

Arrowhead Regional Medical Center

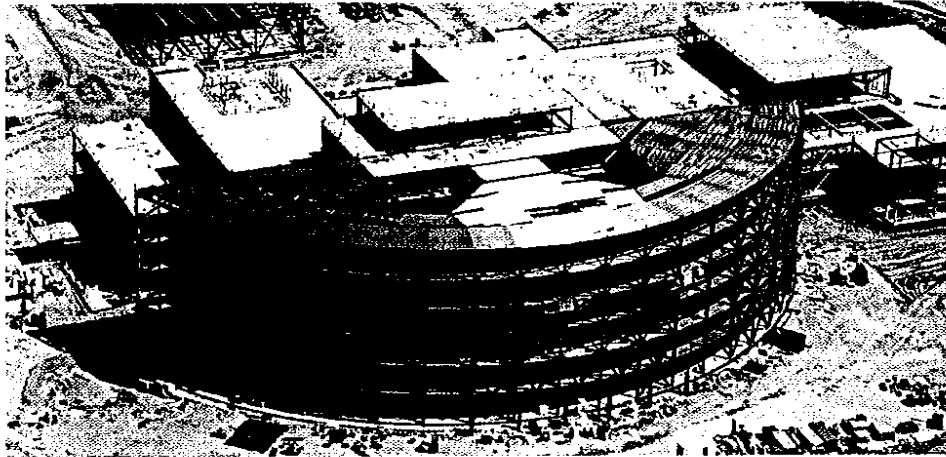
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ARROWHEAD REGIONAL MEDICAL CENTER

*A Unique Healthcare Resource for ALL the
Community...Now and in the Future*



Since 1860, San Bernardino County has been providing health care services to the community. Today, the Arrowhead Regional Medical Center prepares for a new location in Colton that will provide an earthquake-safe, leading edge facility to continue a tradition of quality community health care.

In partnership with Inland Faculty Medical Group, the Arrowhead Regional Medical Center has earned its reputation as one of the nation's leading academic health centers, providing a comprehensive array of health care services including primary and specialty care; hospital, trauma and emergency care; and ancillary and home health services. Other community benefits provided by Arrowhead Regional Medical Center include: Over 1,000 students receive training in 21 fields of medicine and health care each year.

Arrowhead Regional Medical Center is the second largest and one of the most prestigious family practice residency programs in the United States.

The only regional Burn Center between Phoenix, Arizona, Los Angeles, Fresno and Irvine, providing service to four counties, is located at Arrowhead Regional Medical Center.

One of two Trauma Centers located in San Bernardino County, providing treatment to thousands of trauma victims annually. Arrowhead Regional Medical Center is one of the only two Tertiary Centers in Arrowhead Regional providing services such as renal transplant, vascular surgery and more.

Some other specialty services include:

Geriatric Evaluation
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Physical Medicine and Rehabilitation Unit
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Pain Management Center Spine Center
Transplant Program
Pediatric Cystic Fibrosis

Proudly Working With Arrowhead Regional Medical Center



Inland Faculty Medical Group

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Message from the Hospital Director



The completion of the new replacement facility comes almost 20 years after the process began.

In 1978, San Bernardino County hired Booz, Allen & Hamilton to evaluate the existing facility and to prepare a new site master plan. This process is now culminated in the structure which is featured in this publication.

This publication, because its audience is the construction industry, rightfully focuses the majority of its attention on the "nuts and bolts" aspects of the project.

What gets lost among the myriad of design and construction details, is the tremendous impact that this facility will have on the citizens of the County and, more importantly, the patients who will utilize the new facility.

While facilities do not treat patients, this new structure will enable our patients to get quicker and more accessible services. This new building will enable more services to be provided in a more expeditious manner.

If the predictions of a major earthquake are correct, then this facility will be the main health-care resource for many years following such a seismic event.

I am sure that this new facility will accomplish all of the goals that the County wanted to accomplish when the process began almost 20 years ago.

Charles Jervis

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The Clint Caston Company would like to thank the Architecture and Engineering Division of the County of San Bernardino, the McCarthy/Obayashi, Joint Venture Company, our material suppliers and all of our fellow subcontractors for their ongoing hard work and cooperation with us on the Arrowhead Regional Medical Center Project.

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Arrowhead Regional Comes to San Bernardino County

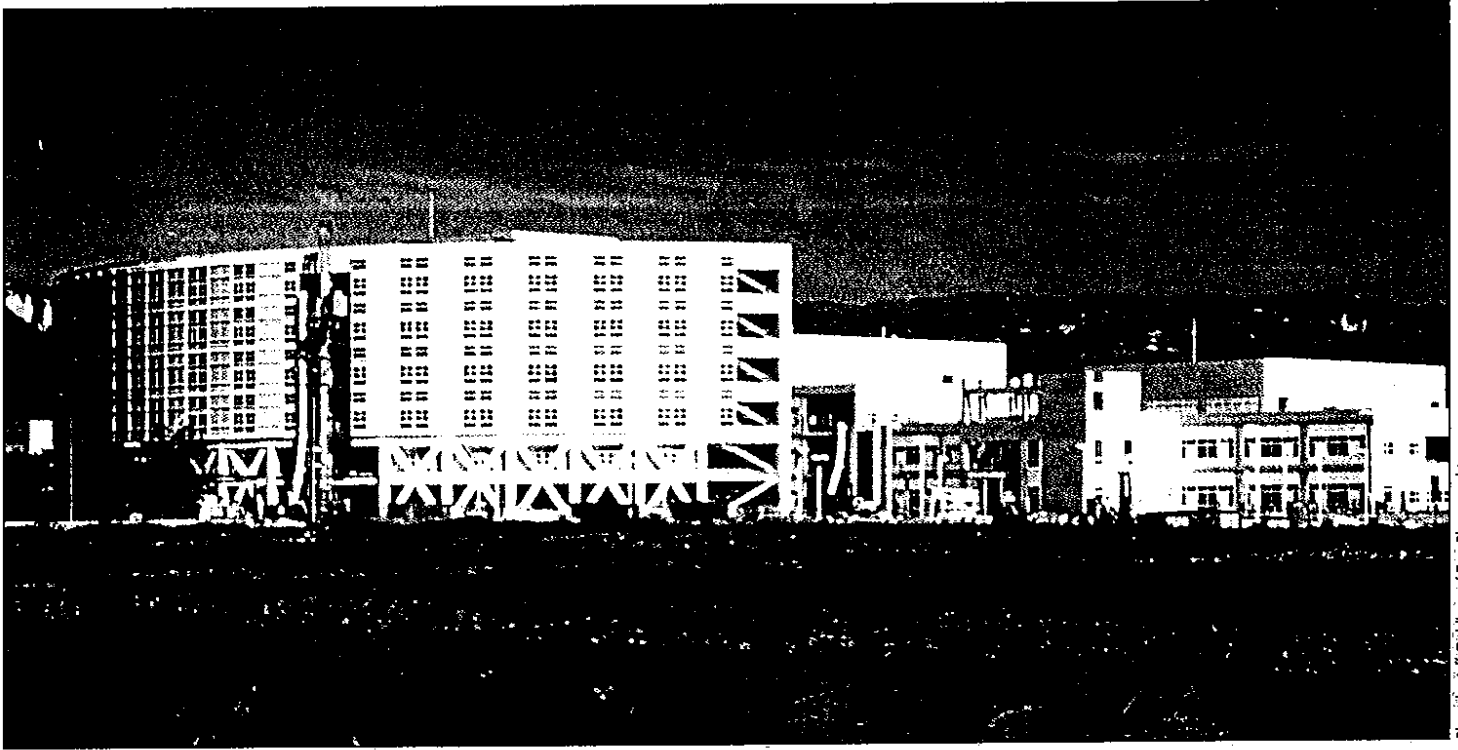


Photo by Jeff Goldberg / Eto Photographics

With less than a year until completion, the Arrowhead Regional Medical Center may be the most seismic-resistant civilian complex ever built. Its five buildings combine never before used technology and are designed to remain self-sufficient for a minimum of three days after an 8.5 earthquake. Located on a 72-acre parcel off of Interstate 10 at Pepper Avenue, the new center is situated 10 miles from both the San Jacinto and San Andreas faults in Colton, Calif.

With roughly one million square feet, the new medical center features a 341,234 sq. ft. nursing tower, a 472,766 sq. ft. diagnostic and treatment center and clinic, a 92,810 sq. ft. mental healthcare facility and a 20,799 sq. ft. central plant.

The 373-bed center will include six medical/surgical nursing units, a telemetry unit, maternal and child health nursing units, three psychiatric units and six special ICU nursing units, including a burn unit.

The distinctive curved nursing tower is composed of single-patient rooms, unique among county hospitals. Each floor is designed as three triangular 24-bed nursing units positioned to achieve a continuum of patient beds, and to provide flexibility to reallocate beds as occupancy rates change.

Simple Beginnings

The San Bernardino County Hospital dates back to 1862 when the county's Board of Supervisors selected a physician, Dr. A.L. Ainsworth, to manage patients during a small pox epidemic. For his services, which included food, nursing, medicine and housing, if needed, he received \$1,000 a year.

The county's first real hospital was built in 1876 on the northeast corner of Second and Utah (now "D") streets. On these five acres were fruit trees, two acres of alfalfa, a low rambling residence of seven rooms, a barn and an artesian well. The county's

population doubled from 4,000 in 1875 to 8,000 in 1885, and a new site was needed for the hospital. A 50-acre site just west of Mt. Vernon and south of Third Street, was chosen in 1885 to house a new 32-room, three-story brick hospital building. In 1918, at a construction cost of \$275,000, the new county hospital was completed and opened on the current site at Waterman and Gilbert Streets.

Since then, many buildings have been torn down and new ones have been constructed to keep up with the demand of the county's growing population and the advances in healthcare.

When Charles Jervis, now chief executive officer of the hospital left Cook County Hospital in Chicago to join the San Bernardino County Hospital's administrative staff, the county's Board of Supervisors were already talking about replacing or adding to the facility.

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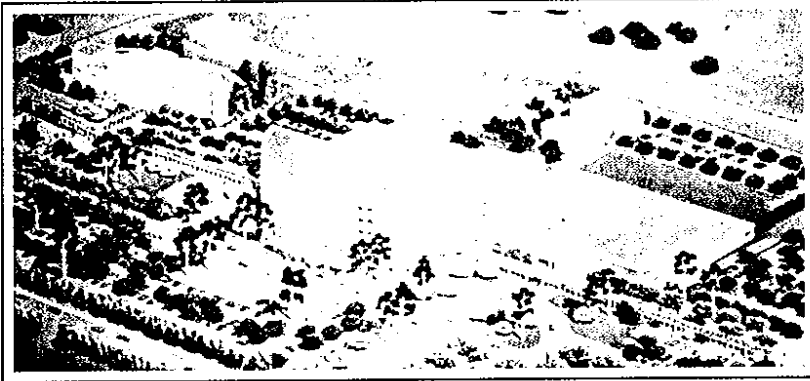


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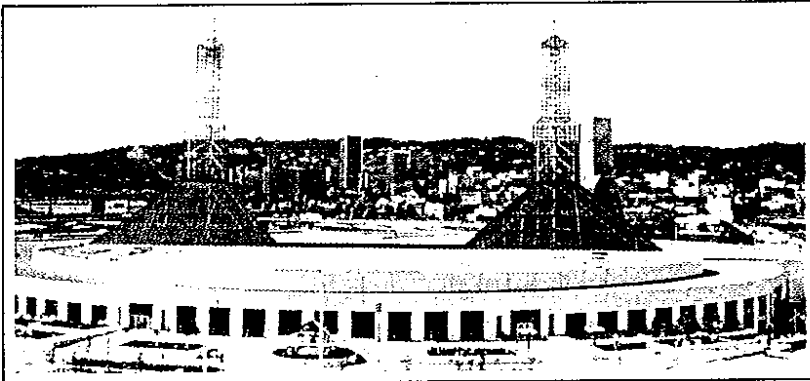
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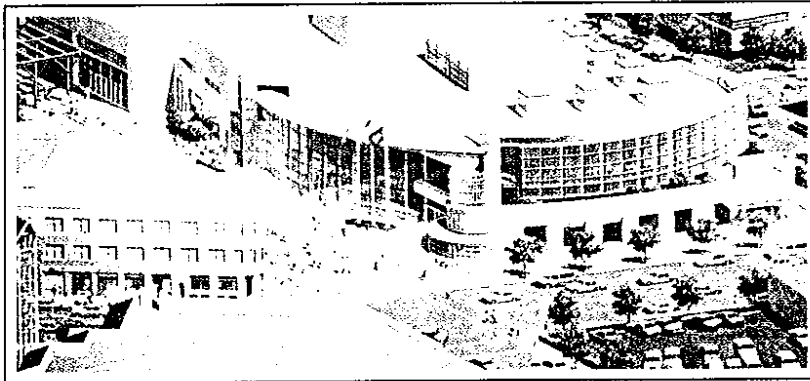
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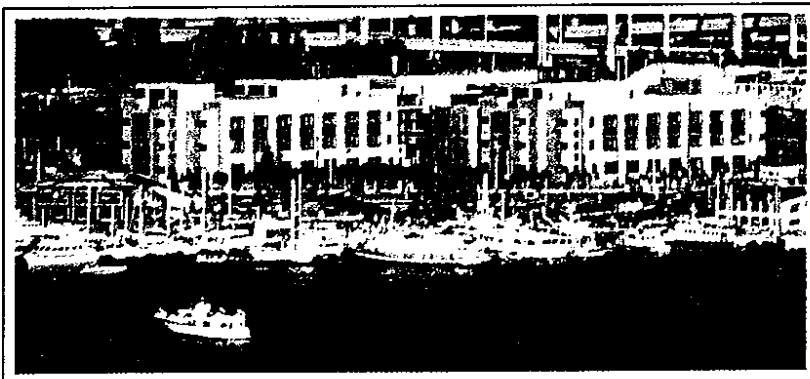
San Bernardino County Medical Center, Colton, California



Oregon Convention Center, Portland, Oregon



Japanese American National Museum, Los Angeles, California



Fred Hutchinson Cancer Research Center, Seattle, Washington

KPFF Consulting Engineers was founded in 1960 to meet the needs of the design profession on the West Coast for creative and responsive structural and civil engineering services. Our work is based upon a thorough understanding of our clients' needs, application of the best available design and materials technology, understanding of construction processes and costs, and a sincere desire to produce the best quality product on time and within budget.

