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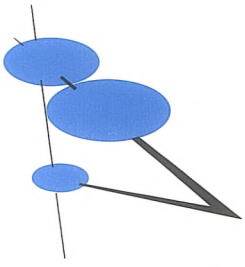
Monthly Review

In this issue

BART: Dig We Must

Built to the Hilt?



January 1970

BART: Dig We Must

. . . The San Francisco Bay Area looks to rapid transit for a solution of its rapidly worsening problem of motor-vehicle congestion.

Built to the Hilt?

. . . Visible evidence of the construction boom of the '60s surrounds us on every side. But will the boom continue into the '70s?

Editor: William Burke

BART: Dig We Must

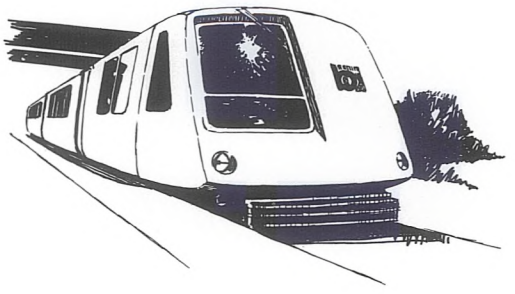
All American cities share a common transportation problem, but only within the last few decades has the problem approached a crisis stage. Few individuals today are immune to the headaches caused by highway congestion and the shortage of parking facilities, and few are unaware of the frustrations and inconvenience resulting from overcrowded, inefficient mass-transit systems. As population and auto usage increase, traffic congestion continues to worsen. The auto's appetite for land is seemingly insatiable, as there is always a demand for new highways and parking spaces. And, whereas the lack of adequate facilities threatens to negate the convenience and flexibility offered by the automobile, the continual construction of new facilities threatens to deny land to other essential uses.

The existing mass-transit systems are meanwhile beset with their own share of problems. The growth in the transit-dependent urban population strains existing facilities, while the even-more-rapid growth of suburban areas creates a demand for the expansion of urban transit services. But at the same time, the transit industry remains trapped in a spiral of increasing costs, declining patronage, and an almost perpetually unfilled need for more and better equipment and maintenance.

Auto spells congestion

Urban planners recognize, however, that a city's viability depends upon its potential to attract residents, shoppers, businesses, and workers sufficient to sustain a high level of economic activity. This potential depends, among other things, on the relative ease with which existing resources can be reached. Yet as it stands, traffic congestion and inadequate mass-transit facilities threaten to paralyze the major American cities and to stunt their growth as important centers of economic, social and cultural activity.

The problem, then, is to create an efficient transportation system which will satisfy a metropolitan area's growing need for peak-hour transportation services but will not endanger the other needs of the metropolis. Unless public officials are willing to allocate a great deal of valuable land to highways, bridges, and parking spaces, the trend towards increased auto usage by peak-hour commuters must be curtailed. The best alternative thus is to provide a metropolitan-wide mass-transit system that is capable of competing with the automobile in terms of speed, comfort, and convenience. A system of this type requires much less land usage, and it also relieves peak-hour traffic congestion on streets and highways by inducing many auto users to leave their cars at home.



With this in mind, Los Angeles, Chicago, Washington, Boston and other cities have all begun to look into the costs and benefits of rejuvenating and/or introducing mass-transit systems. But meanwhile, the San Francisco Bay Area Rapid Transit District — the subject of the present article — has already constructed the major portion of a seventy-five mile system and is now making plans to extend it.

Topography spells trouble

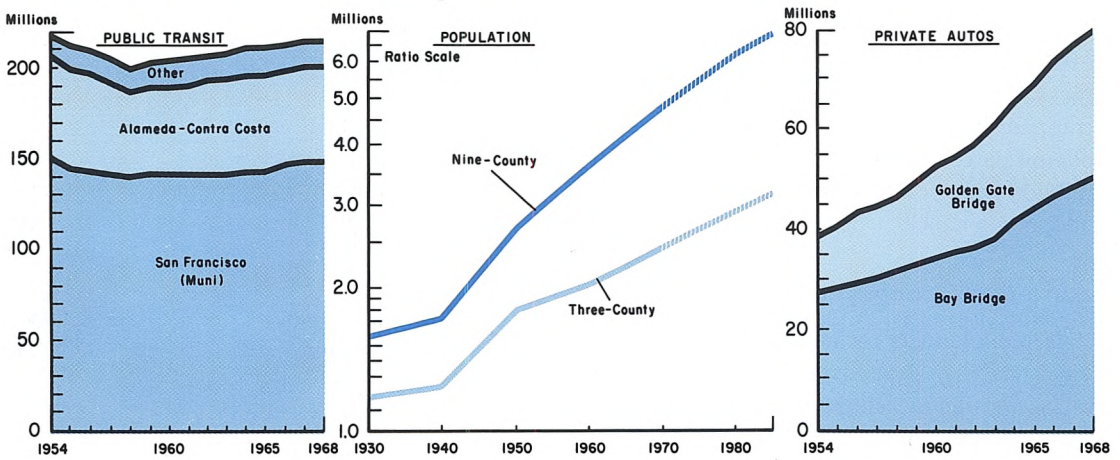
San Francisco is second only to New York in its reliance on mass transit; buses, cable cars, streetcars, trolley cars and commuter trains provide extensive local, interurban, and transbay service. However, the facilities are inadequate and consequently overcrowded, uncomfortable and often inconvenient. Heavy traffic snarls the streets, highways, and bridges during peak-hours, as thousands of motor vehicles pour into the central business district each day and pour out again each night. The topography of the area further aggravates the situation and necessarily narrows the range of feasible solutions. The Bay itself as well as the steep hills that rim the Bay — the very features that make the area so picturesque — create special problems for the transportation planners who would knit the area together.

An omnibus line in the early 1850's, and horsecar and steam-dummy lines later on, freed San Franciscans for the first time from the necessity of living near the center of town. The Market Street Railway, for example, opened up the foothills of the Twin Peaks area. Then, in 1873, Andrew S. Halladie introduced the famous cable car. With its ability to climb steeply graded hills, the cable car permitted settlement of heretofore isolated or sparsely populated sectors — in particular, Nob Hill and Telegraph Hill.

But while San Francisco was clinging to the horsecar and the cable car, the East Bay was opening its arms to the electric railway, so that by 1894 it could boast of almost 60 miles of electric and cable railways. The electric railway stimulated the dispersion of population from Oakland towards the north and southeast. Other railroads and highways, of necessity occupying the natural topographic corridors, were meanwhile servicing the communities of the San Francisco peninsula.

The system now building had its genesis in

Bay Area's population explosion demands new transport innovations, as bridges operate at capacity and public-transport usage stagnates



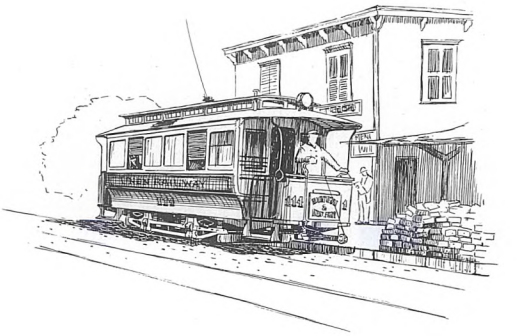
a proposal, made in 1900 by the San Francisco *Chronicle*, for an underground, high-capacity transit system to be centered around Market Street, the city's major thoroughfare. But for many decades, the expansion of the area's transit network depended upon the extension and enlargement of existing surface lines.

