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Construction Bulletin

June 1986

California Tests New Construction Concepts

By Charles B. DeWitt

You and I face a harrowing choice. We can either act decisively and immediately to expand our State prison capacity, or we may no longer be able to continue to remove more violent criminals from the communities of California.

Governor George Deukmejian¹

With these words, the Governor of California proposed an aggressive program of expansion for the State's crowded prison system, calling for 25,000 additional bed spaces. To accomplish this enormous construction effort, California has developed economical building methods, and corrections officials are now sharing

this technology to help others in the State reduce the time and cost required for completion of new jails and prisons.

Transfer of fast and economical construction methods is a key goal of the corrections construction program of the National Institute of Justice.

From the Director

The dilemma of too many serious crimes with injured victims and not enough space to incarcerate convicted criminals is a major domestic policy issue. Convicted violent and repeat serious offenders have contributed to swelling prison and jail populations which outstrip capacity in many jurisdictions. Given today's fiscal pressures, policymakers face difficult choices. Building and operating prisons are extremely costly. But the price of not expanding capacity also has expensive consequences: increased victims of crime and its attendant fear.

The gravity of the problem is recognized by officials throughout the criminal justice system. In fact, when the National Institute of Justice asked criminal justice officials to name the most serious problem facing the system, police, courts, and corrections officials reached a virtually unanimous consensus: prison and jail crowding is the number one concern.

Attorney General Edwin Meese III has spoken out repeatedly on the dimensions of the crisis and the need to help State and local jurisdictions find less costly ways to increase corrections capacity so convicted serious criminals are pre-

vented from preying on people, communities, and our economy.

Responding to the need voiced by practitioners and the policy statements of the Attorney General, the National Institute of Justice has launched a new corrections construction initiative to help State and local officials make informed decisions on building or expanding facilities. The program was announced by the Attorney General at the National Sheriffs' Association 1986 Criminal Justice Symposium.

This *Construction Bulletin*, like others in the series, is designed to share information on advanced construction techniques that hold the potential for saving both time and money in the construction of safe and secure facilities.

This *Bulletin* describes how California devised and tested a model construction system for State prison expansion. The approach includes new construction technologies, more efficient management techniques, and innovative financing methods. Orange County has adapted the system for construction of a new jail—a transfer of knowledge that exemplifies what the corrections construction initiative is all about.

In addition to the *Bulletins*, the National Institute of Justice is publishing a *National Directory of Corrections Con-*

struction, based on the results of a national survey, which provides a wealth of information on construction methods and costs for jails and prisons since 1978. The National Institute will also maintain, at our National Criminal Justice Reference Service, a computerized data base on corrections construction. Through this *Construction Information Exchange*, those planning to build or expand facilities will be put in touch with officials in other jurisdictions who have successfully used more efficient building techniques.

Surveys indicate that an estimated 95 percent of those in prison in 1979 were repeat or violent offenders. We know from research that repeat offenders are responsible for a large portion of the serious crime that plagues our communities. We also know that prisons do work: while in prison an offender cannot commit additional crimes against innocent victims. If we can drive down the excessive costs of building, State and local officials will be in a better position to provide the additional jail and prison space they need to incapacitate those who victimize again and again.

James K. Stewart
Director
National Institute of Justice

This *Construction Bulletin* explains how two advanced building techniques, precast and "tilt-up" concrete, are being tested in California. Lessons learned by California prison officials can be useful to other jurisdictions facing comparable problems.

State Prison

Extent of crowding

California operates the largest prison system in the Nation. On April 30, 1986, the inmate population count

Table 1

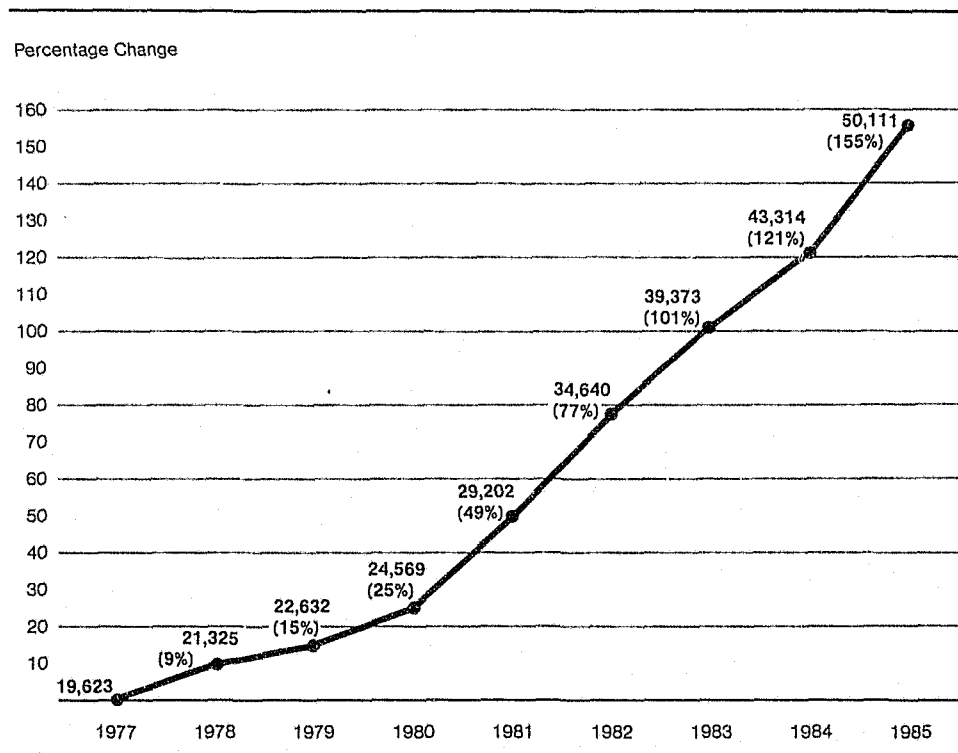
California prison census

| Year | Number of inmates | Increase from prior year | Increase from 1977 |
|------|-------------------|--------------------------|--------------------|
| 1977 | 19,623 | — | — |
| 1978 | 21,325 | 8.7% | 8.7% |
| 1979 | 22,632 | 6.1 | 15.3 |
| 1980 | 24,569 | 8.6 | 25.2 |
| 1981 | 29,202 | 18.9 | 48.8 |
| 1982 | 34,640 | 18.6 | 76.5 |
| 1983 | 39,373 | 13.7 | 100.6 |
| 1984 | 43,314 | 10.0 | 120.7 |
| 1985 | 50,111 | 15.7 | 155.4 |

Year end inmate count.

Figure A

California prison population



was 51,165. As the number of prisoners sentenced to State institutions in California increased dramatically, the upswing resulted in a severe shortage of prison space.

Figure A shows how the trend moved sharply upward in 1981 and has steadily increased since that time. Since the rated capacity of California's institutions is approximately 30,600 bed spaces, the April 1986 inmate total represents 70 percent more than the capacity for which current prisons were designed. During 1985 alone, the inmate population increased by almost 16 percent, which translates into a construction requirement of more than 130 new bed spaces per week.² (Table 1.)

