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The expansion of War Memorial Stadium on Maui to accommodate the Hooters Hula Bowl and recent big events such as the Rolling Stones concerts at Aloha Stadium illustrate why stadiums and sports facilities are important to the state. This issue examines those facilities and others, including the City and County of Honolulu's proposed sports complexes.

COVER: The catwalk atop the University of Hawaii Stan Sheriff Special Events Arena provides an engrossing view of the arena's domed ceiling and aluminum strut framing. Photo by Augie Salbosa

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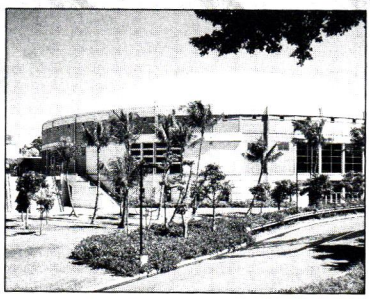

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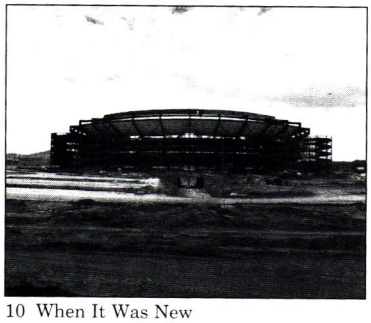

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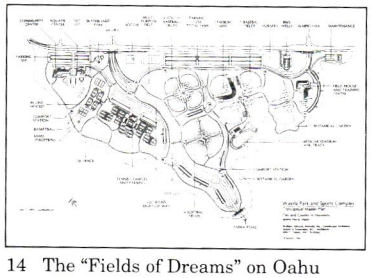

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Capacity crowds greet facility's opening

University Arena Fulfills Fantasy

by Daniel Chun, AIA

The University of Hawaii Stan Sheriff Special Events Arena has been the site of numerous capacity-level sporting events.

Photos by Augie Salbosa

The University of Hawaii Stan Sheriff Special Events Arena was completed in 1994 using a design-build competition with the State of Hawaii contracting with a single entity for design and construction. This procurement process has its supporters and detractors, because, like most human inventions, it has its strengths and flaws.

One of the best aspects about the arena design-build competition was the separation of the zoning permit process from the design-build process. In Hawaii government's regulatory mentality it is too risky to require design-builders of either public or private projects to include the costs of responding to the discretionary conditions which

may be imposed by public agencies. The state engaged Group 70 Inc., drafters of the arena RFP, to obtain the zoning permits.

The most fascinating aspect of the design-build process was the investigation of cost-saving structural systems. This is in contrast to what is a too-common practice on many state buildings. Because of agency micro-economic thinking, the same structural systems are used over and over again and architects and engineers have been forced by too-low fees to reuse the same old designs for new buildings.

Under a macro-economic process such as design-build, more design time is spent on investigating economical foundation and framing systems. The savings then may be allocated to architectural upgrades because architecture is the part of the building that is used and seen by clients. Upgrading architectural finishes makes for lower long-term maintenance costs.

By contrast, many state buildings have expensive structural systems and low-grade architectural finishes which contribute to complaints about poorly-maintained buildings. One solution is to increase schematic design fees for foundation and structural designs so that the cost savings can be devoted to upgraded finishes.

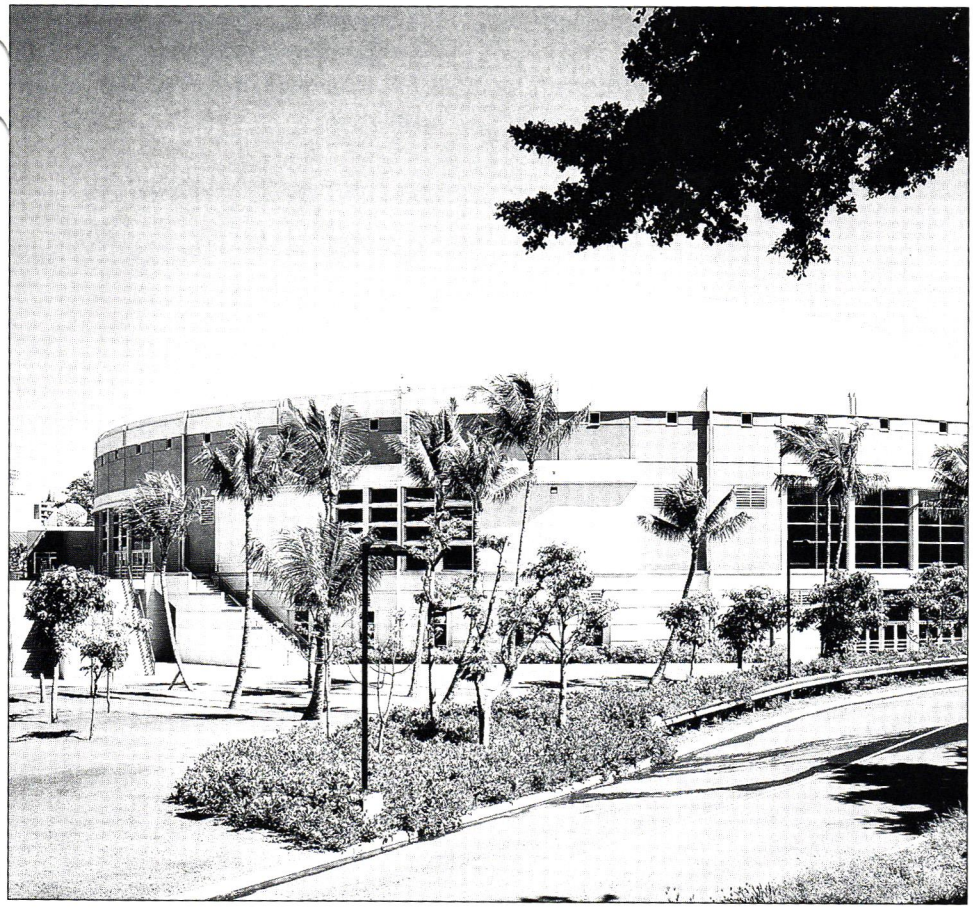
In the case of the arena, the cost savings could not be allocated to architecture. Instead the savings had to be directed toward making the building possible. Most people close to the project felt that the budgeted amount was short about 20 percent.

Game 1

Enter the imagination of design-builder Charles Pankow Builders and structural engineer Dimitrios Bratakos. Most people in the design and construction industry would agree that getting together to solve building challenges is the most satisfying time they ever spend in their careers. By contrast, Hawaii's architects spend a too-large proportion of their design fees wrestling with public agencies, leaving less time and energy to spend on what really ought to count — building design.

Most people in the design and construction industry would agree that getting together to solve building challenges is the most satisfying time they ever spend in their careers.

The state's competition criteria dictated that the winning design-build team first meet basic technical criteria and then submit a low-price bid. In the case of the arena, four design-build teams were ini-



The precast concrete structure with its distinctive domed roof can be seen from the H-1 freeway but doesn't obstruct views of Manoa Valley.

tially selected with three teams ultimately submitting bids. The two lowest bids were $67,000 apart from each other. Heery Architects and Engineers, designers of the Georgia Dome and the 1996 Olympic Stadium, served as chief architects.

Game 2

Cost savings began at the foundation. An old topographic map confirmed that the site had once been covered by nearly 40 feet of solid basalt rock prior to quarrying operations earlier in this century. If the remaining underlying coral had once supported this immense weight there would be no reason why it could not support a much lighter arena, hence the decision to build an economical shallow foundation.

Use of precast concrete up to 56 feet tall was one of the keys to the swift and economical construction. Under the state's typical design-bid-build procurement system it is a wiser practice to use common structural systems in order to allow the widest possible competitive pricing by many building contractors. Another strength of precast concrete is that the structure should resist Hawaii's corrosive environment, giving years of trouble-

In the case of the arena, the only limitations were the confidence of the design-builder, the imagination of the structural engineer, and the lifting capacity of the two cranes used to erect the frame in less than two weeks.

free service. This is in contrast to the state's other major building investments like Aloha Stadium and the Hawaii Convention Center which are built of steel.

In the case of the arena, the only limitations were the confidence of the design-builder, the imagination of the structural engineer, and the lifting capacity of the two cranes used to erect the frame in less than two weeks. The use of prefabrication can also be a useful tool in Hawaii, where building permit processing delays the erection of superstructures.

The aluminum dome roof was the crowning touch to cost savings. Fabricated in Los Angeles by Temcor, the dome offered single-point responsibility for manufacturing and erection. The dome subcontract combined roof structure, insulation, lighting grid support and waterproofing.