Early transit plans

In the West Bay, the San Francisco Municipal Railway (Muni) started operations in 1912 and, within the next forty years, established an extensive service of buses, streetcars, cable and trolley cars. In the process, the Muni system purchased and integrated two private transit companies and two cable car lines. In the East Bay, one F. "Borax" Smith succeeded in the early 1900's in purchasing all the existing streetcar routes and in establishing a major ferryboat system. (This system was preceded by a ferryboat system operated by the Southern Pacific Railway.) Although Smith eventually went bankrupt, his transit system was taken over in 1923 as the Key System Transit Company, and was eventually transformed (1960) into the Alameda-Contra Costa (AC) Transit District.

The Muni in San Francisco, the Key System in the East Bay, and the Southern Pacific railroad in the Peninsula all helped along the development of outlying residential areas. In San Francisco, for example, the opening of the Muni's Twin Peaks Tunnel in 1918 permitted a rapid increase in settlement west of the hilly barrier in the center of the city. Then, in the mid-1930's, the Greyhound Corporation entered this field by offering commuter bus service into Marin County to the north, San Mateo County to the south, and Alameda and Contra Costa counties to the east.

But with the advent of the automobile, the pace and direction of urban living changed radically, as was seen in the accelerated growth of peripheral and suburban areas throughout the Bay Area. And along with the increase in auto usage (and a consequent decline in railway patronage) went an increased demand for more and better streets and highways. El Camino Real, the trunk line down the Bay Plain, by 1915 had already been repaved into a two-lane highway from San Francisco to Santa Clara Valley, while the East Bay Highway from Oakland to San Jose was virtually completed at the same time. Then, during the following decade, engineers began work on a tunnel to connect Berkeley with Contra Costa County in the east, and others began work on the Skyline Boulevard to connect San Francisco with Santa Cruz County to the south.



The expansion of public-transit and (especially) private-auto traffic intensified the need for improved transport links across the various reaches of the Bay. Ferry systems had been transporting passengers and cargo since the 1850's, but passengers in later decades demanded bridges instead of more ferries. Railway bridges came first—at Dumbarton in the South Bay in 1910 and at Martinez-Benicia in the North Bay in 1929. Then came several bridges for automobiles—at Dumbarton and San Mateo in the south and Carquinez in the north. Finally, there were those two masterpieces of the bridgemaker's art — the San Francisco-Oakland Bay Bridge

(1936) and the Golden Gate Bridge, linking Marin County to San Francisco (1937).

The new bridges vastly stimulated auto traffic, but they also helped bring about the demise of the ferry system and a serious decline in the Key System's transbay patronage. Even so, the new bridges and highways did provide the Bay Area with a unified road network — something which the public-transit systems had not been able to achieve.

Coordinated transit plan

The need for a coordinated mass-transit system seemed self-evident to many authorities. San Francisco's City Engineer, M. M. O'Shaughnessy, as early as 1931 predicted that substantial traffic congestion would occur after the opening of the Golden Gate and Bay Bridges, and thus pushed for the development of a rapid-transit system that would help reduce the volume of auto traffic flowing into the city. But despite official backing, the public voted down a proposal for a streetcar subway in 1937. A unified transit system became only a glimmering prospect; indeed, an uninterrupted transit trip from, say, the Peninsula to Marin or the East Bay was a virtual impossibility.

Still, the obvious need for mass-transit planning culminated in 1951 with the creation of the Bay Area Rapid Transit Commission. After five years of extensive research, this group came up with a transit plan for the entire nine-county Bay Area. The Commission foresaw two alternative growth patterns for the Bay Area: one which entailed a dispersion of business activity into many small and uncoordinated districts, and a second which envisioned a well-defined hierarchy of high-density central business districts.

The first alternative — urban sprawl — would almost necessarily result if the community relied on motor vehicles for assuring the necessary circulation of goods and persons throughout the area. But the second alternative—a pattern of concentrated, strategically located central-business districts—would require the development of an extensive mass-transit system. In such a system, San Francisco and Oakland would form the major centers of economic activity, while other nuclei would be located at San Jose, Berkeley, San Mateo, Vallejo, Concord, Petaluma, and Hayward.

In the Commission's view, the central business districts of these various population centers would be connected by a network of freeways and, more importantly, by a $900-million, 123-mile rapid-transit system. Construction would be carried out in three stages: 1) Palo Alto (Santa Clara County) through San Mateo County to San Francisco, across the Golden Gate Bridge to Marin County, and across the Bay in a subaqueous tube to Alameda and Contra Costa Counties; 2) Palo Alto to Hayward and San Jose; and 3) extensions to Napa, Sonoma and Solano Counties and throughout the original six counties.

The Commission recognized the interdependence of rapid transit and other modes of transportation; in fact, it argued that an efficient, coordinated transportation system required the development of feeder service to rapid transit stations, the improvement of existing local transit services, and the building of additional freeways and bridges to fulfill future private transportation demands. But a rapid-transit system, in the Commission's view, was the basic essential, in view of the existence of overloaded freeways, crowded interurban buses, and congested downtown streets. Thus, as a result of the Commission's report, the Bay Area Rapid Transit District (BART) was created in 1957 to finance, construct and oversee the operation of a rapid-transit system to serve the five counties of San Francisco, Alameda, Contra Costa, Marin and San Mateo.

Proposed 1956

Rapid Transit in the Bay Area

Actual 1972

Difficulties and delays

BART has been beset with difficulties from the very outset, beginning with the withdrawal of Marin and San Mateo counties from the original plan. First of all, BART engineers concluded that the cost of a subaqueous tube to Marin would be prohibitive because of the depth of the ocean floor, and then the Golden Gate Bridge District refused to permit a lower deck on the span for BART trains. Next, San Mateo decided to withdraw because it felt that BART would do nothing more than duplicate the bus and rail services already existing in the county, and because the increased tax rate necessitated by BART membership would put the county in a disadvantageous position vis-a-vis Santa Clara County in attracting new industries.

By mid-1962, the District contained only three counties — a far cry from the nine-county plan of 1956 — the 123-mile system was down to 75 miles, and the total cost was up to about $1 billion. Moreover, BART had to make a number of route changes to take account of its shrunken configuration. In San Francisco, for example, it deleted the Geary Street line that would have been necessary to service Marin, and in its place substituted a Muni subway to service the southwestern portion of the city. But finally, after approval of a revised plan by the Boards of Supervisors in the three counties, the District submitted to the voters a $792-million general-obligation bond issue for basic construction work on the new system. Only a 60-percent majority was necessary for approval, in contrast to the usual two-thirds majority, but even at that, the issue barely passed, with a 61.2-percent yes vote (November 1962).

Law suits, route changes, design problems — all contributed to prolonged and expensive delays. In Contra Costa, a group of taxpayers challenged (unsuccessfully) the legality of the bond issue and the use of official funds to support the bond issue. In the West Portal area of San Francisco, local merchants fought for surface construction of the transit line in order to obtain easier access for their customers. Berkeley's city administration, on the other hand, fought for four years (1962-66) against BART's plan for a predominantly surface line in Berkeley. That particular issue was not decided until Berkeley voted to put up over 75 percent of the extra $24 million needed to provide underground construction of the entire route through the city.

Despite all the delays, the first ground was broken in 1964, with construction of the Diablo Test Track, a 4.5-mile segment of the old Sacramento Northern Railway between Walnut Creek and Concord. In February 1965, the first major construction contract was let for the tunnel through the Berkeley Hills between Berkeley and Orinda, and by April 1966, work on the transbay tube was underway.

