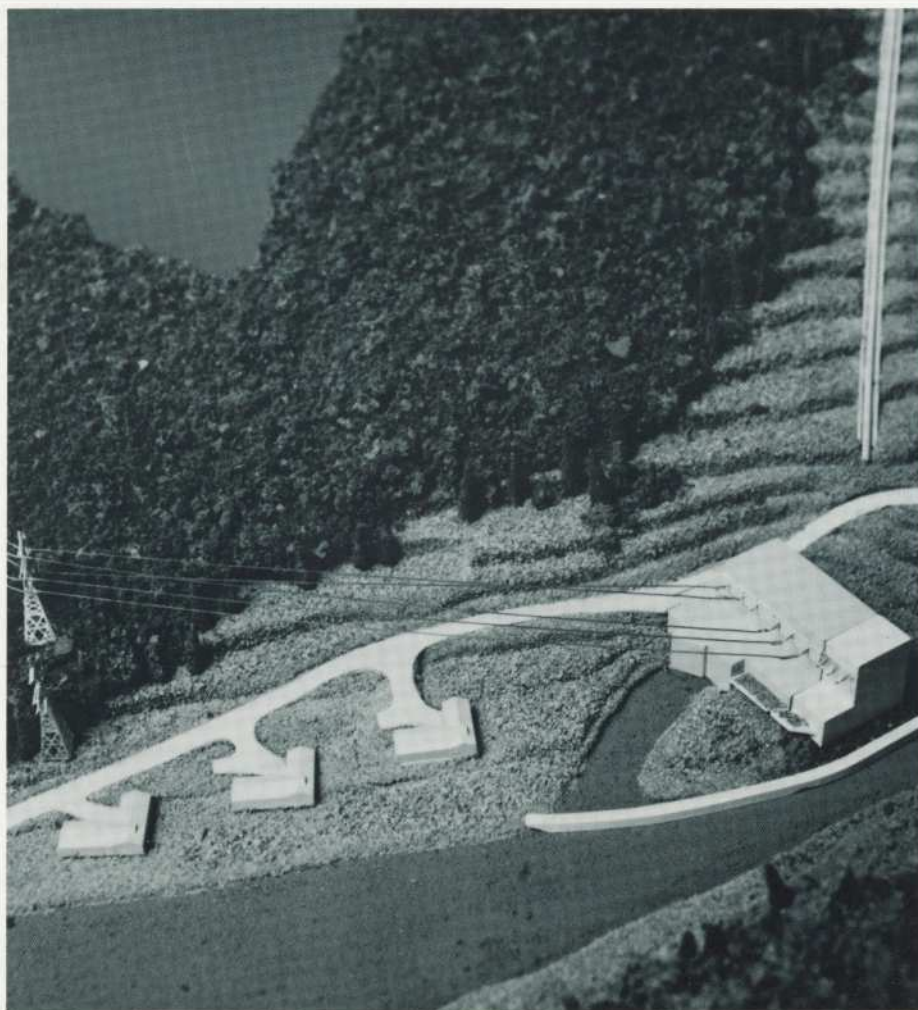


TUDOR QUARTERLY

SPRING 1985

KIRKWOOD ADDITION

Model of Kirkwood Powerhouse Addition



The Kirkwood Powerhouse Addition is proceeding on an accelerated schedule with a planned on-line date of April 1, 1987. The Main Power Equipment Procurement and the General Construction Contract bid documents were issued June 1, 1985, for award in August 1985.

The 36,000 kW turbine-generator planned for Kirkwood is the biggest single unit that Tudor has designed since New Exchequer in 1964. Under normal operations, all water which the City of San Francisco's Hetch Hetchy Water and Power provides to the Bay Area will pass through the turbines at Kirkwood. The water supplied to the Bay Area varies, but may be as much as 400 million gallons per day; during some months, the total water passing through the Kirkwood power plant will be more than twice that amount, with excess releases into the Tuolumne River. The increase in generating capacity is dependent on making use of the presently unused capacity of the existing twelve-mile-long tunnel and penstock.

TUDOR TACKLES "MERCER MESS"

Tudor is leading a team of consultants, including Parsons-Brinckerhoff, in a transportation planning study of the Mercer Corridor for the City of Seattle. The corridor is the east-west connection between Interstate 5 and the Seattle Center, site of the 1962 World's Fair. The corridor currently has an average daily traffic of 70,000 vehicles and is frequently congested. This congestion is especially heavy during evening events at the Seattle Center which coincide with outbound commuter peak traffic. Largely due to the inadequate transportation system, the development potential of the area has never been reached. The problem has been studied several times over the past twenty years, but has never been solved. The magnitude of the problem is such that it is referred to as the "Mercer Mess."

As part of this project, the City of Seattle has developed four land-use scenarios for the Mercer Corridor/South Lake Union area. The Tudor team will develop transportation alternatives which will be evaluated on the basis of how well they serve the land-use goals and objectives. The task of developing the transportation alternatives is especially challenging because all land-use scenarios result in significant increases in projected traffic volumes.

The study is due to be completed early this summer with the final step being a presentation to the Mayor and his staff. The City will then decide which land use and transportation plans are to be pursued further. Tom O'Neill is Project Manager for the study, with most Tudor input being provided by Darrel Chambers.