University athletic traditions can be improved by designing and constructing good buildings for the athletic department.

Temcor was able to meet the requests of the architects for a dome of lower height which would be less obstructive of view planes in Manoa Valley. A secondary aluminum strut framing was installed to strengthen the high center of the dome, and inverted roof-top fans were provided. It is estimated that these more costly building features reduced the overall height by about 20 feet.

The dome design is directly descended from geodesic domes such as the vintage one at Hilton Hawaiian Village. (Invented by architect Buckminster Fuller, the Hilton Dome is now threatened with demolition.)

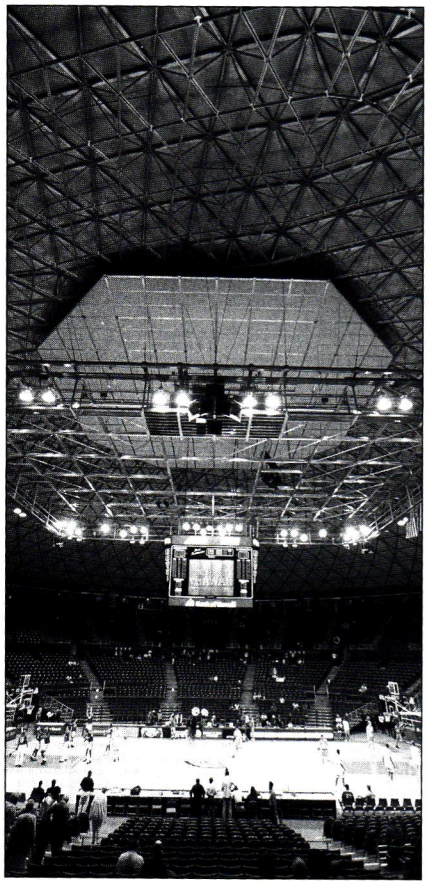
The arena dome does not have a fire-resistive ceiling. Typically fire protection requirements increase as the number of occupants increases; however, the architects used an obscure loophole in the Uniform Building Code which allows fireproofing to be omitted if the arena could seat more than 10,000 people. This is the only "exception" in the Code which allows a reduced level of structural fire protection as the number of occupants increases. This helped save major construction costs.

Cost savings were also realized in mechanical and electrical systems. In the air conditioning system the return air (which has been heated by over 10,000 spectator bodies) is brought back for recooling through the huge corridors and lobbies. A more conventional design would have used separate and costly metal ductwork for this. Using the corridors and concourse for return air circulation helped the design-build team give the university

an enclosed, air-conditioned concourse which was considered a positive feature over other competing designs. The electrical room for the television-quality lighting is hanging from the high ceiling itself to save on wiring runs.

Game 3

On opening night every seat was filled. The excited capacity crowd for a University of Hawaii Wahine volleyball game was a testament to the foresight of the late Stan Sheriff and former Gov. John Waihe'e,



Aluminum strut framing adds an attractive design element while strengthening the domed ceiling.

who were instrumental in supporting this project. The few criticisms of "bread-and-circus" politics have largely faded away as UH athletic teams have gone on to make history on this court of dreams.

Architecture has helped this bottom line. Greatly increased attendance has helped the university's athletic department balance its budget. Outstanding building facilities also help recruit outstanding student athletes.

University athletic traditions can be improved by designing and constructing good buildings for the athletic department. Combine a commitment to good facilities, high public interest and outstanding student athletes, and you have a good recipe for building athletic powerhouses. Isn't it interesting how this holds true for academic excellence as well?

Daniel Chun, AIA, is a partner of Kauahikaua & Chun/Architects, Honolulu. He was consulting architect for the Special Events Arena and 1997 president of the AIA Honolulu Chapter.

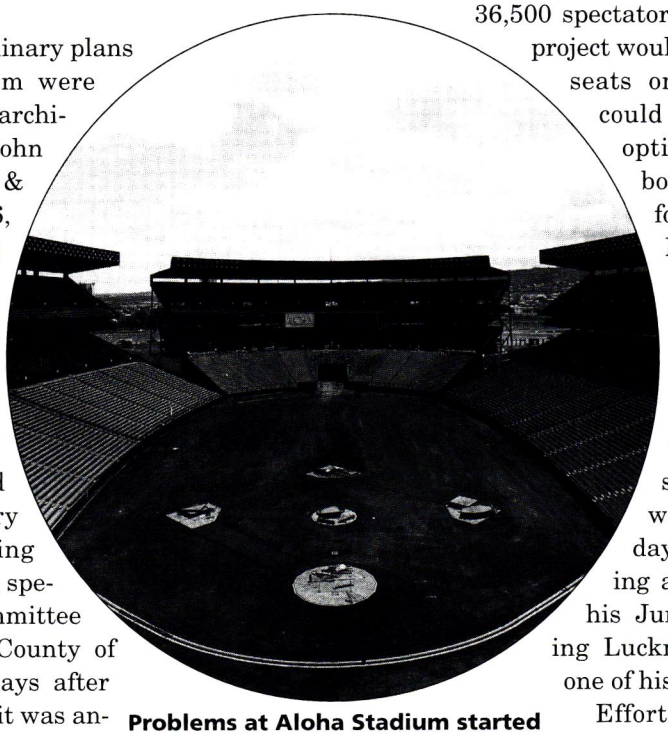
The Aloha Stadium has always been linked to controversy

When It Was New

by Glenn Mason, AIA

When the just-named Aloha Stadium opened to the public for the first time on Sept. 13, 1975, *The Honolulu Advertiser* referred to it as a "beautiful structure," and the public generally welcomed the replacement for the old Honolulu Stadium. However, like so many large public projects, the path to a new stadium involved vision, determination and more than a few political twists.

The first preliminary plans for a new stadium were prepared by the architectural firm of John Carl Warnecke & Associates in 1966, while the firm was still at work on the State Capitol Building with Architects Hawaii. In Jan. 1968 an article in the *Advertiser* announced that six "mystery firms" were giving presentations to a special selection committee of the City and County of Honolulu. Four days after the last interview it was announced that the architectural firm of Charles Luckman Associates had been selected to be the designer. Mayor Neal Blaisdell signed a contract with Luckman's firm early in June of that year to develop a 36,000-seat, $18 million stadium at Halawa.



Problems at Aloha Stadium started even before construction.

Photos courtesy of the City and County of Honolulu

City Council member Frank Fasi, running for mayor, publicly warned Luckman days later that the "new mayor and Council will undoubtedly terminate" his contract. Fasi, long a foe of the project, felt that the city did not have the money to commit to the project, which he estimated would cost "$50 million to $60 million."

Progress on the design continued and by the end of October 1968 Luckman had unveiled his design for a "unique 'two-in-one' stadium with movable grandstand." Seating 36,500 spectators, the $20 million project would have had 27,000 seats on tracks so they could be relocated for optimal viewing for both baseball and football. He praised Mayor Blaisdell and the city's stadium advisory committee for close cooperation that he said made a Jan. 1, 1972 opening possible. However, Fasi was elected just days after the unveiling and made good on his June threat, canceling Luckman's contract as one of his first acts in 1969.

Efforts to construct a new stadium then shifted to the state government. Luckman, in testimony before a House committee, boosted the idea of a new stadium with a detailed presentation and selling points like "With the facility you get the (major league) franchise." He also offered that his architectural firm and a separate development company also headed by him would

put up $3 million of their own money to partner with the city and state in return for the rights to run the concessions at the stadium for three years. Fasi, who attended the hearing, still rejected spending any city money. He specifically questioned the building of a steel structure "right near the salt water" and warned that the finished facility would cost as much as $75 million when expanded to its full 50,000 seat size.

Architect or Developer?