To date, almost all of the design work is finished, roughly 90 percent of the right-of-way has been acquired, and more than 55 percent of the total system is completed. Much work still remains to be done, of course, and contracts still must be let for various parts of the system—for the Richmond-Concord line, for example, and for the stations at Fremont and Daly City. Even so, the first passenger service from Oakland to Hayward should begin next year, and the entire system should be in operation by mid-1972.

Modern-day design

BART, when completed, will be the first truly modern rapid-transit system in the country—even though it will utilize the standard type of transit vehicle, the bottom-supported type with metal wheels operating over steel rails. (According to BART engineers, no other alternative offered the same combination of safety, speed, capacity, operational efficiency, comfort, and quietness.)

But the Diablo Test Track, a symbol of the District's commitment to build the entire system from scratch, has been used to develop the most up-to-date types of track, power, train-control systems and noise-reduction techniques.

BART's electrically powered trains will have a top speed of 80 miles per hour, an average speed of 45 mph, and an acceleration/deceleration rate of 3 mph per second. The longest trip into downtown San Francisco (from Fremont) will take only 35 minutes. Each car (67′3″ long, 10′5″ wide) will accommodate 76 seated passengers, and BART's total carrying capacity will be 30,000 seated passengers per track per hour, a carrying capacity equivalent to 30 freeway lanes.

Station stops will be approximately 8 to 20 seconds, with trains running every 90 seconds during peak-hour service and, except for late at night, every 15 minutes during off-peak hours. The scheduling, speed and spacing of the trains will be automatically controlled by a central computer. But there will also be three fail-safe systems: 1) an emergency power system capable of maintaining the full system for two hours; 2) a duplicate computer system adjacent to the central control room; and 3) automatic controls at each station capable of operating independently of the central computer control.

BART will have 38 stations — 13 in San Francisco and 25 in the East Bay. (Four of the San Francisco stations — Van Ness, Church, Castro and West Portal — will be part of the Muni Rapid Line.) Suburban stations will be equipped not only with free parking facilities but also with special turn-off lanes for feeder buses and passengers.

Perhaps the most challenging engineering task in the entire project has been the construction of the $180-million, 3.6-mile trans-bay tube, which now lies from 75 to 130 feet below the surface of the Bay between San Francisco and Oakland. Altogether, 57 steel sections — 314 to 350 feet long, 24 feet high, and 48 feet wide — with two tunnel bores 17 feet in diameter and a central repair walkway, were laid end to end across the Bay. When the system is completed, passengers will be able to cross the Bay in BART trains in only 8 minutes' time.

Fare collection will be automated on the BART system. Passengers can choose between using a credit card or buying a cash value ticket to pay for their ride. Fares will average 2½ to 3 cents per mile, and a plan is being developed to allow for a transfer system between BART, Muni and AC Transit.

Modern-day costs

The cost of BART is no less spectacular than its design. But the District, under its original 1957 authorization, has a number of alternative means of financing: 1) incur bonded indebtedness in an amount not exceeding 15 percent of the assessed valuation of taxable property within the District; 2) levy and collect taxes to pay the principal and interest on bonds issued; 3) issue bond anticipation notes; 4) levy and collect taxes, not to exceed 5 cents per $100 assessed valuation of taxable property, for purposes other than payment of debt services; 5) issue revenue bonds and equipment-trust certificates for the purchase of equipment; and 6) issue special assessment bonds.

The District's 1962 report envisioned a total cost of $997 million for construction of the proposed 75-mile system. The $792-million general-obligation bond issue of 1962 made funds available for basic construction work, for acquisition of right-of-way, and for basic design. (Payment of principal and interest on the bonds would be based upon a District-wide property tax not to exceed 71 cents per $100 of assessed valuation.) In addition, financing of the $133-million trans-bay tube would be obtained from bridge rev-

enues and from revenue bonds of the California Toll Bridge Authority, while financing of $72 million of rolling stock would be based upon District sale of revenue bonds secured by future BART revenues. BART was also obligated to reimburse the California Toll Bridge Authority for the $61-million cost of tube approaches.

Within several years, however, the $997-million cost estimate seemed wildly optimistic, despite — or because of — the use of a 3-percent annual inflation allowance in the estimates. Delays due to the 1962 taxpayers suit, delays due to prolonged negotiations over station design and route location, and delays in cash disbursements all contributed to spiraling costs. In many instances, too, BART had to contend with bids well over the 1962 allotments, such as the $9-million excess on the transbay tube alone. Other increases came about because of additional engineering work, or because of unanticipated improvements in station finish, train control, and tube approaches.

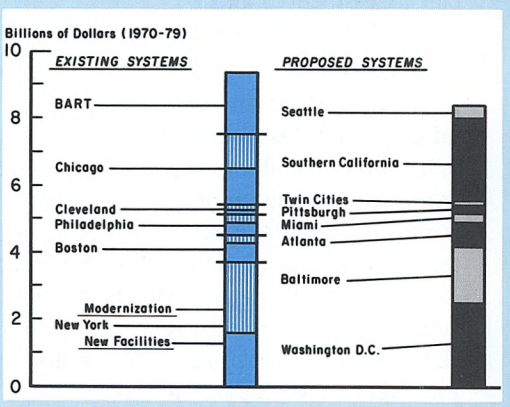
Despite cost reductions in some areas, BART by 1966 had overrun the 1962 estimates by more than 18 percent, and the situation continued to worsen in later years. Cost inflation, delays, design improvements and additional engineering services all added to the toll. Thus, by early 1969, the total cost for the package was estimated at $1,380 mil-

Needed: $20 Billion

The rapid-transit industry handed Congress a $20-billion shopping list last summer for the modernization of existing transit facilities and the construction of new systems. Over the next decade, industry spokesmen estimate their requirements this way: $8.0 billion for existing rail rapid-transit systems, $1.3 billion for existing commuter railroad systems, and $8.4 billion for new rapid-transit operations, plus another $2.5 billion for motor bus systems.

New York alone could utilize $3.7 billion for rapid transit over the period 1970-79, and Chicago could use another $2.1 billion. In both cases, roughly half the total is needed for modernizing existing plant, and half for building new facilities. San Francisco's BART could use perhaps $1.8 billion, and Boston, Philadelphia, and Cleveland are in for smaller amounts.

For constructing completely new systems, Los Angeles could use perhaps $2.5 billion, Washington $2.4 billion, and Baltimore $1.7 billion. If construction were completed on these systems and on smaller systems in Atlanta, Miami, Seattle, Pittsburgh, and Minneapolis, some $8.4 billion would be required.



Where's the money coming from? Industry spokesmen support the establishment of a Federal urban rapid-transit trust fund, using funds available from the existing auto excise tax. If that were done, public agencies and state-and-local governments could "move ahead now with the kind of assurance that state highway commissioners have enjoyed in developing the interstate highway program."

lion — $383 million above the 1962 estimate — and some critics wondered if even that would be enough to finish the entire system as planned.

Where is this $1,380 million coming from? The initial $792-million bond issue started the ball rolling. (The bonds have been marketed over a period of several years, and the net interest on the entire issue thus averages out to an unbelievably low — for these times — rate of 4.14 percent.) The initial $133 million from the California Toll Bridge Authority for the transbay tube has now risen to $180 million, and $118 million more has come from Federal grants for research-and-development and rolling stock. A maximum of another $150 million will come from the 0.5 percent sales tax now levied in the three-county District, $50 million will come from interest earned on funds held longer than expected because of project delays, and there will be other funds available from other sources.

