus Courier*: "Sept. 26, 1894—350,000 basalt paving blocks were sold to the Southern Pacific Railroad in San Francisco; Frank Roberts, 100,000; Davis, 100,000; John Lynch 50,000; J. Cooney 50,000; Lester Hardin 50,000; Mr. Wilkinson 50,000. The company will need one million blocks for the paving of sixteen block lengths of the street on Potrero and Railroad Avenue in San Francisco, buying the remainder from Sonoma and Santa Rosa. The price is probably about $33 per thousand." The Pinelli Quarry is the only Sonoma County quarry thus far discovered to have Italian ownership.

Ted Gambogi recalled, "Blockmakers were mostly single men, newly arrived in the U.S. They lived at the Byrnes Hotel, the Hotel d'Italia Unita and the Gardell Hotel. The Stone House, built by Galeazzi, was originally a blockmakers' boarding house." (LeBaron, opus. cit.)

Blockmakers were paid for blocks chiseled, usually in thousand block lots. In the 1880s blockmakers made about $4-$5 a day, this at a time in San Francisco when laboring men complained: "A dollar a day is damn little pay." In the early part of the 1900s the blockmakers made $22 per thousand blocks; after 1910 the union raised that to $45. It was a bad time to double labor costs and raise the price of basalt blocks just as asphalt with its attractive surface to automobiles was beginning to replace stone paving.



Sonoma Stone-workers, 1905: Perhaps the lady in the background brought lunch up to the quarry workers. Workingmen's tin lunch pails appear to be standard, but wine bottles vary.

HOW THE STONE WAS QUARRIED

A 1962 interview by Dr. William Kortum of Sonoma with A.J. Camozzi, then in his late 70s, a rock quarryman who cut "blue stone" for use as paving on San Francisco streets.

"This is one of the tools I used in my work; this is a drill hammer. Then we also had the sledge hammer we used to split the stones square. Our tools had three kinds of temper—blue, yellowish and white. We had a little portable furnace with a crank on it, and we dressed or made our own tools. Most of them we bought in a hardware store, but we tempered them. That stone work was between 1910 and 1913.

"First your tool is sharp, like razor, and you mark the stone, where you are going to hit it. Then you tap it on one end and you give it the biggest hit where you are going to split it.

"Say, there's a stone right there. [Demonstrates] You find out where the grain is and you drill the hole square to the grain. You don't put the hole in slanted, you'd break it. You put the hole down straight, just as if you took a square and squared it up, you split nice.

"This is one grain, and this is the cross grain. You don't start with the flat grain, you blast that. You blast it to create layers. You don't <u>hit</u> it with your hammer and drill. With your hammer and drill you can then cut the rock two ways, either this way—this is the easiest way, the cross way is best. But you cannot hit it on the flat—when the grain lies flat you never <u>hit</u> it that way, you can never break it. You <u>blast</u> with the black powder.

"If the rocks are bigger, you use your powder first, you blast it.

"I didn't do that—I was good at finishing. The finishers were the oldest guys. You had to put in two years finishing like any other trade. As you go along you catch up a little bit more, and a little bit more, and a little bit more. Then, when you work in a group—"motion" they call it—a guy does what he does best because you do piece work. One guy does this best and one guy does that best. My best was trimming.

"In shearing off a narrow stone to cut blocks off, we used such tools as the reel and duffle. Duffle is a Swedish name. Italians used a chisel, and they used a little hammer. (This hammer I have here, a machinist's ball peen hammer, is just as good), and a little chisel with two edges, hollow in the middle. You just went along—tap, tap, tap—and once you know the stone, you knew just where to hit it and just what to do. You took the chisel and the hammer, and you turned the block over as many times as you wanted to, to make it square. That was the Italian style, old Italians used.

"My father was doing the same thing back in the old country, a stone man. I learned before I came out here from Italy to square up the corners for holes. All the homes

they built back there, regardless of what, the cornerstone has got to be squared up. You put one this way long and you put one the other way long, like some buildings today have them. That's what we learned in the old country.

"The blue rock of Sonoma County is the best. Granite is coarser. It's just like wood; you have wood that has a fine grain, and you have wood that has a coarse grain. If it is fine grain, you make a fine cut; if you have a coarse grain, you make a coarse cut. Now if you have the stone flat, with the grain flat, you can only plant the powder right across flat. But you come in with your plugs and your hammer—your hand work—in a 90 degree different direction. If you take a piece of wood, and you cut it on the end, it splits, but if you try to cut it on the flat grain you cannot split it.

"The Scotchmen, the Welshmen, and the Swedes were the main ones when I landed here fifty-one years ago. First we went to work at $1.25 a day, digging the dirt around where the rocks were. Those quarries were in Sonoma Valley. As I say, we worked mostly in blue stone for cobblestones, that was our specialty. Blue stone was used for curbs and pave blocks in San Francisco. They went from three to four inches wide, from six to seven inches deep, and from seven to eight inches long. A man got three and a half cents a block, and if he made 150 blocks, he'd get $5.25 for the day.

"If the stone was good, you could make two hundred a day, and at three and a half cents that was seven dollars. If it was bum stone, maybe you only made 150. I made six or seven dollars a day many a times, but at the end of the month I didn't have no money. . .

"Here's how you dig in, say on the Wymore ranch [Sonoma quarry]—first we make the pocket with dynamite; a man who knew about it, did it—he knew just how much dynamite would make the size pocket you needed. Then you used black powder; then put your fuse and cap on and fire. That would shake up your hillside. Down would come dirt and rocks at the same time. Then come the lumpers to shovel the dirt away; then the trimmers come, so they can make room to work in front.