KPFF provides structural and civil engineering services for projects that includes a wide variety of project types:

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KPFF uses the application of highly sophisticated computer modeling and a thorough understanding of structural dynamics affords our clients with the expertise necessary for even the most complex structural analysis as well as for conventional projects. KPFF aims to maintain the highest standards, both professionally and ethically, and to be technically creative while producing a consistent, thorough product.

Continued from page 6

The main patient care tower was seismically unsafe and the buildings, as well as the infrastructure supporting the buildings, dated back to the 40s.

"The biggest single problem in 1981 when I arrived was there was no way of paying for an addition or replacement for the hospital," says Jervis. "It wasn't until 1989 when a bill passed which required the state and the federal government to participate in hospital construction costs that it became feasible to do this kind of a project."

Also financing the Arrowhead project are certificates of participation — a type of leasing arrangement between the hospital and the bond holders. These certificates do not require voter approval as traditional general obligation bonds, and do not increase real estate taxes.

Site Search

The next obstacle for the County was where to build the new center. "We conducted some studies and determined that it would be difficult to get an EIR passed at our current site due to the fact that we are located in a residential neighborhood, and the construction cost would be excessive because of the limited space," says John Giblin, the County's deputy administrative officer, in charge of finance and long term planning.

In addition to the Colton site, the County identified two other possible sites for the center — one in San Bernardino and one in Ontario.

"The San Bernardino site received a negative EIR because the neighbors didn't want their view of the mountains blocked, and the site was directly across from a grade school," says Giblin. "The other site in Ontario received the best EIR, but the City of Ontario asked us to withdraw our offer because they had a large taxpaying tenant that wanted to use it." The Colton site didn't have good freeway access and had a threatened species on the property, but the County decided to go ahead with the project on Pepper Avenue. Off site

mitigation would have to be done on streets surrounding the new center and adjacent to the 10 freeway. These improvements include the widening of the freeway overpass and on-off ramps; widening of the local streets and adding curbs, sidewalks, and street lights; constructing a stormwater retention basin and a localized storm drainage system; constructing a new electrical substation; and the re-routing and undergrounding of utility systems.

Architect selection

The initial programming for the new hos-

pital was done in 1986 and updated in 1990. "We knew what we needed in terms of the relationships of square footage and the hospital functions," explains Jervis. "On the one hand it needed to be up-to-date, modern and useable; but it couldn't be a Taj Mahal."

The firms hired to perform the preliminary architectural and financial programming were Los Angeles-based Coopers & Lybrand and Stone, Marraccini and Patterson of San Francisco.

Although the formal request for propos-

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Hospital Equipment, Services: State-of-the art

Once completed, the Arrowhead Regional Medical Center will be a third larger than the county's current facility on Gilbert and Waterman Streets in San Bernardino.

"We've added a lot of services since I came to the hospital in February of 1981," says Charles Jervis, chief executive officer for the hospital. "We also have seen growth in ambulatory care, effective managed care and an increase in short stay procedures.

"In our new facility, we have more beds, more clinic space and no more six-bed wards."

In addition to primary care, the new center includes the following services:

Picture Archival Computer System -

The center will be the first to use total filmless radiology in a hospital-wide application. This system makes digital images vs. analog pictures, which can be moved around electronically. Siemens — one of the largest producers of radiology equipment in the world — worked in conjunction with Dr. Carl Jensen to design the program for the hospital.

Trauma Center and Burn Unit -

The center is the third busiest trauma center in Southern California. In addition, it is the burn unit for Inyo, Mono, Riverside and San Bernardino counties.

Medical and Paramedical Education -

More than 1,000 students in 21 different disciplines from neo-surgery to phlebotomist pass through the center's doors each year.

Behavioral Health -

A 90 bed unit is responsible for all the county's emotionally disturbed. Special sections for severely disturbed adolescents, adults and elderly are provided.

Other specialized programs include:

Geriatrics, acute physical medicine, pain center and neuro-diagnostic center which combines neurosurgery and neurology departments. The \$62 million medical diagnostic equipment was programmed and planned by Jerry Clubb of TheSPECGroup, Phoenix, Ariz.

The county's medical staff currently serves over 150,000 outpatients annually, based on 1994 figures, and the conservative estimate is that figure will rise to 180,000 by 1998, says Jervis. ▲

Continued from page 8

als was not sent out until late 1990, the County prequalified a pool of architects by attending the annual meeting of the American Association of Hospital Architects in 1989.

"We rented a suite in the hotel and invited 18 architectural firms with substantial hospital design experience to a one hour 'get acquainted' meeting," says Jervis. "After that initial meeting and over the next few days, we spent an hour interviewing each of the 18 firms."

Twelve firms were invited to formally interview with the County. "We had only two conditions that we required at the presentations — the principals who would be involved on the project had to make the presentations and no models were allowed," says Jervis. "Any of the firms that we invited to the interviews could have done the job, so we wanted to make our choice based on merit and the chemistry between our team and theirs rather than get caught up in a pretty model. We didn't even open the bids until after we had picked who we wanted to work with."

In December 1990, the team of Bobrow / Thomas and Associates of Los Angeles as executive and design architect and Chicago-based Perkins & Will as associate architect were selected for the project. After a similar process, The JCM Group, Los Angeles, was selected as construction manager in 1991. A request for bids was sent to 12 contractors in 1994, and McCarthy/Obayashi, a joint venture team based in Newport Beach, was awarded the project.

As soon as the architect had been selected, the County and the design team visited new, large teaching hospitals to determine the design elements they wanted to incorporate in the new Center. Among them were the Veterans Administration Hospital in Houston, Texas, the University of Iowa Hospital, the new Mayo Clinic in Scottsdale, Ariz., the University of Virginia Hospital — a hospi-

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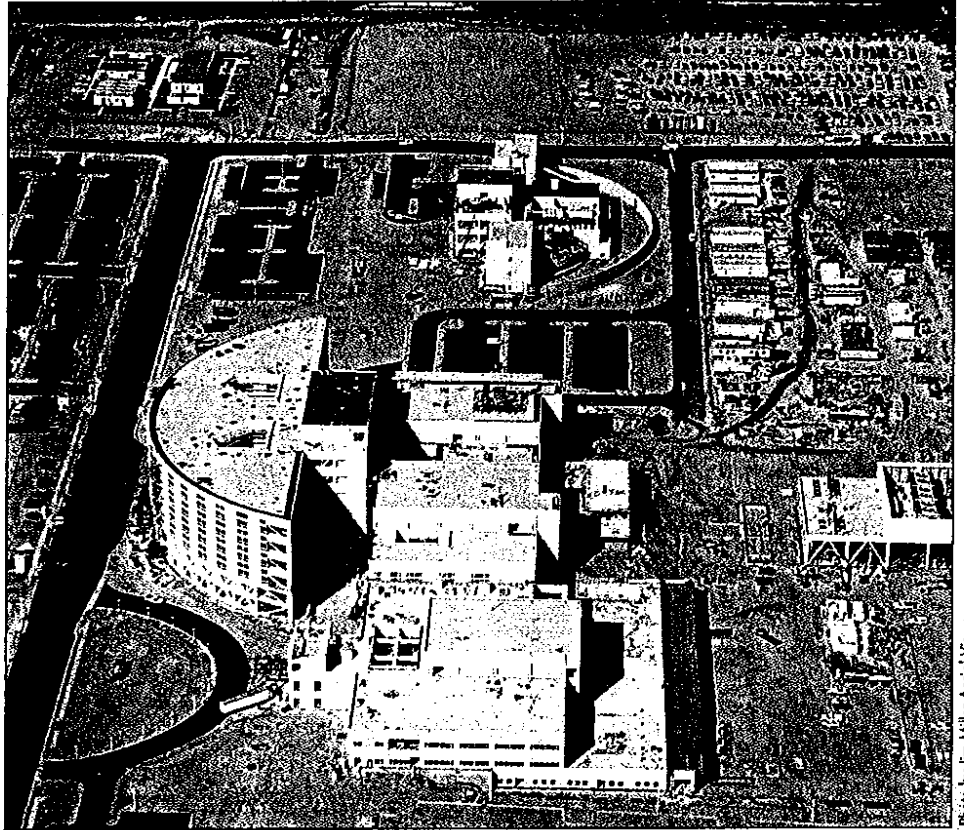


Photo by Jim Miller Aerial Views

The Arrowhead Regional Medical Center sits on a 72-acre site in the city of Colton. The buildings are situated, from bottom clockwise, as follows: Outpatient Clinic, Nursing Tower, Mental Health Clinic, Central Plant and in the center, the Diagnostic and Treatment Facility.

A New Name, New Image

Before the name was changed, the San Bernardino County Medical Replacement Hospital was the only county hospital, with the exception of the Los Angeles County/USC Hospital, with the word "county" in its name.

"The images that a county hospital conjures up can be unappealing," says Charles Jervis, chief executive officer for the hospital. "Besides, we didn't want to be described as the 'new county hospital'. By renaming the facility Arrowhead Regional Medical Center, we become a hospital for all the citizens of our county. We wanted to put forth a brand new image along with a brand new facility."

A contest was held in the summer of 1996 to seek a new name for the hospital. The San Bernardino County Board of Supervisors selected the winner after narrowing down the choices from over 460 entries submitted. The name Arrowhead Regional Medical Center was submitted by a hospital administrative employee who received a \$500 check donated by Siemens Corporation. The name Arrowhead has its ties to the area's natural phenomenon — a large, distinct arrowhead silhouette that protrudes from a mountain just north of the new center's site. ▲

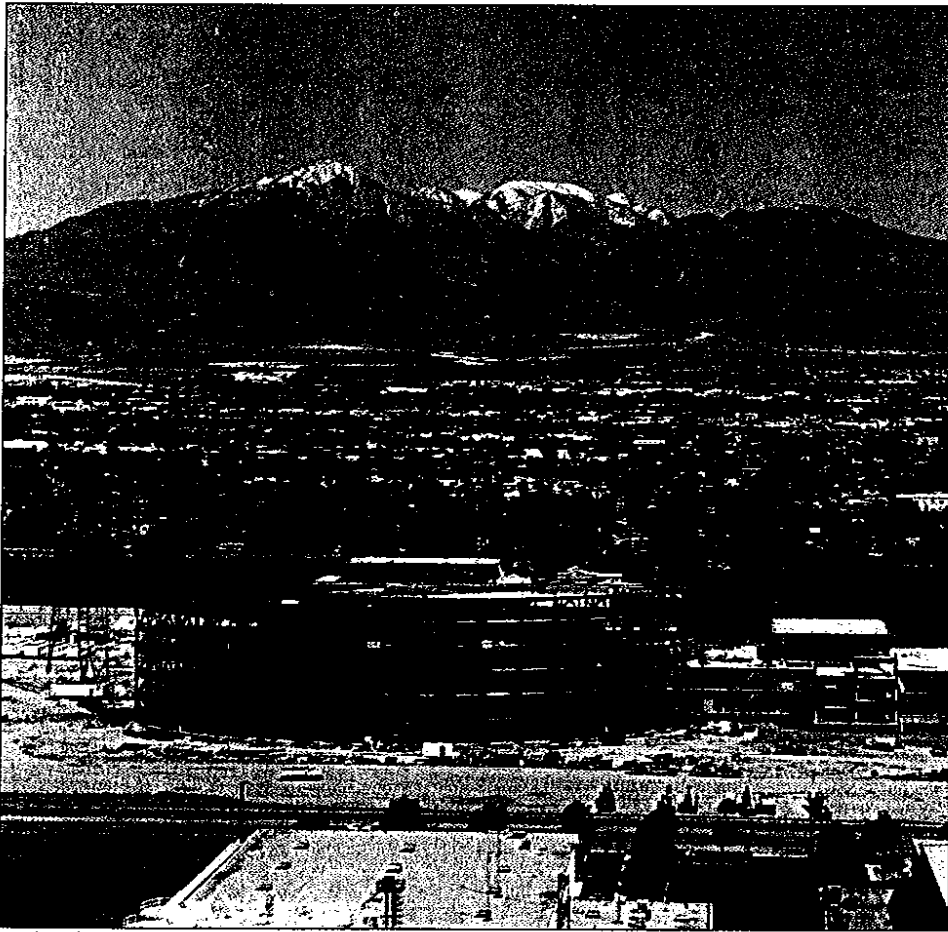


Photo by Jim Miller Aerial Views

When completed, the 373-bed Arrowhead Regional Medical Center will emerge as a leader in technology and equipment to serve the County of San Bernardino's 1.6 million residents.