Some critics are still not certain that $1,380 million will do the job. (To cite one minor but significant action, bids submitted recently for the finishing of the concrete shells of three subway stations in Berkeley and Oakland came in $2 million above the District's estimates.) The budgetary squeeze is accentuated by the unresolved debate over the Muni Rapid subway — the result of a lack of sufficient funds to finish the line as promised — and by the unanticipated expense of adding water fountains and facilities for the handicapped to each BART station. BART directors may be correct in stating that they will be able to finish the system with the available funds, but to do so may require the deletion of such "fringes" as more stations, landscaping, and good design.

Modern-day growth

With the cost of BART rising daily, Bay Area residents may wonder how BART will benefit the community — how BART will affect not only the area's peak-hour congestion problems but also the overall development of the communities serviced. Some answers can be gained from the analysis published in the 1967 report of the Northern California Transit Demonstration Project (NCTDP).

Despite a decline in patronage for the transit industry nationwide, both AC Transit and Muni have experienced increases in revenue patronage since 1960 — 11.3 percent and 4.4 percent, respectively. Moreover, according to the report's projections, three-county revenue patronage may increase 26 percent by 1975. Even in the face of the introduction of BART services, both Muni and AC should share in this increase because of their greater patronage from BART feeder services.

Population in the three-county area is projected to increase about 25 percent by 1975. Most of this growth may be concentrated in the suburban areas of Alameda and Contra Costa counties, implying a substantial demand in these areas for BART as well as extended AC Transit services. But San Francisco, although perhaps losing some population by 1975, should still provide over 52 percent of the three-county transit patronage in that year. San Francisco, after all, is the focus of most daily adult transit trips in the area; besides, it has always been a transit-dependent city, due primarily to its high population density (16,500 persons per square mile) and its hilly terrain.

But the report indicates that BART will make its main contribution in fighting auto congestion. Between 1960 and 1967, auto registrations in this area increased over 28 percent — somewhat more than population growth—with the number of persons per car declining steadily. Highway and bridge congestion during peak-hour travel thus progressively worsened, so that both the Bay and Golden Gate Bridges could expect unbearable congestion in future years unless alternatives were provided to auto travel.

But according to NCTDP estimates, roughly one-third of BART's patrons from the East Bay may be diverted from automobiles by 1975. "In terms of equivalent capacity, BART will be equal to another Bay Bridge in delivering East Bay citizens to downtown San Francisco each morning." If such results are actually realized, BART could put off the need for a new bridge to relieve Bay Bridge congestion, and it could also save San Francisco millions of dollars each year in terms of streets and parking spaces that would otherwise have to be provided.

Since BART does not service Marin or the southern Bay Area counties, it will not relieve their congestion problems or reduce the traffic flows from these areas into San Francisco and the East Bay. But the system may not always remain in its present form. Planners are already considering such possibilities as a San Francisco-Marin ferry system and augmented bus system, a comprehensive feeder network to BART stations, and of course, the eventual implementation of BART's original plan.

Already, some major signs of growth have appeared in tandem with the construction of the BART system. In San Francisco, over 400 stories of new office buildings are planned, under construction, or already operating in the vicinity of Market Street, near the BART stations; indeed, San Francisco accounts for 60 percent of new office-building permits issued in the nine-county Bay Area, as compared to 31 percent in pre-BART days. Oakland has initiated an urban-renewal project in the area of BART's 12th Street station, and will locate four new high-rise buildings and a college campus near the Lake Merritt station. Berkeley's inventory of rental space has jumped 30 percent; Union City's improved land value has risen 50 percent and its vacant land value has doubled; in Fremont, a whole new central business complex is developing, with land value in-

Europe vs. America

Many European cities are emerging as models of balanced transportation systems, on the basis of a distinctive European approach to transportation problems coupled with a long-standing dependence on mass transit. In Europe, as cities were rebuilt after World War II, both public transit and automobile traffic were taken into consideration. In America, by contrast, the emphasis on automobile transportation and auto-oriented facilities resulted in increasing highway congestion and decreasing use of public transportation systems.

Since the end of World War II, new rapid-transit systems have been opened in Stockholm, Oslo, Frankfurt, Cologne, Milan, Rotterdam, Lisbon, and Rome. Other new systems now under construction or in the planning stage include: Helsinki, Amsterdam, Brussels, Munich, Essen, Dortmund, Stuttgart, Hannover, Nuremburg, Dusseldorf, and Bremen. Highway construction has also been making strides to keep pace with the rapid growth of automobile ownership — from one car for every 50 persons two decades ago, to one for every 5 persons today.

European cities have generally utilized the familiar two-rail rapid transit as the most efficient system. American cities in contrast, have frequently tended to conduct costly studies in the search for technological breakthroughs. BART, for example, carried out a number of studies which eventually supported the claims of the standard two-rail system.

creasing accordingly. Quite obviously, BART is stimulating the development of those areas that will be reached by its transit lines.

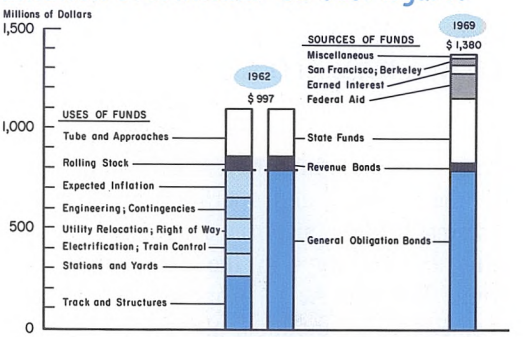
Pluses and minuses

BART's obvious growth potentialities have led many communities to consider ways of tieing into the system. San Mateo, in its transit plan, has discussed the possibility of rejoining the District, while Sacramento, California's state capital, has considered means of extending BART there. Oakland has already financed a $200,000 study to evaluate a BART line to the Oakland airport. More recently, a similar study has been authorized to determine the costs and benefits of a rapid-transit line to the San Francisco airport; several firms are submitting reports on the feasibility of a monorail system to the airport, but these plans tend to suffer from the fact that they envisage an independent line uncoordinated with BART.

BART's advocates, regionally and nationally, cite a long list of advantages that will accrue from the operation of this rapid-transit system. The list of pluses include: a delay in the need for the construction of more facilities for autos; stimulation to the growth of the areas serviced; increased mobility of the labor force in the three-county area; savings in travel time and in auto-insurance and maintenance costs; easier access to social, cultural, and recreational activities; and the provision of a high standard of public transportation at a low cost. And, unlike many transit systems, BART will have a large reserve capacity to fulfill future increases in demand for service.

But for every encomium BART has received, it has received several brickbats as well. A common complaint is that too much money has gone into a single mode of transportation, without sufficient analysis of alternative uses of available funds. Serious doubts exist, for instance, as to how effective BART

BART seeks new funds, as severe inflation overwhelms '62 cost figures



will actually be in relieving peak-hour highway and transit congestion. Furthermore, BART has been criticized for servicing primarily the suburban cities and the central business districts of the three counties. Thus, BART may stimulate a further rush to the suburbs and thereby accentuate the problems of the inner city. Others point to the negative effects of the high level of indebtedness caused by BART, which may render the public less willing to approve bond financing of equally important projects in future years.

Only time will test the validity of these various criticisms. All that is certain at this point is that BART's shortcomings, as well as its achievements, will be of considerable interest to metropolitan areas nationwide.

BART and the future

Perhaps one of the most vital needs of the Bay Area is a regional agency for transportation planning. As it stands now, responsibility for the planning and operation of various modes of transportation is highly fragmented and specialized. Despite this dispersion of responsibility, many agencies closely coordinate their operations; for instance, BART and the California Division of Highways have developed arrangements for joint use of rights-of-way, thus saving both agencies millions of dollars. However, the establishment of a single "umbrella" agency would allow for a much greater degree of overall coopera-

tion and integration of transportation facilities, present and future.