"You look the rock over. If it was too big, you started drilling holes with a drill about this size with two lips down at the bottom. It was white temper. I could make it go sideways, or down straight, but not uphill. You used water, with a rag around your drill; you go up and down, you hit it all the time and move your fingers all around so that you don't have to stop. You can go down four or five feet that way. That's how we drilled. We didn't go too deep because that would bust the bottom; we knew when to stop. It's just like everything else; you had to use your own judgment.

"After the hole was made, we took another drill with a bigger, wider lip that the first one. If you didn't have the lip you'd get stuck in the hole. By having the lip you make the hole wider than your drill. All right, a bigger lip, say 1/8 of an inch wider. Then you use a piece of steel with a hole in it (so you can hold it) and go down and draw a line to be cut. If you put it down straight the cut will be just as straight, as a die, but if you go down crooked, the rock will break crooked.

"Here is your hole. Then the ream with two lips cut the hole wider than this one you had. It had two little holes, one in this side, and one on this side. We keep pounding

until we hit the bottom. After we put the powder down, we take the fuse and put it into this side. Then you put dirt on top. Then you start firing. You have so much time per fuse, and they give you double. In case it don't go off, you have to go back and drill over again. That was for a big boulder. When we put that hole in there, it is right across, this is the grain. It is just like wood. When you put plugs in, you never put them flat on top of the grain, you put them on the end. Then you can split in both directions. The only time you drill right flat on the grain is when you blast it.

"You are trying to make it square, and when the stone is down small enough that you don't think you are going to need any more black powder (because it might bust to pieces) then is when you use your plugs. Then you can judge if you need one plug or two plugs, three or six, sometimes. Then you drill straight and put in wedges, and—tap, tap, tap—until they just bust by themselves—like playing a piano.*

*[Wm. Kortum note: "Mr. Camozzi said that all the plugs have to be "ringing" at the same pitch. I cut the ends off the large stones I used in my fireplace area with plugs, right around the rock and had the same "musical" experience. A plug is a pair of little steel shims, half-round on the outer side, that you put in the hole, one on each side. In between, you slip a pair of steel wedges, and these are what you drive down to finally split the rock. Listening to the tone, allows you to keep the same tension on a number of plugs in the row. This is the way you proceed to to split off a large chunk, but with the resulting smaller pieces. A blow of your hammer the right way, taking account of the grain, allows you to do the shaping. This, of course, is a less time-consuming way to get on with making paving stones.]

"I worked up at Rocklin, near Sacramento in a granite quarry. A quarry is where you pick the rocks out of crown or out of the bank; that's what you call a quarry. I never done that kind of work. They wouldn't let a kid like me do that. I worked there—one time it was 125 degrees in the sun—splitting stone. We use to go down and pick up steam beer, and bring it up in buckets from the saloon, a gallon at a time. We would put our beer along the stone on the shady side, and we'd help ourselves. Then they'd go down and get some more. We sweat so much that our undershirt was wet all the time and that was what kept us cool.

"At Rocklin they didn't have us quarry the stone; they had deep holes and they brought it up with derricks. They laid the granite out; I work here, the next guy works there, and so forth. That was granite. They'd give you a chunk and you went ahead and made blocks. Apprenticeship was two years. We cut granite just the same as bluestone. . .Blue stone is the most brittle stone. It is very good, you can make a good job. Sandstone is very easy, but you can spoil it very easy. The hardest to handle is the granite. You've got to have years of experience to get the best in granite because you work by the piece—piece work—no working by the day. Some guys work harder than others, and there are those with more sense, and those who drink less. We were unionized already in them days. We didn't work after noon on Saturdays.

"I quarried for the county here on this side, but I only blasted. In them days they didn't have no machinery like they do today. They only had wagons in Sonoma County here and a small pony. And they used a powder monkey. In those days you were eighteen years old and a responsible man; today even thirty-year-old people don't have enough brains to share responsibility.

"The quarrymen today—well they don't have no quarrymen because the art is gone.

"One cobblestone company in San Francisco was Flynn and Tracy. They had their own hill in Sonoma Valley, between Bennett Valley and Sonoma Valley. Flynn and Tracy was one of the biggest. In fact, they even put up buildings out in these quarries where the men had a room or two, and washroom where they could wash their clothes. There was no toilet in this house or running water; they all went outside and got their water in buckets. . . .

[Explaining how they made the paving stones for the area of street car tracks.] "You have a flange on your cobblestone and they put them alongside the track to hold your track because they were in the sand in them days; they didn't have cement. Your block was square, like this, and they cut a piece off so that the stone would go under the car track to hold it in place; we called them flanges.

"In San Francisco we were getting three and a half. Then they went on strike. I remember the first time; they were out for six months, for a five cents raise. I lived with a good German family, and while they worked, they trusted me. In them days we walked tracks to get another job. So finally they got five cents. So what did they do then in San Francisco? They had begun to use a little cement with bricks and they removed the paving blocks from the flat areas of the city after the earthquake, where they figured they didn't need them. The earthquake shook the paving loose. So they started to use a little cement (although at first they didn't know how to do this) and replaced the blocks on the flat parts because they had to have them on the hills. Because of the horses. In them days, horses were no cheap thing, they pulled big loads and going up the hills they had to have something to catch. Well, they took the blocks from the bottom flats and used them for the hills, and that meant less block business. Then it meant the guy that made blocks, unless he was good, couldn't get a job.

"The blocks were square and smooth . . .but remember between each block there was sand for abrasion (helping the horses up the hills). You maybe can see some of them in San Francisco, yet. . . There was enough room there for the horse's shoe to grasp, see? San Francisco used more than any place else because of the hills.