CALAVERAS A STEP CLOSER

On November 1, 1984, bids for the design and construction (turnkey) of the North Fork Stanislaus River Project were received. The low bidder was Guy F. Atkinson/Harrison Western, a joint venture. The construction cost, guaranteed complete price as quoted by A/HW, was \$267,025,000. The project consists of a 280-foot-high concrete face rockfill dam, 11 miles of tunnel and 205 MW of power. Tudor, working with Chas. T. Main, Inc., Boston, Massachusetts, reviewed the three final proposals. The construction contract with Atkinson/Harrison Western was signed on March 15. Bonds totalling \$624,000,000 for the Project were sold on April 3 and construction will begin by mid-summer. Tudor's role in construction administration and inspection, as a subcontractor to Chas. T. Main, Inc., is presently being developed. For those Tudorites who have not worked here long, Tudor began this project by preparing a preliminary report in 1958!



New Spicer Meadow Dam site

AINSWORTH CANAL

Tudor's Denver office has been selected by the Ainsworth Irrigation District in Nebraska to design a check and turnout structure along the Ainsworth Canal. The structure will consist of two radial gates, one 14 feet wide and one 16 feet wide, which will enable the District to divert excess storm water from the canal into a storage pond located next to the canal. Dikes for the storage pond are being designed by the Soil Conservation Service.

Funding for the project will be provided by a federal revenue sharing program. Design is expected to begin this summer, and construction should be complete before the first snowfall.

EL VADO POWER

The final design of all civil, structural, mechanical and electrical features included in the El Vado Dam Power Project in New Mexico was completed in April 1985. The project was advertised for construction on April 22, and bids are scheduled to be received in August.

There has been much interest in the project by prospective contractors. This is evidenced by the number of sets of bidding documents which have been purchased. On this basis competitive construction bid prices are anticipated.

Among the construction activities associated with this project, there is one which is of significance — the underwater removal of an existing concrete plug which was placed in the tunnel when this structure was abandoned at completion of a replacement outlet works by the U.S. Bureau of Reclamation. This activity will be performed under 140 feet of water.

The successful completion of the final design and preparation of bidding documents for this project was accomplished by efforts of Project Manager, Roberto Iniguez, Project Engineer, Hans Albring, and other members of the Hydro Design group including Greg Reichert, Hans Pokorny, Margarita Khavul, Bill Untiedt, Paula Dierkop and Grant Larsen.

L.A. METRO UPDATE

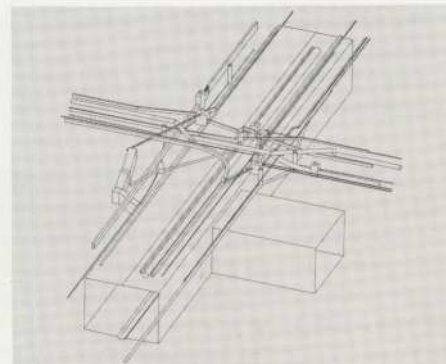
In August 1983 Tudor, in a Joint Venture with architectural firm William L. Pereira and Associates, was selected by the Southern California Rapid Transit District to design a three-mile segment of the proposed new Metro Rail subway system in Los Angeles. Tudor/Pereira's part of the project includes two subway stations in Wilshire Boulevard together with the adjoining three miles of twin bore tunnel.

After 18 months this design work is near completion and the District must await additional funding before construction proceeds. Some areas of design, principally architectural, mechanical and electrical, could not be completed because of funding cut-backs; however, the client developed a plan for carrying various parts of the design to those levels of completion needed to preserve the progress so that the work can be retrieved efficiently and completed when funds become available.

In general, Tudor's work will be carried to 100 percent completion. Tunnel design and the design for one station have been completed and submitted. The other station design will be completed in July when Tudor/Pereira's current contract ends.

Tudor's role in the project has been civil, structural and utilities design. Keith Bull was the Los Angeles Project Manager with Jim Schroeder assisting. Bob Ganse, assisted by Mark Nothaft, directed the work in Tudor's San Francisco office. Perry Lin supervised the structural engineering staff. Don Moore and Don Scapuzzi were responsible for surface restoration and utilities rearrangement work, respectively.

Although Tudor's CADD system was not available for this work in a complex utilities area, a major street intersection at the Wilshire/Western Station, was recently programmed on CADD to produce a three-dimensional view of utilities buried below the streets. The accompanying picture demonstrates another valuable feature of CADD — the ability to present complex information visually for analysis.



CADD Isometric

NEW EXCHEQUER REPAIR PROGRAM

Tudor has been working with the Merced Irrigation District (MID) and Pacific Gas and Electric Company (PG&E) since August 1984 to assist in the development of a long-range, comprehensive repair program for the New Exchequer Dam. Tudor was retained by MID to implement a conceptual repair program proposed by Project consultants J. Barry Cooke and Thomas Leps, whose consulting services have been utilized by dam owners around the world. Tudor's effort has included a study of alternatives for the repair program, and preparation of details and specifications for the proposed repair work.