Lobbying for the state to take over the project continued with negotiations and maneuvering taking place in public and private. Luckman stayed very much in the thick of this discussion, promoting his plan. In March 1970 the Hawaii Society/American Institute of Architects, in a letter to Luckman, questioned the ethics of his involvement with the

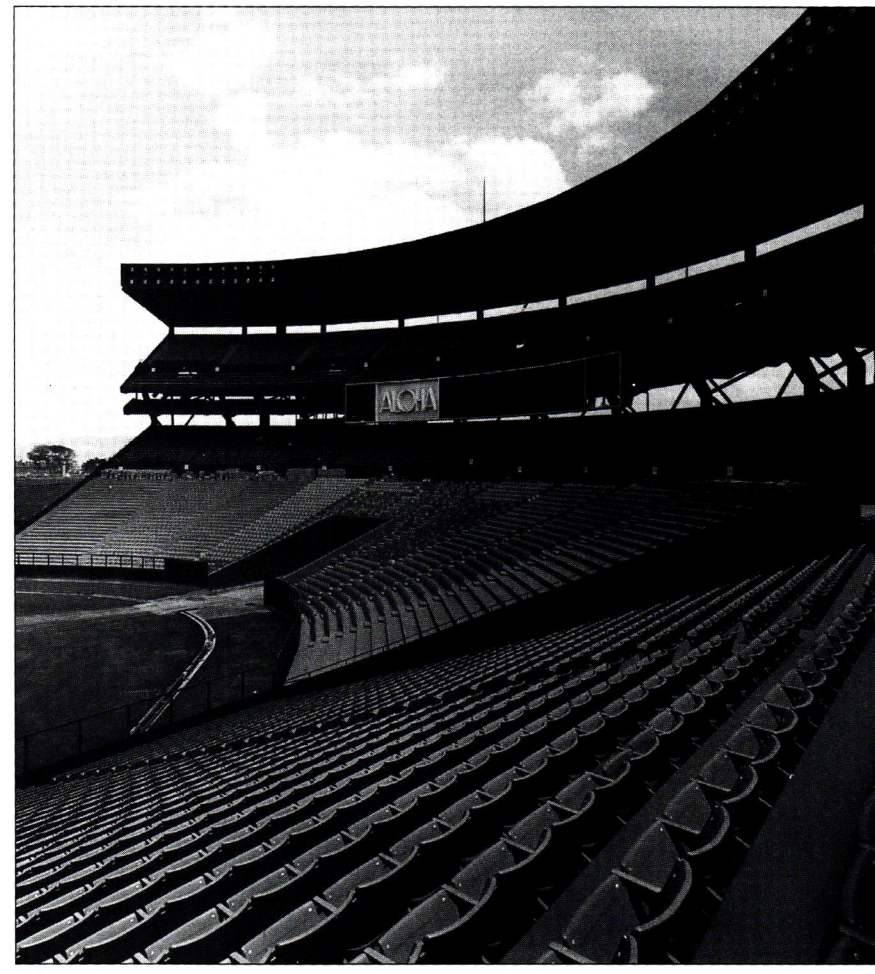
Although the repairs and painting of the steel structure have more than doubled the original construction cost, the stadium has been well used over the years.

project because of confusion about whether he was acting as architect or developer. Luckman, with two separate companies, had been acting in both roles, working on the project for nothing to keep the plan alive. His efforts would eventually bear fruit.

With Legislative approval, Gov. John Burns signed a contract on Oct. 15, 1970 with Charles Luckman Associates for what was billed as a $12-million, 35,000-seat stadium, still with movable seating.

A bit of trivia:

How did Aloha Stadium get its name? Although officially selected by the Legislature, the name was the winner in a "Name-the-Stadium" contest held by *The Honolulu Advertiser* in 1974. Of the 11,000 entries submitted, 441 proposed the name Aloha Stadium. To pick a winner, winners' names were put in a basket and that of Homer S. Halili was drawn as the winner.



Gaps between seat sections have been criticized as wasting seating area.

Groundbreaking was scheduled for July of 1971 and completion set for 1973. By the end of 1970 about 100 acres of Halawa land accumulated by the city was turned over to the state, but the road to a new stadium was still only half traveled.

By February of 1971 the cost estimate had doubled, due partly to increasing the size of the stadium to 50,000 seats. Hawaiian Dredging was the contractor for the project. Construction brought more difficulties, chief among them being that the soils on the site were much worse than had been expected. The poor soil caused problems with the concrete pads over which the movable stands were to float and extensive settling, especially in the parking lot areas. The seriousness of the issues caused Hawaiian Dredging to sue the architect for damages in July of 1974. The problems resulted in another nine months of delays.

The price tag, including $6.1 million for acquisition, design fees and other soft costs, was $32.9 million at completion.

Today the repairs and painting of the steel structure have cost more than double the original construction cost. Putting aside the failure of the Corten steel to withstand the elements (which included a variety of causes), the stadium has other problems that point to a lack of sufficient programming of project needs at the onset of design.

Bob Fishman, current city managing director who served as deputy general manager from October 1974 until 1980 and as general manager in 1993, said the stadium "was designed for architects and engineers, not for the users." While that statement may seem a little harsh, he pointed out that the gaps between the seat sections due to the movable seating waste seating area and that the stadium in its baseball configuration has far too many (poor) outfield seats. The field is also too narrow for soccer, but who knew then how popular soccer would be?

The biggest problem, in Fishman's perspective, is that the stadium tried to be everything to everyone. He said he believes that eliminating the movable systems would have resulted in a more customer-friendly stadium and made its operation much more efficient.

Popular Despite Problems

Despite its problems, Fishman pointed out that for the first five years of its operation, the stadium was heavily used and for two of those years ranked as the busiest open-air stadium in the nation. Over 120 football games were played in the stadium each year, and the goal of having each varsity team in the state play in the stadium at least once per year was attained. Those who fondly remember the more intimate confines of the old Honolulu Stadium need to also remember the parking nightmare in that location and the good reason for its "termite palace" nickname.

This view taken in 1973 looks northeast of a movable stand.

Today, its detractors exaggerate its blemishes and its proponents booster its positives, just as each side did during its gestation. A little more analysis and a little less political gamesmanship would have benefited all.

Glenn Mason, AIA, is president of Mason Architects, Inc., Honolulu, a firm specializing in residential architecture and historic preservation.

The City and County of Honolulu plans major sports complexes

The "Fields of Dreams" on Oahu

by Benjamin B. Lee, AIA, and Randall K. Fujiki, AIA

Last June, Mayor Jeremy Harris announced the planning, design and construction of two visionary recreation and sports complexes that will serve our community and provide the foundation for Oahu's emerging sports industry.

The Waipio Peninsula Soccer Complex will cover about 240 acres just makai of the Ted Makalena Golf Course near Pearl Harbor. More than 80 percent of the land will be leased from the U.S. Navy in a partnership between the federal and city governments. The site, the former location of the Waipahu incinerator, is generally flat and was used to grow sugar cane.

The Waiola Regional Park and Sports Complex is located on 269 acres between Waikele and Kamehameha Highway. The area stretches all the way to Kipapa Gulch and provides a panoramic view of Pearl Harbor and the Waianae Mountains. The land is being obtained from Castle and Cooke.

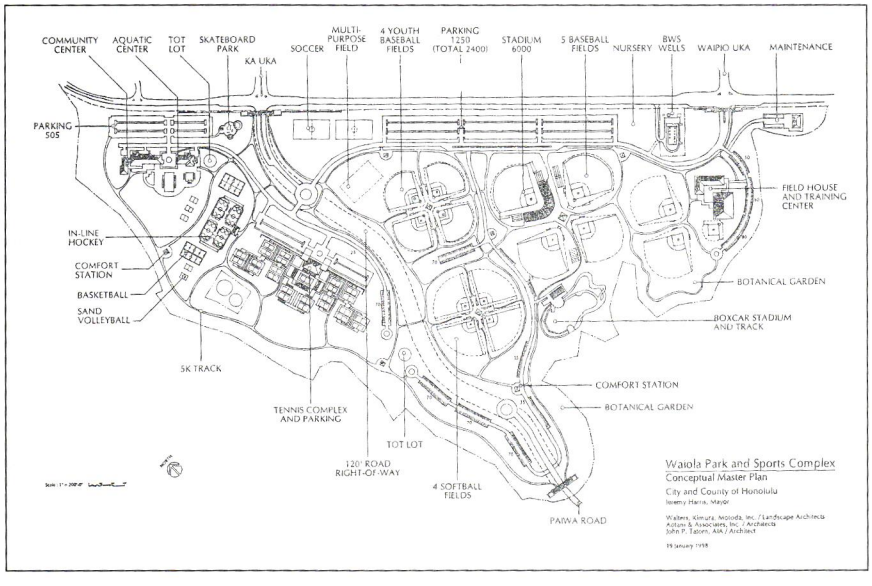
The complexes are key parts of the city's long-range plans and will be Oahu's largest recreation centers. Each is larger than the 155-acre Kapiolani Park and the 120-acre Ala Moana Park.

Diversifying the Economy

Both complexes are being designed as world-class sports facilities for Oahu's people. These facilities will be the cornerstone in developing sports tourism in the city and diversifying Hawaii's economy. They will also allow the city to attract professional teams for training and host regional, national and international tournaments.

Several months ago, Mayor Harris established a Sports Advisory Task Force composed of over 60 members to begin a community-based planning process in developing the program and conceptual designs for the two facilities. Six work groups were formed with members from Oahu's sports community and the city administration. The groups brought leaders in sports, government and the community together with design professionals to develop the projects.