"I never worked putting the blocks in the the streets; my end was always in the quarry. you started as mucker and after awhile you made blocks. Then you were tops. If you were not tops, whenever jobs were scarce you didn't get no job. Them days we didn't have the government coming along and saying . . . 'Well, if you don't want to work today . . .' Any time you see a man between 16 and 60 who needs helping, God knows, I'll give him my shoes, but when you see them between 16 and 60 and not working because he's too lazy to work, you ruin the country. . . ."

George Allardt's 1877 Manuscript Map of San Francisco's Waterfront: The port's projected seawall is shown as the shaded area that curves around the waterfront. The new seawall was built in sections from 1880 through 1922. The 20-foot contour lines are accurate representations of the 1852 Coast Survey of Rincon Point and South Beach. The original 100-foot peaks of Rincon Hill can be found on Harrison Street from First to Second Street.
(Port of San Francisco Archives)

FOCUS ON SOUTH BEACH

To understand the history of street paving on any given stretch of San Francisco's changing waterfront, we start with the city's earliest scientific map—the Coast Survey of 1852 (published in 1853) and shown as contour lines on the map opposite. At this date, South Beach remained almost completely untouched by human technology. Subsequent maps reveal the extent of filling at dated intervals. To that we add information from photographs, municipal reports, city directories, and harbor commission reports. Against the background of the larger San Francisco history of paving, and more specifically basalt block paving, we understand not only "when" but "why" changes took place.

Research on San Francisco paving practices revealed that in the early 20th century (1913) basalt paving blocks were being dug up in one street to make way for new paving of concrete topped with asphalt. Old basalt blocks were sorted for culls and re-used in repairing or replacing other streets.(Department of Street Repair, 1913-14: p. 385) This practice makes it impossible to discover the precise age and source of specific basalt blocks on each street. Street repairs were going on all the time so that we can't say which is the original paving and which is a later repair. Recognizing these particular limitations, we can make statements that are generally true about South Beach basalt paving.

Geographic Changes in the Area

The San Francisco Redevelopment area under consideration extends north to Bryant, and is bounded on the west by Second Street, and the east by the Embarcadero (formerly East Street), and on the south by Berry Street and the China Basin.

A useful map for easy orientation is the 1877 Allardt Manuscript Map, commissioned by the Port of San Francisco to show how the projected new seawall would cut across existing piers. Allardt, who did most of the surveying and mapping of the Bay Area tidelands to facilitate the Tidelands Act of 1869, was a skilled and accurate chart-maker. His 1877 map becomes especially useful for reference because he included the first scientific representation of the area's original 1852 shoreline and the contours of Rincon Hill.

Using Allardt's map to demonstrate how much of the South Beach study area was under water in 1852, trace the bottom contour line from Fourth and Brannan up to Spear and Harrison, and then over past First and Howard. Ninety percent of the South Beach study area was under water in 1852.

The first 20-foot contour line on Allardt's map delineates the steep 1852 coast line with only a narrow beach. This is confirmed by daguerreotypes made in 1853 of the

(California Historical Society)

South Beach in 1864: This view of Second Street, looking north from Townsend, was made before the Oriental Warehouse was built. Second Street remains a sandy road with buggy trails switchbacking up over Rincon Hill. Planked wooden sidewalks do not appear until Bryant Street crosses Second. On the right, several ships are pulled up on the beach for repair in John North's yard, with improvised paths leading steeply down Brannan Street. St. Mary's Hospital, at First and Bryant, is the largest building on the skyline.

South of Market waterfront area. An 1852 hydrographic map indicates waters just off this promontory were 2 and 3 fathoms deep.

Three 120-foot peaks of Rincon Hill can be found along the line of Harrison, between Second and First streets. This is important because Rincon Hill was not regraded until the early 1930s, when the piers for the Bay Bridge were put in place. The upper contours of Rincon Hill were still dirt roads at a time that streets on either side had been paved.

The geography of this sandy chaparral point made it ideal for H. B. Tichenor's 1851 marine railway and ship-repair yard at the foot of Second at Townsend. Ships could be launched into deep water directly from the beach and his repair operation was sufficiently remote from the city to give him cheap but accessible land. His yard was the beginning of the area's first industry, and by 1857 the Coast Survey had labeled the coast south of Townsend, with the beginnings of King Street from 2nd Street past 3rd, as Steamboat Point.

From 1853 up through 1870, Steamboat Point saw the construction and repair of some San Francisco's finest riverboat steamers—including John North's launching of the *Chrysopolis*, a floating palace, the most luxurious of all the river steamers. Patrick Tiernan built sternwheelers and sidewheelers, and in 1870 launched the big *Thoroughfare* a ferry designed to carry railroad freight cars across the bay.