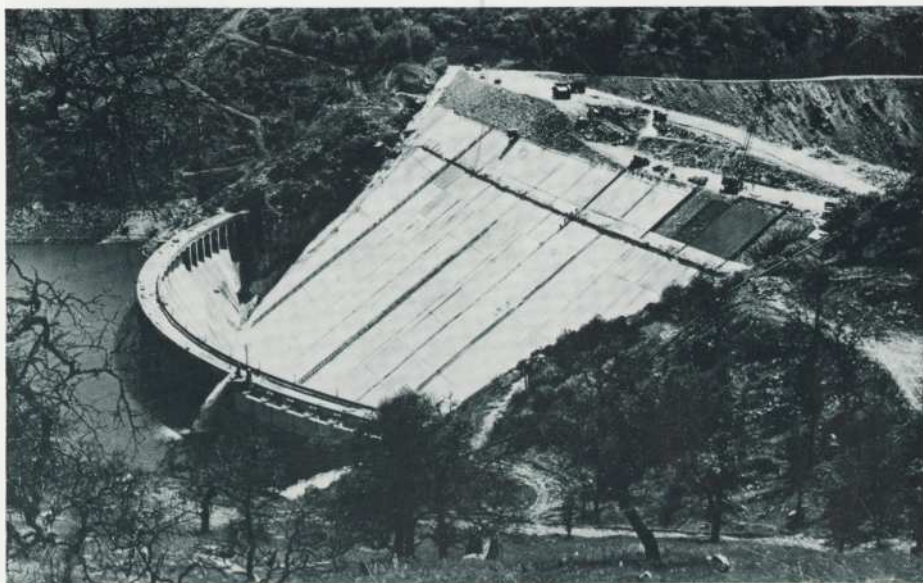
New Exchequer Dam impounds Lake McClure and is located in Mariposa County about 30 miles northeast of Merced, California. The dam and reservoir are an integral part of the Merced River Development Project, which was designed by Tudor and built by MID during the years 1964-1968. Included in the project were the dam, outlet works and 80 MW powerhouse at New Exchequer, and a dam, outlet works and 9 MW powerhouse at McSwain Dam, located just downstream from New Exchequer. Tudor also provided engineering services during construction for the project.

New Exchequer Dam consists of a zoned rockfill embankment with an articulated upstream concrete face slab. The original Exchequer Dam, constructed in 1926, is a concrete gravity arch dam that is 325 feet high. The design of New Exchequer Dam was unprecedented in that the upstream slope abuts against the downstream face of the original dam about 180 feet above the base. Due to its configuration, the upstream concrete face slab extends through a vertical height of about 310 feet, while the embankment has an approximate height of 490 feet. New Exchequer Dam was the highest rockfill dam in the world at the time it was constructed.

Settlement of the dam over the years has caused the slab joints to open at the abutments, resulting in leakage through the rockfill. The leakage is not considered to be a safety problem, but the lost water is valuable to MID and PG&E because it would normally pass through the turbine at New Exchequer to generate electricity. Various temporary repairs have been made to reduce the leakage in the past; however, the continuing settlement creates new leakage.

The joint repair program is intended to change the original face slab design by modifying the joints to produce a more monolithic face slab, thereby reducing joint movement. Neoprene covers will be provided at the abutment joints which have experienced the greatest movement.

The design effort is nearing completion and construction started in June 1985. The design team for this project is led by Hugh Brown and Paul Kneitz.



Exchequer Dam under construction

GRISWOLD CREEK

The Griswold Creek Joint Powers Agency has selected Tudor to conduct a feasibility study and prepare a FERC License Application for a proposed hydroelectric project on Griswold Creek in Tuolumne County, California. Tudor completed a prefeasibility study in March, resulting in the selection of a preferred project configuration from 19 alternatives. The prefeasibility study was conducted using a screening program, "HYSIZE," that was developed by Dick Everett and Avry Dotan. This program was used to optimize the features of each of the alternatives before ranking and selecting the preferred one.

The project will be a diversion from Griswold Creek to the Middle Fork of the Stanislaus River, and will use 1,800 feet of head to develop approximately 25 MW of power. The feasibility study will be completed by August 1985, and the FERC License Application will be based on the results of this study. Bob Toothman is Project Manager and Avry Dotan is the Project Engineer.



Griswold Creek

COLEMAN DOCK

Tudor has recently begun work on the Coleman Dock Design Study, conducted in association with TRA, a Seattle Architectural-Engineering firm. The study is for the marine division of the Washington State Department of Transportation, a long-time Tudor client. Coleman Dock is the location of the downtown Seattle Ferry Terminal, which is slated for major renovation. Work for this study will consist primarily of traffic engineering, and is essentially an update of a previous study. Einer Handeland, who did the previous traffic engineering work, will also perform the update. This project is one of many civil/traffic engineering efforts which Tudor has performed along the Seattle waterfront over the past several years.

WESTERN Support Services

Work continues in the Denver office under Tudor's marketing support services contract with the Western Area Power Administration (Western). Some assignments have been completed, while other tasks continue, and new work is assigned.

The latest completed assignment is Bruce Braaten's work with Western's Billings Area Office on their Conservation and Renewable Energy Program. This work, started by Cliff Bjorgum in July 1984, was assigned to Bruce in October 1984.

Ed Barbour and Dave Darling have completed work assisting Western's preparation of a report in response to a Congressional request to investigate ways of financing federal water projects with revenues from federal power projects.

Tudor's subcontractor, Stone and Webster Management Consultants, Inc., completed a study for Western's Sacramento Area Office of a potential non-federal transmission hookup from northern California's geothermal fields to the Central Valley Project (CVP) system.

Gene Buffum began an assignment as a full-time consultant to Western's Sacramento Area Office on May 1. Gene will analyze the operation of several major substations in Western's CVP system and recommend changes to improve the operation.

Bob Toothman of Tudor's San Francisco office completed an assignment involving studies of solar and wind energy potential at Western's operational facilities. As part of the assignment, Tom Rawlings evaluated a small hydro project at Folsom Dam.

Ed Barbour recently completed a review draft of written guidelines for power values determinations for Western's review. The guidelines, when finalized, will be used throughout Western's organization. Ed will write similar guidelines for the broader area of economic and financial analysis.

Ron Wright from Tudor's Seattle office and Doug Gruber, from the Denver office, began full-time assignments in Western's Salt Lake City Area Office. Doug will work in marketing and the Conservation and Renewable Energy Program; Ron is assigned to rates and repayment.