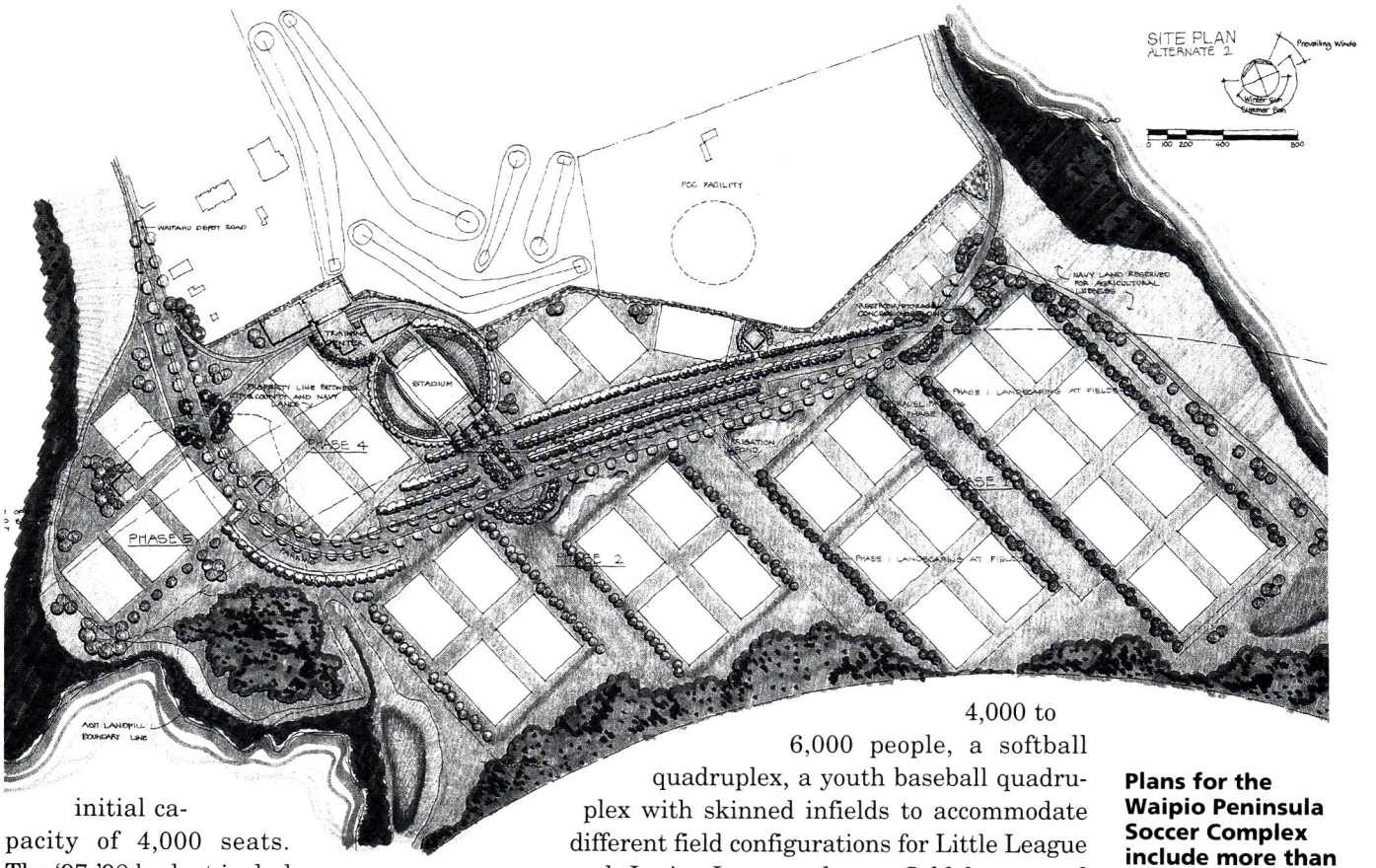
The six groups and co-chairs of each are: soccer, Debbie Ching and Frank Doyle; baseball, Glenn AhSam and Robert Nakasone; softball, Larry Baird and Joe Magaldi; tennis, Dick Poirier and Salvatore Lanzilotti; in-line hockey/box car racing, Ken Perel and Mike Amii; and a work group on community recreational and other sports facilities led by Martin Burke, Bill Balfour, Cliff Laboy and Ben Kama.



The Waiola Regional Park and Sports Complex will provide space and facilities for a wide variety of sports.

Soccer Gets Its Due

The Waipio Soccer Complex is being designed by Stringer Tusher Architects Inc., AIA. Conceptual plans for the 240-acre facility include 33 soccer fields and a stadium with an



Plans for the Waipio Peninsula Soccer Complex include more than 30 soccer fields and a stadium.

initial capacity of 4,000 seats. The '97-'98 budget includes an appropriation of $12 million for the construction of the first phase of the three-phase facility. In addition, Stringer Tusher has provided schematic designs to convert the existing incinerator building into a training facility for professional and visiting soccer teams. It will consist of locker rooms, multi-purpose and exercise rooms, meeting and dining facilities and dormitory space for visiting teams.

Construction is expected to begin this year and be completed in 12 to 18 months. That timeline will make the complex a potential site for the 2001 United States Soccer Federation Youth Division Far West Regional competition, which would bring over 200 youth teams to Hawaii. The complex may also host the U.S. men's and women's national teams during the same year.

Public-private partnerships and corporate sponsors will be sought for the construction, maintenance and operation of these facilities.

An Athlete's Paradise

Walters, Kimura, Motoda, Inc. Landscape Architects; Aotani and Associates, Inc.; and John Tatom, AIA as project architect are preparing conceptual designs for the Waiola sports facility.

The plan consists of six baseball fields which includes a stadium with seating for 4,000 to 6,000 people, a softball quadruplex, a youth baseball quadruplex with skinned infields to accommodate different field configurations for Little League and Junior League play, a field house and training center, a championship tennis complex with 24 tennis courts and a center court with seating for 1,500 to 2,000 people, an aquatic center and community center with Olympic-sized swimming and diving pools, four in-line hockey courts, a box car racing facility, several multi-purpose fields and passive recreation along the edge of Kipapa Gulch. Another dozen hard courts are planned for the basketball and volleyball communities, as well as four sand volleyball courts. Still other areas are being considered for multi-purpose use such as football and soccer. The passive area will have bikeways, hiking and jogging paths, picnic areas, a botanical garden and areas for kite flying along the edge of the gulch.

Public-private partnerships and corporate sponsors will be sought for the construction, maintenance and operation of these facilities.

Sid Fernandez, former All-Star major league baseball pitcher, was appointed by the mayor as the city's Director of Sports Industry Development to assist in marketing, programming and designing the baseball facilities. "We've needed something like this for a long, long time. I can remember having to practice on the sand near Lanikai because all

the fields were in use. Athletes still travel across the island for games and practice because of a shortage of fields. Although it will not fill all of the need for fields, Waiola is a major step forward," Fernandez said.

"Waiola will be world-class. When we're done, this will be able to handle teams from around the world who want to hold training camps and play in our winter league. We'll be leading contenders for lots of international sports business," he said.

The site plan and conceptual designs are currently being refined as the sports work groups meet and the design consultants balance the diverse needs and translate them into a cohesive, functional master plan.

"Waipio and Waiola are major investments in our future. They address the recreational needs of our people, and they will create jobs and diversify our economy. Most important, our young people will benefit from the exercise, social skills and confidence that sports offer. We cannot deny them those opportunities," said Mayor Harris.

Community support has been positive and the city has received numerous inquiries from the private sector and corporate sponsors who are interested in developing portions of the project. We have a great opportunity to provide much-needed ballfields for our children, diversify our tourism-based economy, and preserve and protect our scenic open space for the next millennium. Based on what we've been hearing from the community, there is little doubt in our minds that if we build it, they will come.