Analysis of prison population

Do such increases in the prison population mean that California uses prisons more often than the Nation as a whole? Since prison sentences represent a State's response to serious crime, this question may be evaluated by examining the ratio of prison commitments to major offenses.

California reported only 1.3 prison commitments per 100 serious offenses

in 1980. Within 3 years, this ratio had shifted upward to 2.3 prison sentences per 100 major crimes, an increase of 76 percent. Although this might seem to be a dramatic shift, the change merely brings California closer to practices of the Nation as a whole. The 1984 ratio in California was 2.6 per 100 offenses, but the national figure was 3.9, a level 50 percent higher than California's ratio.³

Another measure is the per capita rate of incarceration. This method simply measures the prison census in relation to the general population without considering how much crime occurred. When this approach is taken to assess the California prison population, California's practices still appear to be less punitive than the Nation's as a whole.

California had 174 sentenced prison inmates per 100,000 population in 1985, while the national prison count numbered 197 inmates per 100,000 population. Thus the national rate of incarceration was 13 percent higher than California's.⁴ The available evidence suggests, then, that California's building efforts respond to the level of serious crime and are appropriate for the State's population.

Expansion plan

California had not built a new prison in more than 20 years. Since expansion was long overdue, the current State administration has undertaken major construction efforts planned for at least 25,000 additional bed spaces, almost doubling the capacity of the prison system.

The Governor's long-range plan presented in 1985 calls for 14 new institutions: 13 for men and 1 for women. The total cost of these projects is estimated to be more than \$1.8 billion.⁵

Governor Deukmejian directed the California Department of Corrections to explore how rapid and economical construction methods might be utilized in the statewide effort.

California officials recognized that they could ill afford to start from scratch on each of 14 new prisons.

The Department commissioned a study of 17 different construction methods, an evaluation that included time and cost requirements for building new prisons.⁶ Based on the results, the California Department of Corrections selected a building system consisting of factory-produced concrete components.

Other elements include reliance on a campus-style configuration with small housing units and prototypical support buildings for each of the planned institutions.

The construction system was to be tested for a pilot project and then used as a model for subsequent prison projects. The first project is a major expansion of the State institution at Vacaville, California, located about 40 miles west of Sacramento.

Demonstration site

The California Medical Facility at Vacaville opened in 1955 as a high security institution specializing in medical and psychiatric treatment for adult male felons. The main institution has a rated capacity of 1,597, and the prison was expanded in 1956 by 472 beds to add a Reception Center for northern regions of California.

Figure B

The new institution at Vacaville, California



Table 2

Cost of housing units

| | Building cost | Capacity | Cost per inmate | Space per inmate |
|--------------------|---------------|----------|-----------------|------------------|
| Single occupancy | \$2,600,000 | 100-bed | \$26,000 | 250 sq. ft. |
| Multiple occupancy | \$2,100,000 | 172-bed | \$12,209 | 145 sq. ft. |

Cost of housing units only, no support facilities or site utilities included.⁷

Now, 30 years later, the Vacaville facility has been joined by an adjacent 2,404-bed medium-security prison, designed to house inmates from throughout California. Housing units for 300 inmates were opened in only 8 months and buildings for 900 more prisoners were completed within a year.

The new institution at Vacaville has set records for fast and cost-effective construction in California. As shown in Figure B, new construction consists of four semiautonomous facilities, separated into two prison complexes. The first complex is designed for 1,200 medium-security inmates (Level III) and the other side houses 1,204 lower medium-security prisoners (Level II). Each of the four 600-inmate facilities contains an exercise

yard and is surrounded by a security perimeter. Each side or complex contains its own support services such as administration, dining, and academic education. The only services shared by the two complexes are a central kitchen, infirmary, and maintenance shops, where mixing of inmate security classifications is kept to the absolute minimum.

Single-occupancy cells

As shown in Figure C, a typical inmate housing unit contains 100 single-occupancy cells, arranged around a large central dayroom. One correctional officer monitors prisoners from a control station in the center of the building, positioned for an unobstructed view of all areas in the unit.

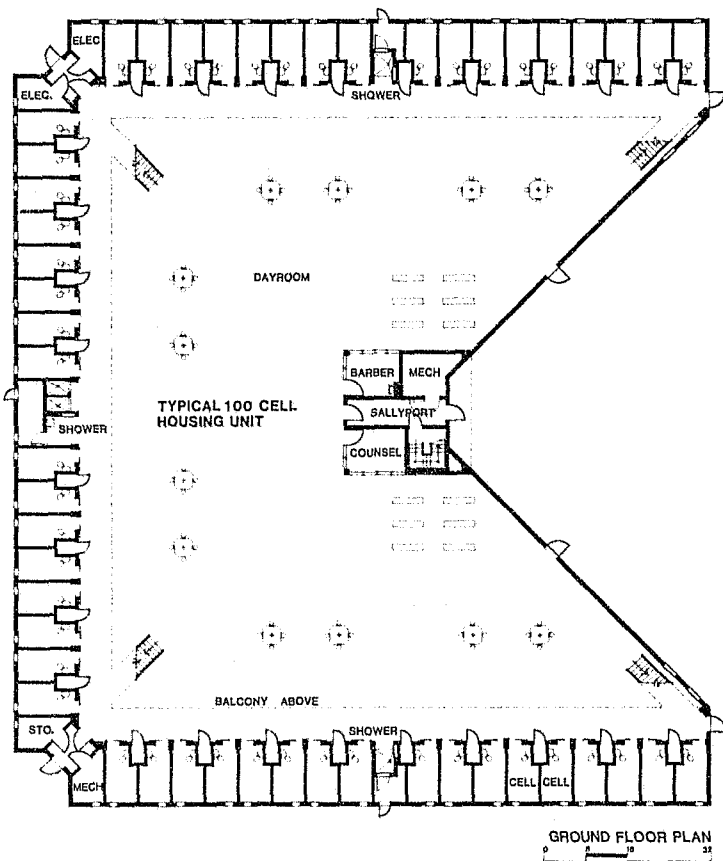


Figure C

In Level III housing units, cells are arranged around a larger central dayroom.

In addition to the control room officer, another correctional officer is assigned to the dayroom area to permit direct contact with prisoners and supervision of daytime activities.

When inmates are locked in the cells at night, the staffing changes to one floor officer for every three buildings, but each housing unit maintains an officer in the control room.

Dormitory version

To maximize available prison space, California officials have adapted this floorplan for dormitories. Figure D shows how the building designed for single-occupancy cells has been modified to create 5-, 8-, and 9-person dormitories. The building frame and shell remain the same as in the 100-inmate buildings. By eliminating utility chases and some interior walls, the floorplan was modified to provide dormitories for 172 inmates.

The dormitories are constructed with appropriate features to permit conversion into a single-cell configuration. Officials have included special concrete footings, mechanical systems, and electrical wiring that will accommodate a change to single cells at any time.