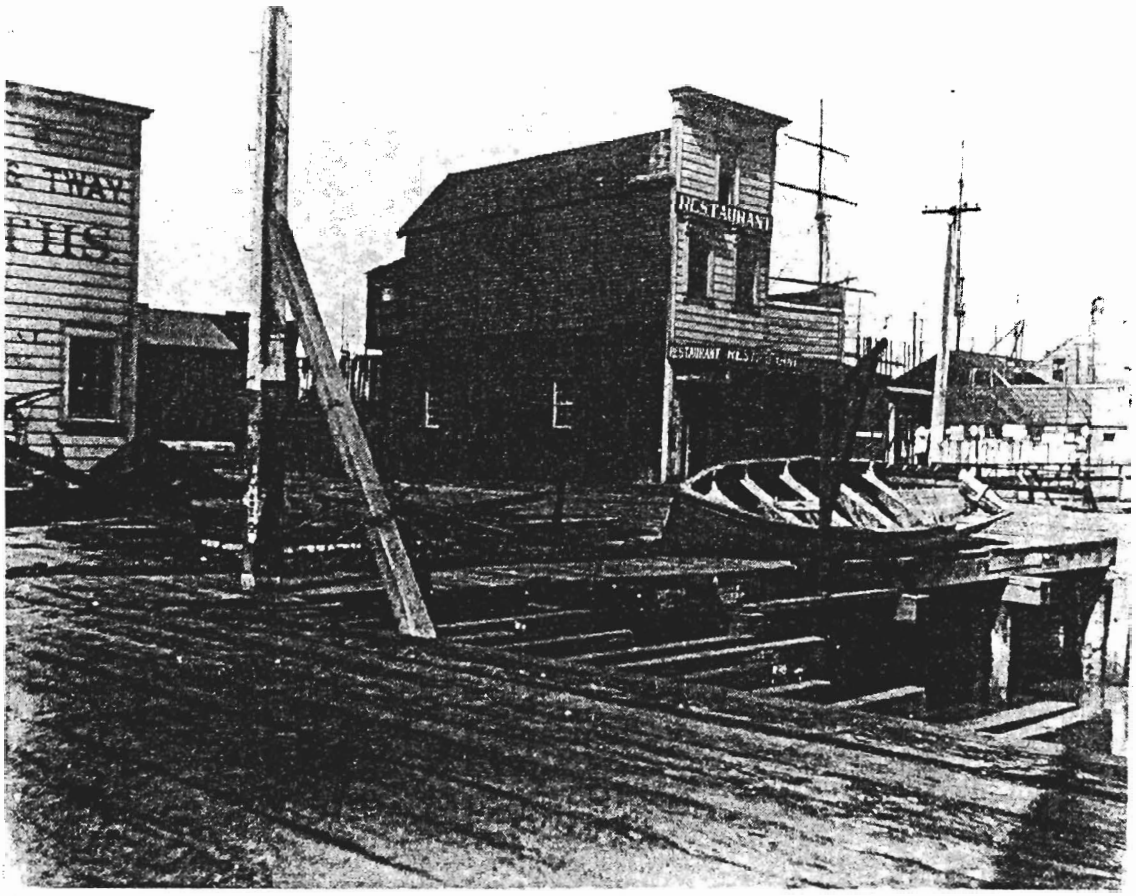
The 1857 Coast Survey map shows fill extending out from Bryant Street starting at First Street nearly to Brannan. The shoreline has a sizable scatter of some 30 small structures labeled "Chinese" (at First & Bryant). The presence of what used to be called "grease ways" along the beach below, possibly locates Charles Hare's Rincon Point ship-wrecking operation. Charles Hare was stripping and burning unwanted Gold Rush ships, using Chinese workmen for the tedious business of recovering the metal fastenings, mostly copper, always a valuable metal.

The 1869 Coast Survey Map (the third in this important series) shows considerable filling between Second and First streets between Bryant and Townsend, but King Street ends at Second. The Oriental Warehouse (seen on Allardt's map as a heavily shaded square facing First Street, just south of Brannan) was built in 1867 with the Pacific Mail Steamship Company's main wharf extending out the line of First Street. An 1870 Carlton Watkins photograph shows planked sidewalks and dirt streets with lots containing coal storage (between First and Second streets) planked, and still on pilings.

By 1877, the time of Allardt's waterfront survey map, the study area is characterized by extensive wharves. Dry land ended at Brannan Street and First Street, with the Pacific Mail Dock wharf extending south on First as far as the line of Berry Street. The Pacific Mail Dock Basin is partially enclosed by the large claw shape of the Central Pacific Railroad Ferry Slips at the Foot of Second. The Beale Street Wharf starts at Bryant, and then extends south, halfway between Brannan and Townsend.

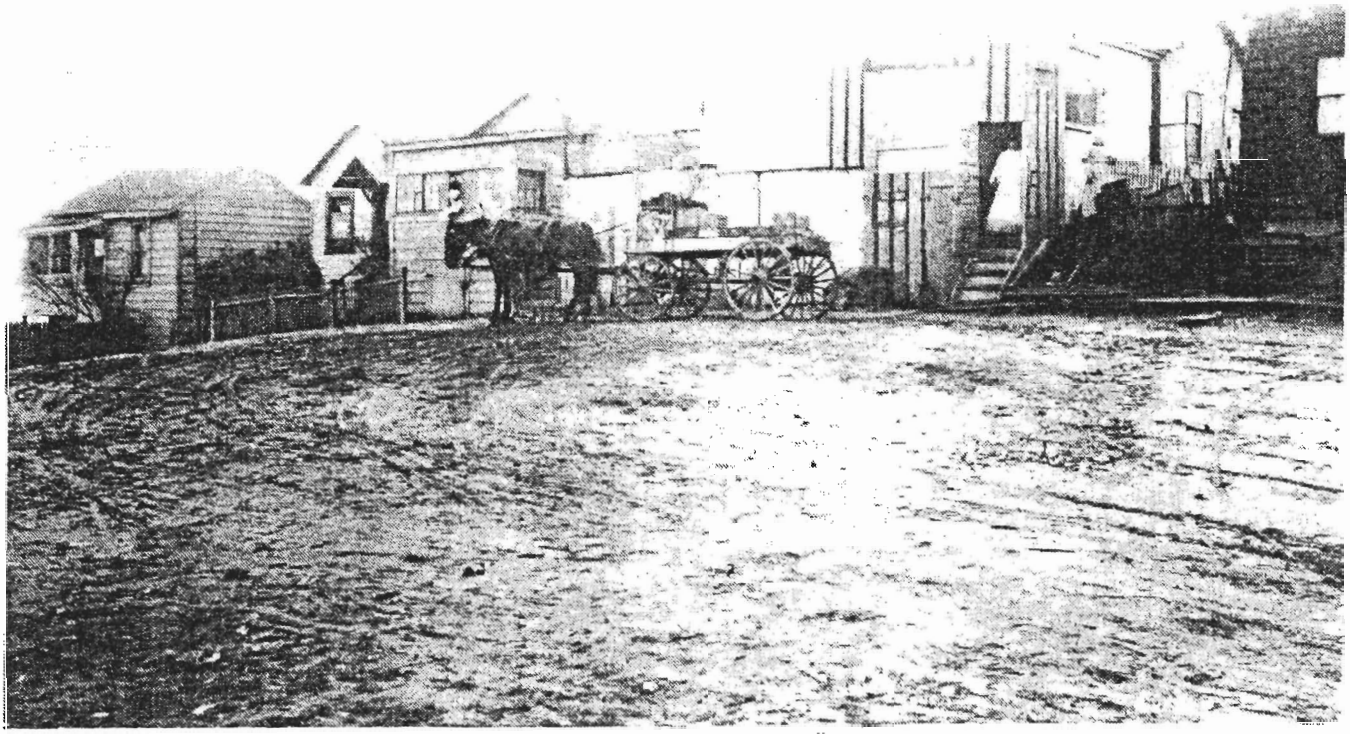
An 1896 Harbor Commission Map shows little change from Allardt's 1877 map, indicating the study area remained an active wharf and shipping area. Seawall Sections