Continued from page 10

tal designed by Perkins & Will — and also a number of local healthcare centers.

Local healthcare providers welcomed the visits from the County, but they had concerns about a new, large hospital being proposed in their area.

"Most the hospitals in the area report 70 percent occupancy rates while others report as low as 50 percent," says Jervis. "They proposed to us that rather than build a hospital so close to them, that we contract out services to the ones with empty beds."

According to Jervis, the County had looked at that possibility in 1991, however, it was deemed too expensive of an option. It wasn't until the full effect of managed care began to grip the providers in late 1993 that concerns began to surface.

"So we put together an agreement that

basically said that we would continue to contract out two services that we currently do not offer for five years after the new center opens — high voltage radiation therapy and open heart surgery — and that we would not add more beds to our acute care units for a period of five years."

Moderate quakes have caused substantial damage in recent years. In order to guarantee continued functionality for the center, the San Bernardino County Board of Supervisors has made a decision to be prepared and ready to serve the area residents when a major seismic event happens. "We can't forget that we live with two major faults," says Jervis. "so we have tried to ensure that this hospital will be around after a major earthquake and be available to the community for years to come."▲

The Sand Fly Solution

The Delhi Sands Flower Loving Fly is a rare, non-threatening creature that goes about its daily existence without much commotion. The impact of this unassuming creature, however, is causing some significant, and expensive problems for the County of San Bernardino.

"The fly is having significant environmental and economic impacts on the area," says Charles Jervis, chief executive officer for the hospital. "Not only has it caused problems for this project but also for the City of Colton which is trying to develop both residential and industrial areas."

On the threatened species list when the property was purchased in 1993 for the Arrowhead Regional Medical Center, the County knew that the fly was a permanent tenant on the site. As a matter of fact, the fly was the main reason why the Colton location was the hospital's second choice for potential new sites for the hospital. As the other hospital sites were eliminated, Colton became the home for the new hospital.

However, the fly's advocates were monitoring the project and were silent. The day after the preliminary site clearing was to begin in 1993, environmentalists had the fly listed on an emergency basis as an endangered species. Ultimately, a solution to co-exist was developed and the site plan was altered. The hospital was moved 250 feet northward in order to set aside a \$3 million, eight-acre habitat just southeast of the hospital. ▲

Construction Project Team Register

Owner/Operator:

Arrowhead Regional Medical Center
 Charles Jarvis, chief executive officer
 Karen Shamass, chief operating officer

County of San Bernardino

John Giblin, deputy administrative officer, finance / long term planning
 Robert Gerdeman, project manager
 Carl Alban, project manager

Executive and Design Architect:

Bobrow/Thomas and Associates, Los Angeles, CA
 Michael Bobrow, FAIA, design principal
 Julia Thomas, planning and design principal
 David Burdick, Robert Cull, Zeke Triana, management team
 Sina Yerushalmi, senior designer

Associate Architect:

Perkins & Will, Chicago, IL
 Jean Mah, AIA, principal
 Jocelyn Lum Frederick, AIA, principal
 Fred Afshari, AIA, principal

Structural Engineer

KPFF/Taylor & Gaines, Santa Monica, CA
 Jefferson W. Asher, S.E., principal-in-charge
 Roger Paul Young, S.E., project manager
 Hodge Gaines, S.E., principal-in-charge

Mechanical/Electrical Engineer:

Syska & Hennessy, Los Angeles CA
 Andrew Watson, P.E., principal-in-charge
 Simon Wong, P.E., project director
 Caecilia Gotama, P.E., project manager
 Alfred Ong, mechanical engineer
 Raj Masson, electrical engineer
 Al Saez, plumbing engineer

Construction Manager:

The JCM Group
 Wayne Twedell, president/chief executive officer
 Robert York, executive vice president
 Geraldine Rayca, vice president
 Wayne Modugno, project manager
 Robert R. Leamer, project director

General Contractor:

McCarthy/Obayashi (jv), Newport Beach
 Michael Bolen, president, Pacific Division (McCarthy)
 Yoshitaka Hara, president (Obayashi America)
 W. Carter Chappell, executive vice president, operations (McCarthy)
 Dean Piles, project executive/construction director (McCarthy/Obayashi)
 Craig Scaringi, project manager (McCarthy/Obayashi)

A Medical Center in a Park

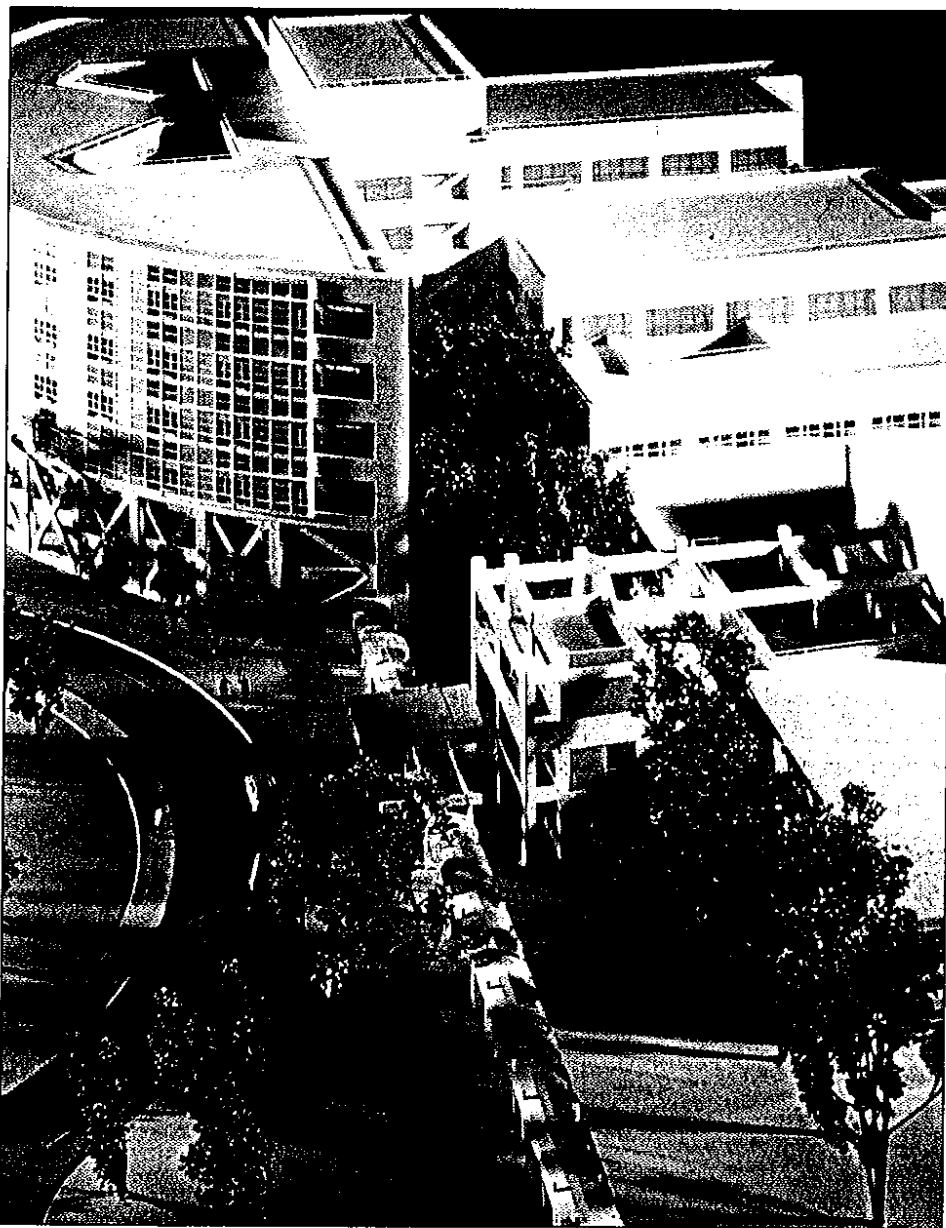


Photo by Fred Licht

Conceived as a "medical center in a park", the design for the Arrowhead Regional Medical Center was orchestrated from day one. With a campus of distinct buildings along a landscaped pedestrian circulation spine, or a park, the structures are placed within a series of individually landscaped parking courts connected by outdoor pathways and seating areas.

A plethora of elements were considered and integrated in the final design of the

373-bed medical center including a variety of outpatient clinics, medical/surgical and specialized nursing, telemetry, maternal and child health nursing and inpatient psychiatric care. The program also includes a full range of ancillary and patient services to support all campus facilities.

Following is a discussion with the design principals, Michael Bobrow, Julia Thomas and Robert Cull from the architect of record Bobrow/Thomas and Associates,

Los Angeles and their associates, Jean Mah and Jocelyn Lum Frederick from Chicago-based Perkins & Will:

How did Bobrow/Thomas and Associates and Perkins & Will come to work together?

Julia Thomas: When it became clear to us that this project was one in which the architect would be chosen clearly on merit through an open, non-politicized selection process, we became very serious in pursuing it. We had a principal in our office at that time, the late Dave Burdick, who was very instrumental in putting together the association of Bobrow/Thomas and Associates and Perkins & Will. We felt that the design process on a project of this size and scale would work better as an association. Because we worked as a collaboration, we have a much more integrated design, which eliminates a lot of potential problems.

Why do you think your firm was chosen to design the project?

Thomas: Our proposal was very straight forward. We did a lot of research on the hospital — its market share, the types of services in place, etc. In putting together a presentation, we decided to focus on their role as a hospital that includes a teaching function as well as a large primary care function. We approached the project with three basic concepts that the County desired: 1) the project needed to be designed from the inside out to ensure it was highly functional; 2) it should be state-of-the-art, not cutting edge; and 3) it needed to be flexible to accommodate changes in future use. We viewed the project as one that had many interesting components, that had to be managed very carefully, and that had to be approached with a flexible plan and program because of the length of time it would take to build the project.

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Michael Bobrow: The interview was a very relaxed atmosphere. It was set up so we could discuss the County's issues in a broad way. We not only looked at the architectural/design solution, but we communicated an understanding of the health-care market and the needs of a hospital in order to be competitive in that market. Although we had almost 100 years of design experience among the association's principals, I think the chemistry between our association and the selection committee was the deciding factor in the end.

In addition to the hospital's programming needs, what factors significantly dictated the design?

Jocelyn Lum Frederick: The design plan was established early in the research period when we traveled to approximately a half dozen other comparable healthcare centers

around the country. We then put together a hierarchy of issues — building systems, site use, circulations, lifecycle costs, etc. — and compiled a coherent menu that everybody could agree to. Once the issues were agreed upon and prioritized, it was not difficult for us to develop a variety of solutions. It was an exciting time, because everyone was the author of the design. We developed these concepts and established the County's priorities so we knew what was important to them and could put our emphasis there. Together, we looked to maximize the overall value of the project, so if they determined that they needed to spend a little more in one area, they could shift their priorities early in the design phase.

Robert Cull: It's interesting to note that all these issues were established well before a base isolation design was involved. The conceptual design solution that the County and our team developed held up

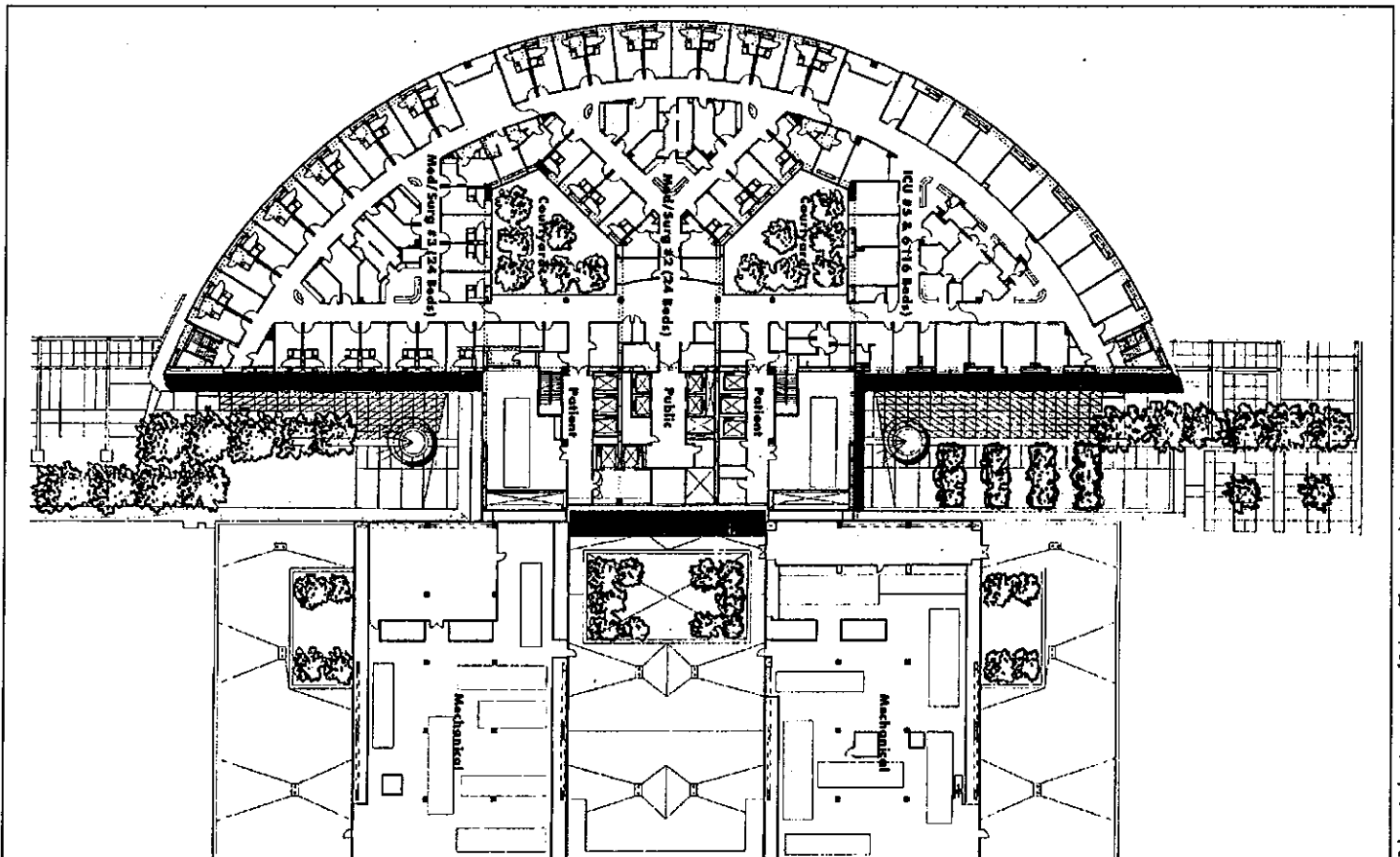
all the way through the base isolation technology phase.