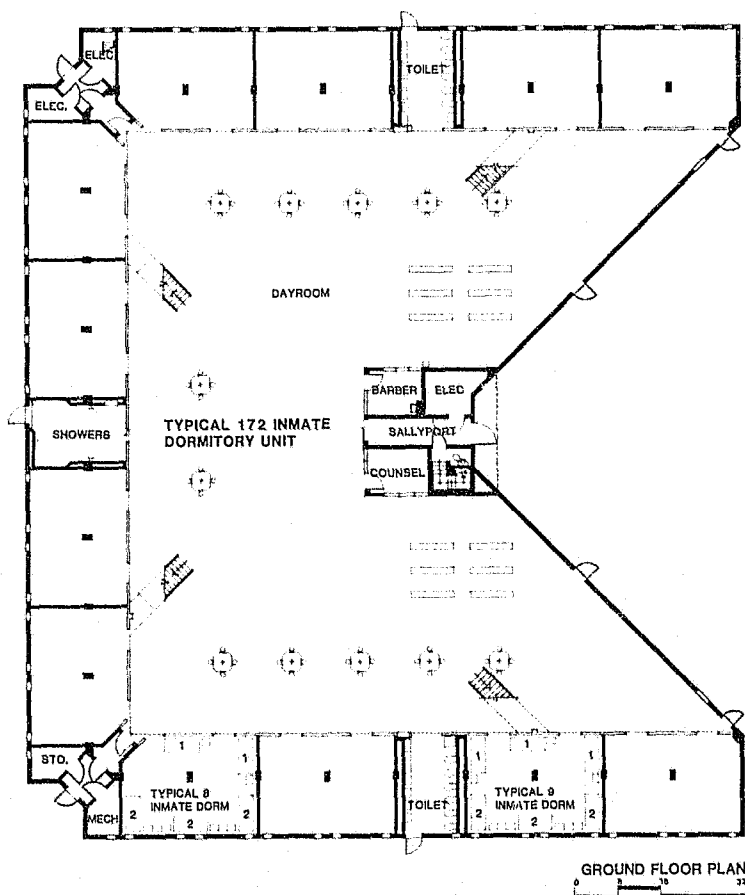
California officials will rely on intensive screening and evaluation to classify inmates suitable for a dormitory environment. Dormitory buildings will house prisoners requiring lower security than those assigned to the single-occupancy cells.

California has realized substantial cost savings by constructing dormitory buildings, illustrated in Table 2. Costs were reduced because the smaller number of rooms has cut the cost of interior walls, plumbing fixtures, and security hardware. Savings are further magnified because 72 additional inmates can be housed in a building of the same dimensions and interior space as a single-cell building.

Officials point out that the same number of inmates are housed in only 7 buildings on the dormitory side of the prison versus 12 housing units in the single-cell complex as shown in Table 2. The cost per inmate in dor-

Figure D

In Level II housing units, the facility is modified to create 5-, 8-, and 9-person dormitories.



mitories is less than half the construction cost for single-occupancy cell buildings.

Building method

The prison's housing units are being built primarily from prefabricated concrete components. The only exceptions are foundations, some interior walls, and a steel roof system. These building elements are termed "precast" concrete because they are first produced at a plant and then shipped to the prison site for assembly.

As shown in Figure E, less than a dozen different pieces of concrete are used in the cell buildings. In this way, prefabrication simplifies and expedites the completion of the prison by

Construction workers install precast components, many weighing as much as 6,000 pounds, at Vacaville. Workers can place as many as 45 pieces per day.

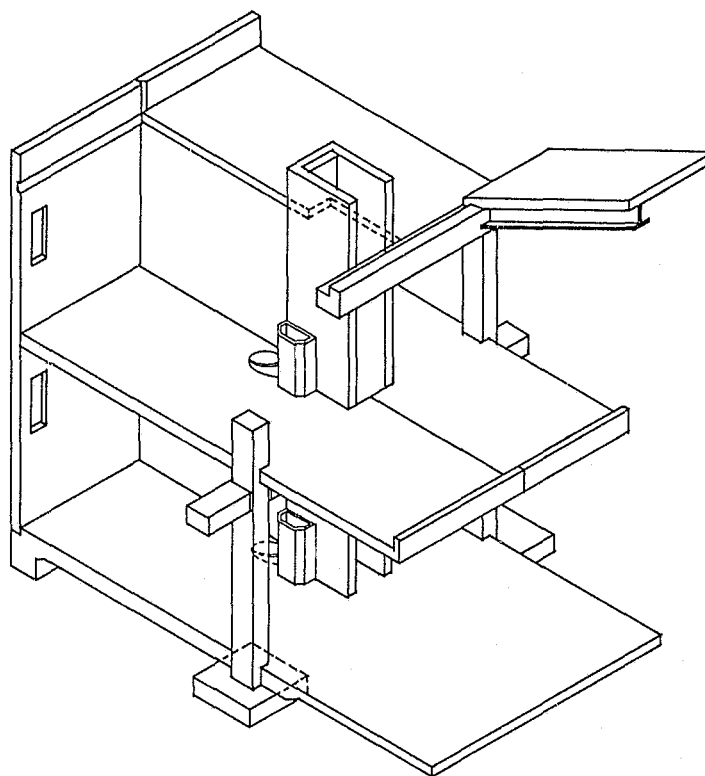
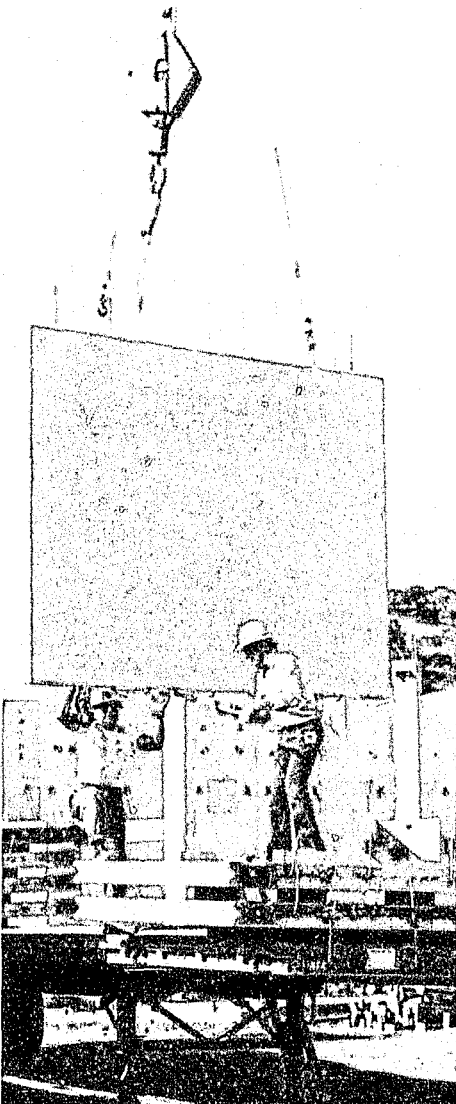


Figure E

Cell buildings use less than a dozen pieces of precast concrete.

increasing the proportion of work performed in advance of field construction.