In 1968, the Bay Area Transportation Study Commission (in conjunction with the Bay Area Regional Organization Study Committee) recommended the creation of one such "umbrella" agency, a Metropolitan Transportation Authority, which would oversee the planning and operation of all transit systems, bridges, airports, seaports, ferry systems and freeways in the nine-county Bay Area. The MTA, as proposed, would take over BART's functions, along with those of the State Division of Bay Toll Crossings, the California Toll Bridge Authority, and the Golden Gate Bridge and Highway District. The proposed MTA at this point may be nothing more than a glimmer in a planner's eye, but some such move toward regional unification may be necessary to assure the continued growth and well-being of the Bay Area.

An effective transportation network requires not only a high level of coordination but also the provision of alternative means of transportation at varying costs, speeds, and degrees of comfort and convenience. BART is one step in that direction, and the extensive research now taking place in the field of transportation offers a variety of "next-steps." Transportation planners recognize that the usual solution of providing more and more of the same facilities is no longer an adequate solution: although the value of traditional means of transportation cannot be denied, the need to take advantage of recent technological advances in mass-transportation techniques is equally as important.

Perhaps, to much too great an extent, the San Francisco Bay has been ignored as a natural transportation corridor for daily travel purposes. Technologically advanced watercraft, such as the hydrofoil or air-cushion vehicles, may provide the type of high-capacity vehicles which will obviate the need for more and more trans-bay bridges. Meanwhile, some of the land vehicle systems developed in recent years may also provide alternative approaches to solving regional traffic problems. These systems include:

- PERC, an automatically controlled (2-person) personalized capsule running over city streets;
- GENIE, a small (10-person) bus routed by computers and servicing residential areas on call;
- StaRRcar, a small commuter vehicle capable of being operated individually on local streets or automatically at higher speeds on special guideways;
- Tunnel Train, a high-speed air-supported train that would travel in an enclosed tunnel; and
- Hovertrain, a similar vehicle that would glide along guide tracks.

Traffic today is outpacing street and highway construction. Existing transit facilities are outmoded and frustratingly overcrowded. Population is growing rapidly, spreading to the suburbs, and demanding faster, safer, and more convenient means of transportation. Simply providing more of the same facilities may not work; consequently, the San Francisco Bay Area has taken a broader approach and turned to rapid transit for relief.

The creation of BART has been a somewhat evolutionary process. The integration of design and performance standards, the problems of route location, and the desire to satisfy local community demands have necessitated a sometimes agonizingly slow process of development. Yet, within several years we can expect to see high-speed, high-capacity trains carrying passengers throughout the three-county area. BART may not solve all of the Bay Area's transportation difficulties, but it represents an ambitious step on the part of one of the nation's major metropolitan areas to solve a serious nationwide problem.

Patricia Alexander

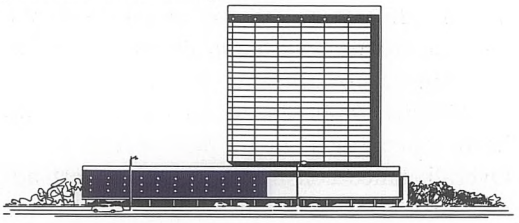
Built to the Hilt?

A discussion of recent growth in nonresidential-construction activity hardly requires statistical documentation; visible evidence surrounds us everywhere. Downtown skylines are changing dramatically, with new concrete and steel mountains overshadowing the giants of yesterday . . . freeways are continuing their far-reaching sprawl through city and countryside . . . shopping complexes are mushrooming over suburban landscapes . . . education facilities are growing strikingly . . . utility and water-development projects are multiplying in size and number . . . industrial plants are stretching out horizontally in every direction. Nonresidential construction indeed has responded nobly to the tremendous needs of the nation's growing communities and expanding business during the Soaring Sixties.

The industry is large and markedly heterogenous. Not surprisingly, then, the upward sweep in nonresidential-construction activity during the past decade represents not so much an industry-wide uptrend as the resultant of varying growth rates among different construction categories. The two major categories are 1) building construction, which includes office buildings, stores, manufacturing plants, schools, hospitals, and warehouses, and 2) heavy-engineering construction, which includes public works and utilities. (F. W. Dodge contract-award data.)

Building construction

Building-construction activity has been vigorous throughout the Sixties; all major building classifications have exhibited notable upswings. Activity in the West, however, has not quite matched the breakneck pace in other parts of the country. This region's 5.8-percent average annual gain in construction contracts, from $2.2 billion in 1960 to $3.5 billion by 1968, was considerably less than the 8.4-percent annual gain registered elsewhere. The Western share of U.S. building construction thus declined, from 18 to 15 percent, over this period.



But the West has fallen behind the national pace only in very recent years. During the first part of the decade, building construction advanced somewhat faster in the West than elsewhere, while the reverse was true between 1965 and 1968. However, the picture so far in 1969 suggests some renewed strength in the Western industry, since the value of Western building contracts through October was 29 percent higher than the comparable year-earlier figure, in contrast to a 16-percent year-to-year gain elsewhere.

Construction performance has varied widely among individual Western states. Building construction in the Pacific Northwest—Oregon and Washington — has far outstripped the growth recorded elsewhere, as contract volume has more than doubled in these states since 1960. But in other Western states — Idaho, Nevada, and Utah — building activity has actually fallen below the peak levels recorded during the first half of the decade.

And California, which accounts for a weighty three-fifths of Western nonresidential-building activity, expanded only half as fast as the Northwest states in the 1960-68 period, although its 1969 performance promises to be much stronger.

Office building binge

The construction of office and bank buildings has been the driving force behind the rise in building construction, both in the West and elsewhere. Thus, office-building contracts have grown from roughly one-eighth of the total in 1960 to one-fifth in late 1969.

Growth in the West has been irregular and has not coincided too closely with the national trend. The boom in Western office building occurred during the earlier part of the decade, while the boom elsewhere has been concentrated in the last several years. Overall, office construction in the West advanced at a 7.9-percent annual rate in the 1960-68 period (to $516 million) as against an 11.4-percent annual rate elsewhere.

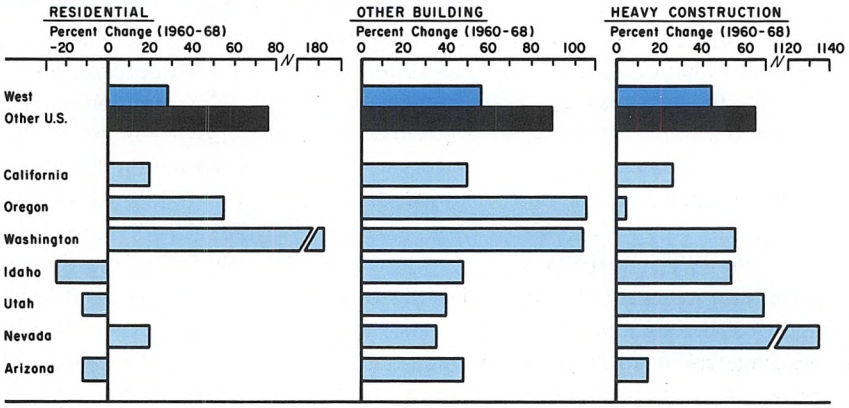
Gaining its initial momentum during the Fifties, the office-building spree has by now spread to virtually every major urban center in the nation, with builders attempting to keep up with a seemingly insatiable demand for modern, efficient office space. Office buildings have been moving in ever-increasing numbers to outlying areas beyond the central business district — locations at one time regarded as unfashionable or too remote. This feverish flurry of office construction reflects the influence of several major breakthroughs in technology and management.