How are the buildings organized?

Bobrow: This site organization separates elements by medical function with distinct facilities for nursing, diagnostic, and treatment zones serving inpatients and clinics. The distinct quality of the individual buildings, articulated as simple shapes based on platonic forms, allows the organization of services to be clear, despite the very large size of the 72 acre campus. The entries are placed such that it is possible to go into the hospital and not have to become involved with other areas of the hospital.

Within the individual buildings, the north/south axis of the external circulation spine is continued. Major public functions and vertical circulation nodes are located off of the spine, as are entries to

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Schematic of the unique design of the nursing units which have been clustered together to assure efficient operation and patient care and provide flexibility for future use.

Schematic drawing courtesy of Bobrow/Thomas and Associates

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the interior courtyards. The form of each building is created with a skylit atrium or courtyard space within its most public area, providing patients, staff and visitors with opportunities for informal social interaction and private reflection in an

outdoor space. Glazed walls and single-loaded corridors allow the light and views of these landscaped areas to penetrate the interior spaces of the buildings.

What design components were implemented to provide for flexibility for future use of the Center?

Jean Mah: We have addressed the continually changing healthcare by designing flexibility in the Center through maximum horizontal expansion potential on virtually every floor of the building. Just as the circulation corridors are arranged around the east-west spine, the mechanical systems are organized in a way to achieve large open spaces with no shafts to maximize flexibility for change in the future.

How is the architecture related to the structural design?

Cull: The expression of the elevations for the medical center is directly linked to their structural development. The primary exterior materials of precast concrete panels and glass curtain wall are further articulated by the metal panel enclosure of the seismic braces which define the base of the curved nursing tower and the structural frame around the clinic entry. The majority of the materials used are on a white or light gray color, providing a unified look for the varied forms. A range in textures, from the rough finish of the concrete to the smoothness of the reflective glass provides complexity in finish and detail.

Public buildings are scrutinized in terms of 'architectural enhancements.' How did you address this issue in your design?

Frederick: The issue of enhancement needs to be looked at from the perspective of the life cycle costs of the building. The County needed the center to be competitive, and be resistance to wear-and-tear both inside and out. The building's use was a major issue for them so if we spent a little more on materials that resulted in less maintenance and replacement, the County considered that a long term savings and accepted our recommendations. Although it may appear that this hospital has better materials than other public facilities in the area, in the long term, these materials contribute to a more cost effective building. The County wanted a building that was solid and would be easy to maintain yet did

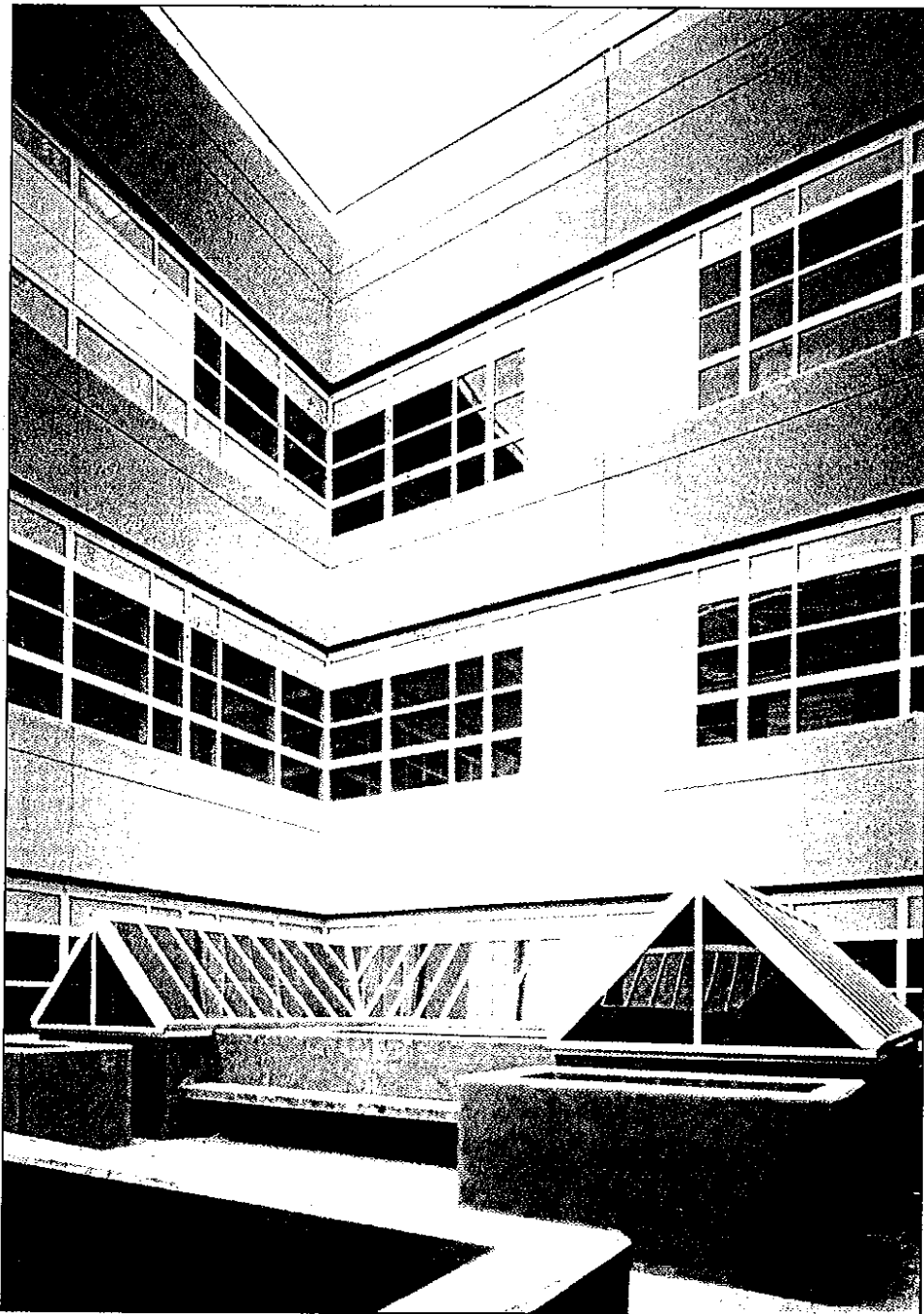


Photo by Jeff Goldberg / Esto Photographics

Architecturally one of the most interesting designs for a public facility, the Arrowhead Regional Medical Facility also incorporates optimal operational design including technological advances for future growth and building flexibility.

not give the perception of being lavish. The development of the interior finish palette followed the same strict durability requirements as that of the building systems. A simple color scheme which included deep, rich tones is rendered in a variety of textures through a wide range of materials, all of which underwent thorough life cycle and damage testing before selection.

Although the curve frontage of the nursing tower is quite dramatic, what purpose did it serve in the functionality of the hospital?

Bobrow: Each floor of the nursing tower is designed as three triangular 24-bed nursing units positioned to achieve a continuum of patient beds. Our concept of clustering beds around a central support unit increased the efficiency of the opera-

Continued on page 22

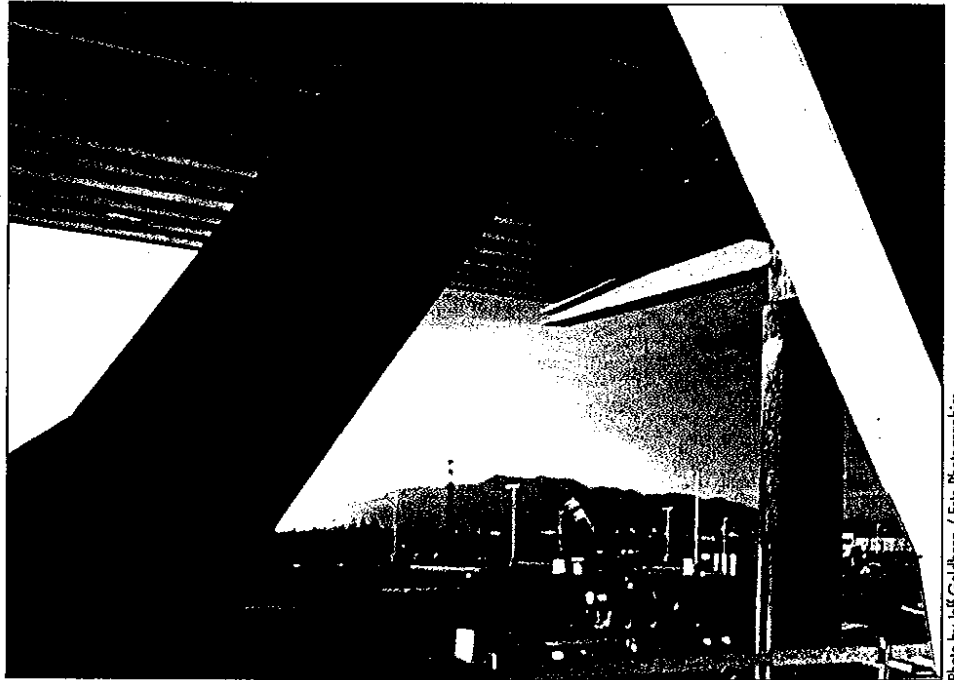



Photo by Jeff Goldberg / Esto Photographics

The exterior materials of precast concrete panels and glass curtain wall are expressed by the metal panel enclosure of the seismic braces which define the base of the curved nursing tower and the structural frame around the clinic entry.

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S A N D I E G O P H O E N I X D E N V E R W A S H I N G T O N , D C

Continued from page 21

tion of the nursing units. We adapted triangular nursing units to pull all the units closer in to the central support unit thus dictating a curved outer wall. Glass walls are utilized on the interior corridor to allow the nursing staff to view the patients into each room without having to enter the rooms. This configuration provides flexibility to reallocate beds as occupancy rates change. Also, since the tower is 350 feet long, by slightly curving the corridor, the sense of a long, never-ending corridor is eliminated.

What was the role of the County and the hospital in the design?