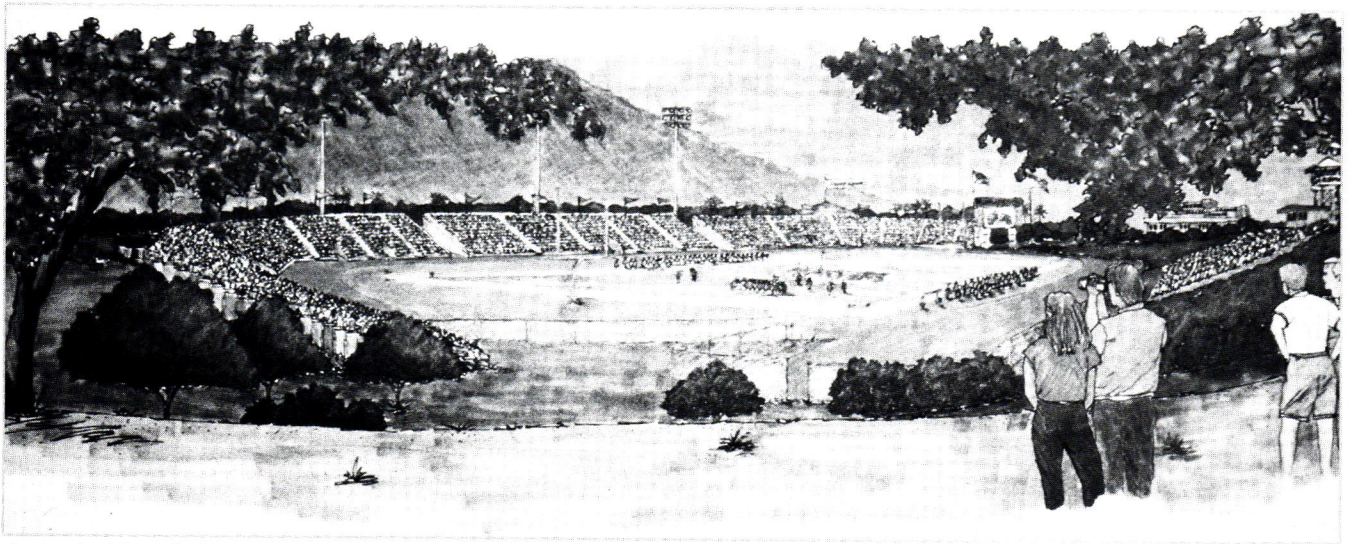
Benjamin B. Lee, AIA, is an architect and the Chief of Staff for Mayor Jeremy Harris. He has extensive experience in both government and the private sector and heads the Mayor's Public-Private Sports Task Force.

Randall K. Fujiki, AIA, is an architect and planner. He has worked in the private sector and has served as the Building Director for the City and County of Honolulu since 1994.

War Memorial Stadium undergoes extensive renovations

Maui Greets Hula Bowl With Aloha

by Brian Shimomura, AIA



A rendering of the expansion of War Memorial Stadium depicts how well the facility complements its setting.

Rendering by Jeffrey J. Peterson

For years, the War Memorial Stadium on Maui has been an important community resource. The formerly 6,700-seat facility in Wailuku served as the venue for many Valley Isle events, including high school graduation ceremonies, various interscholastic sporting competitions, Fourth of July fireworks displays and Easter sunrise religious services. With its rubberized track encircling the grassy playing field, the stadium was utilized daily by walkers and joggers of all levels and ages. However, when the owners and promoters of the Hooters Hula Bowl approached Maui County about moving the college all-star football game from Aloha Stadium to Maui, it was time to grow to the next level.

The $1.2 million construction project was launched after approval was given by Maui County officials. "The genesis for the additional seating really started when the Hula Bowl (promoters) came to us," said David Goode, deputy director of Maui County's Public Works and Waste Management. The intimacy of the facility and panoramic views of Haleakala were features that attracted the promoters, but the existing facility did not have nearly enough seats.

The intimacy of the facility and panoramic views of Haleakala were features that attracted the promoters, but the existing facility did not have nearly enough seats.

The stadium expansion brought the number of permanent seats to nearly 16,000. NCAA rules require at least 20,000 seats for NCAA-sanctioned events, so promoters brought in the remainder of the seats to satisfy this requirement.

The project began with design and planning consultants stepping forward to donate their services. The environmental assessment, traffic and drainage reports, and structural, civil and electrical engineering work resulted in enormous cost savings and expedited the project's schedule by foregoing the normal consultant selection process.

The new aluminum and steel

Bleacher structures provide an almost surrealistic picture in the foreground of an expansive Maui sky.

Photos by Brian Shimomura, AIA

supporting structures, which seat 9,300 people, were obtained from a Florida bleacher manufacturer. The general contractor who installed the bleachers traveled to Florida to inspect the recent installation of a 25,000-seat bleacher at the Daytona Motor Speedway.

One hundred twelve concrete footings over existing sand subgrade were constructed to provide the foundation for the steel structures. Despite transportation delays from the mainland, steel erection was completed within schedule with minimal interruption to facility users. In conjunction with the new bleacher construction, other areas of the stadium underwent renovations: the announcer's press box, locker rooms, restroom facilities and existing wooden bleachers.

More People, More Cars

Parking was another major concern at the project's inception. With the number of seats planned, some 2,700 to 3,300 parking stalls were required. The Maui Planning Commission had approved an off-site parking plan to utilize nearby parking facilities. In addition to the existing stadium's and adjacent street parking, the Central Maui Youth Center, War Memorial Gymnasium, Baldwin High School, adjacent soccer fields, and the new Keopuolani Park all have available parking stalls. During major events such as the Hula Bowl, hotel and private bus shuttle services help to provide relief from traffic congestion.

Access for the physically-chal-

Steel erection and bleacher construction were completed with minimal interruption to the stadium's users.

Concrete footings provide the foundation for the steel structure.

lenged was another consideration to address in the project's design. "We already have handicapped-accessible parking in the stadium itself," explained Goode, "and three different areas for handicapped-accessible seating have been identified. Seating will be available near the press box for full viewing of the playing field, elevated locations near the southern end zone, and on the existing track for close-up, ground-level action."

For now, the existing electronic scoreboard will remain. However the Hula Bowl promoters installed a "Jumbotron" viewing screen for the event, along with the temporary seating and V.I.P. tent structures.

The expansion of the War Memorial Stadium originally brought forth much public criticism as well as hope for Maui's future. Some felt that several of Maui's favorite pastime events would be adversely affected by stadium construction. However, a team effort by the community and successful planning by the project leadership has proven otherwise. The project holds much potential for Maui's residents and its economy by attracting larger-scale events to the Valley Isle.

Brian Shimomura, AIA, is a member of the Hawaii Pacific Architecture *Editorial Board. He is in private practice in Maui with experience in commercial/retail and residential design, and design for handicapped accessibility.*

Professional sports arenas' contribution to community is debatable

Stadiums: Benefit or Boondoggle?

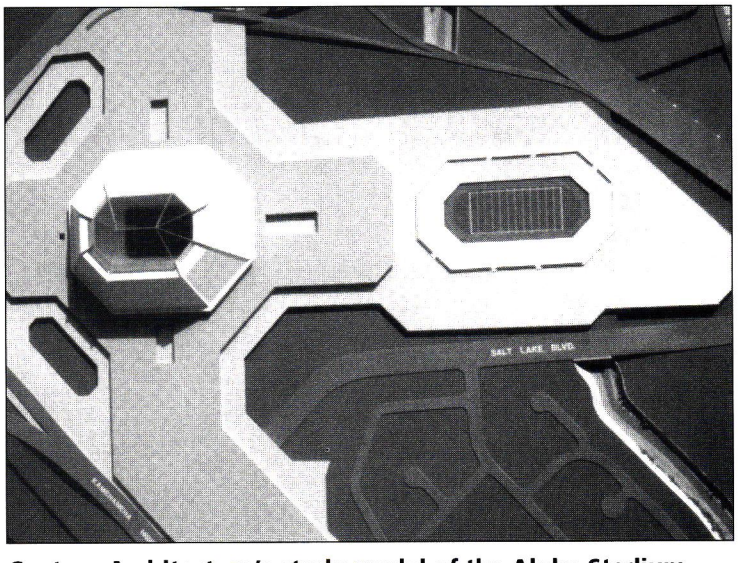
by Jo Paul Rognstad, AIA

Professional sports team owners are big-time spenders with team payrolls ranging from $30 million to $100 million. Sports owners are also possessors of franchises worth millions; for example, the Los Angeles Dodgers baseball franchise recently sold for over $300 million. The National Football League sells its television rights for billions of dollars per year. Yet, despite the astronomical payrolls and revenues generated by major league sports, most professional sports team owners expect the local taxpayers to provide them with a free or near-free place to play.

The justification for the use of taxpayer dollars to build sports facilities is based on the tenuous argument that the sports attractions generate beneficial financial activity that, in turn, multiplies by stimulating business around the stadium and by providing stadium employment. However, Chicago economics professor Robert Baade has concluded that the stadium activity actually siphons off entertainment dollars that would be spent locally on existing entertainment (theaters, concerts, etc.) and that the only jobs provided are minimal-wage types (except for owners and players). Consequently, he believes the taxpayer receives little or no actual beneficial return on the huge expenditures required for sports palaces.

When voters have turned down sports funding initiatives, a few owners have actually paid for their "playpens" out of their own pockets. The Miami Dolphins owner was the first to privately fund his own stadium. The Washington Redskins stadium has just been completed with owner funding.