In contrast to modular systems, the Vacaville system consists of smaller components, such as flat panels and slabs. Features of precast concrete are shown in Table 3. A comparison of panel systems versus the modular approach is given in an *NIJ Construction Bulletin* titled "Florida Sets Example With Concrete Modules."

Groundbreaking was held on January 5, 1984. Preparation of the site was underway for 2 months when workers began to cast the pieces at a plant 50 miles from the prison site. While site work continued, plant crews fabricated floors, walls, columns, and beams which would make up the new prison.

At peak production, 2 plants each poured 48 concrete components per day on a 6-day work week. Approximately 120 cubic yards of concrete were poured every day.

The first trucks were sent to the prison site on April 18, 1984, only a month after work began at the precast plant. As shown in the photo, construction workers began installing precast components, many of which weighed up to 6,000 pounds, at the rate of 45

pieces per day. Two 80-ton cranes were used to lift the concrete elements off the arriving trucks and into place. Exterior wall panels extended from the foundation to the roof, measuring 6.5 feet wide, 9 inches thick, and 21.5 feet in height. The first 6 housing units consisted of 2,800 pieces of concrete, or about 460 concrete components per unit. Altogether, 400 truckloads of concrete components had made the journey from casting plants to the job site.

Since the construction system consists of individual concrete components, additional time was required for sealing joints between adjacent panels. Joints were filled with a nonshrinking high-strength grout that cures to a strength even greater than the concrete itself.

The last panel was secured in place on May 29, 1984. From groundbreaking, the building frame and shell had required less than 5 months for completion.

Final stages of construction required 3 additional months. Complex security and electronic systems were installed, together with time-consuming tasks like electrical wiring and plumbing.

Three of the single-cell housing units, representing 300 beds, were ready for

occupancy on August 26, 1984, less than 8 months after groundbreaking. Almost immediately, the Department of Corrections moved inmates into the completed buildings, thus relieving severe crowding at other institutions.

By the end of the year, six more buildings were occupied. The last 3 housing units were opened on January 30, 1985, bringing the total to 1,200 beds. (Officials have temporarily placed two inmates in each cell pending completion of other facilities.)

Construction management

The approach in California combines construction management methods for accelerated building schedules with prefabrication for efficiency in field construction.

California officials assigned overall responsibility for coordination of building the State's 14 new prisons to a single construction management firm, Kitchell CEM based in Phoenix, Arizona. This firm serves as an overall program manager for the State's efforts, and provides such services as development of a long-range master plan, individual project planning, cost control, and design review. In addition to the statewide program manager, each project has its own construction manager.

A professional construction management (CM) firm offers expertise in building jails and prisons, and provides specialized services and resources not usually available to many State and local governments. A CM team typically includes estimators, planners, engineers, and scheduling experts.

Tasks such as cost estimating and project scheduling are known to be uniquely difficult for corrections projects when compared to other building types. The construction management approach represents a delegation of selected management tasks to a company retained for coordination and supervision of complex projects. While public officials retain authority for critical decisions, daily project duties may be assigned to a construction manager who specializes in correctional facilities.

A key to California's approach is aggressive scheduling, backed with firm action by the Department of Corrections. For example, the construction manager ordered delivery of precast components to the site for erection only 2 days after crews had completed pouring the concrete foundations. Officials were ready to enforce a penalty for late delivery of the components at the rate of \$5,000 per day.

Daniel McCarthy, Director of the California Department of Corrections, said,

The fast track planning/scheduling and precast processes initiated at Vacaville are revolutionary to State construction programs. These processes have enabled the Department of Corrections to dramatically shorten the lead time necessary to develop and activate prisons when compared to conventional scheduling.⁸

The California experience illustrates two particularly noteworthy features of construction management:

- **"Fast track"**—a procedure for acceleration of the building schedule by starting construction at the earliest possible moment, overlapping the design phase. Building phases are sequenced to complete construction of each stage in the order that buildings will be occupied.
- **"Value engineering"**—the analysis of alternative systems, equipment, and materials to identify the relative benefits of each option. Initial costs and long-range operating costs are both analyzed to determine the best choice.

The new approach resulted, in part, from concern about delays associated with conventional building methods. A new maximum security prison was already under construction elsewhere in California when the decision was made to try the new approach. The prison was started in May 1982, more than 1½ years before groundbreaking at Vacaville. However, the new approach enabled State officials to move 600 inmates into the Vacaville facility 1 year prior to completion of the institution built according to conventional methods.⁹

Table 3

Features of "precast" concrete (components made at plant)

| | |
|------------------------------|---|
| Economy | Simplicity and repeated production of building components reduces costs of field construction. |
| Speed of construction | Advance plant fabrication accelerates the field construction process, and fewer workers are required at the construction site. |
| Stockpiled materials | To avoid delays, building parts may be fabricated and then stored in large quantities in advance of field construction. |
| Quality control | Greater consistency and quality can be achieved under controlled plant conditions, and monitoring-inspection can be accommodated more easily than in the field. |
| Weather conditions | Fabrication of building components may continue inside a precast plant despite severe weather conditions that would halt field construction. |

The cost of construction at Vacaville, including all support buildings, security perimeter, and onsite utilities, translates to \$45,757 per cell. This represents a substantial reduction when compared to other correctional institutions in California, where construction costs are among the highest in the Nation.

Advanced finance methods

A major portion of California's prison construction plan will be financed through innovative techniques such as lease-purchase. Lease-purchase is an approach that enables a unit of State or local government to raise capital

Inmates will fabricate two of the concrete components to be used in the statewide construction program. Floor and roof panels made by inmates will be stockpiled after production at Vacaville, awaiting shipment to prison construction sites.

California County Jails

The jail census in California's 58 counties exceeded the number of prison inmates for the first time during 1985. Jail inmates numbered 47,000 in January 1985 and passed the State's prison count by the end of the year. The estimated yearend total for jails exceeded 52,000.

The California Board of Corrections has rated the total capacity of the State's jails in January 1986 at 39,618. The shortfall of approximately 12,000

beds is accommodated by an assortment of interim measures, ranging from double bunking to temporary housing in dayrooms and recreation areas. Trailers and tents are used as well. Litigation on crowding is pending against 25 counties in 1986.

According to a report prepared by the Board of Corrections, California must spend more than \$1.2 billion on local jail construction simply to keep pace with the growing inmate population. An estimated 21,000 to 30,000 additional beds will be required to accommodate the projected 1990 jail count.

In 1980, the California Legislature allocated \$40 million for jail improvements. These efforts were soon followed by two statewide ballot measures in which voters authorized an additional \$530 million in State

funding for construction of county jails.

Through these initiatives, the California Board of Corrections is providing grant funds for sheriffs and local corrections agencies to build 14,444 jail beds. Since a number of California's jails are in need of renovation or replacement (11 jails are more than 50 years old), 3,306 beds will replace substandard facilities. These efforts will result in a net increase of about 28 percent more jail space in California.

Orange County jail expansion

Orange County is a major southern California jurisdiction, the fastest growing county in the region. With a population of greater than 2.25 million, Orange County is the second largest county in the State.