First, the total volume of office work has increased substantially. The Sixties have witnessed a startling growth in corporate activity, obtained either through internal means or through acquisition, as well as a vast expansion and proliferation of white-collar service industries—banks, investment houses, accounting and law firms, data-processing firms, advertising agencies, and the like. Consequently, office employment has soared.

Second, the average amount of floor space per employee has also tended to rise. While this increase reflects in part the desire for more spacious working quarters, it is also the result of the stepped-up space demands of computers, office machinery, and such increasingly common appurtenances as employee lounges and eating-and-recreational facilities.

Third, new materials (prestressed concrete), new machines (tower cranes) and other cost-reducing techniques have helped spur on the boom. And in the West, rigid building codes linked to past earthquake scares have been relaxed, now that engineers with greater seismic-design know-how have

Construction activity gains in West, but rises even faster in rest of nation



devised new ways of erecting structures which can withstand shaking.

But as with any boom there always lurks an undercurrent of concern: can the present pace of activity be sustained? Opinion appears mixed. The building bubble could swell further in coming years, in view of an expected upsurge in service-oriented activities and a concomitant rise in the number of white-collar workers, as well as a further increase in the type of workers (administrative, technical, and professional) who utilize relatively large amounts of floor space. Moreover, the financing of office construction may remain more insensitive than residential financing to the restraining influence of tight monetary policy, owing to substantial differences in sources of mortgage funds, types of sponsors, and scales of development. Already, in fact, many commercial-construction firms have sought out new sources of capital —either by selling shares to the public or by acquiring as partners (or subsidiaries) those large investors, such as insurance companies or pension funds, who have access to substantial amounts of mortgage credit or cash.

On the other hand, some evidence suggests than an oversupply is developing and that office-building activity may soon be cut back. To many firms, the cost of renting space in a new building is becoming prohibitive. Office rentals have skyrocketed, partly as a result of the strong demand for office space, but also because of the spiraling costs of land, labor, construction materials, and financing. Even those larger corporations which are able to bear such heavy rental expenses now think twice about the increased costs of relocating, and thereby temper the demand for new office space.

In addition, construction underway today does not necessarily reflect the near-term demand for office space, because of the increasing relaxation of leasing requirements posted by mortgage lenders. At one time, a builder could not obtain mortgage funds unless a rather high percentage of the total planned office space had been leased in advance—typically around 80 percent. There was then always some assurance that future office space would be filled. But today, with substantially eased leasing requirements, there are no such assurances, and vacancy rates thus could jump rapidly as new office buildings are completed.

Moreover, the current monetary restraint may now be catching up with commercial construction as well as with the housing sector. Earlier in 1969, construction funds were generally available, at least for the high-yielding commercial-construction sector. Monetary stringency, however, has continued without letup throughout the year, so that even funds for commercial-building projects have now begun to dry up. Contractors thus may find it difficult in 1970 to match the 47-percent year-to-year gain recorded in January-October 1969.

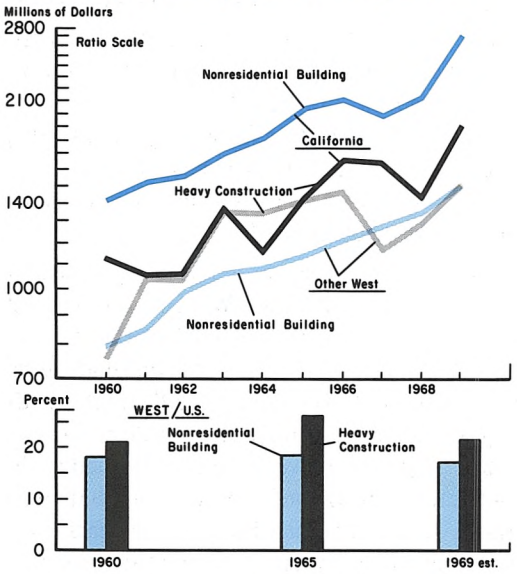
Stores and factories

Store construction, the second major component of the commercial-building industry, has also boomed throughout the Sixties. Activity expanded in the West at a 5.1-percent annual rate between 1960 and 1968 (to $549 million) and stores went up at almost twice the Western pace in the rest of the nation.

The boom in store construction has become synonymous with the rapid spread of suburban shopping centers, created by the pressure on retailers to follow the migration of the middle class to the suburbs. And with the auto revolution relentlessly registering its effect, retailers have found it necessary to provide shopping facilities surrounded by acres of parking. Altogether, since 1946, over 9,000 shopping centers have sprouted up throughout the country.

The stores remaining in the downtown areas meanwhile have been forced to mod-

West has smaller share of industry than before, despite recent gains



ernize in order to keep up with the competition. And as a reflection of the pressures to revitalize central retail districts, it is not uncommon to see downtown department and specialty stores in various stages of construction—expanding and renovating, both inside and out.

Industrial construction has grown rapidly, although less rapidly than office construction, during the Sixties, increasing at a 6.7-percent annual rate in the West (to $525 million) and at a 7.6-percent rate elsewhere between 1960 and 1968. Factory building has remained crucial because of its close relationship with swings in economic activity. These zigs and zags have reflected the cyclical variations of a number of influences, such as the rate of capacity utilization, current and anticipated corporate-profit levels, the level and trend of product sales, competitive pressures for modernization, and the availability and cost of financing.

During the upside of a typical business expansion, industrial investment first takes the form of expenditures on equipment within existing structures. But as the pace of economic activity quickens, with rising sales and backlogs and brightening profit and sales outlooks, businesses accelerate production in an attempt to gain their share of the rising market. Eventually, as producers find their existing floor space inadequate, they begin to expand plant facilities. Industrial construction may then mount (perhaps quite sharply) and may gather increasing momentum for a while—but then, as the boom reaches a peak and capacity begins to overtake production, construction activity tends to drop off. And so goes the cycle.

During the Sixties, however, industrial construction has not exhibited the cyclical ups and downs that it did in earlier years, perhaps reflecting the steadier upward pace of economic activity during this decade. In the nation as a whole, industrial construction has risen (albeit rather unevenly) in every year since 1961. In the West, the building of industrial structures has dipped in only two years, 1963 and 1968.

Industrial plants, not unlike one-time city-dwelling families, have been increasingly lured to the suburbs, which have ample quantities of low-priced land. And with almost universal car ownership, these plants have been able to attract workers from many miles away.

Schools and hospitals

Construction of educational facilities has also increased substantially since 1960, with a 4.4-percent annual increase in the West (to $793 million) as against an 8.1-percent rise in the rest of the country. The burgeoning postwar school population, coupled with the nation's growing zeal for higher (and higher) education, has triggered a sizable expansion in college and other school facilities during the decade.

There are now about 7 million college students, twice as many as in 1960, and

more than three times as many as in 1950. A continued vigorous growth in college construction thus seems inevitable. And although the increase in elementary and high-school enrollment has recently been tapering off, construction outlays for lower-grade and secondary schools still continue to rise, reflecting the soaring costs of building and financing, the need to provide such facilities as science laboratories and computer-instruction rooms, and the need to accommodate the nation's highly mobile population as it shifts into suburban areas.

But, public-school construction, like other publicly funded construction, remains vulnerable to the vagaries of financial markets. The current monetary stringency has hampered the planned financing of many school districts. In some cases, interest rates have exceeded legal or referenda-imposed bond ceilings; in others, the cost of servicing bonded debt has forced the postponement or abandonment of planned projects.