The one-year contract will expire in July 1985, but with the number of long-term assignments of Tudor personnel, it appears likely the contract will be renewed. Nelson Jacobs is the Project Manager.

BEAR VALLEY DAM



Bear Valley Dam

Tudor was retained by the Big Bear Municipal Water District in September 1984 to evaluate alternatives for modifying Bear Valley Dam in the San Bernardino mountains in Southern California, and to provide design services, and engineering services during construction for the selected alternative. Bear Valley Dam, constructed in 1911, is a multiple arch dam about 90 feet high and 300 feet long, and forms Big Bear Lake, a scenic lake with heavy recreational use and residential development.

In 1980 the State Division of Safety of Dams directed the District to re-evaluate the dam using state-of-the-art seismic analysis techniques. Initial studies by other consultants indicated the dam, which supports a highway bridge, would not withstand seismic forces during a major earthquake on the nearby San Andreas Fault.

During the evaluation phase, Tudor reviewed previous findings and developed alternatives to either repair or replace the existing dam. The existing dam was evaluated for corrective structural modifications including significant spillway changes. Structural options to the existing dam included mass concrete infilling, partial infilling, internal shear walls, and buttresses. Each option contained different concepts for spillway and outlet works improvements. The desire to widen the existing two-lane highway bridge also resulted in subalternatives. New dam alternatives included a concrete arch dam, a concrete-faced rock-fill dam, and a roller compacted concrete dam. The studies included comprehensive spillway and outlet works arrangement and sizing aspects.

The multiple arch stress evaluation and the concrete arch dynamic stress evaluation were conducted by Dr. Ray Clough under subcontract to Tudor. The finite element method was used in each case. Geotechnical studies were conducted by Schaefer Dixon Associates, also under subcontract to Tudor.

Evaluation phase studies were performed by Jim Legas, Project Manager and Project Engineer, assisted by Steve Van Til and Avry Dotan.

After detailed discussions, the District decided to construct a new concrete arch dam about 100 feet downstream from the existing dam. It will be about 90 feet high with a crest length of about 400 feet. The foundation exploration program for the arch dam began in late May. Tudor's services for preparing the plans and specifications for the arch dam began in June. Subsequently, CalTrans reactivated their earlier interest in placing their new, and perhaps widened, highway crossing on a roller compacted concrete dam — one of the more competitive alternatives. A joint project study is expected to be undertaken shortly by Tudor for CalTrans and the District. Project Manager is Gordon Marsh, and Jim Legas will assist in the dam design. Construction is scheduled to begin in March 1986 and to be completed in March 1987.

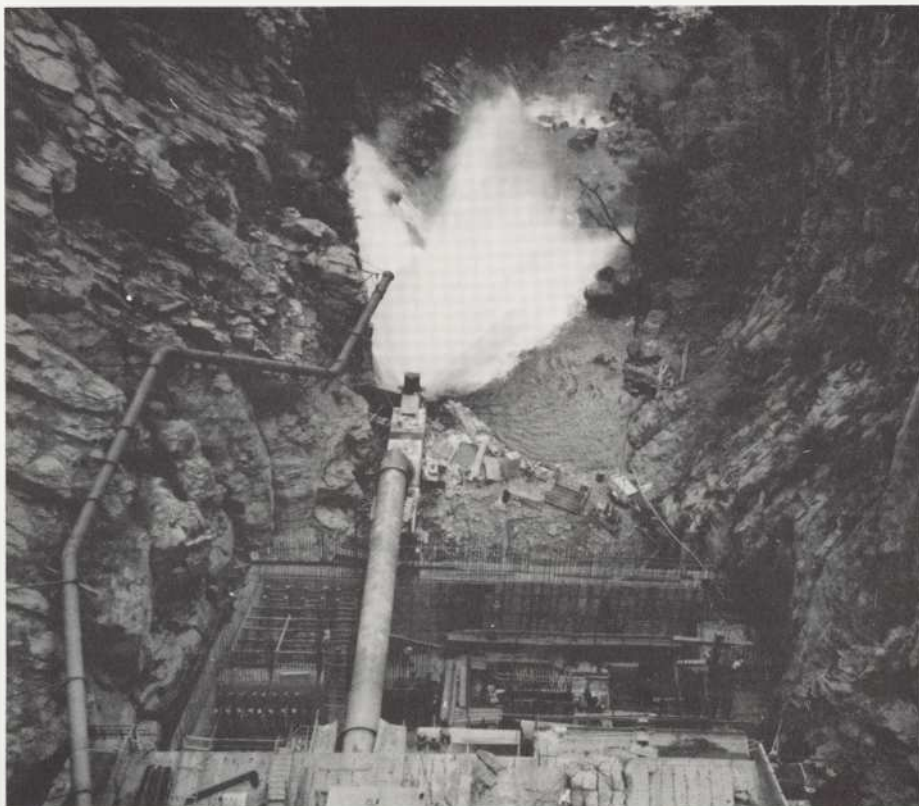
LAKE SISKIYOU POWER PROJECT

Construction of the Lake Siskiyou Power Project continues near Mt. Shasta in northern California. The four million dollar civil construction contract is approximately 50 percent complete. Completed work includes rock bolting for slope protection; erection and installation of the intake structure; temporary diversion and control of water; a rock, sand and filter fabric cofferdam; and rock excavation for the powerhouse.