(Bancroft Library)



Bryant between Spear and Main, 1899: Much of South Beach remained planked and on pilings at the turn of the century. Christoffersen and Tway are the shipsmiths on the left; the restaurant at 19 Bryant faces a pier on the waterfront.

(San Francisco Engineering Archives)



Rincon Hill on Hard Times, ca. 1916: Fremont, between Bryant and Harrison, had a dirt street, wooden curbs, and if the residents were lucky, a planked sidewalk. Fremont Street, at this point, would have had an elevation of 60 feet on Rincon Hill.

9, 10, 11, 11b and 12 were built from 1908 and 1915 from Harrison Street (present day Pier 24) south to King Street. However, filling in back of the seawall was still going on in 1911, as photographic views reveal. East Street, the present-day Embarcadero, was filled in and paved as sections of the seawall were completed.

A 1916 Board of Harbor Commission Map shows how the curved waterfront Embarcadero created new triangular waterfront lots and extended streets as it intersected the existing city street grid. Over one million square feet of new commercial land was created by this waterfront redesign. Railroad tracks for the state-owned Belt Line Railway covered many of these new lots and extended out both sides of each 200-foot pier so that freight cars could be loaded with ocean cargo directly alongside shipping. San Francisco and Rio de Janerio became the only two major ports in the world with continuous waterfront rail-water circuits. Whereas the earlier wharves had been ad hoc stairstep extensions of the existing street grid, new 200-foot piers fanned out along the curve of the seawall Embarcadero.

Basalt Paving in the Study Area

A 1923 map of San Francisco Paving shows all of the streets in the study area had been paved with basalt paving by that date. This is in contrast to other city streets where asphalt/bituminous surfaces were in place. The Embarcadero was still paved with basalt from Harrison Street south to China Basin.

Undoubtedly it was the heavy use from wagons and drays hauling freight that required paving the survey area with basalt blocks. South Beach business was receiving water freight from its earliest development. The fact that Second Street, after it was cut through in 1869, changed from a fashionable residential street into a main arterial for industrial traffic from the south waterfront to the city, further defined the South Beach area as one that saw a lot of teaming.

The dominance of railroad freight business in the area started with the building of the Central Pacific/Southern Pacific railroad ferry slip at the foot of Second Street in 1869. When the Pacific Mail Steamship Company moved to the foot of First Street by 1865-67 it was the largest and most influential maritime company on the West Coast. The presence of rail freight access to incoming ships made the South Beach area a place of heavy industrial commerce, with bonded warehouses serving as important auxiliaries to ocean and rail commerce.

Until the advent of the automobile and the truck, with the resulting decline in importance of the railroad and ocean freight connections, South Beach remained an important part of San Francisco's "working waterfront." By the 1930s, when automobiles took over city streets and created the need for bridges across the bay, South Beach declined in commercial importance. Asphalt that surfaced most of San Francisco's streets now covered, or replaced, the basalt block paving.

In the summary below, the dates given are the earliest dates discovered in the *San Francisco Municipal Reports*, or in dated photographs, but should not be taken as the earliest date that a given street was paved.

(San Francisco Engineering Archives)

Basalt Paving in South Beach: First Street on the west side, north of Brannan in 1917. A rugged street in an area that had warehouses and wharves with a lot of dray traffic. In the background is Rincon Hill and the Cape Horn Warehouse.

(San Francisco Engineering Archives)

Basalt Paving on Bryant Street, ca. 1916: Where Bryant joined Main Street, the basalt paving changes direction to turn corners. At the corner saloon, McClure served Hot Lunch from 11 to 1 for 20 cents, but San Francisco's traditional free cold lunch helped sell the beer all day .

Bryant Street: Bryant Street, from First to Beale Street, is paved with basalt blocks by 1909, and from Beale to Main by 1913. As late as 1911, Bryant from Main to East Street consisted of a railroad spur mounted on piers which was probably used to build Sections 10 and 11 of the Seawall in 1910 and 1911. By September, 1914, Bryant Street was paved with basalt blocks through to the Embarcadero. (*Board of Harbor Commission Biennial Report*, 1915-1916, p. 57)

Brannan Street: By 1907, Brannan Street had been paved with basalt paving as far as First Street. Brannan, from First Street to the Embarcadero, remained planked with piers as late as 1919. It was paved with basalt blocks by 1920.