In addition, school financing continues to be hamstrung by taxpayer revolts. According to a Federal Reserve survey of small-government financing, the actual borrowing of Twelfth District school districts in tight-money 1966 amounted to only 52 percent of planned borrowing, mostly because of bond-referenda difficulties. And so far in 1969, a startling 43 percent of the nation's proposed school-bond issues have been turned down by the voters.

Hospital construction, on the other hand, has been the fastest-growing segment of the building industry during the Sixties, increasing by 8.7 percent annually in the West (to $324 million) and by 13.2 percent elsewhere. Yet in light of the increasing utilization of hospitals, even this rate of advance is not impressive enough. For example, 4 million more patients were admitted to the nation's hospitals in 1967 than in 1960, but only 13,000 new hospital beds were added during this period. Patient pileups are a common occurrence in many hospitals, particularly in urban areas. Public hospitals, which cannot turn patients away, are feeling most of the pressure of space shortages.

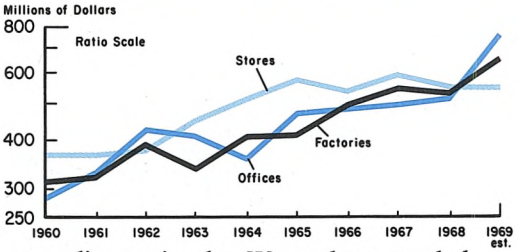
The rising demand for hospital space reflects the implementation of Medicare and Medicaid programs, the increasing number of older people, the extension of private and employer-financed health insurance plans, the rapid advance of medical technology, and of course the growing affluence which has encouraged more persons to use hospital facilities. Undoubtedly, these factors will continue to affect future hospital demand, so that unless we are willing to tolerate continued congestion in our hospitals, we will have to allocate even more resources to rebuild and replace the nation's health facilities.

Heavy construction: the auto . . .

Heavy construction, the second major segment of the nonresidential-construction industry, has failed to keep up with the rapid pace of building construction, perhaps because of its dependence upon the sometimes unpredictable flow of appropriations from government sources. Even so, spending increased at a 4.7-percent annual rate in the West and at a 6.5-percent rate elsewhere between 1960 and 1968. Heavy construction in the West—which accounts for one-fifth to one-fourth of the national total — reached a peak of $3.1 billion in 1966 and then began to decline. In 1969, however, Western activity perked up sharply again, with a 28-percent year-to-year gain through October.

Topping the list in this category is street-and-highway construction, currently accounting for two-fifths of all heavy construction. The nation spends more dollars building roads and streets than it does for building such other things as schools, hospitals, factories, or offices. In January-October 1969,

Office-building boom dominates Western construction scene today



expenditures in the West alone totaled an imposing $1.3 billion, over 31 percent higher than the year-ago figure.

The nation of course is increasingly dependent on the automobile. During the last ten years, the number of cars has increased about three times as fast as the nation's population. There are now almost 83 million cars and over 17 million trucks and buses registered in the U.S.—and one-fifth of all of them are in the West.

Providing adequate highways for this horde of vehicles is a mammoth, endless task. Western states have constructed some 141,000 miles of roads and streets during the past ten years, and some of them are barely adequate and even obsolete by the time they are completed. State-administered highways account for the great bulk of these construction outlays, utilizing seven out of every ten highway-construction dollars.

The 42,500-mile Interstate Highway System is now two-thirds completed, with some 28,000 miles of modern, high-speed freeways (7,100 miles in the West) currently open to traffic. Begun in 1956 and designed to accommodate the volume of traffic then forecast for 1975, the Interstate program has cost more than $35 billion to date.

. . . and the airplane

As the nation struggles to provide safe and efficient highways for its swelling supply of automobiles, it is perhaps even more hard-pressed to keep pace with the mounting construction requirements of commercial and general aviation. While some notable progress has been made recently in constructing new airports, expanding and upgrading terminals, building new and lengthening existing runways, and adding more auto-parking facilities, the effort so far falls critically short of the need, especially in view of the vast expansion in traffic generated by the new jumbo jets and airbuses.

Airport construction typically involves a lead time of five to ten years. Aircraft technology, however, has far outstripped the 1960-style forecasts of airport planners, so that today's airports now seem adequate to accommodate only yesterday's needs.

The needs for airport construction will only intensify in coming decades. Scheduled U.S. airliners now carry 162 million revenue passengers a year, more than double the 1960 figure—and the number may approach 500 million by 1980, according to the Federal Aviation Administration. At the same time, the number of privately owned aircraft may well double from the 114,000 now in use. And the air-cargo industry should continue to grow at its recent rapid-fire rate, after tripling its revenue-ton mileage in less than a decade.

But many major jetports are already operating at or near capacity, ominously approaching ultimate saturation. The West's three major airports—Los Angeles International, San Francisco International, and Seattle-Tacoma International — have together experienced a 15-percent annual growth since 1960 in the number of revenue passengers carried. But expansion at existing airports may not suffice to keep up with increases of this magnitude. A recent FAA survey suggests that the $8.5 billion required for airport construction by 1980 will involve construction of 900 new airports, including 25 major jetports.

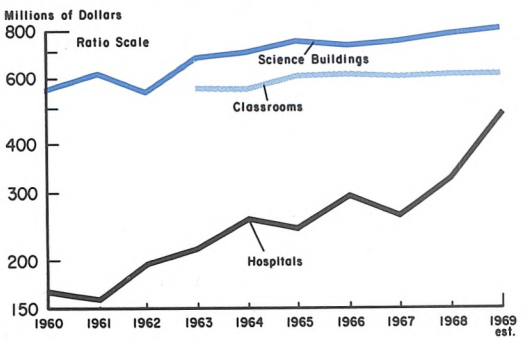
Congress has been reluctant to date to

appropriate funds under the Federal Aid to Airports Program, and the airlines have become somewhat disinclined to guarantee airport-construction bonds (a major source of airport financing) because of financial problems stemming from their recent heavy investments in planes and equipment. Moreover, land acquisition for expanded airport capacity, especially in big-city areas, is often stymied by local citizens' opposition to the inevitable noise and congestion. But a technological revolution in the sky, however impressive, is rather worthless unless accompanied by substantial progress on the ground. Without the needed construction, the nation may wistfully watch its much-touted mobility disappear.

. . . and other transport

Barrels of construction money are needed in the sagging railroad industry as well. Beset with a huge decline in earnings, railroads have found it increasingly difficult to undertake expenditures to improve roadbed and structures, and hence to improve rail performance and profitability. The bulk of capital investment (roughly three-fourths of the total) has gone into equipment, particularly rolling stock. Since locomotives and cars can be repossessed rather easily, financing of equipment purchases is relatively riskless.

Hospital construction:
fastest-growing segment



Construction meanwhile has been rather active on the nation's long-neglected ports and harbors, with the refashioning of outdated piers into modern facilities suitable for handling container ships and super-carriers. Port-construction expenditures in the West, although fluctuating widely, have averaged over one-fourth of the national total during the past five years. In view of the greater-than-national growth of Pacific Coast export-import trade, it is not surprising that Pacific ports now rank so high in port-improvement expenditures.

The glittering potential of rapid-transit rail systems has not been realized in most Western cities, or anywhere else in the nation. Even so, after many years of construction and a series of financial crises, the 75-mile Bay Area Rapid Transit System in the San Francisco Bay Area is now within reach of completion. (See the preceding article in this issue.) The crucial link between San Francisco and Oakland—a 3½-mile tube under the San Francisco Bay—was finished last April. But cost estimates for the entire project now run as high as $1.4 billion, 40 percent more than the original forecast.

Power, waste and water

Contract construction has played a telling role in the vast utilities sector, notably in the area of electric-power generation. Western states spent $400 million constructing electric-power plants during 1968—one-eighth of the nation's total—and plant-construction expenditures in January-October 1969 far exceeded the 1968 total.