The concrete work for the powerhouse that will house two 2.5 MW horizontal Francis units is 25 percent complete. Approximately 850 CY of concrete must be removed from the toe of Box Canyon Dam to key the powerhouse into position. This concrete demolition has proved to be a monumental task. The California Division of Safety of Dams allowed the use of controlled explosives to crack the concrete into blocks that could be removed from the canyon with the 188-ton crane. However, this method was stopped by the California Department of Fish and Game during the nesting period of two osprey. As a second method, the Contractor tried removing portions of this concrete using an expansive cement product. This method produced intermittent success, but it was very slow. Now the Contractor is mobilizing a large hoe-ram with which to remove the remainder of concrete without delaying the placement of new concrete for the powerhouse.

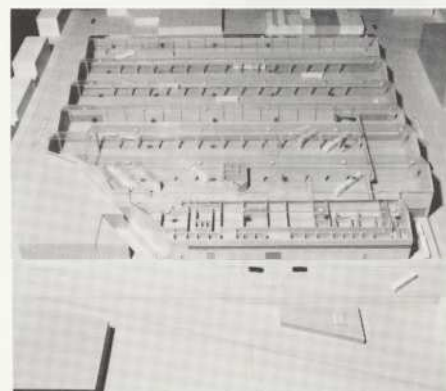
Two other critical activities lie ahead for the Contractor. After the concrete work has been completed up to the operations deck, the permanent penstock must be installed and the temporary 60-inch diversion pipe removed. This activity is expected to take approximately four weeks, during which time only the 30-inch diversion will be operational. Because of black bass spawning in Lake Siskiyou this time of year, the California Department of Fish and Game requires the lake level to be within one foot of the spillway.

The final critical activity is the placement of the roof deck concrete. Approximately 1,800 CY of concrete must be placed in a monolithic lift. All concrete placed to date has been with the crane and a three-yard bucket. The production with this method is typically 15 CY/hr. Since this rate is too slow for the roof deck, the Contractor is considering a slick-line and conveyor system that would handle the plant capacity of 60 CY/hr. At this rate, the roof deck will take 30 hours to place. Resident Engineer is Brian McDermott.



Lake Siskiyou Power Plant under construction

MUNI HARRISON STREET FACILITY



Model of Muni Harrison Street Facility

The conceptual design of the MUNI Harrison Street Facility, a storage, maintenance and repair facility for the articulated bus fleet, was submitted to the Utilities Engineering Bureau (UEB) of the San Francisco Public Utilities Commission (PUC) in May. The submittal, which included a Project Basis of Design Report, architectural and structural drawings, and an equipment list, was the culmination of six months of coordination between the design team, managed by Tudor, and staff from the UEB, MUNI, and other City departments.

Construction of the project has been estimated to cost \$15.2 million, approximately \$3 million above the amount originally budgeted by the City. However, realizing that there was little that could be eliminated from the project, the PUC has decided to raise the additional funds.

The next phase of the project will be a three-step detailed design extending over a nine-month period, already begun in early May. The project will be divided into three separate construction contracts: an initial demolition contract within the existing 6-acre structure; the construction of the main facility and adjacent tire shop, including all equipment and utilities; and the construction of a City office complex and two levels of employee parking over a storage yard. Principal-in-Charge of the job is Mike Harrington. The Project Manager is Lou Salaber, assisted by Heinz Mueller, Steve Gold, Alfred Korbmacher, Karen Yapp and Charlie Tsang. An accelerated construction schedule still should allow the facility to be opened in late summer, 1987.

UP CLOSE AND PERSONAL



Pam Stimpson

Pam Stimpson grew up on the southeast coast of Maine; her fondest childhood memories are of boating and swimming in the ocean, playing on the rocky coastline, and eating fresh seafood. Looking for adventure and more desirable career opportunities, Pam packed her VW and headed west to Denver, Colorado, in 1978.

Before joining Tudor, Pam worked in various career fields. She was an administrative assistant for a heavy haul/moving and storage company, a research pediatrician's office, and a podiatry clinic. Pam quips, "They were interesting places to work but the "fragrant" atmosphere was a little hard on the nose!"

Pam has worked for Tudor since June 1980, when she became the Denver office's first permanent secretary. Pam now participates in many of the administrative activities, including such responsibilities as moving consultant, telecommunications consultant, word processing supervisor and troubleshooter, social director for the annual Christmas dinner party and picnic, and time management juggler!

"I do miss the ocean," Pam admits, "but Colorado is a great place for outdoor activities." She enjoys camping, hiking and exploring in the mountains, volleyball, windsailing, whitewater rafting on the Colorado River, and running. Although not a marathoner, Pam enjoys the shorter runs. In April, she ran the 5-mile Cherry Creek Sneak to benefit the Colorado Special Olympics, and on Memorial Day ran the 10k Bolder Boulder. When asked how she did in the Bolder Boulder Pam said, "It was a hot day so that made it a little difficult, but it was very exciting with 20,000 other runners. I knew I was almost home when I entered the Folsom Field football stadium where there were thousands of people to cheer us on! I was just happy to finish the race."

Pam is also involved with the Colorado Mile High Players, a group of semi- and non-professional performers. The Players recently performed a musical melodrama called, "No, No, A Million Times No!", and are planning another show for the fall. Pam is looking forward to her role as a participant.

Anchor DeWitt Jensen

Anchor DeWitt Jensen's Danish forebears have been building boats for 180 years. DeWitt's grandfather, an accomplished violinist, sailed to Canada from Denmark and eventually played in the Empress Orchestra and the Seattle Symphony. DeWitt retains his family's love for Seattle and the Washington wilderness, but he has traded bowing strings and floating boats for the inland pursuits of highway alignment and bridge construction. As a sideline, he is part-owner (with his father) in a boat building business. In the summer of 1973, DeWitt launched his career with Tudor upon the waters of the mighty Columbia and Willamette Rivers, enjoying the beginner's task of field studies. He obtained his BSCE from the University of Washington in June of 1974, and joined Tudor full time. After a summer MARTA stint in Atlanta soaking up southern hospitality, DeWitt spent four years in charge of irrigation and drainage design for portions of interstates I-82 and I-182, and final design plans for the west interchange of the West Seattle Phase I High Level bridge. DeWitt also contributed to Nooksack Falls, Thunder Creek, and San Francisco's Calaveras hydro projects.