Mah: The County did their homework and traveled across the country to look at other facilities. Early in the design process,

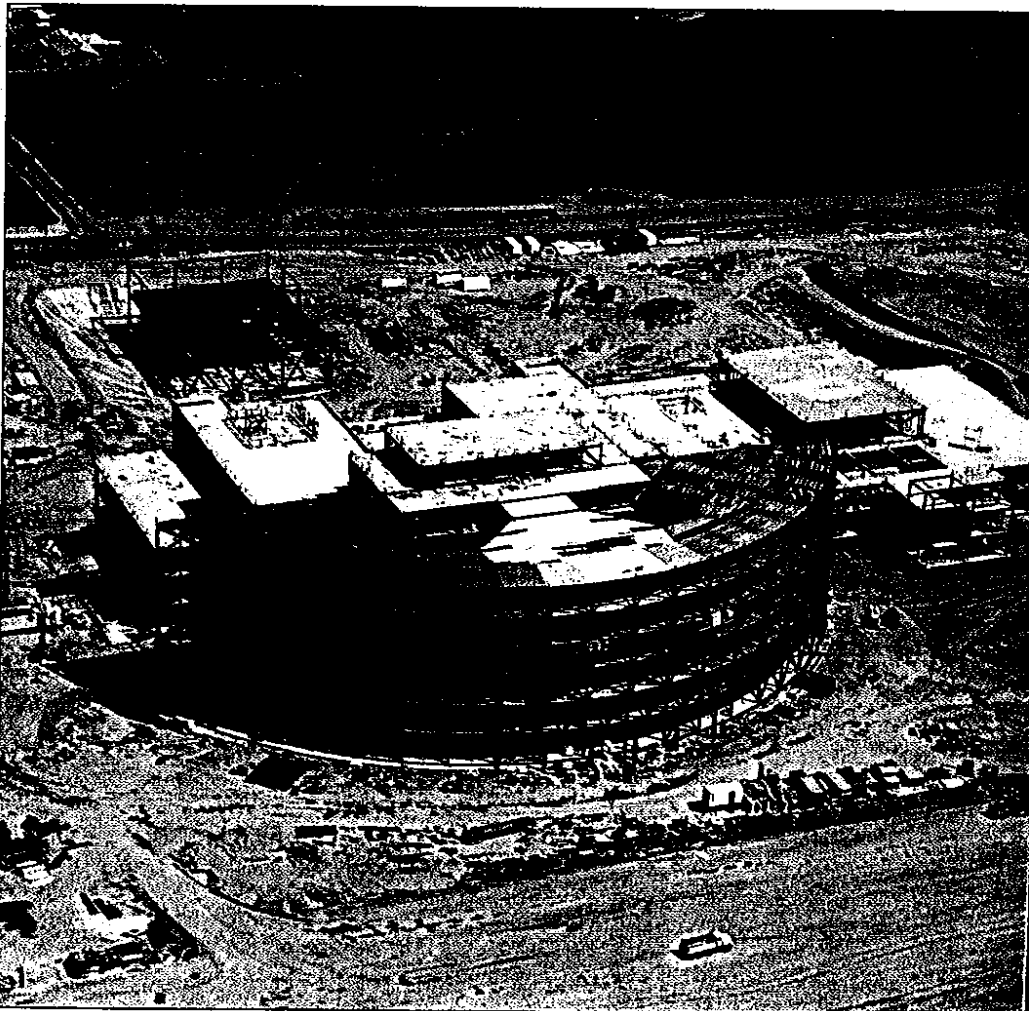
a hospital steering committee including Charles Jervis, Bob Gerdeman, John Giblin, doctors, nurses and other senior management held a series of meetings with the users to discuss the design affecting each of their departments. These meetings allowed us to get input from the users in a very directed and focused way. By the end of each session, we had closure on issues which moved the design through quickly. They also had the foresight to anticipate problems and provided budget contingencies to cover those items. Timely decisions prevented the design schedule from getting into a bind during the final design stages.

Bobrow: Also, early in the design stage, the hospital painted the 350 foot nursing tower on a parking lot and erected 'walls'. Every hospital employee was given a

chance to walk through and feel the distances from the nursing station to the room, the sizes of the rooms, etc. Even furniture was brought out into the dirt lot and put into the mocked up rooms.

What would you consider to be the success behind the design of the Center?

Mah: Architecturally this project is a model for the design for future facilities. Continuity of the project team contributed to the success of the design process as well as the County's extraordinary forward thinking and commitment to the project. ▲



Unlike the steel moment-framed buildings which structurally failed during the 1994 Northridge earthquake, the Arrowhead Regional Medical Center incorporates both a steel brace frame and a composite concrete-filled metal deck system.

Photo by Jim Miller Aerial Views

Planning for Success

The Arrowhead Regional Medical Center project was sufficiently large that the County knew it would be difficult for them to assemble the resources to manage the construction. Rather than trying to assemble experienced individuals with a history of working together on a similar project, it was more efficient for them to hire a construction/project manager.

Following a process similar to that used to select the architects, Los Angeles-based JCM Group was selected as construction manager in May 1991. "They really wanted to meet a group of people that were strong enough, experienced enough and capable enough to do this project," says Wayne Twedell, president of The JCM Group.

The architect/engineering (A/E) team consisting of Bobrow/Thomas and Associates, Perkins & Will, KPFF and Taylor & Gaines had by then completed approximately a year of schematic design. The JCM Group initially focused on the pre-construction phase of the project — where the project planning opportunities could be maximized.

"Reviewing project opportunities and potential pitfalls with the County, a number of approaches to management were discussed and adopted, along with certain contractor qualifications deemed to be necessary," says Bob York, JCM's executive vice president. "One of the main items was the use of a paperless Construction Project Management Information System (CPMIS) by the entire integrated project team." (see story, page 26)

As part of their management plan, JCM proposed a contractor pre-qualification process for this project. Twelve contractors responded to the Request for Qualification. Six of the 12, who represented the most experienced hospital builders in the country, were ultimately deemed best qualified to bid on this project. "Each contractor had a combined total of over a billion dollars of hospi-

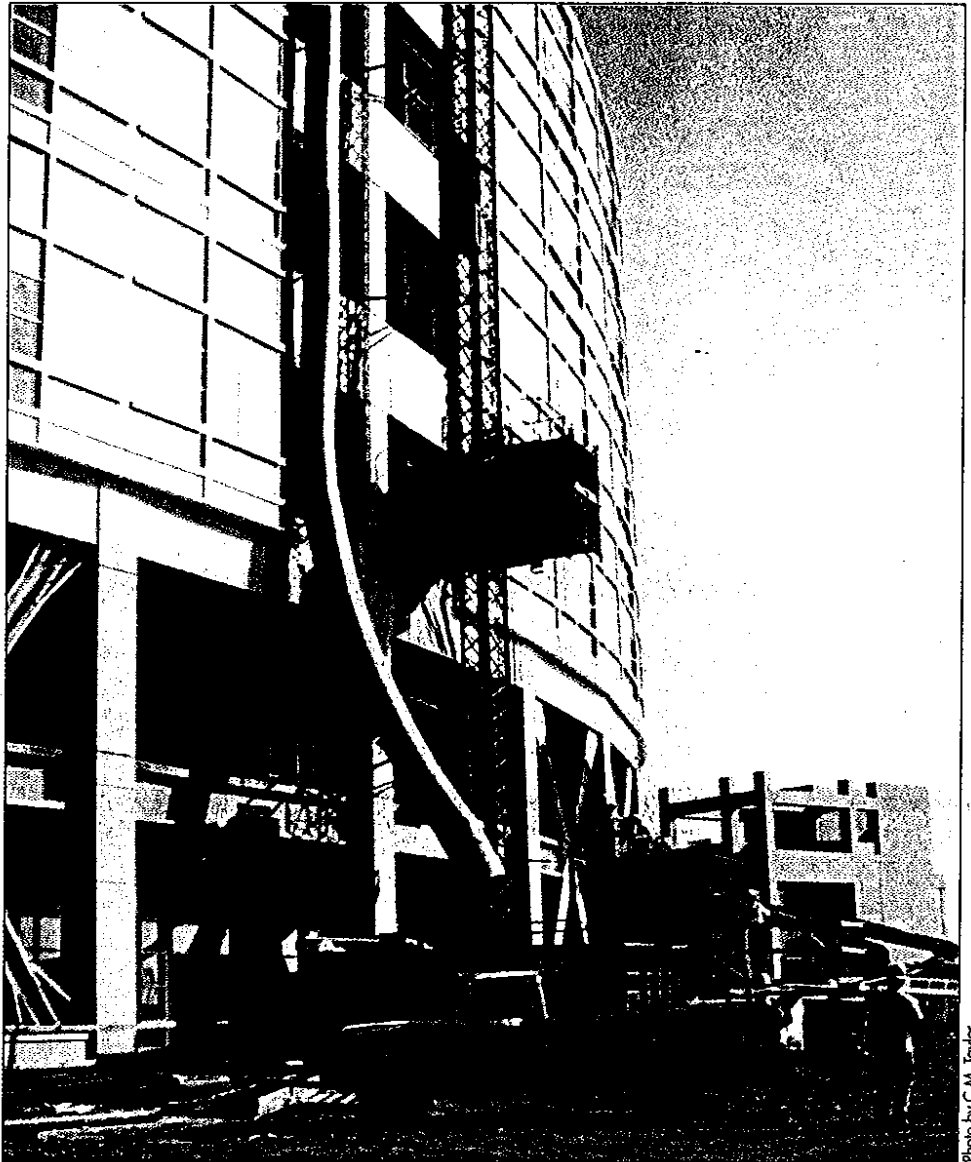


Photo by C.M. Taylor

The extensive pre-construction planning and latest construction management techniques have contributed to the smooth-running and cost-efficiency of the Arrowhead Regional Medical Center.

tal construction in the previous five years," says Geraldine Rayca, vice president at JCM. "These six bids had only a 5 percent spread."

Unique aspects of this particular pre-qualification process included pre-qualification of the general contractor's on-site management team along with pre-qualification of their major subcontractors. The prequalification of the on-site manage-

ment team enabled the County and JCM to subjectively evaluate the experience of each proposed team member.

Another unique management element was the coordination and detailing activity program, or CDA. Since numerous interface issues are inherent in a project of this type and complexity, JCM initiated a contractually-mandated CDA program to

assist in avoiding time-consuming field problems involving systems and equipment interface and to further refine and coordinate shop drawings.

from the offices of the architect, engineers, construction manager and contractor, along with the County's representative, be on-site at all times.

and discussed as they happen, thus the project maintains its momentum."

Currently ahead of schedule and under budget, the project may become a model for all future endeavors of its type. "We are not only ahead of schedule, but we are saving a lot of money because we are cutting down on disputes and problems," says Twedell. "This is going to be, in my expectation, the largest hospital built on the west coast, without claims, disputes or delays. I really believe it's because every one involved planned ahead." ▲

"This is going to be, in my expectation, the largest hospital built on the west coast, without claims, disputes or delays."

— Wayne Twedell
The JCM Group

This on-site coordination program involved McCarthy/Obayashi and detailers from each of the affected subcontractors. The entire CDA process was integrated in the project schedule in order to ensure the coordinated drawing effort was completed on schedule.

Also, in order to facilitate timely reviews and responses to all types of project documents, the County required that decision makers with signatory authority

"This expedites the review and decreases turn-around times for all project information, establishes a team-like atmosphere, and is an essential element of dispute resolution," says Wayne Modugno, on-site project manager for JCM. "Being on-site, decision-making individuals develop an increased sense of project ownership, and non-project distractions are kept to a minimum. Most items do not become issues because they are reviewed

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Paperless Project Management

— Never-before-used information management computer system brings planning and organization to Arrowhead's jobsite

Large construction projects have traditionally been difficult to control and coordinate, due in large part to the amount of documents generated. Between plans, schedules, change orders and other information, everyone can be overwhelmed with paper.

This paper avalanche creates a number of problems. Decisions are deferred because information is buried somewhere in the "administrative zone." Architects, project engineers, field managers and inspectors become isolated because they don't have time to fully coordinate their efforts. Costs are not properly controlled because of the difficulty of gathering, processing and retrieving information.

Faced with building the one of the largest public sector jobs, the County of San Bernardino elected to change to a paperless documentation system. Developed by the County with the assistance of Los Angeles-based The JCM Group, and consultant Marsha Lewin & Associates, Los Angeles, the Construction Project Management Information Systems (CPMIS) is possibly the most sophisticated and powerful tool of its kind currently in use anywhere in the construction industry.

"The system ensures that everyone shares the same information and that all decisions are likewise based on it," says Bob York, executive vice president at JCM. "In this system you can retrieve information in hours compared to spending months in discovering the same information in a traditional paper document control method."

The \$2.6-million-plus CPMIS assists the construction team members in managing project costs, schedules, communications, manpower and all documentation, with completely electronic, paperless interface among all parties. This system integrates activity scheduling, document management, work flow tracking, manpower tracking, site access, cost control and office automation through the use of custom codes and the best available software packages. All project data such as schedule updates, requests for information, meeting minutes, inspection reports, change order requests, field orders and bulletins, etc., are input via electronic forms. The system has registered and tracked approximately 95,000 documents including over 125,000 "electronic transmittals" of those documents between project team members. The small amount of information that is paper-based is scanned as if it had been electronically generat-

ed. CPMIS is conceivably the first in which almost all construction documents are electronic, according to York.

First used to coordinate the efforts of over 60 different firms working on the medical center project, CPMIS enabled general contractor, McCarthy/Obayashi, Newport Beach, and the County and its representatives to have every document instantly available. This ensured that identical data was shared, eliminating the discrepancies that often arise due to separately maintained databases.

Another particularly unique feature of this paperless system is that all workers entering and leaving the site are recorded using the latest labor tracking technology. Cost and labor loaded schedule activities are then electronically loaded into the system by the general contractor with the actual hours expended, and matched against the hours recorded for entry on site. The result is that anyone else on the system can retrieve a report of planned versus actual hours for every scheduled activity. This enables the construction manager to monitor true schedule progress on a real time basis, analyze productivity and impact claims. It also helps the general contractor and subcontractors plan their work more effectively and maintain their schedules with real information about what is happening on the site.

"By comparing the percentage of time spent on a number of construction tasks using traditional methods to those same tasks performed on CPMIS," adds York, "San Bernardino County has seen the benefits of the paperless system."

How's the system working?

"You have to realize that before this system you had a paper system. We have had some hardware issues, but nothing that couldn't be solved in a short amount of time," adds York.

While the "paperless office" is little more than a dream for most firms, the County of San Bernardino has proven that it can become a reality. ▲

Ed. Note: The CPMIS system design was a recent finalist from a field of international, world-class entries in the Fourth Annual Windows World Open competition. Sponsored by Windows '95, the competition recognizes custom system solutions that exhibit outstanding innovation and technical excellence.