The sheriff operates a large corrections system consisting of nine different institutions at three sites. In April of 1986, Orange County had a population of 3,399 inmates held in facilities rated by the California Board of Corrections at 2,787. As in many metropolitan counties, the inmate population has risen dramatically in recent years. The 1986 inmate count has increased 44 percent over the 1982 population and is 139 percent greater than the custody population in 1978.¹¹

Conditions of jail crowding in Orange County may exemplify problems faced by sheriffs throughout the Nation. More than 300 inmates are housed in tents.

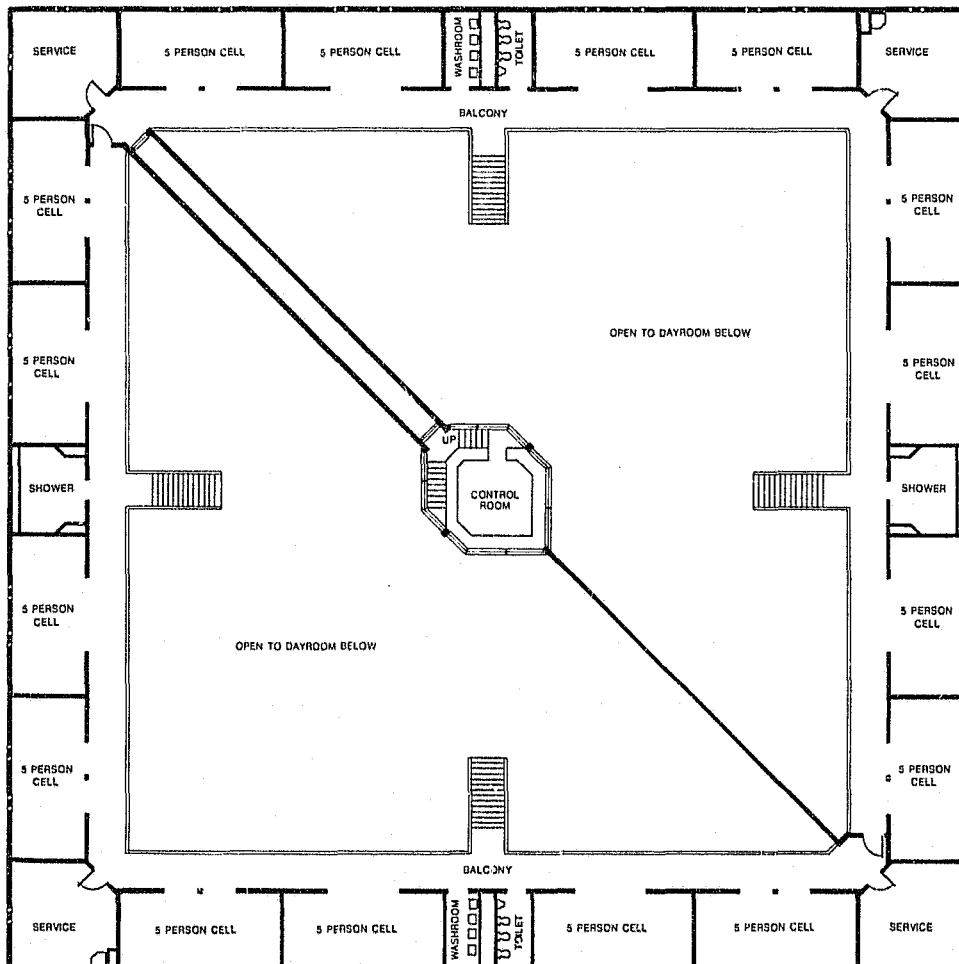
Sheriff Gates recently described conditions in Orange County in terms that apply to sheriffs throughout the Nation: "The critical issue of jail overcrowding will be ever present until adequate facilities are built through foresight and decisive action."¹² As a response to these conditions, Orange County built a new 180-bed housing unit of concrete construction in only 7 months.

Facility design

When local officials in southern California decided to proceed with jail construction, they knew that time

Figure G
Orange County floorplan

Floorplan shows differences between the jail unit and Vacaville. While the exterior wall design, building dimensions and roof are the same, a fourth wall of cells is shown and the building is divided into two distinct sections.



quickly for construction of correctional institutions without increasing general obligation indebtedness. These techniques avoid many problems and restrictions that accompany traditional finance methods.

In a report to the California Legislature, the Department of Corrections noted that costs could be reduced when funds could be raised quickly.¹⁰

The California Public Works Board was authorized by the legislature to sell lease-purchase securities on the bond market. These securities will be shares of the State's lease, and investors who purchase the certificates will receive tax-exempt income. California will ultimately retire the debt after making lease payments for a period of 30 years.

The National Institute of Justice will soon release two publications on advanced finance methods. A *Construction Bulletin* will present a case study of Ohio's approach to prison and jail finance. A more detailed report entitled, "Lease-Purchase Financing of Prison and Jail Construction," will be available for State and local agencies that want to investigate further alternative finance methods. This NIJ

Table 4

Features of "tilt-up" concrete (walls cast at site)

| | | | |
|------------------------------|---|---------------------------|---|
| Economy | Tilt-up permits unique wall features, while precast relies on repeated production of pieces for economy. | Site access | Tilt-up may be more suitable for remote locations and sites with difficult access since transportation of materials is greatly reduced. |
| Market conditions | Tilt-up is readily available and highly competitive. A greater number of bidders generally results in lower prices. | Design/engineering | Walls designed for tilt-up may be cast in larger sizes since they are raised as one piece and not transported on trucks. |
| Transportation issues | Since walls are cast at the site, tilt-up simplifies transportation issues and reduces hauling costs. | | |

brochure will offer guidance for decisionmakers now planning to build or remodel correctional institutions.