Since 1983, DeWitt has been involved with the plans and design of the West Seattle Phase 2 Low Level Swing Bridge, and currently is in charge of the civil alignment/roadway portion. "It has been an interesting but extremely demanding job for us all because of the short time schedule," DeWitt comments.

DeWitt and his wife, Carol, are currently enjoying the company of Matthew, their 8-month-old son. Of course, there is never enough time for his killer zucchini, to pamper his peaches and pears, or to restrain his reckless roses. DeWitt also would like to hitch another ride to Europe someday. He and Carol thoroughly enjoyed a one-month tour of England, Scotland, Switzerland, Germany and Austria in 1983.

DeWitt's other favorite pastimes include running, slow pitch softball, and attending University of Washington football games. A devoted Husky fan, DeWitt enjoys smooth sailing on the field as well as on land and on sea.



Paula Dierkop

A native of Quincy, in eastern Washington state, Paula Dierkop left her hometown to attend the University of Washington, and except for brief family visits, has lived most of her adult life elsewhere. During a nineteen-year marriage to a career army man, she moved 26 times from such diverse locations as Chicago and Monterey, to the island of Okinawa and France.

Since 1963 Paula has lived in California — San Diego for 17 years and San Francisco for 5 years. Before her marriage ended in 1965, Paula had re-entered the business world as office manager for a mechanical-electrical consulting engineering firm. It was here that she learned specification writing. In 1972, Paula returned to school to continue the college education interrupted when she married. Studying at San Diego College and U.C. San Diego, she completed two additional years of college work. By this time Paula's years as a single mother were winding down as her children finished high school and left home for college and careers.

Through her years as an army wife, Paula developed a love for travel. While foreign travel has been limited during the past twenty years, she has enjoyed the scenic beauty of California, Hawaii and British Columbia, cruised to Alaska, and visited New York City frequently.

Paula has helped to write specifications for not only many hydroelectric power projects, but also for the Corrosion Control Facility, Alameda NAS, and the Repair and Construction, Wharf 7 — Oakland.

When she is not writing specifications for Tudor, Paula attends opera, symphony and theater performances. Her favorite vacation spots in Northern California are Lake Tahoe, the Mendocino coast, and the Monterey peninsula.

Since January, Paula has been in an accelerated degree program at the University of San Francisco. In May 1986 she will graduate with a BS in Information Systems Management.



Dick Rudolph

Early in his career, Illinois native Dick Rudolph joined the Army to see the world. He purchased a shiny red Austin Healey convertible in France to "impress the French girls," and a successful impression it was! After eighteen months' service in a Corps of Engineers Construction Battalion, Dick returned to the U.S. and was released from the Army.

Discouraged by a lack of jobs and the inclement Illinois weather, Dick heeded the call, "Go West, young man!" and roared over the plains and mountains to San Francisco. Once established, Dick worked for the Division of San Francisco Bay Toll Crossings where he participated in the design of the Richmond-San Rafael Bridge, the San Francisco-Oakland Bay Bridge Lower Deck Reconstruction, the Southern Crossing, and the San Mateo-Hayward Bridge.

When the Division ran out of bridges to design, Dick moved to Seattle, then to North Dakota for a three-year hitch working on Boeing-designed Minuteman Missile construction sites. Unwilling to endure another harsh North Dakota winter, Dick began his career with Tudor, San Francisco, as a design engineer on the BART standard aerial structures. He was subsequently assigned to the Tagus River Bridge in Lisbon, Portugal, during the construction services phase.

After work on MARTA, Warm Springs Bridge, and Port of Stockton Wharf, Dick left Tudor to become an associate in a small engineering firm in Alaska and Washington. In 1979, Dick again joined the Tudor team to work on the Caracas Metro Project.

Dick's current work includes the Mercer Island I-90 project, Seattle Monorail Rehabilitation project, Seattle METRO Multi-Corridor report and the QA review for the West Seattle Bridge Phase 2. He occasionally travels to San Francisco for temporary assignments which have included the Jones Fork and Mendocino Projects and SLAC Experimental Hall.

Collecting and painting military miniatures (toy soldiers, to the uninitiated!) is one of Dick's special interests, along with photography, reading history, and cheering the Mariners baseball team. Dick and his wife, Phyllis, share the joys of pasta making, gardening and traveling. Setting his sights ever higher, Dick will someday climb to the top of Mount Rainier—for Dick, the sky's the limit!

TUDOR ON THE MOVE II

Tudor's Denver office moved to a new location on April 27, 1985—or is it an old location? The Denver office began in October 1979 with John Williams located in the same building as the new office.

Office space in downtown Denver is overbuilt and vacancy rates are as high as 30 percent, making the cost of office space competitive. The Denver office is now located on 17th Street, which is the Wall Street of the Rockies and adjacent to the new Marriott City Center Hotel.

Preparations for the move began months earlier when John Williams and Pam Stimpson discussed a workable, more efficient space plan. With the signing of a lease, Drafter Vince Baldassano joined in to help with the layout. Interior Designer Robin Mullen assisted with color coordination of the burgundy carpets, warm white walls, and gray panel fabric.