Starting about five years ago, the nation's utilities went on a nuclear-plant buying spree. But a variety of technical difficulties and considerable public resistance to specific nuclear plants have led to serious delays in the operation of planned nuclear projects. Even so, the utility industry's reliance on nuclear generation is expected to increase sizably

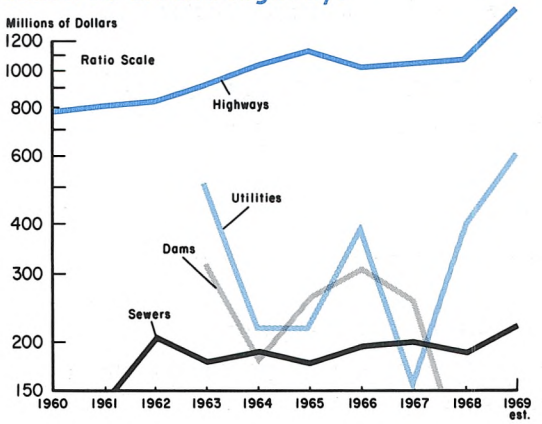
during the next several decades; according to Atomic Energy Commission estimates, nuclear power's share of the nation's generating capacity will rise from 1 percent to 25 percent between now and 1980.

In addition to the amounts budgeted for plant construction, the nation has spent comparable amounts for electric-power transmission and distribution. Recently completed construction projects include two major 500-kilovolt interties connecting the Pacific Northwest and the Southwest, as well as an 825-mile long, 800-kilovolt transmission line from the Columbia River to the Los Angeles area.

Although hydroelectric power provides an important portion of the nation's total power supply, new construction in this field is tapering off, primarily because of the growing scarcity of available sites (except in Alaska) and the increasing development of rivers for other water uses. Hydroelectric power thus represents a declining share of the nation's total installed generating capacity, both regionally and nationally. Significantly, however, hydroelectric power still represents 49 percent of total power capacity in the West, compared to only 10 percent elsewhere.

The West spent $184 million last year—over one-eighth of the national total—constructing sewage-treatment and waste-disposal facilities, but even that sum seemed inadequate to the region's needs. Improperly treated sewage continues to be disgorged into rivers, lakes, and streams, at least partly because of the increasing obsolescence and inadequacy of existing facilities. Many millions undoubtedly will have to be spent to overcome the pollution of our water resources, which has impaired the survival of fish and game, inhibited water-recreation activities, corroded water-exposed structures, and generally undermined esthetic values.

West's heavy construction centered around highways



Finally, as a result of the substantial sums spent on water-resource development, the U.S. ranks today as one of the most thoroughly dammed nations in the world. During the past five years, contract awards for dam and reservoir construction averaged $215 million annually in the West, so that this region accounted for nearly half of the nation's expenditures in this category. Perhaps the greatest recent achievement in this field is California's 770-foot Oroville Dam, which was completed in 1968 as the nation's highest dam.

In recent years, however, water-resource development has increasingly embodied the multipurpose or basinwide concept, with construction projects planned to combine a large variety of functions, such as water supply, power, pollution abatement, flood control, recreation, irrigation, and fish and wildlife enhancement. One outstanding example is the $2.8-billion California State Water Project. With over 60 percent of the planned construction completed and another 20 percent underway, the state will soon boast a complex of facilities to convey water from relatively humid Northern California to what some observers describe as the chronically "aquaholic" Southland. And under the Colorado River Basin Project Act approved in 1968, a 450-mile aqueduct system will be constructed to transport water from the Colo-

rado River to the water-deficient Phoenix-Tucson area.

Inflation and environment

While the recent strides in nonresidential construction are indeed impressive, the rise in spending is considerably overstated in terms of real volume. Rocketing cost inflation is responsible for much of the seeming growth, as construction costs have soared by roughly 30 percent between 1960 and 1968, and thus have offset much of the 74-percent increase in dollar spending.

Prices are up sharply for land, labor, money, and materials. For example, average weekly earnings in construction spiraled upward by a hefty 46 percent in the 1960-68 period, and then jumped 10 percent more in 1969. Wholesale prices of construction materials registered a substantially smaller increase than labor costs, but these costs too rose sharply in 1969 to about 15 percent above the 1960 level. Overall, the sharp increase in the nation's nonresidential-construction spending loses much of its gusto when consideration is given, as indeed it must, to the underlying effects of inflation.

Finally, there is a certain intangible dimension which cannot be measured simply by counting the number of new structures or by comparing present dollar expenditures with those of some previous year. This concerns the ultimate environmental impact of new construction. More and more, the urgent need to build is colliding with a growing public concern over the protection, preservation, and enhancement of the environment. Development is not yet a dirty word, but in the view of an increasing number of the nation's opinion leaders, progress is hardly achieved from projects that yield short-term benefits at the expense of the long-term productivity, health, and beauty of our nation's resources.

Karen Kidder

President Nixon has announced that his Council of Economic Advisers will direct a study of "pricing policies and market conditions" in the copper industry. The domestic price of copper has risen five times during the past 12 months — to a high at the time the study was announced of 56 to 56¼ cents a pound.

Background information on the copper industry is available in "Copper: Red Metal in Flux," a Federal Reserve Bank of San Francisco publication. This 60-page monograph presents an historical study of copper mining and copper markets, along with an analysis of the future outlook.

Copies of this publication are available by writing to: Administrative Service Department, Federal Reserve Bank of San Francisco, 400 Sansome Street, San Francisco, California 94120.

Publication Staff: R. Mansfield, Artist; Karen Rusk, Editorial Assistant.

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Western Digest

Bank Credit Rises Seasonally

Large Twelfth District banks posted a $442-million increase in outstanding bank credit during the first three weeks of December. This increase, which was largely seasonal, was made up of a $410-million gain in loans adjusted and a $32-million rise in security holdings. In the latter category, banks added substantially to their Treasury-bill holdings, but offset most of that gain with reductions in holdings of Treasury notes, municipals, and other securities. . . . Most of the increase in the loan category came from sharp gains in borrowings by commercial-industrial firms and by nonbank financial institutions. But although business firms posted a record ($330 million) gain in borrowing over the corporate tax date, the business-loan increase this December was less than half the average December gain of 1965-68.

Aerospace Closes Laggard Year

Western aerospace firms cut over 40,000 jobs off their rolls during 1969. This was the second straight year of cutbacks of this magnitude, so that by year-end, employment in the industry was more than 12 percent below the late 1967 peak. . . . Several firms entered 1970 with plans to expand employment, because of increased manpower requirements for the production of late-model commercial jet aircraft. Despite this tinge of optimism, total employment could weaken further in 1970 if defense and space-agency expenditures continue to sag.

Housing Closes Strong Year

Western contractors built almost 10 percent more housing units in 1969 than in the previous year, while builders elsewhere posted a 3-percent decline in housing starts for the year. The pace of activity varied by locality, however. New-home construction permits dropped about one third in Seattle over the year, thus marking the end of that area's prolonged housing boom, but permit activity increased sharply in the major centers of Southern California, Southern Nevada, and Arizona.

Farm Returns Lag Behind Nation

Western farmers scored a 5-percent year-to-year gain in marketing receipts over the January-October period, as against an 8-percent gain for their national counterparts. For 1969 as a whole, District crop receipts may be no higher than in 1968, partly because of low prices and reduced production of the region's important cotton crop, now being marketed. But District livestock receipts may be at least 8 percent above the 1968 figure, especially in view of the strength of beef cattle prices during 1969.