Most owners, however, continue to pick the pocket of the taxpayer, despite the examples provided by a few of their more financially creative brethren. Is there a place for the architect to add creativity to stadium design that could help eliminate the plundering of taxpayer funds? Probably the most recognized firm in stadium design is HOK. Their recent baseball stadiums have received accolades from many as keeping the traditional ambiance of America's "grand old game." However, the nostalgic characters of these recent ballparks were all achieved by taxpayer largesse.



Century Architecture's study model of the Aloha Stadium site for mixed-use development shows a new enclosed stadium located at the exact spot of the existing stadium. The adjacent open-air football field and Olympic 400 meter track provide space for football as well as track and field events.

While major professional sports are only a future possibility for Honolulu, we have an opportunity to provide an example of sports development without public funds. The Aloha Stadium site would be ideal for such development because of a number of contributing factors:

1. It's an ideal size for multi-use development (90+ acres).
2. It's the absolute hub of freeway development because of proximity to the H-3 interchange.
3. It's a near-waterfront site.
4. It's a near-downtown site.
5. It's on any future mass-transit right-of-way.
6. It's close to Pearl Harbor employment.

The site could support Honolulu's biggest and best shopping mall which alone could financially carry the project. The site is ideal for mid-rise affordable condominium housing. Using its condominium structure to enclose a stadium in an "atrium"-like configuration would, in turn, reduce expenses to only the cost of seating and circulation space.

The economics of this type of mixed-use development can be so profitable that the stadium becomes an "amenity" rather than a major cost factor, wherein its use may not be an essential financial contributor. However, when stadium use is important to the financial success of the facility, the stadium should be usable for both football and baseball, as is the case at Aloha Stadium. Unfortunately, most football owners want football-only facilities and baseball owners want baseball-only, which is typical of most new sports construction, with taxpayers paying the costs. Whether government should subsidize any sports facilities beyond school and community uses is questionable. Professional sports can and will pay their own way, but only if they cannot convince local politicians to foot the bill.

Jo Paul Rognstad, AIA, is president of Century Architecture, a firm specializing in high-rise condominiums. His offices have been located in Honolulu for 36 years.

Project Profile:

ONE ARCHER LANE

Located in the heart of Honolulu is One Archer Lane, a new 41-story condominium project. This high-rise consists of a 33-story tower over an eight-level parking deck. Topping off the tower is a four-sided pyramid-shaped roof trellis made of steel. The new home of Island Television KITV, which is the first digital television station in the United States, is on the first two floors.

A steel roof trellis completed the 41-story tower at One Archer Lane.

Photo by Bill Hagstotz

Unlike many high-rise structures, the roof at One Archer Lane was designed as an architectural feature adding the finishing touch to its overall appearance. Located 400 feet above King Street, the roof structure needed to be constructed of a material which could meet several criteria. First, the material needed to be lightweight to minimize dead load and seismic inertial forces. Next, because of direct exposure to the elements, the material had to be durable. Accessibility to the roof structure would be limited, requiring maintenance to be minimal, easy and inexpensive. The ease of constructability was also considered. Scheduling demanded the roof structure be erected within an extremely tight time frame due to KITV's early occupancy requirements. Finally, it was important that the material and system be cost effective.

During the conceptual design stage, potential materials considered for the roof structure included structural steel, concrete, fire-treated wood and fiberglass-reinforced plastic. With the criteria established, it was apparent that structural steel was the material of choice. Structural steel is relatively lightweight, durable, non-combustible, quick to erect and cost effective. The structural steel members were specified as hot-dip galvanized to provide corrosion resistance. In addition, the steel roof was to be painted. The painting was primarily for architectural and aesthetic purposes, but the paint system also provided additional protection from the elements.

Fire-treated wood, although lightweight and relatively cost effective, was ruled inappropriate since much maintenance and replacement would be required. Fiberglass-reinforced plastic is both lightweight and resistant to corrosion. However, the exposure to sunlight would cause fading. More importantly, the cost of a

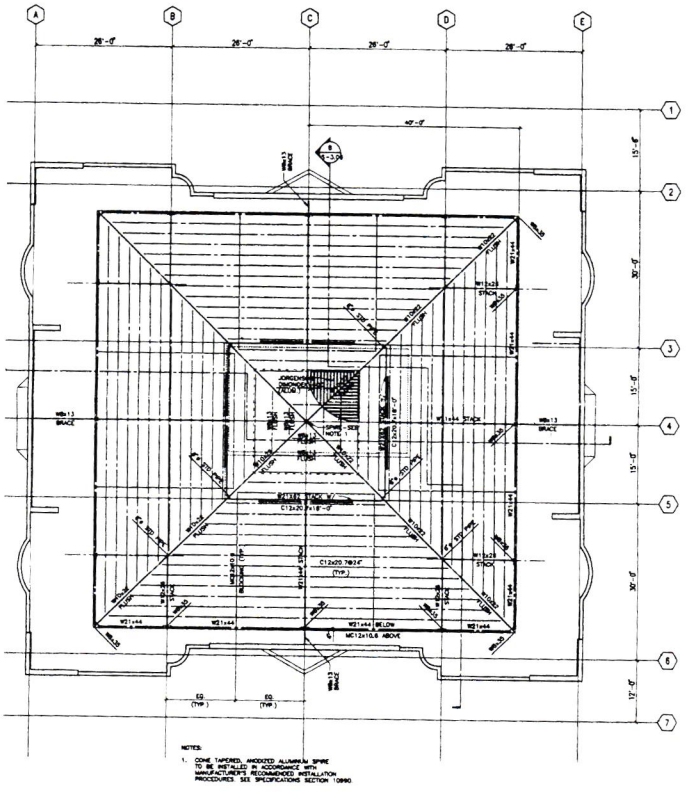
fiberglass-reinforced plastic structure would have been approximately two times that of a similar steel structure. A concrete trellis structure would have been twice as heavy as a comparable steel structure. It also was the designer's opinion that the constructability of a concrete trellis would not have been as simple as that of a steel structure even if the members were precast.

The design criteria conforms to the 1991 Uniform Building Code. Because of the project's proximity to urban Honolulu, Exposure B was used in accordance with the exposure categories as described by ANSI. The steel roof structure was designed to resist wind loads acting both in the horizontal and vertical directions. The lateral load resisting system of the roof trellis structure consisted of moment resisting frames located along the perimeter and cross bracing located in the interior portion of the structure.

Typical purlins were 12-inch deep channels located at 2-foot spacing with maximum spans of 26 feet. Blocking was placed at mid-span. A combination of stack and flush framing was utilized. Beams and hips were 10, 12 and 21-inch deep wide-flanged sections. Wide-flanged and pipe columns carried the structural loads onto the tower's concrete roof structure.

In order to facilitate erection, material from the fabricator's shop was brought on site and first placed on the ninth level recreation deck. There, sections of the roof were fabricated to the largest extent possible and then lifted by tower crane to the concrete roof deck where erection took place. Erection of the entire steel roof trellis required only four weeks. The tower's concrete roof deck was completed in mid-October and KITV Channel 4's new television station needed to be on air before the end of the year. Thus, four weeks of erection provided ample time for KITV to place its electronic equipment on the roof.

It is testimony to the choice of structural steel for the roof trellis that KITV is now broadcasting from its new studio located at One Archer Lane.



B HIGH ROOF FRAMING PLAN

ONE ARCHER LANE

Credits:

Developer/Owner
The Myers Corporation/
Myers King Street Partners
Honolulu

Architect
Media Five Ltd.
Honolulu

Structural Engineer
Robert Englekirk
Consulting Structural
Engineers, Inc.
Honolulu

Structural Steel
Industrial Welding, Inc.
Honolulu

General Contractor
Fletcher Pacific Construction
Honolulu

Hawaii leads the world in steel-framed housing

Steel Popularity Grows

by Tim Waite, P.E.

Most design professionals in Hawaii are familiar with light gauge steel and have seen some of the projects around the state. However, most people are not aware that the state leads the world in the percentage of houses that are framed with steel.

Steel framing accounts for 25 to 30 percent of new housing starts in Hawaii. The next highest percentage is Australia with about 12 percent. California comes in third with just under 5 percent.

Some contractors have been using steel in Hawaii since the early '70s. Although it was not as cost-effective back then, contractors sold the concept of steel framed houses based on their quality. Steel's resistance to termites, the durability galvanized steel has against rust, its ability to produce straight walls, and no swelling or shrinking resulting in almost no call-backs were major selling points. But it wasn't until the latest upward trend in lumber prices in the early '90s that steel framing caught the attention of several Hawaii contractors and design professionals.