Townsend Street: Townsend Street was basalt blocks and cobbles between 3rd and 2nd in 1909. Basalt paving was in place from Second to Japan Street (Colin P. Kelley), and paved to the Embarcadero by 1912.

King Street: King Street was paved with basalt blocks by 1890 from Second Street to First. By 1909, the basalt paving stretched from First Street to the Embarcadero.

Berry Street: Berry Street was paved with basalt paving from Third to Second Street by 1908, and on to the Embarcadero by 1909.

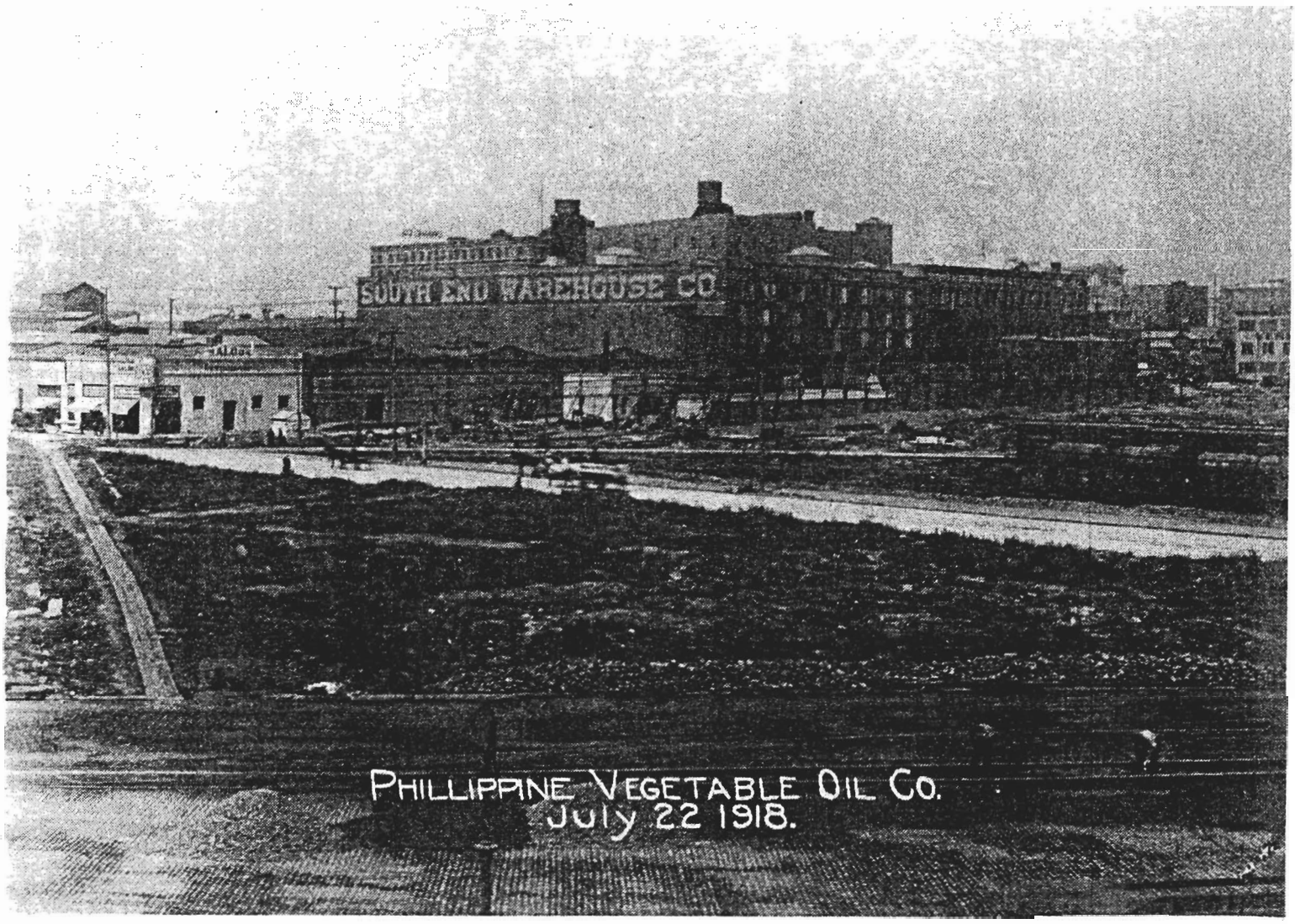
First Street: First Street crossed the contours of Rincon Hill so that the paving varied according to contours of the hill in this section. Photographs and municipal reports show First Street to be paved with basalt blocks north of Harrison to Market Street by 1911. From Harrison to Bryant Street, First remains an unpaved dirt road in 1919. From Bryant to Brannan, First Street is basalt and cobble pavement by 1907. First Street, south of Brannan, is unpaved as late as 1912. By 1914, First Street was paved to the Embarcadero.

Fremont: Fremont Street also crossed the contours of Rincon Hill. South of Folsom to Harrison, photographs show it paved with basalt paving in 1921 and Fremont remained unpaved and in dirt, south of Harrison to Brannan in 1919. In September of 1914, Fremont was paved with basalt to the Embarcadero.

Beale Street: As with Fremont and First streets, Beale crossed over Rincon Hill, and photographs show basalt paving in place in 1921. South of Harrison to Bryant, the street remains unpaved in 1912. In 1913, Beale Street was paved to the Embarcadero.