Inmate labor

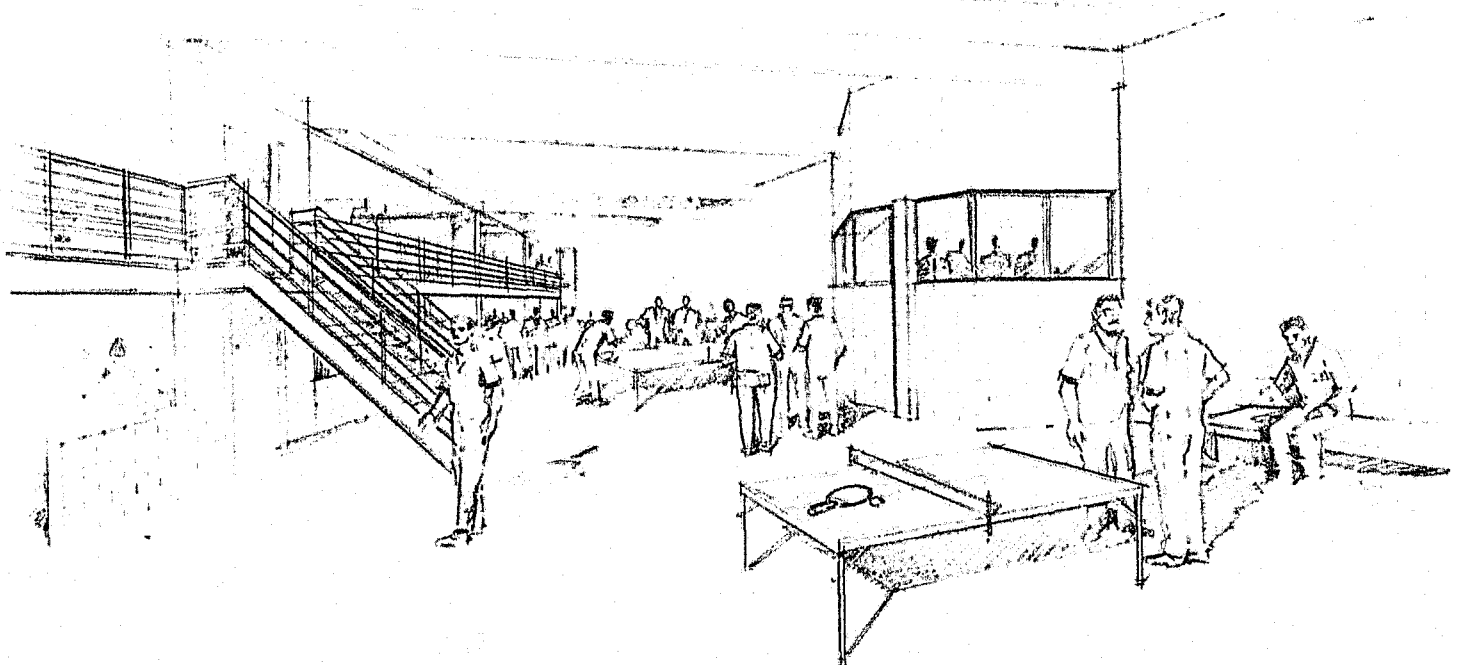
California is committed to creative use of prison labor to reduce costs of building and operating institutions, as well as providing job training and

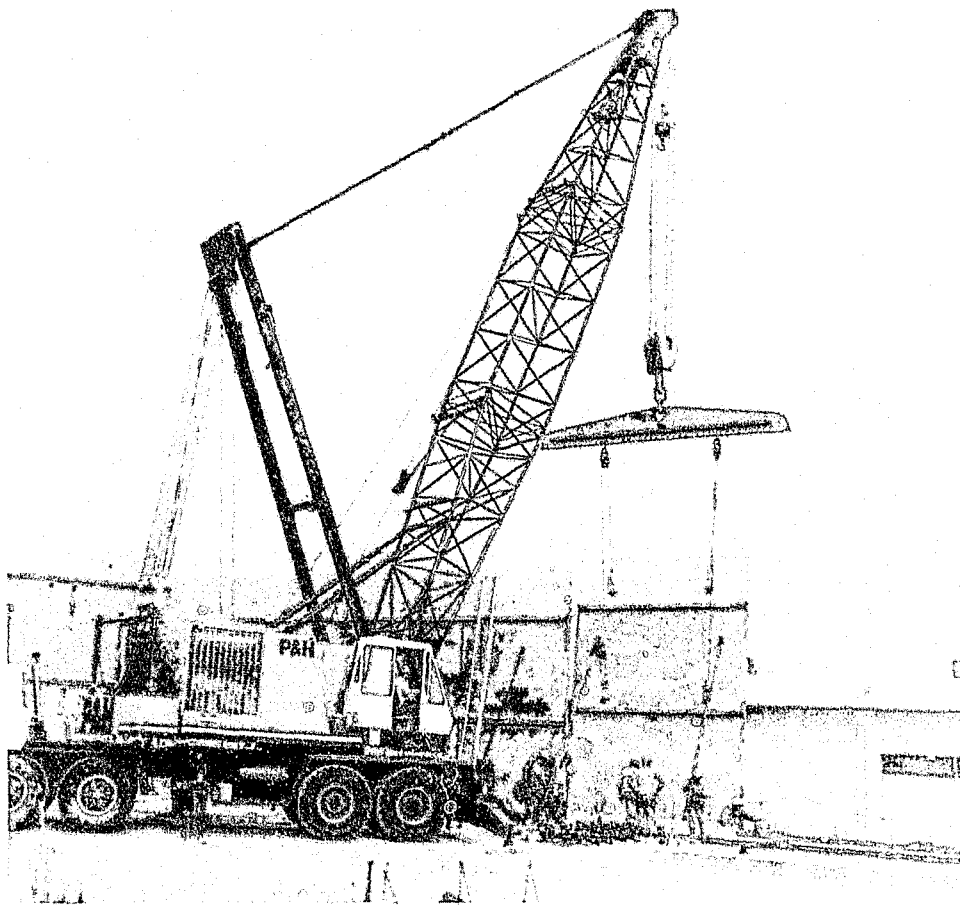
work experience for inmates. With the advent of precast concrete for new prisons, the State explored whether inmate industries could produce some of the building components. After careful study, the legislature approved a plan for inmate industries that includes construction of a precast plant to be operated by State prisoners.

Figure F

Interior of the Theo Lacy Facility in Orange, California

The building serves as a housing unit for 180 jail inmates, completed in only 7 months.





Workers use a crane to place one of four large pieces of tilt-up concrete for a wall of the Lacy Security Facility.

would not permit the sheriff's department to start from scratch. To make the best use of limited resources, the sheriff's staff wanted to use a tested building system, provided that one could be found that met their needs.

The assistant sheriff toured the Vacaville construction site, and it was soon decided that the housing unit could serve as a model for Orange County's building. The same construction manager was hired, and an Orange County architect was appointed to translate the State prison layout into a floorplan appropriate for the jail population.

The sheriff's new building, shown in Figure F, is located at the site of an existing jail complex, the Theo Lacy Facility in Orange, California. Because the building serves only as a housing unit, it relies upon the larger institution for services such as laundry, medical, and kitchen.

Designed for 180 inmates, the facility consists of 32 small dormitories, each housing 5 to 8 prisoners.

Figure G shows how the jail unit compared to the Vacaville project. Identical aspects of the facility include exterior wall design, building dimensions, and the roof system. Orange County's architect modified the floorplan by adding a fourth wall of cells and dividing the building into two separate sections.

Accordingly, the central control room is in position to monitor both sides of the building. Only two staff on each shift are required to operate the new facility; one deputy monitors inmates from the central control station and the other officer is assigned to supervise inmates from inside the housing unit.