The week before the move was hectic with everyone packing while maintaining project schedules. On moving day John Williams, Pam Stimpson, Jerry Cross, and Vince Baldassano supervised and directed Bekins movers. By 5:00 p.m. the weary supervisors were happily into their new office! On Monday morning the unpacking and settling-in began with the realization that it would be a few weeks before the effects of the move would allow a return to normal.

FRIANT TOUR

Saturday, June 15, twelve adventurous Tudorites traveled to Friant Dam on the San Joaquin River for a tour of the Friant Power Project construction. Resident Engineer Bill Gray and Jim Richardson escorted the group to River Outlet, and then to Madera and Friant-Kern power plants.

Each powerhouse differs in layout and equipment, and is at a different stage of completion. Of special interest were the turbines, generators and turbine shutoff valves, as well as the miles of pipe, conduit, and other auxiliary systems equipment. The tour was planned by Walt Anton and Dan Boyle, who also drove the vehicles.

SCHOLARSHIP AWARDS

Each year Tudor Engineering Company joins with other firms and organizations in sponsoring Scholarship Awards for outstanding high school seniors seeking higher education to become the engineers and scientists of tomorrow. This year at the Engineers' Week Banquet, held at the Oakland Convention Center, the Tudor Scholarship Award was presented to Ronald Marquardt of San Ramon Valley High School in Danville.

Ron will attend the Massachusetts Institute of Technology where he plans to study in the fields of chemistry and physics. He is a squad leader in his school's marching band and is a Sea Cadet in addition to his academic achievements.

TUDOR AWARDS

At a June Awards Banquet at the Engineers Club, the San Francisco Chapter of the Construction Specifications Institute presented the 1985 Chapter Organizational Certificate of Appreciation to Tudor Engineering Company "for support and distinguished service to promote the advancement of the San Francisco Chapter CSI." The Chapter President's Certificate was awarded to Paula Dierkop, CCS, in recognition of her contribution as editor of the Chapter newsletter.

James Ricereto

Memorial services were held in San Francisco on June 29th for James Ricereto III, who died after a brief illness.

Jim, a graduate of Rutgers University and the University of Pennsylvania, worked for Tudor from 1972 until 1981, both as a civil engineer and a marketing representative, with a one and one-half year leave when he worked for Parsons Brinckerhoff in New York City.

After leaving Tudor, Jim founded his own marketing consultant practice. In 1983 he joined the San Francisco office of DMJM as a marketing representative.

Contributions may be made in his memory to Hospice of San Francisco, 225 30th Street, San Francisco, CA 94131.

NEW FACES . . .

Tudor welcomes new employees:

. . . for san francisco



Lynne Gomez
Secretary

. . . for denver



Douglas Gruber
Civil Engineer

CONGRATULATIONS

Dewitt and Carol Jensen of Seattle, proud parents of son Matthew Anchor Dewitt, October 8, 1984.

Robert and Brooke Toothman of San Francisco, on the birth of a son, Robert Cosmo, May 1, 1985.

Synthia and Gaston Lee of San Francisco, on the arrival of their son, Richard Gilbert, June 30, 1985.

THE TUDOR QUARTERLY is published by Tudor Engineering Company for the information and enjoyment of its employees, their families, and friends.

CONTRIBUTING AUTHORS: Roslyn Ball, Jack Biederman, Roberto Iniguez, Nelson Jacobs, Brian McDermott, Bob Myrdal, Tom O'Neill, Lou Salaber, Jeff Stevens, Pam Stimpson, Bob Toothman, and Dave Willer.

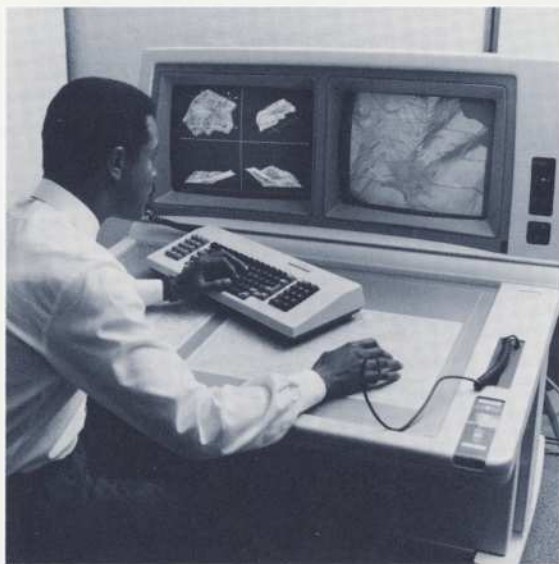
EDITING AND PRODUCTION STAFF: Frank Chiappella, Paula Dierkop, Jim Flannery, Alfred Korbmacher, Grant Larsen, Andy Nguyen, Greg Reichert and Charlotte Wheeler.

TUDOR

Quarterly

Summer 1985

CADD FULLY IMPLEMENTED



Isometric tunnel diagrams



Color Graphics Workstation

Tudor Engineering Company installed an Intergraph computer aided design and drafting system last December. Since then, its use for CADD, engineering computation applications, and corporate accounting is now averaging about 1450 logged hours per month.

Under the direction of CADD Supervisor Rich LaRowe, the CADD system has been fully implemented, and the majority of Tudor's drawings are being produced on the system. Operators are Karen Yapp, David Silveira, Susan Lee, and Richard White.