Main Street: In 1919, Main Street was paved with basalt from Folsom to Harrison. By 1913, Main Street was paved from Harrison to Bryant. In 1914, Main Street was paved with basalt to the Embarcadero.

(Author's collection)



Repairing the Embarcadero with Basalt Blocks, 1918: Workmen are digging up the railroad tracks on the Embarcadero, just south of King Street in 1918. Basalt blocks have been dumped along the triangular waterfront lot to be used between the tracks and for repairs.

Digging Up Paving Blocks Along East Street, July 17, 1908: Workmen repaired the railroad tracks for San Francisco's Belt Line train. In the process, they unearthed hundreds of tons of paving blocks--most were cleaned up and reused, right on the spot. The scene above is between Howard and Folsom streets, when East Street was lined with sailors' boarding houses, saloons that served San Francisco's famous "Free Lunch", tailor shops, barbershops and pawnshops. Collectively it was known as "The City Front--and it was here that the work of the waterfront was done.

East Street-the Embarcadero: East Street remains on the city maps until 1909 when it was re-named the Embarcadero. It was an era of re-discovery of the city's Spanish heritage and the city fathers chose "Embarcadero" as a reminder of the Mission Period.

In building the new seawall the Board of Harbor Commission generally moved from the north waterfront to the south but construction was not always sequential. On the south waterfront, for example, seawall section 13 (from the foot of King Street south to Berry Street) was started in 1903 and finished in 1905, and section 12 (between Brannan and Townsend) was started in 1907 and finished in 1908.

As the seawall was put in place and new piers constructed, the Embarcadero was filled and paved with basalt paving laid on a sand cushion.

"Building the new seawall and bulkhead in legal established locations increased the width of the Embarcadero from 14' to 45'—in some instances it became 100 feet wider." (*Board of Harbor Commission Biennial Report*, 1916: p. 21) All of the city streets which were extended to the piers were paved with basalt paving. The piers in the survey area were paved with wooden block pavement sealed with a bituminous surface.

In 1910, the Harbor Commissioners used the basalt paving because so much of the city's freight was still handled by horse-drawn drays (low-slung wagons with iron tires). Basalt paving was still considered "invincible" by the Superintendent of City Streets. But by 1916, the Board of Harbor Commissioners acknowledged, "To accommodate the enormous increase in automobile travel on the Embarcadero, the board decided to build a strip of smooth pavement (asphalt) at least 30 feet wide and provided also a wide basalt pavement which is required for heavy horse-drawn vehicles, especially in damp weather." (*Board of Harbor Commission Biennial Report*, 1916: p. 21)

By 1920, the board had decided to re-pave the Embarcadero with a concrete pavement six inches deep with a two-inch smooth wearing surface of asphalt. They had re-surfaced the waterfront roadway as far south as Folsom Street. As the Embarcadero was paved further south, basalt blocks were left in place and surfaced with asphalt. Along the Embarcadero today, just south of the site of former Pier 42, asphalt does not quite cover the paving blocks near the waterfront curbs.

Sources for South Beach Paving Blocks:

Because the South Beach area was late and long in filling, it was also late in paving. We have not found any city contracts paving for the South Beach dating before 1907 or after 1919. This time period for South Beach basalt paving is further confirmed by analysis of photographs. San Francisco Municipal Reports do not list the names of individual contractors in their reports but the *Board of Harbor Commissioners Biennial Reports* list some familiar Sonoma County quarry owners supplying paving for the Embarcadero in the South Beach area: Flynn & Tracy (considered Sonoma's largest working quarry in 1903), J. G. Harney, and Wymore's Quarry. It is safe to conclude that Sonoma quarries produced most of the basalt paving found in the South Beach study area.

HISTORIC PRESERVATION OF PAVING BLOCKS

In 1976, San Francisco's sewer construction project involved the tearing up of city streets to lay down a sewer measuring twenty-five feet across. The project followed the length of the city's waterfront and was six years in construction. In compliance with the Historic Preservation Act of 1975, a survey of cultural resources, together with recommendations for appropriate mitigation, was published in advance of construction.

Channel Street was the first contract to comply with the Historic Preservation Act. Basalt paving blocks were observed, sometimes two layers deep, along Berry Street. The procedure recommended for paving was as follows: "Attention is called to present policy of the Department of Public Works of the City of San Francisco with regard to the historic basalt block paving that will be encountered, which is that the paving blocks removed are stored for subsequent city improvements. Diagrams will be made under the direction of the principal investigator to show how this paving was laid (in some cases it appears to be two layers). It is not recommended that paving blocks removed in the course of construction be replaced unless the Landmarks Preservation Advisory Board of the City and County of San Francisco determines that such replacement is important to maintain the historic character of the city or the area." (Olmsted, 1977: p. 112-113)

The report went on to comment, "The stone street paving mentioned above does not qualify for the National Register of Historic Places as it is by no means the earliest or last surviving example of such paving in the city." (Ibid. p. 113)

In the South Beach study area basalt paving blocks around the Oriental Warehouse would be essential to preserve its integrity. At the time of writing these paving blocks have been removed. When the building is restored the site around the historic warehouse should be paved with basalt paving blocks.

It is impossible to say when the Oriental Warehouse blocks were first laid—the warehouse itself was built in 1867—and the paving would have been laid under private contract. No historic photographs of the yard immediately around the warehouse have been discovered. One might assume that the blocks were laid at the time the warehouse was constructed. Although it is possible that the early filled-in yard was dirt leading to the wharf, as was the case in 1870 Carlton Watkins view of surrounding streets. 1867 would be very early for this kind of pavement. The Oriental Warehouse yard would have been repaired frequently because of constant heavy use over the years from wagons, drays, and railroad freight cars. Blocks would have been re-laid when the various spur railroad tracks were put in.