Seismic Stability Center is by Design

Structural Engineering Emphasizes on Base Isolation

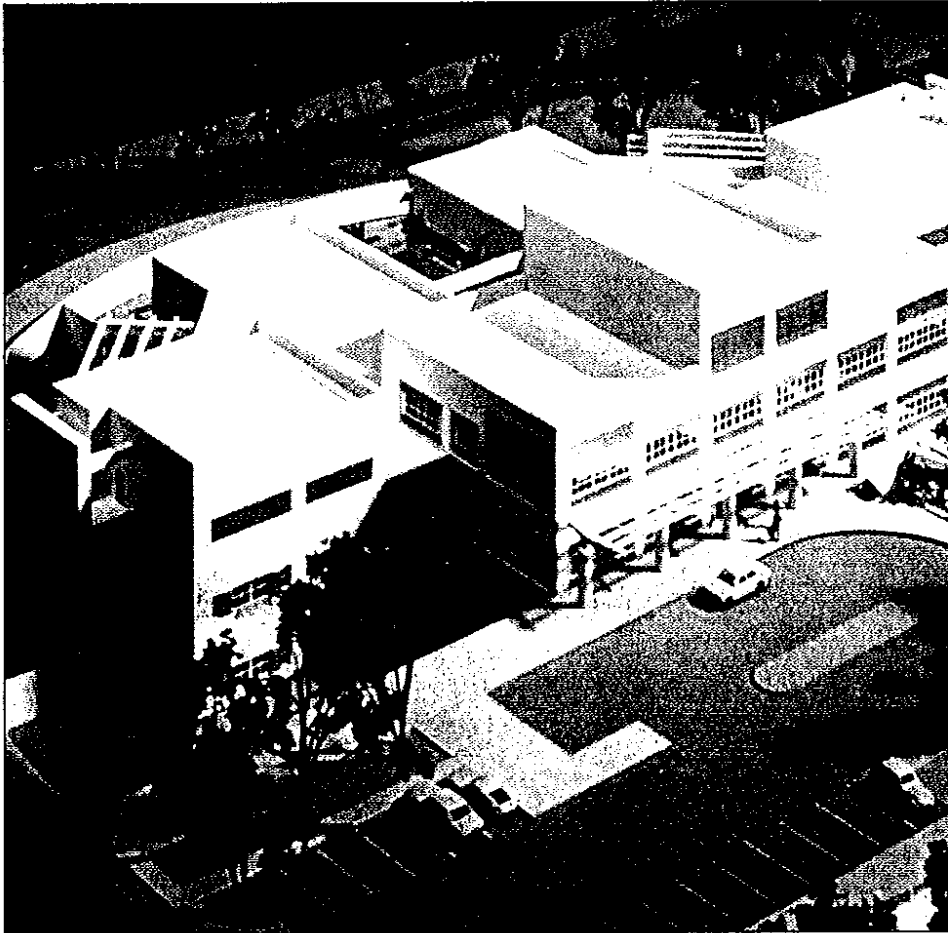


Photo by Fred Lich

Directly linked to the structural elements, the majority of the materials are of a white or light gray color, providing a unified look for the varied forms. A range in textures, from the rough finish of the concrete to the smoothness of the reflective glass provides complexity in finish and detail.

Since the 1994 earthquake in Northridge, just northeast of Los Angeles, the effects of seismic movement on buildings are being studied more than ever before, simply because so many buildings were damaged. Many former theories and standards of "safe seismic design" have been re-evaluated due to many unexpected structural failures.

Although the decision to incorporate base isolation in the structural design of the Arrowhead Regional Medical Center had already been made, (the County had previously constructed the first base-isolated building in the U.S. — the four-story, steel-framed Foothill Communities Law

and Justice Center in Rancho Cucamonga) the effects of the Northridge earthquake still had significant impacts on the center's structural design.

"The Arrowhead Regional Medical Center project was in the final stages of plan review by OSHPD, when the Northridge earthquake hit in January 1994," says Jefferson W. Asher, vice president of KPFF Consulting Engineers in Santa Monica, Calif. KPFF, in association with Hodge Gaines' engineering firm, Taylor & Gaines, Pasadena, Calif. is the project structural engineer for the center. KPFF Consulting Engineers has designed many seismically isolated structures,

including The Washington State Emergency Operations Center, the University of Southern California University Hospital, Hayward City Hall and the Los Angeles County/USC Medical Center.

"Although the specific hospital concerns that were raised at the time addressed steel moment-frame buildings rather than steel braced-frame buildings such as this Center, we incorporated all the new information pertaining to structural steel welding that had been gleaned from the damage," says Asher. "All the project provisions were changed so that all the latest requirements would be implemented into the construction of the project."

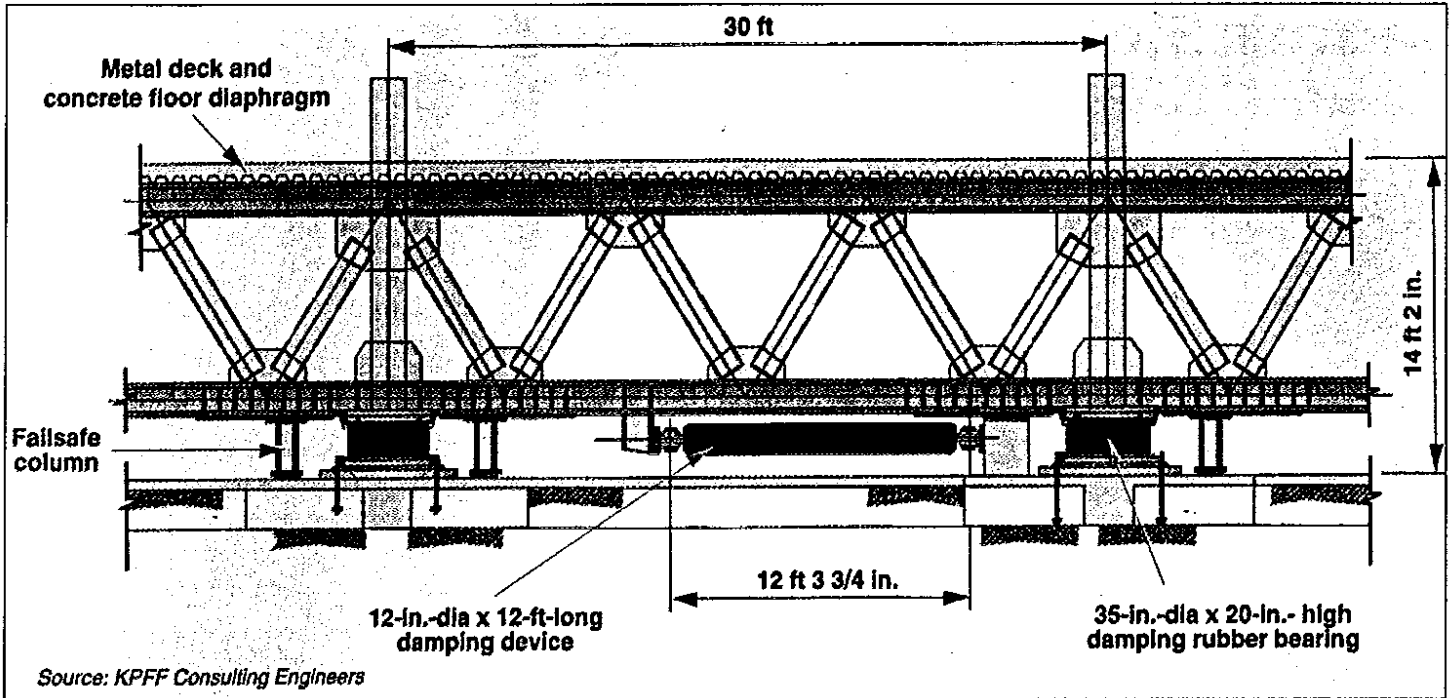
Each of the five base isolated buildings vary in size and configuration, ranging from the six story, 341,234 sq. ft. curved front nursing tower to a two-story 20,799 sq. ft. rectangular shaped central plant.

"Even though they are functionally connected, the buildings work separately from a structural performance perspective," says Roger P. Young, project manager with KPFF. The three core buildings — the nursing tower, diagnostic and treatment center and outpatient clinic — will be linked with first-of-their-kind telescoping corridors, called portals. These 14-foot-long portals, along with flexible roof/joint and extension wall covers, will enable the four foot gaps between the three buildings to close to as little as four inches or open as wide as eight feet.

"In addition to the base isolation system," explains Young, "unique flexible mechanical joints are installed in the electrical and mechanical utility lines that lead into the buildings across the seismic gap. These joints have been tested to the maximum design displacement of 22 in. horizontally."

To test the reliability of the overall

Continued on page 28



Continued from page 27

seismic system, an actual column, which was supporting six floors of structural steel and the floor above it, was removed from the building. A special testing apparatus was manufactured to apply huge forces to the column for an extended period of time — much more than it would actually have to sustain in an actual seismic event.

“There were no failures of any kind in the column,” says Asher. “So, McCarthy / Obayashi took the column and re-installed it in the building. We are confident that we have a very safe, sound building. The base isolation along with the seismic joints will help accomplish our goal — that this facility will remain fully operational after a major earthquake.”

The premium paid for the seismic-resistant features includes nearly \$7 million for the 25 telescoping portals, \$14 million for base isolators and dampers, plus the ball joints for the utilities. Additional expenses included the extra-stiff trusses in the 18 foot-high “crawl space” that contains the isolators and dampers. The dry moats needed around the buildings to accommodate movement in the event that isolators shear up to 22 in. also increased costs.

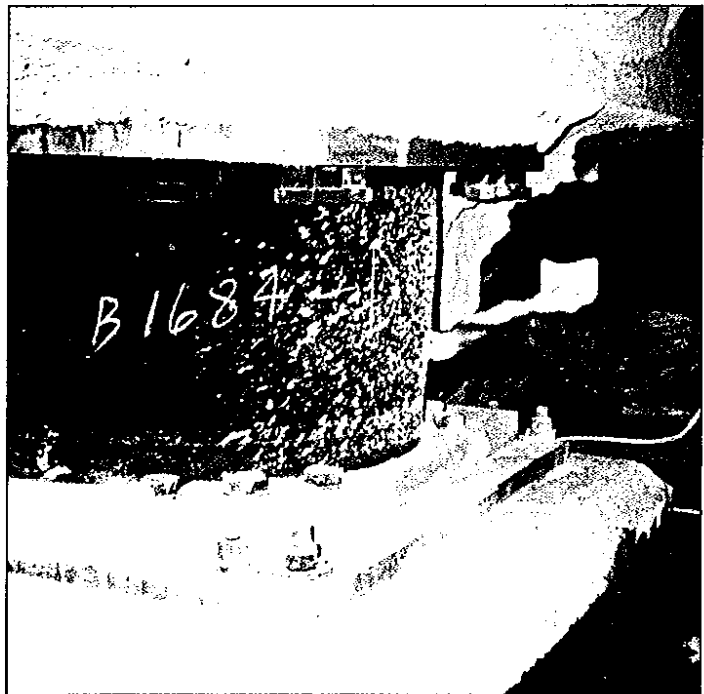
Both construction and design costs were important factors that were considered by the County of San Bernardino, but it opted for the use of isolators and dampers for its new medical center for one reason — base isolation may save lives when a major earthquake strikes.

What is base isolation?

The base isolation system is a hybrid passive energy dissipation system consisting of both linear and nonlinear high damping rub-

ber bearings along with viscous damping devices located at the base of the structure.

Base-isolation designs such as used here, incorporate rubber mats bonded to steel plates to create a “pad” or isolator. The steel frame of the building is designed to sit directly on these isolators at each column location. (see diagram above). Due to these isola-



The base isolators sit beneath columns to carry gravity loads, yet also allow horizontal movement somewhat like a deck of playing cards.

Photo by C.M. Taylor

tors, which are 20 inches high and 35 inches in diameter, the motion of the building during an earthquake is dampened. The isolators eliminate much of the destructive jerking motion that can severely damage a building and its contents. The dampers, resembling an automobile shock absorber, are installed horizontally with one end attached to the building's foundation and the other end to a column or tab on a horizontal truss. The 184 dampers for the project are generally 12 feet long by 14 inches in diameter and weigh 3,000 lbs each. They consist of Teflon-coated solid stainless steel pistons in cylinders filled with non-combustible silicone fluid.

Each damper will provide a maximum damping force of 320,000 lbs. at a maximum operating velocity of 60 inches per second.

The damping elastomeric isolators were designed and manufactured by Dynamic Isolation Systems, Inc., Lafayette, Calif. and the viscous dampers were manufactured by Taylor Devices, Inc., North Tonawanda, NY. ▲



Photo by C.M. Taylor

New York based Taylor Devices, Inc. converted a shock absorber system, originally designed to protect the MX missile from a nuclear explosion, into an earthquake shock damper capable of absorbing the energy of an earthquake jolt.

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Construction Challenges Equal Opportunities for Success

As one of the nation's leading health-care builders, it was almost expected that McCarthy would be involved in the construction of the Arrowhead Regional Medical Center. The Newport Beach based company has teamed up with Obayashi Corporation, one of the top five general contractors in Japan, to build the nearly one million square foot replacement hospital for the County of San Bernardino. Joint venture partner, Obayashi Corporation, not only brings extensive experience in the planning, engineering and building of large construction projects, but has helped with financing and bonding as well. The joint venture team of McCarthy/Obayashi began construction on the Arrowhead Regional Medical Center in January 1995.