Building method

The Orange County design team selected a fast and economical construction method, a new technology for the corrections field. The technique is termed "tilt-up" concrete, an approach first developed as a method for rapid and inexpensive construction of warehouses and factories. Features of

Table 5

Precast and "Tilt-Up" Concrete Advantages of New Construction Methods

| | |
|--------------------------------|--|
| Time savings | Less time is required for field construction when compared to conventional methods. |
| Prevention of escape | Almost impervious to attack by inmates; 5,000 psi concrete cannot be penetrated, except with specialized tools. |
| Protection from fire | Maximum level of fire safety; superior to virtually all other materials. |
| Resistance to vandalism | Hard surface will not scratch, dent, or chip; extremely difficult to damage. |
| Ease of maintenance | Surface can be cleaned easily; resists stains and discoloration when sealed. |
| Energy conservation | Panels and walls may be designed to contain insulation for maximum energy ratings. |
| Esthetics | A variety of colors and surface textures may be considered in both precast and tilt-up. |
| Simplified process | Fewer building parts reduce complexity of field construction, simplifying management and coordination. |
| Weather problems | Rapid completion of walls minimizes disruption by adverse weather and accelerates completion of shell to protect crews from the climate. |
| Labor skills | Tilt-up and precast may be erected in remote areas where shortage of skilled masons precludes brick and concrete block. |
| Security hardware | Window frames and other critical security hardware may be embedded in concrete, resulting in greater strength than conventional methods. |

tilt-up construction are shown in Table 4.

Work began on August 2, 1985, by pouring a large concrete slab on grade. While the slab was to become the floor of the new jail building, it was first used for casting the concrete walls. The floor surface was smoothed out and sides were built up to act as a form or mold. Concrete was then poured into the forms on the floor surface. After the proper curing time, a crane was used to tilt up the completed walls.

Each wall of the Lacy Security Facility consists of four large pieces of concrete, as shown in the photo on page 9. The largest pieces measure 43 feet wide, 22 feet high, and 8 inches thick.

In contrast to smaller precast concrete components used for the State prison, the tilt-up wall sections weigh about 83,300 pounds and consist of 21 cubic yards of concrete. Despite their size and weight, the walls were tilted up without difficulty in just 2 days using a 90-ton crane. A total of only 10 working days were required to erect the four exterior walls of the new jail facility.

On March 7, 1986, the new facility was completed, representing an impressive construction time of 7 months. The cost was only \$13,056 per inmate.

Local officials realized several benefits from this approach:

Design phase

- *faster completion* by incorporating existing design features
- *confidence in design* because staff have observed/tested a comparable building

Construction phase

- *accelerated schedule* with advanced construction methods
- *reduced construction cost* through reliance on a proven building technique

Finance method

Although State assistance was provided for Orange County's new intake center, the Lacy Security Facility was built entirely with local funds, available from criminal penalties.

As an innovative finance method, California counties secured passage of State legislation that dedicates a percentage of criminal fines and forfeitures to construction of local justice facilities. In this way, new revenues have been created to pay for ongoing building efforts.

Next steps

California voters will again be asked to authorize funds for jail construction in June 1986. If approved, this \$475 million measure will permit further jail construction, and counties may consider replication of the construction methods exemplified by the Orange County and Vacaville facilities.

In the past year, the California Legislature approved four new emergency bills to speed construction of further prison projects. Clearing the way for immediate construction of 5,000 prison beds, the action was hailed by the Governor as

...a very strong and clear message to the criminal element in California. If you commit a violent crime, you're going to pay the price, and we're going to make room for you in our State prisons.¹³

Limited resources will preclude major expansion of the Nation's jails and prisons unless officials carefully examine the most progressive building techniques, such as the new methods featured in this *Construction Bulletin*. Benefits of both approaches are shown in Table 5.

State and local officials in California have demonstrated that precast and tilt-up concrete permit fast and cost-effective construction of correctional facilities. To share their experience with colleagues, officials responsible for the buildings described in this *Construction Bulletin* are appearing before the 1986 Annual Conference of the National Sheriffs' Association, June 1986.

NOTES

1. Address to California State Legislature on August 19, 1985. Reported in *San Francisco Chronicle* August 20, 1985.

2. December 31, 1985, population was 50,111, an increase of 6,797 over 1984's total of 43,314. Computes to 15.7 percent increase and 130.7 inmates each week for 52 weeks.

3. Serious offenses defined as murder and nonnegligent manslaughter, robbery, rape, aggravated assault, burglary, larceny, and motor vehicle theft. Source: Federal Bureau of Investigation, *Uniform Crime Reports for the United States* 1980, 1983, and 1984, U.S. Government Printing Office.

4. Bureau of Justice Statistics, U.S. Department of Justice. "Prisoners in 1984," 1984 and unpublished report August 1985.

5. State of California, "1985-1990 Facility Plan." Department of Corrections, Sacramento, California.

6. *Construction Alternatives Study*, vols. I and II, prepared by Kitchell CEM, Sacramento, California, September 1983.

7. Data provided by Giffels/Del Campo and Maru, Kitchell CEM, and California Department of Corrections. Completion dates and costs for housing units only, no support buildings included.

8. Report to State Legislature, April 18, 1984, page 1.

9. Conventional facility is maximum security, 1,000 beds, single-occupancy cells. Groundbreaking May 1982, 500 inmates housed in October 1985. Vacaville groundbreaking January 1984, 600 inmates housed by October 1984.

10. State of California, "Report to the Legislature—Alternative Financing of California Prisons," California Department of Corrections, January 1984.

11. Orange County yearend jail populations: 1978, 1,424; 1982, 2,364; April 1986, 3,399.

12. Sheriff Brad Gates, report to Board of Supervisors, February 9, 1986.

13. Address in Los Angeles, California, on Tuesday, September 24, 1985. Reported in *Los Angeles Times*, Part I, p. 3, Wednesday, September 25, 1985.

Charles B. DeWitt is a Research Fellow at the National Institute of Justice, serving as Project Director for an NIJ grant to investigate new methods for expansion of jail and prison capacities. Mr. DeWitt was formerly Director of the Justice Division in Santa Clara County, California, where his duties included planning and construction of new correctional facilities.

Facility Profiles:

California State Prison, Vacaville

Jurisdiction: State of California,
Department of Corrections

Type of facility: State prison

Type of construction: Housing units:
Precast concrete column-and-beam
structure with precast panels and
steel roof system

Number of beds: 2,404
(12 × 100-person units and
7 × 172-person units)

Number of cells: 1,200 in single cells;
1,204 in dormitory units

**Total construction cost, including
onsite utilities:** \$111,000,000*

Building cost only: \$85,000,000

Building cost per inmate:
average: \$35,358

Total cost per inmate: Average:
\$45,757
single cell: \$53,122
dorms: \$39,340

Building cost per square foot:
\$77.69

Size of facility: 423,000 GSF total
housing area; 1,094,000 GSF entire
facility

Space per inmate: 455 GSF (entire
facility, including support buildings)

Start date: January 5, 1984

Completion dates: August 26, 1984
(300 beds, single-cell units,
housing only)

January 30, 1985 (1,200 beds,
single-cell units, housing only)

May 16, 1986 (1,204 beds, dormi-
tory units, housing only)

August 25, 1986, projected final
completion of all support buildings

Construction time: 8 months—initial
three housing units
13 months—single-cell facility
31 months—entire institution

Lacy Security Facility, Orange County, California

Jurisdiction: Orange County,
California, Office of the Sheriff

Type of facility: County jail (housing
unit only, no intake or support
services)

Type of construction: new construc-
tion at an existing compound,
support services not included in
construction

Number of beds: 180 design capacity

Number of cells: 32 dorms

**Total construction cost, including
onsite utilities:** \$2,350,000

Building cost only: \$2,150,000

Building cost per inmate: \$11,944

Total cost per inmate: \$13,056

Building cost per square foot: \$66

Size of facility: 32,529 GSF

Space per inmate: 181 GSF

Start date: August 2, 1985

Completion date: March 7, 1986

Construction time: 7 months

*Total does not include off-site im-
provements, roads, or fees for testing
and inspection. Architectural and CM
fees are not included.