Following this reasoning, we cannot be sure of the age of the Oriental Warehouse basalt paving, but the character of the warehouse requires that such a surrounding

(Karl Kortum photograph)

Basalt Blocks are Prized by Architects for Decorative Paving: The stone mason uses old paving blocks to make handsome steps below a fountain at Ghirardelli Square.

basalt block pavement be restored as the correct setting when this important historic landmark building is restored.

Uses of Historic Blocks

"Someone is Stealing New York City's Streets" headlined the *New York Times*, January, 1985. "Many of the older parts of the city were done with paving block and have now become industrial areas. On weekends and at night, when very few people come by, that's when they come in vans. . . Officers from the 44th Precinct in the Bronx arrested two men in a blue van who were trying to make off with the corner of 161st Street and Jerome Avenue. The men had already pried 200 stones out of the street with crowbars and piled them in the van. . . The men were arrested and charged with "Grand Larceny Rock." The officers believed the men were getting from $1 to $3 a piece. They are selling them to contractors who believe they are legitimate suppliers.

Charles Forti, New York City's General Manager of Highway Operations, said that many of the city's waterfront streets were paved with 19th century granite blocks that "was used for ballast in freighters from Europe. After being loaded with cargo, the ships left the blocks behind and the cities paved the streets with them." Mr. Forti described them as "Belgium paving blocks, cut rounded on their sides—the newer ones, were flat. The rectangular blocks measure 12 inches by 6 inches by 4 inches and weigh five pounds."

New York City's city streets were far too extensive to have depended on ship ballast for paving. An engineering study reported that in 1890, New York City had 365.2 miles of pavement [more than three times as extensive as San Francisco in 1892]; 87 percent of these streets were paving stone that cost $3.25 per square yard when laid. The next most popular street surface was macadam which cost 45 cents per square yard, and paved 6.6 percent of New York's streets. (*Engineering News*, July 7, 1892, p. 4-5)

In San Francisco, basalt and granite stone blocks have been prized for decorative purposes. One good example is the stairstep wall facing the beach at Aquatic Park. Our photograph shows a stone mason laying the stones around a fountain in Ghirardelli Square. In courtyard and alleyways that are free from heavy automobile use, basalt paving could make an attractive comeback and greatly enhance the historic quality of buildings. In rebuilding the Hyde Street Pier, for example, basalt paving would make a handsome walkway to the historic ships. It is the fact that the stone is hand-finished that gives it a pleasing characteristic texture. Hand-made objects that require human judgment and skill take on an added significance, giving importance to a site and enhancing everything on it.

BIBLIOGRAPHY

Reports & Annuals

State Board of Harbor Commissioners Biennial Reports for the years listed. (Period covered, 1886-1926)

California Journal of Mines & Geology from 1886-1955.

Engineering News, 1875 to 1950

Journal Association Engineering Society, 1892

Langley San Francisco City Directory 1865-1920

Merchants Association Review, 1900-1910

Mining in California, Report of State Mineralogist, 1894
California State Mining Bureau Publication

San Francisco Municipal Reports, 1860-1917

South of Market Journal, 1926

Periodicals

New York Times, 1985

Petaluma Weekly Argus, 1857-1898

Press Democrat, Santa Rosa, 1985-1986
Gaye LeBaron columns

Articles and Books

Bancroft, Hubert Howe 1884-1890 — *History of California*, 7 vols. San Francisco, A. L. Bancroft &

Bancroft, Hubert Howe 1857 — Scraps. dated 1857.

Division of Mines
1951
Geological Guidebook of San Francisco Bay Counties. California State Division of Mines, Bulletin 154.

Dow, Gerald Robert
1973
"Bay Fill in San Francisco: A History of Change." M.A. thesis, California State University, San Francisco.

Harris, Ellen M.
1983
"Penngrove: A Jigsaw Puzzle of Its Past and Present." Typescript, 2nd edition.

Hittell, John S.
1878
A History of San Francisco, and Incidentally, the State of California. San Francisco, A. L. Bancroft & Co.

LeBaron, Gaye, et al
1985
Santa Rosa, A Nineteenth Century Town. Santa Rosa, Historia Ltd.

Lewis Publishing Co.
1889
Lewis Illustrated History of Sonoma Chicago, Illinois.

Munro & Fraser
1880
History of Marin County. Alley, Bowen & Company.

Olmsted Roger R. & Nancy
1977
The San Francisco Waterfront. San Francisco, Waste Water Management.

Pamphlets

California Redwood Paving & Flooring, 1918. Bancroft Library

City Street Improvement Company, 1891-1898. Bancroft Library

Imperishable Pavement Company, Sept. 1894. Bancroft Library

Stow Foundation Pavement, 1869. Bancroft Library.

Oral History & Letters

Camozzi, A. J. Interviewed by Dr. William Kortum of of Sonoma in approximately 1962.

G.P. McNear Letter to Ed Mannion of Petaluma, 1941

San Francisco Engineering Archive Photograph

Hand-hewn Basalt Paving Blocks Ready to Be Laid on Seventh Street, North of Folsom, April 4, 1913: Considered "invincible street paving" by San Francisco's Superintendent of Public Streets in 1916—basalt blocks were comparatively expensive, $60 per thousand. At six cents a piece the stone mason kept 3.5 cents each, but after a strike he got 5 cents each. The rising cost of basalt paving, which had to include shipping and handling by rail and by water, made the far cheaper asphalt a bargain hard to resist especially as automobiles became less of a curiosity and drivers more demanding of smooth, quiet rides