"We have an ongoing relationship with Obayashi from other projects, so it was a natural fit for both companies," says Michael Bolen, president of the Pacific Division of McCarthy. "They have tremendous financial depth and engineering capabilities. This project is very complex in its design, and their engineering expertise is very important to building the project successfully."

According to Bolen, in the wake of an 8.5 earthquake, the center will be one of, if not the only, operating hospital left in the Los Angeles basin. "That's a sophisticated standard to have to build to," adds Bolen. "We are confident that we have the caliber of people to complete the project to the quality of the specifications. Right before we were awarded this contract, we were fin-

ishing a similar size facility off the 10 freeway in Baldwin Park for Kaiser Permanente. We had a good group of subcontractors on that project and we were able to encourage them to get involved with Arrowhead." Among those subcontractors are Herrick Steel, Morrow-Meadows Electrical, The Murray Company and Rebar Engineering.

Currently, construction on the center is 84 days ahead of the contractual completion date, according to McCarthy/Obayashi's Construction Director Dean Piles. He and McCarthy/Obayashi Project Manager Craig Scaringi directly oversee 120 professionals and over 700 subcontractors and tradespeople. The five separate buildings, now 75-95 percent complete, are scheduled to be completed at various dates between February and May 1998 — the first will be the central plant, followed by the mental health clinic, then the diagnostic and treatment facility, the nursing tower and finally the outpatient clinic.

McCarthy/Obayashi's commitment to quality during construction has been demonstrated through all of the mockups the construction crews have put together for the project. Construction crews have built mock-ups on curtain walls, casework, acoustical ceiling tile, light fixtures, interior millwork, patient and exam rooms and on every exterior and interior finish for the hospital. They have also performed extensive testing of the seismic joints and racking systems, portals, wind and water and air filtration systems as well as several other systems. "Mockups are an important part of our total quality management philosophy," says Scaringi. "We build the mockups to determine the constructability and aesthetics of the design and to attempt to discover any potential problems that could affect the quality and productivity in the field."

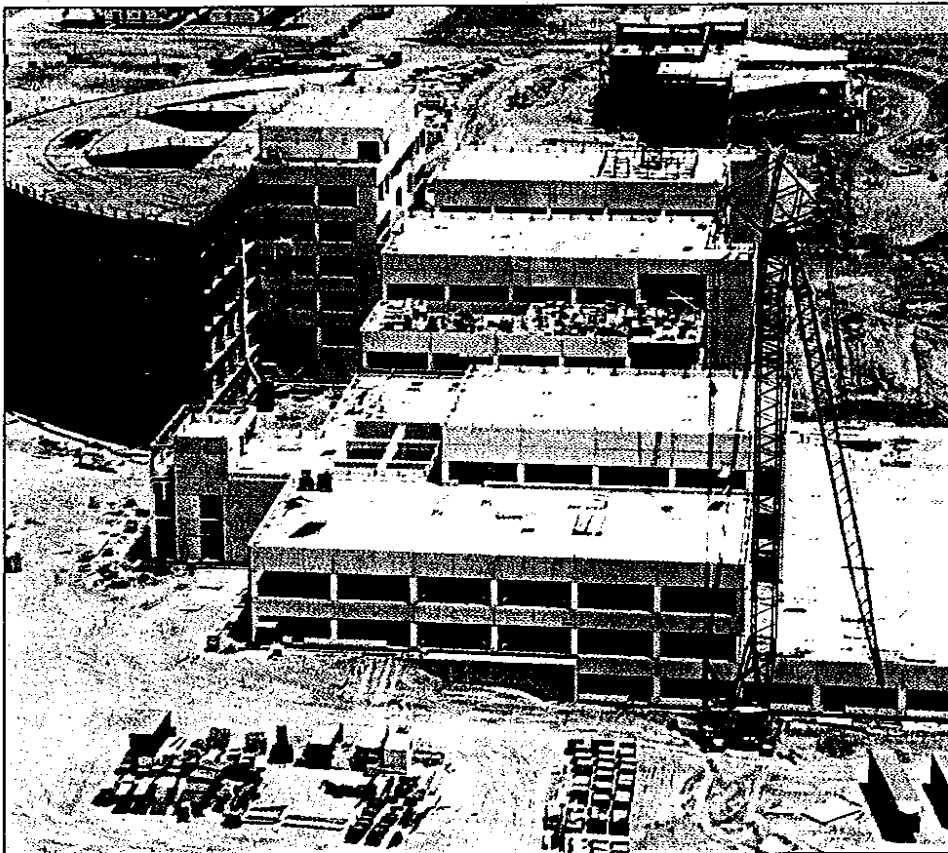


Photo by Jim Miller Aerial Views

Now almost 80 percent complete, the Arrowhead Regional Medical Center is 84 days ahead of the construction schedule with the five separate buildings scheduled to be finished at various dates by May 1998.

"Enormous challenges are an every day part of life on this project," says Piles. "For example, the installation of the anchor bolts to meet the structural steel requirements for the base isolation had some of the highest tolerances that we've ever seen. McCarthy/Obayashi Superintendent Pete Balhar supervised this challenging installation.

"Keeping within 1/16 in. tolerance and the specified spacing on sections that contained up to 20 bolts in them was the hardest thing to do," says Balhar. "A normal building averages up to only eight bolts in one template. However, we were able to place thousands of these bolts without any miscues anywhere."

During the concrete pour, the surveyors from Pfeiler & Associates, Diamond Bar, constantly monitored the anchor bolt center line, relaying the tolerances to the

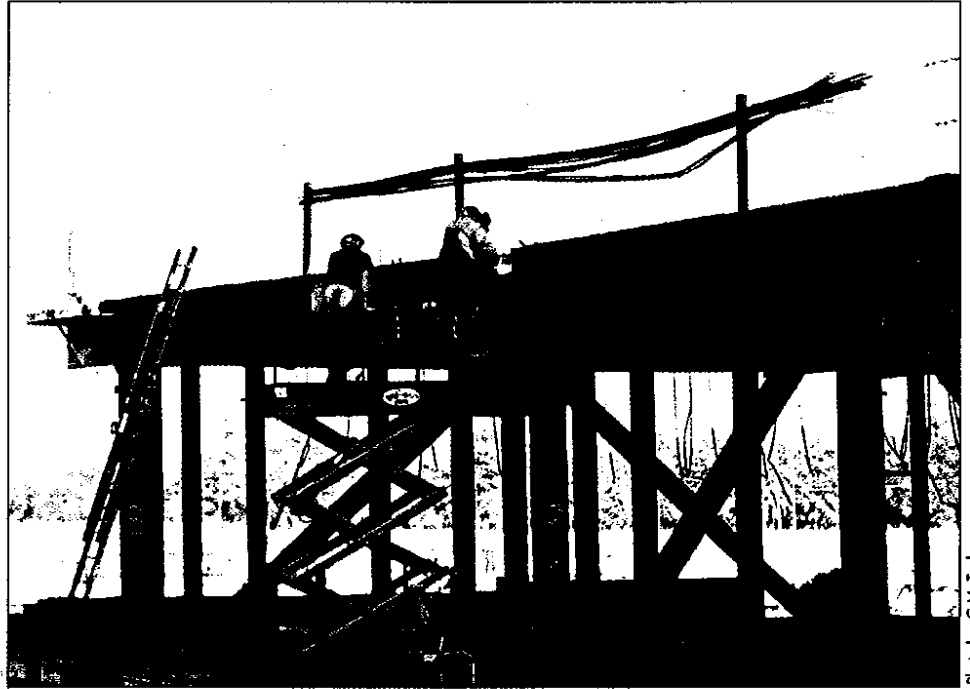


Photo by C.M. Taylor

All the latest requirements and techniques pertaining to structural steel welding were implemented into this hospital's construction as a result of the information gathered from the damage caused by the Northridge earthquake.

Continued on page 32

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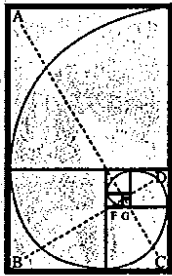
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Continued from page 31

installer who made the adjustments to the templates to keep the center line from drifting. Balhar estimates that crews completed one pour a day for the footing which consisted of about six- 16 x 16 foot x 8 foot deep sections plus tie beams. Over 300 footings were placed using approximately 500 cu. yds. of concrete a day. A special anchor bolt setting apparatus, that was 18 x 10 foot and expendable to 30 feet, was used in conjunction with the footing concrete work. McCarthy had used this type of apparatus on smaller projects. The templates and apparatus were manufactured by N.J. Products Corporation, Aliso Viejo, Calif.

"The project hasn't been without its problems," says Bolen. "However whenever issues arise everyone gets together in the same room, rolls up their sleeves and begin to work toward a solution. This is why the project has moved along very quickly."

Although the architect, engineer and construction manager had already been selected when McCarthy/Obayashi was selected as general contractor, Bolen says that it was easy for them to become part of the project team.

"A project is more than bricks and mortar," says Bolen. "The fact that this project is where it is today — having overcome the obstacles over the last three years — is a credit to everyone involved. We have managed to work through it all. Here we are today, with a building that is on its way not only to perform the way it was intended, but which will also be a model for future essential facilities." ▲

Computer tool helps get the job done right the first time

“Our first construction challenge was getting our arms around 3,000 plus sheets of construction drawings and nine bulletins with over 400 sheets of drawings,” says Dean Piles, construction director with McCarthy/Obayashi. “So we developed the DACCS System.”

DACCS, or Document Administration and Cost Control System, is the computer software application developed by the on-site construction staff that keeps an accurate history of revisions to the contract drawings and tracks the documents which create those revisions along with their associated costs.

“This system has been instrumental in keeping control over cost, document changes, and ensuring correct information in the field,”

— Dean Piles
McCarthy/Obayashi

“When the ‘For Construction Drawings’ were issued, we discovered that additional revisions had been made other than those identified in the nine bulletins. These were largely due to OSHPD plan check corrections. During the parallel, fast-track bid and approval process, coordination between the design disciplines to incorporate revisions became extremely difficult, and the document trail became unclear,” says Dave Whitaker, project administrator with McCarthy/Obayashi.

“We had several drawings, but no clear picture or guide to provide us with the most current and correct version of any drawing to build from, or changes since the initial contract documents were issued,” says Whitaker. “As a result, we needed to establish a baseline which is an accurate drawing log for the construction and bid documents; define the changes between two document sets; and, track all further changes as they related to the new baseline.”

However, due to revisions from Requests for Information (RFI), Field Orders, Bulletins, etc., this log was literally out of date before it was established. A versatile, fast and accurate method of linking these documents to each other as they were generated was required so that, at anytime, McCarthy/Obayashi, Bobrow/Thomas and Associates and the County could attain the latest drawing version as well as the changes leading up to it. This ensured that any drawings reissued by bulletin would be in sequence and coordinated with previous changes.

“It’s critical that everyone in the field be kept abreast of the latest correct information,” says Whitaker. “It’s always more diffi-

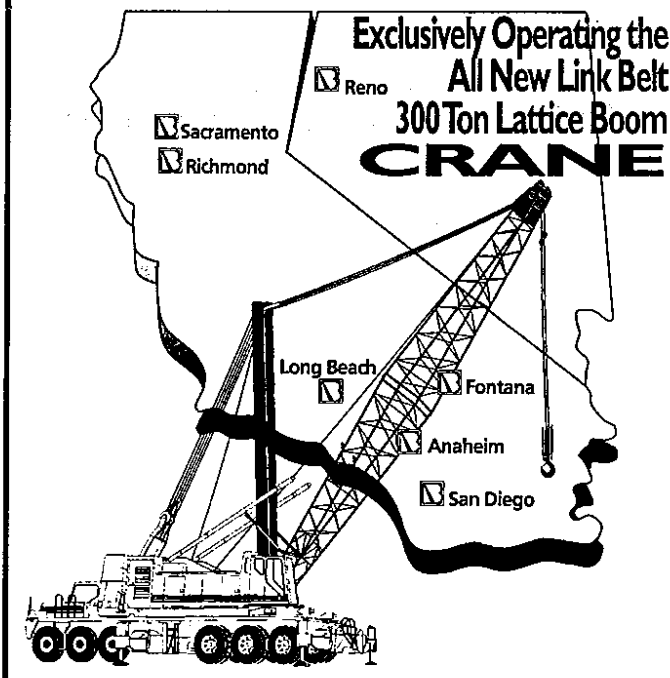
cult and costly to correct wrong information once it gets built than it is to get accurate information in place the first time.”


McCarthy/Obayashi looked at all the programs available on-site and in the market, but none provided the flexibility, powerful cross referencing and linking required on this project,” says Whitaker. Whitaker and McCarthy/Obayashi Senior Project Engineer Dan Gramer, spent approximately three months, part-time and less than \$500 in hard costs developing the system which is networked throughout the project staff.

“All the information is within our system, it is also cross linked and available instantly to all of the project staff. This system has been instrumental in keeping control over cost, document changes, and ensuring correct information in the field,” says Piles, who adds that the project’s mission statement is, “Do it right once.”