For further information...

Prison construction

Department of Corrections:

Daniel McCarthy, Director
Dennis Dunne, Deputy Director, Planning
and Construction Division
California Department of Corrections
P.O. Box 942883
Sacramento, CA 94283-0001
916-445-7112

Statewide program manager:

Clarence Vaughn, President
Jim Davis, Vice President
Kitchell CEM
501 J Street, Suite 630
Sacramento, CA 95814
916-442-3779

or

1707 East Highland
Suite 280
Phoenix, AZ 85016
602-266-1970

Architect:

Martin Del Campo, AIA, President

or

Ravi Anad, Vice President
Giffels/Del Campo and Maru
45 Lansing Street
San Francisco, CA 94105
415-777-4025

Superintendent:

Eddie Ylst, Superintendent
California Medical Facility
Box 2000
Vacaville, CA 95696
707-448-6841

Concrete manufacturer:

George M. Amoss

or

Ross Rudolph
Basalt Precast, a division of
Dillingham Construction, Inc.
2301 Napa-Vallejo Highway
Box 2490
Napa, CA 94558
707-257-7111

Precast concrete engineer:

Norman L. Scott, President
The Consulting Engineers Group
1701 East Lake Avenue
Glenview, IL 60025
312-729-0646

Jail construction

Board of Corrections:

Norma Lammers, Executive Officer
Edgar Smith, Assistant Executive Officer
California Board of Corrections
600 Bercut Drive
Sacramento, CA 95814
916-323-8618

Sheriff:

Brad Gates, Sheriff
Orange County
Box 449
Santa Ana, CA 92702
714-834-3012

Jerry Krans, Assistant Sheriff
Orange County Sheriff's Department
550 North Flower
Santa Ana, CA 92702
714-834-5444

General contractor:

Steve Herthel, President
Construction Group, Inc.
20917 Devonshire Street
Chatsworth, CA 91311
818-998-6905

Construction manager:

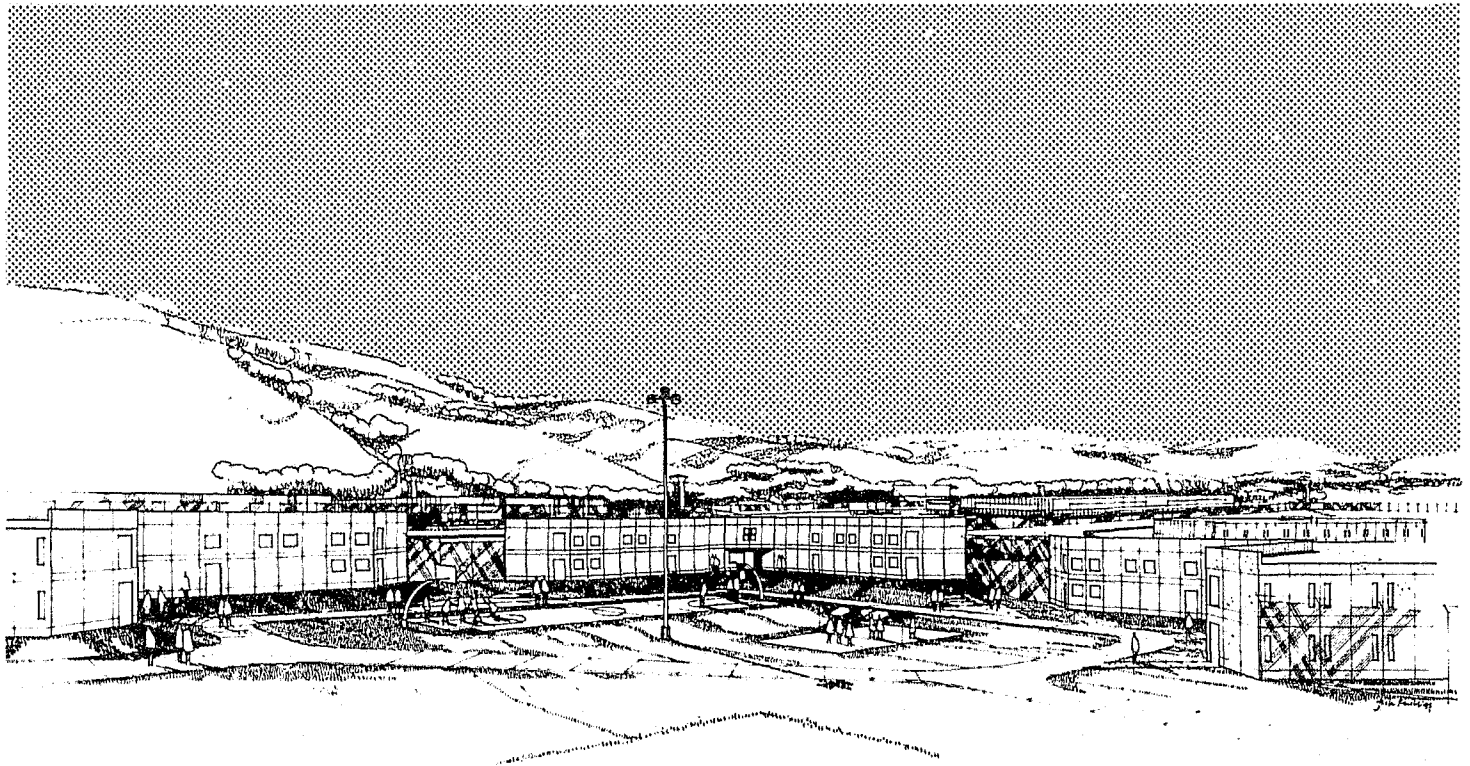
Clarence Vaughn, President
Jim Davis, Vice President
Kitchell CEM
501 J Street, Suite 630
Sacramento, CA 95814
916-442-3779

or

1707 East Highland
Suite 280
Phoenix, AZ 85016
602-266-1970

Architect:

Ralph Allen, AIA, President
Dave Brown, Vice President
Ralph Allen and Partners
520 North Main Street
Suite 200
Santa Ana, CA 92701
714-547-7059



California State Prison, Vacaville

Construction Information Exchange

The *Construction Information Exchange* is a Federal initiative designed to provide information on construction methods and costs for jails and prisons built since 1978. Through the *Exchange*, those planning to build or expand facilities will be put in touch with officials in other jurisdictions who have successfully used efficient building techniques. Publications

include these *Bulletins* and the *National Directory of Corrections Construction*. For more information, or to submit information for inclusion in the *Exchange*, contact:

Construction Information
Exchange/NCJRS
Box 6000
Rockville, MD 20850
**Telephone: 800-851-3420
or 301-251-5500**

Please Note:

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