Developer Castle & Cooke's new subdivision at Mililani Mauka features thousands of homes framed with steel.

Steel Becomes Competitive

Lumber prices became volatile in 1993, making it difficult for contractors to estimate the cost of lumber more than one week in advance. Coupled with the extra expense of having to use treated lumber to protect against termites, steel framing became cost-competitive for the first time.

In 1993, the three largest developers in Hawaii: Castle & Cooke, Schuler Homes and Gentry, were all using steel framing. Castle & Cooke has built thousands of homes in Mililani Mauka and Kunia out of steel. In 1997, the U.S. Navy had 136 units built out of steel in Moanalua to replace concrete block residences. The U.S. Army now prefers steel framing over any other framing material and is using it to replace residences at Schofield. The Marine Corps is using steel to build hundreds of new residences in Kaneohe. With their extensive experience in the technology, Hawaii contractors offer a high degree of expertise in steel frame construction. Home buyers have eagerly embraced steel-framed housing, viewing them as high-quality homes that termites are not going to destroy.

Standards Set

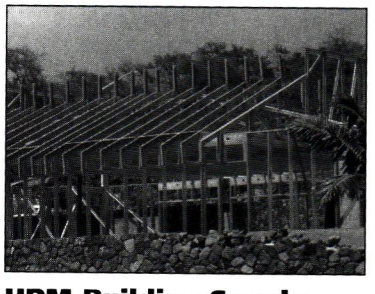
In 1993, the year that lumber prices more than doubled, the American Iron and Steel Institute (AISI) worked closely with the National Association of Home Builders to develop standards for the use of cold-formed steel in residential applications. The resulting document is *The Prescriptive Method for Residential Cold-Formed Steel Framing,* which was updated in 1997 with an expanded Second Edition. Copies are available from AISI by calling 1-800-79-STEEL.

In 1997, a network of contractors, suppliers, engineers, architects, academic and economic development groups formed a new association called the Hawaii Steel Alliance. The Alliance recognizes companies and individuals that are using steel framing and metal roofing in Hawaii and assists them in becoming more efficient.

Recognizing that cold-formed steel is relatively new to the residential industry, the Alliance helps provide solutions to the shortage of trained steel framers, assists in the development of new tools for cutting and fastening, and participates in trade shows to show the benefits of steel framing. The Hawaii Steel Alliance strives to publicize the fact that Hawaii leads the world in steel framing technology and is beginning to introduce the Pacific Rim to its members' talents and capabilities.

Tim Waite, P.E., is the managing director of the Hawaii Steel Alliance, current president of the Hawaii Chapter of the Light Gauge Steel Engineers Association, and director of the Building Industry Association of Hawaii Resource and Training Center.

New Products



HPM Building Supply Offers New Steel Trusses

HPM Building Supply, Inc. now offers a pre-fabricated light gauge steel truss system as an authorized MiTek Industries truss manufacturer. The patented ULTRA-SPAN system offers builders the same convenience and ease of use they expect from wood trusses.

Using MiTek's design software, HPM can lay out and engineer all the trusses required to frame a roof. For more information, call HPM Building Supply at 841-7633.

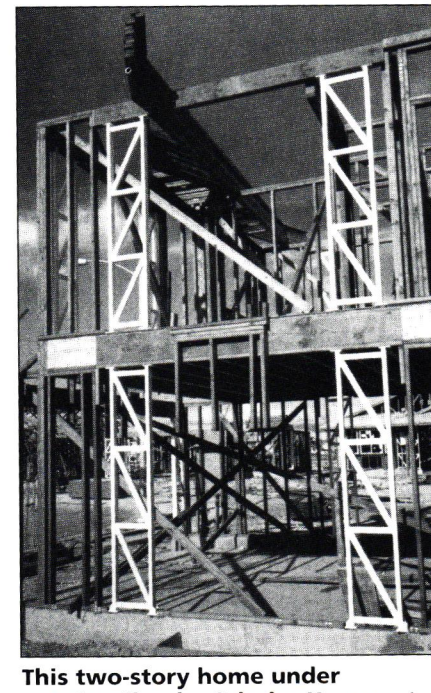
Structural detailing should include numerous holdowns

Making Structures Disaster-Resistant

by James A. Adams, S.E.

Many areas around the world, including states such as Hawaii, Florida and California, are repeatedly hit by devastating hurricanes and earthquakes causing billions of dollars in damage. Almost every building in Hawaii eventually will be challenged to withstand at least one hurricane during its lifetime. Buildings on the Big Island have the added burden of large earthquake forces equal to Seismic Zone 3.

The quest for an effective structural system to withstand these forces is ongoing. After the devastation caused by the earthquakes in Northridge, California and Kobe, Japan and Hurricane Andrew in Florida, insurance companies teamed up with local building code officials, university experts and structural engineers to discover why the damage was so severe. Their efforts concentrated on light-frame construction, since much of the damage was found in single family homes and stick-built multi-family homes. Their research turned up some very interesting results. Previous assumptions made by structural engineers and allowable code values are now being called into question.



This two-story home under construction by Schuler Homes at KulaLei, Ewa uses a Z-Wall for shear walls with window openings between.

New Test Discoveries

Newly developed cyclic tests on wood-framed and light gauge metal shear walls, simulating high winds and earthquakes, have been conducted at the University of California at Irvine, Santa Clara University, and Simpson Strong Tie Company in California. These tests have separately demonstrated that the repeated cyclic loading of shear walls can produce problems (reference *Simpson Strong-Tie Catalog C-97*, page 15):

1) Nails loosened, sill plates crushed.

2) Metal studs collapsed.

3) Degradation of the entire shear wall occurred, with loss of strength.

4) Unacceptable deflections occurred leading to heightened damage levels.

Given this background of ongoing research and new code changes, it is apparent that the standards of the industry have changed. Properly designed and detailed lateral load systems have become the new standard of the industry for light-frame construction, whether using metal or wood studs. Architects and engineers can no longer get away with less than a comprehensive, properly calculated and fully detailed set of plans that meets code, which should include up lift ties, holdowns, sill plate fastenings, shear wall schedules and more.

Some owners continue to try to reduce their

costs by using drafting services, or the owner and architect together may decide to forgo a structural engineer entirely in order to save money. Alternatively, it is still possible to find architects and engineers who will charge less money or stamp drawings with their professional seal without adding the necessary structural details and components. In fact, selection of a structural engineer for light-frame construction is sometimes determined by whomever charges the lowest fees or will require the least amount of structural hardware. Some architects think they don't need a structural stamp at all, because "the Building Department will accept ours."

While it may be true that the Building Department doesn't enforce structural detailing, most homeowners, developers and contractors expect the design professional to provide a set of plans that meets all the code requirements. If plans do not meet code, this must be disclosed when the house is sold. Professionals cannot rely on the Building Department to insure that plans meet the code.

All new houses in Hawaii are now built with truss and rafter uplift ties installed. Therefore the next link to be challenged in the "continuous load path" may be the integrity of the shear walls and their connections.

A Short Course in Structural Engineering

All homes need two types of structural systems: a vertical load carrying system and a lateral (wind or earthquake) load carrying system. In order for both of these systems to perform satisfactorily and meet code, they must have "continuous load paths." A "continuous load path" is a pathway through which the load is transferred continuously from one point to another until the load is anchored to the ground. A holdown is just a part of the lateral system, generally found at either end of a shear wall.

Essential Elements of a Shear Wall

A shear wall is made up of four basic items. Each of these four items is essential for the satisfactory performance of the wall:

1) Holdowns at each end of the shear wall — This will keep the shear wall from overturning and toppling over.

2) Connection along the top of the shear wall — This will allow the wind or earthquake load to get into the shear wall. If there is not connection along the top of the shear wall, it cannot grab the horizontal load and the roof or floor can slide over the top of the shear wall.

3) Connection at the bottom of the shear wall — This will allow the lateral load to get out of the shear wall. If not connected properly the shear wall will simply slide on its base. This sill connection resists sliding and should not be confused with holdowns which restrain overturning.

4) A skin, such as plywood with a rated UBC or ICBO value – Without this skin, the shear wall has no strength.

Shear Wall Detailing

Even though Building Department checkers do not enforce shear wall detailing, design professionals are still responsible to see that the shear walls are designed, detailed and built properly.

Here are a few questions to ask:

1) Does this lateral systems meet the code? Does it have a continuous load path?

2) Where are the details at the top of the shear wall?

3) Where are the details at the bottom of the shear wall?

4) Where are the holdowns? Where are the details?

5) Where is the nailing or screw schedules?

If the client or contractor complains that there are too many holdowns, professionals can emphasize the importance of good shear wall design by asking these questions:

1) Does the client want to meet the minimum code requirements?