According to San Bernardino County Project Manager Carl Alban, “The County has realized a significant cost and time savings due to McCarthy/Obayashi’s innovative approach to problem solving in regards to document and cost control.”▲

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Cutting Edge Support Systems

The mechanical, electrical and plumbing systems on a hospital project need to provide efficient and reliable service to the hospital's critical care units. For the Arrowhead Regional Medical Center, the \$70 million vast and complex MEP systems are designed to be efficient, reliable and state of the art as well.

An unusual feature relating to all the MEP systems is the fact that the building is designed to move almost two feet in either direction. The Los Angeles office of Syska & Hennessy needed to find utility connections that would accommodate this movement. "After a long investigation into our industry and many other industries that have faced our same challenges, we chose a combination of ball joints for wet pipe, flexible pipes for dry pipe, and deflection fittings for electrical connections," says Caecilia Gotama, project manager for Syska & Hennessy. "In principal, these connections will be able to give us the movement that we need. The challenging part is to find a configuration that is simple enough, will provide for enough movement, and yet will fit within the space limitation of the project."

For example, Gotama explains, for the wet pipe connection, ball joints installed vertically appear to be a simple solution, as the vertical pipes could wobble in any direction during shaking. This would, of course, have to be within the limits of the lateral deflection of the joints. For example, 12 in. diameter pipes with only 7.5 degrees deflection each side would need a leg 184 in. long to provide the 24 in. offset in any direction. With the required pipe fittings at the top and bottom, this dimension was greater than the space available. Therefore, the L-shaped four ball joint configuration was selected in most seismic connections for ease in piping arrangement, space available and reduction in sliding supports.

In meeting the seismic requirements, the facility has become crowded with structural brace frames, special utility connections and special seismic routing restrictions.

"We have seismic joints all over," says John MacDonald, MEP manager with McCarthy/Obayashi. "Every time the services cross those seismic joints they need to be able to move with the building. The specially-manufactured ball joints on all the systems allow the piping systems to move with the buildings."

"The challenging part is to find a configuration that is simple enough, will provide for enough movement, and yet will fit within the space limitation of the project."

— Caecilia Gotama
Syska & Hennessy

According to MacDonald, these seismic joints are supported from the slab and from the structure with rigid bolt connections. As the buildings move, the pipes can move, and will not break.

"The coordination process that the MEP team had to go through was unforgettable," says MacDonald. "We had to ensure that all utilities are routed in a way that all structural members and seismic zones are avoided."

At the beginning of the project, all the MEP detailers went through a coordination process where all the shop drawings were made and then overlaid on the building plans on a light table to determine at what elevation each one needed to be in order to avoid getting in each other's way. "On a normal job that coordination process generally takes 3-4 months with 20-25 different areas to consider. On this project we have over 200 critical areas, but

Multifarious MEP Systems

Approximately \$70 million was invested in the mechanical, electrical and plumbing systems for the Arrowhead Regional Medical Center to ensure that the facility will remain functional at its peak capacity for 72 hours without any outside help. Following is a description of the MEP systems:

Mechanical:

Cooling for the Arrowhead Regional Medical Center is served by three 1,100-ton and one 800-ton centrifugal chillers located in the Central Plant.

Space heating, hot water and steam requirements are served by three natural gas/diesel fueled boilers located in the central plant building. Each boiler is capable of producing 21,000 lbs/hr steam at 125 psi pressure.

Air distribution systems are served by 43 air handling units and 30 fan coil units that move a total of 1,246,260 CFM of air.

Electrical:

The facility has two sets of generator systems. One is serving at 15 KV which is the equipment branch and the second set at 480/277 V serving the life safety and critical branch. The total emergency power is served by seven 2000 KW emergency generators with a total of 14 MW capacity.

Plumbing:

The facility is equipped with the following storage capacities:

- 750,000 gallons of water for the domestic water and fire protection system.
- 550,000 gallons for the sewage retention basin.
- Four liquid petroleum gas (LPG) tanks at 15,000 gallons each to serve as the boilers backup.
- Five diesel fuel tanks at 20,000 gallons each for emergency generator fuel.

still finished the coordination process in 14 months, with having meetings three times a week. You can see the results in the field when the front end work is carefully done."

Currently, construction crews are beginning the start-up and commissioning of the equipment including the air and water balancing for the Center. "This phase takes 8-12 months from start to finish," says MacDonald. "We plan to be substantially complete by the end of 1997." ▲

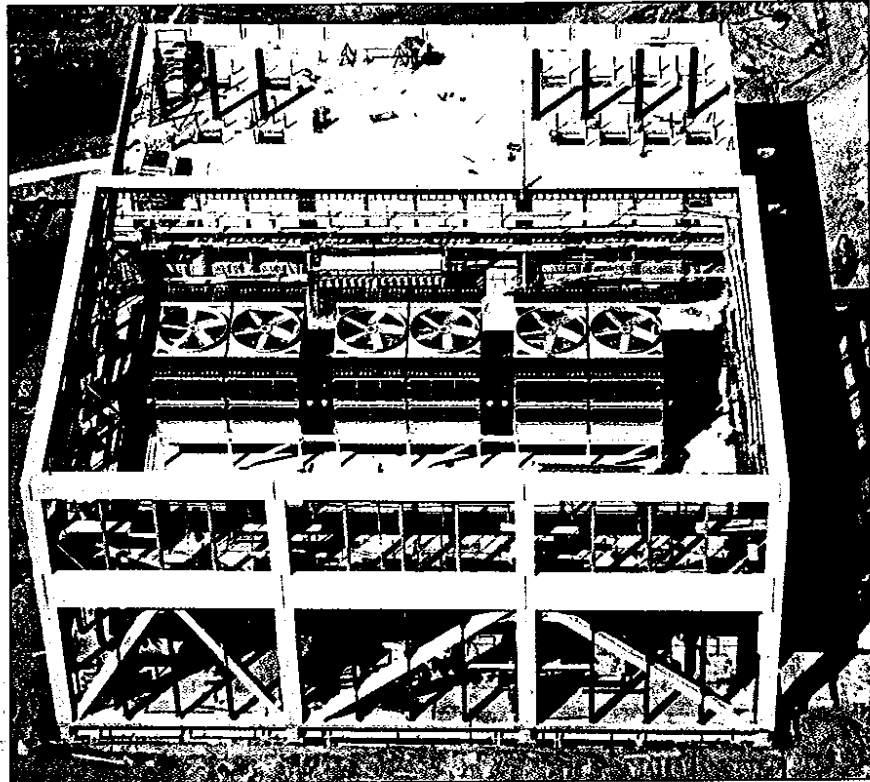


Photo by Jim Miller Aerial Views

The central plant provides support to the \$70 million, state-of-the-art mechanical, electrical and plumbing systems of the Arrowhead Regional Medical Center.

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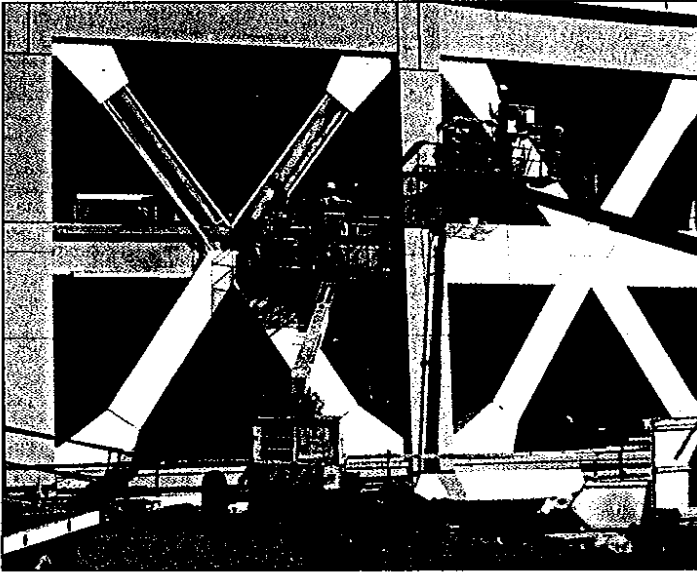


Photo by C.M. Taylor

At the peak of construction activity, over 700 subcontractors and tradespeople were on site daily at the Arrowhead Regional Medical Center project.

When faced with the challenge of controlling the insurance costs of a medical center with construction costs of \$251 million for the County of San Bernardino chose an Owner-Controlled Insurance Program (OCIP) for the Arrowhead Regional Medical Center project.

"This task was to be performed while taking into consideration the County's goal of expanding opportunities to smaller, local contracting firms and minority and women-owned firms," says Bill Stevens, safety director for The Hobbs Group, San Bernardino. "These firms are traditionally at a competitive disadvantage when required to provide for costly individual insurance policies in their bid for work." Robert F. Driver Associates and RFP Insurance Services, the brokers who are providing the wrap-up insurance through carrier Argonaut Insurance Company, were selected through a competitive bidding process.

The County Board of Supervisors sought a legislative amendment to allow the County to use an owner-controlled insurance program (OCIP) for the construction of the center. According to Stevens, OCIP's are commonly used in private projects, but in California, were prohibited by law on public projects. "This legislative amendment, SB 286, was signed into law by the Governor effective January 1, 1994," says Stevens.

OCIP's provide for cost savings by using centrally-managed, volume insurance plans under a "wrap-up" insurance policy covering all contractors on the construction site with the County as owner of the project. Under the OCIP, all contractors at the construction site are held to a single set of strict, well-monitored safety standards with one person accountable for project safety, instead of multiple policies with multiple staff having these responsibilities, says Stevens.

"This results in better loss control and claims management," Stevens says. "For these reasons, the OCIP is expected to provide insurance savings of 30 percent over the four year construction period. These savings have been reinvested in the project to reduce the overall cost of the new center."

Part of these savings have already been realized. The entire project team made up of representatives from Argonaut, Driver, Hobbs, RFP, the County and McCarthy/Obayashi were invited in December 1995 to present a refund check to the County Board of Supervisors in the amount of \$391,794. "The County can expect that much or more in the coming years," says Dean Piles, McCarthy/Obayashi's construction director. "We stress with every worker that every person on the job site is a safety engineer."

In addition, says Stevens, a remarkable safety record was achieved at the construction site — the best safety record of any



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Best wishes and continued success.
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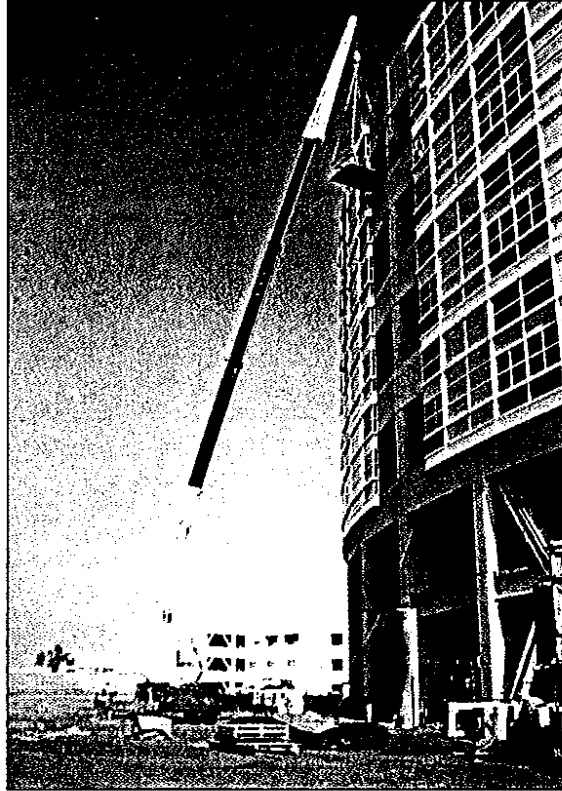
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like project in the nation. "Injuries are estimated to be 70 percent less than OCIP industry standards which are already deemed safer than conventional public projects," says Stevens. "This translates to safer working conditions for

"A remarkable safety record was achieved at the construction site — the best safety record of any like project in the nation."

— Bill Stevens
The Hobbs Group

workers, reduction in delays due to reduced safety problems, fewer claims disputes among subcontractors, improved community relations through centralized response to regulatory agencies and citizen concerns regarding the construction's impact on the community."▲



Construction managers, architects and engineers are on site daily to facilitate the process of meeting daily construction challenges.

Photo by C.M. Taylor

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PROJECT STATISTICS Arrowhead Regional Medical Center

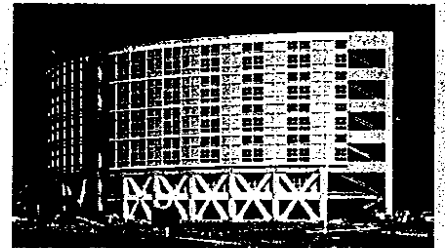
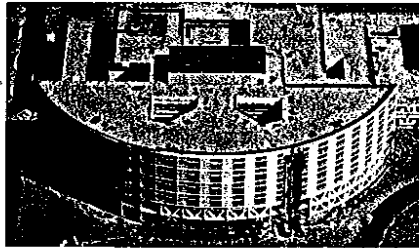
Project Completion - June, 1998
 Cost - \$470 million (including land, consulting fees, medical equipment and \$251 construction cost)
 927,588 square feet - five buildings
 373 beds
 72 acre site
 3,000+ drawing sheets
 392 base isolators
 184 viscous damping devices (3,000 lbs each)
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Mr. Robert Gerdeman
 Project Manager
 Arrowhead Regional Medical Center



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