2) If the home does not have sufficient shear wall connections to meet the code requirements, does the client realize that by law this must be disclosed to the new owner?

3) Does the client want to save money in the short term by leaving out a few holdowns in return for the risk of potential lawsuits?

Sometime in the future a client or an attorney may ask, "Why do you have so many holdowns?" or "Where are the holdowns?" This is the time to get prepared to give them the answer.

James A. Adams, S.E., is a structural engineer and principal of JAI Adams Allison Inc., Honolulu.

AIA HONOLULU 1997

Award of Excellence

Office, Commercial & Industrial

Group 70 International, Inc.

University of Hawaii Federal Credit Union

Jury's Comments:

"Open space, personality, and extra height make this confined space very usable for workers and customers alike."

The design concept of this project was the creation of a building of transparency and warmth which would reflect and encourage the personality of the University of Hawaii Federal Credit Union. This had to be accomplished within a challenging property that was narrow and deep. Group 70 International, Inc., achieved the transparency by using interconnected horizontal and vertical spaces and transparent walls. The warmth was achieved by selecting residential-like materials, finishes and colors. The color green was used for key building elements and furnishings to connote environmental friendliness and as a subtle reference to the credit union's university connection.

A brick plaza was built at the front of the building to comply with zoning regulations which would not allow the building to be placed directly adjacent to the sidewalk. This plaza and its landscaping convey a sense of welcome and friendliness. Inside, natural light and plants, such as native-specimen ohia trees and tropical shrubs, were used to accentuate the spaciousness and openness of the building. Office windows, which face the staff and public areas, were framed in wood and stained a warm cherry color. An important connection to the university was made by the dramatic view of Manoa Valley and the university from the second floor.

The atrium, seen here from the ground-floor lobby, is full of natural light from the skylights above the third floor.

Photos by Jim Buckley Productions

(Above) Brick and wood were used on the second (main) floor rather than more institutional materials. (Below) A night view from King Street displays the transparency and warmth of the building.

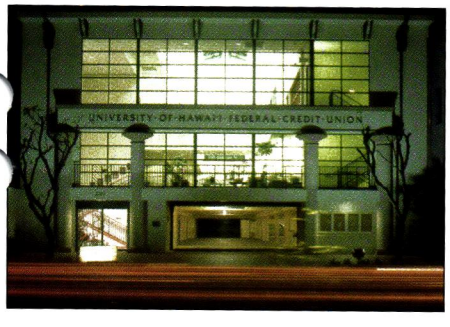
Credits

Owner/client:
University of Hawaii Federal Credit Union

Architect:
Group 70 International, Inc.

Contractor
Robert M. Kaya Builders, Inc.

Consultants
Structural: Tanimura & Associates, Inc.
Mechanical: Cedric D.O. Chong & Associates, Inc.
Electrical & Lighting: Albert Chong & Associates, Inc.
Landscape: Walters, Kimura, Motoda, Inc.
Civil Engineer: Gray, Hong, Bills & Associates, Inc.



News Briefs

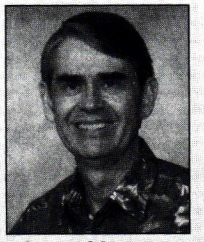
Conference Examines Sports Design

"It's not about SPORTS — it's about DESIGN" is the theme of the 48th annual International Design Conference in Aspen, June 3-6, 1998. At this leading forum on the designed environment, designers from every field can examine the many design themes found in sports, including architecture and the sports landscape.

Conference participants will include architects, planners, engineers, landscape architects, product and graphic designers, software and media designers, fashion designers, educators, artists, business leaders and athletes.

For more information, contact IDCA at (970) 925-2257

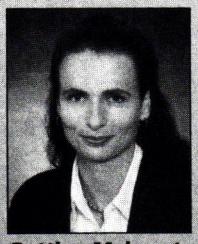
Architects Hawaii Announces Promotions



Alan Atkinson, AIA, CSI

Architects Hawaii recently announced four promotions at the Honolulu-based firm.

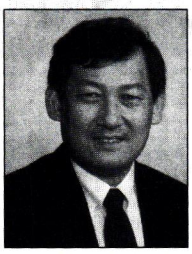
Alan Atkinson, AIA, CSI, was promoted from associate to senior associate and now becomes one of 12 owners of the firm. His responsibility is quality control of all phases of architecture including residential, commercial, hotel-resort, health care, industrial and institutional projects.



Bettina Mehnert, AIA

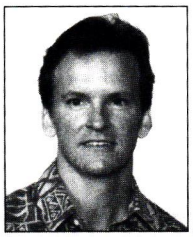
Bettina Mehnert, AIA, was promoted from associate to senior associate and also becomes an owner. Her specialty is applying advanced computer systems to architectural uses in multiple disciplines.

Tom Young, AIA, has been promoted from associate to senior associate and also becomes an owner. His expertise is in hotel-resort, retail, and large-scale housing projects with mixed-use components.



Tom Young, AIA

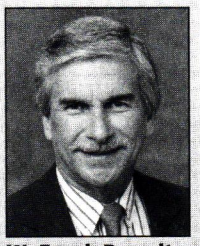
Matthew W. Gilbertson, AIA, has been promoted to associate. He specializes in retail and hotel-resort with particular interest in sport and entertainment facilities.



Matthew W. Gilbertson, AIA

Brandt Honored by National Landscape Association

The American Society of Landscape Architects (ASLA) recently named W. Frank Brandt of the Honolulu firm Phillips Brandt Reddick and Associates, Inc. as a Fellow of the Society. Nominated by the ASLA Hawaii Chapter, Brandt was one of 31 landscape architects from around the country to receive the honor.



W. Frank Brandt

Currently, there are 451 living ASLA Fellows of an estimated 30,000 landscape architects in the United States. Six Fellows reside in Hawaii.

Coastal Windows Recognized

Coastal Windows, Inc. was selected by members and directors of Small Business Hawaii as one of three "Small Business Success Stories of 1997" at the recent 22nd Annual SBH Business Conference.

Coastal Windows was started in 1990 by Kurt and Marie Winner, who realized Hawaii's need for windows and doors that would stand up to the harsh climate of the islands.

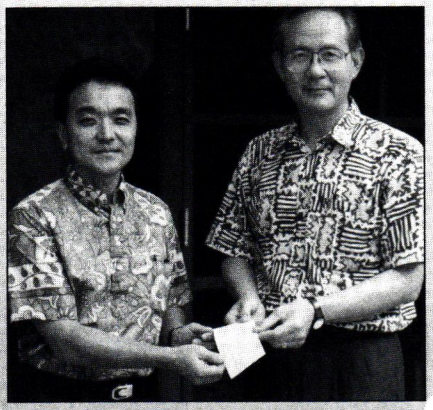
Hawaii Sports Theme of Photo Contest

Amateur photographers statewide are invited to share their love of sports by entering the "Sports in Hawaii" Canon Photo Contest. Entries will be accepted through Feb. 28 and must have been photographed between Jan. 1, 1997 and Feb. 28, 1998.

For more information, call 522-5930.

Monier Merges with Boral Lifetile

Monier Inc. and Boral Lifetile Inc. recently announced the formation of MonierLifetile LLC, a joint venture to operate the combined concrete roofing tile businesses of Monier and Boral Lifetile. Hawaii's MonierLifetile plant, located in Campbell Industrial Park, will continue to supply the local market. For more information call Jim Quill, operations manager, at 682-5853.



Clayton Mimura, president of Geolabs Hawaii, recently presented a $20,000 check to W. H. Raymond Yeh, FAIA, dean of the University of Hawaii School of Architecture, for the advancement of student research in architecture of the Asia-Pacific region.

Remodeling
Surprises, Solutions, Success!

"Surprises aren't surprising in commercial remodeling and this job certainly had its share," recalls architect Earl Kono. "Allied Builders System was responsive, innovative and flexible from demolition to walk-through — more so than any contractor I've worked with to date."

The job involved 44,000 sf on two levels previously used by multiple tenants. To meet Ross standards, ceilings were raised, floors resurfaced, wiring and conduits reworked. Columns and glass railings also presented special issues.

"It was a first class on-time, on-budget performance," reports John Haskins, Ross' California based construction director. "Since the building wasn't retail ready, we started from a shell condition. Allied Builders' professional control, aggressive scheduling and continuous communication overcame many challenging field conditions enabling us to open as planned, about two months after groundbreaking."

ALLIED BUILDERS SYSTEM

Teamwork. Our motto. Our method.

1717 Akahi Street · Honolulu, Hawaii 96819
Telephone (808) 847-3763 · Fax (808) 842-3905
Contractor License ABC-5068