In August two digital terrain modeling (DTM) projects were completed. PG&E's San Francisco office had the task of locating an embankment site which would impound a specific volume of dredge material. The available material for the embankment was limited, and therefore site optimization became very important. Tudor received a data tape from Towill, Inc., who had performed the aerial photography of the proposed embankment site and had stereo-digitized the terrain. A three-dimensional model of the site was created and in a three-day period, eleven reservoir sites and five embankment configurations were investigated in detail, volumes were calculated directly from the model, and an optimum site was chosen for final design. The next step used a process called Hidden Line Removal and Surface Shading to create a color-filled, three-dimensional isometric view of several alternatives which were photographed and used for presentation during the approval process.

Tudor also used the DTM package to determine earthwork quantities for a water treatment plant being designed by James M. Montgomery Consulting Engineers of Walnut Creek. The complex site consisted of two access roads, three graded areas at different elevations and six structures within the three areas, all located on a site which had an elevation difference of about 250 feet. Aerial photography by Towill, Inc., provided the data tape for creation of the three-dimensional terrain model. Excavation plans were prepared and cut-and-fill volumes were calculated for three phases of the construction sequence; major site excavation, structural excavation, and final site configuration with the structures in place and backfilled. Isometric plots were also prepared for the final configuration.

In response to new applications and an increasing workload, a third graphics workstation was added to the CADD system in July and operator training continues.

SMUD Pumped Storage Study

Tudor has been selected by the Sacramento Municipal Utility District to conduct a reconnaissance level study of potential pumped storage projects. Pumped storage projects are similar to conventional hydroelectric projects with the addition of the ability to pump water uphill. A typical project would consist of a reversible pump/turbine operating between upper and lower reservoirs. During periods of low electrical demand, low cost electricity would be used to pump water from the lower reservoir to the upper reservoir. This water would then be released through the pump/turbine to generate electricity during periods of high electrical demand.

Tudor's efforts will consist of assisting SMUD with the identification of potential pumped storage schemes and preparing computerized operation studies of the potential projects. The major emphasis of the study is to identify potential pumped storage projects within the existing SMUD Upper American River Project; however, other potential sites in California are also being considered. Tudor has previously prepared a detailed computer model of the hydrology and operation of the SMUD project. This model is currently being revised by Ivan Mlaker to include the provision of pumped storage. Steve Alters is Project Manager and Bob Toothman is Project Engineer.

Projects

NEXT TRANSIT PROJECT

The Puget Sound Council of Governments has retained Tudor to estimate costs and evaluate feasibility for its North Corridor Extension Project, "NEXT," in Snohomish County. This project is an approximately 20-mile-long extension of the proposed North Corridor Transit Alternatives from the King County/Snohomish County line into Everett. Raymond Kaiser Engineers in association with Tudor, completed the North Corridor Project for METRO and evaluated alternative transit routes and technologies for connecting the Seattle Central Business District with the North King County/Lynnwood area.

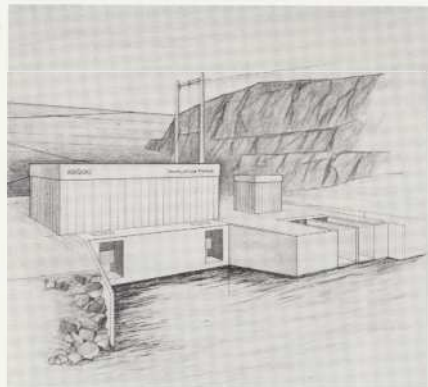
The NEXT project involves two different routes. Tudor is the prime consultant, assisted by Raymond Kaiser Engineers, who are responsible for systems engineering. Tudor will prepare conceptual cost estimates for civil/structural elements, and comment on the feasibility of the two alignments. Bela Vadasz is Project Manager, and Roger Brassfield is Project Engineer.

DENVER Update

Work continues in the Denver office on the design of the spillway, outlet works, and power plant for the Stagecoach Dam located near Steamboat Springs, Colorado. The 140-foot-high roller compacted concrete dam is being designed by Woodward-Clyde Consultants. Plans and specifications are scheduled to be started this fall with design completed by the end of the year.

Other completed work is the review of three hydro projects in northeastern Utah for Burns and McDonnell Engineers, and the final design of an outlet works with GEI Engineers for the rehabilitation of a Forest Service dam in Oklahoma.

ABIQUIU Dam Power Project



Abiquiu Power Plant

The basic design effort on the Abiquiu project, started in August 1984, has been completed. This work involved significant coordination with the U.S. Corps of Engineers, Albuquerque District, and the Rio Grande Compact Commission for design of the project features and out-of-sequence operation of existing reservoirs during project construction. Also, extensive coordination with the County of Los Alamos was required to decide on specific critical items such as final installed capacity, project schedule, and the number of construction and procurement contracts.

The project approved for final design includes the installation of horizontal Francis turbines and generators with a capacity of 16MW, two 60-inch diameter synchronous bypass fixed cone valves, and a 123-inch diameter steel liner in the existing outlet works tunnel.

Final design began in May 1985. The procurement contract for turbines, generators, valves, and associated electrical equipment is in the bidding process, and award is scheduled for mid-winter. An unusual aspect of the construction schedule is that it requires two winter seasons (low flow periods) for the tunnel liner and plenum chamber installation.

All coordination efforts with the County of Los Alamos are with Dan Wegloski, County Project Engineer. Tudor's design effort is the responsibility of the following individuals: Dave Willer, Responsible Principal; Roberto Iniguez, Project Manager; Paul Kneitz, Project Engineer; Greg Reichert, Jim Gormly, Bill Untiedt, Grant Larsen, Paula Dierkop, Andy Yeung, Tony Lea, and Steve Van Til.

WESTERN RENEWED

Tudor's Denver office has completed one year under the marketing support services contract with the Western Area Power Administration (Western). The contract has a provision for Western to exercise an option to renew the contract for two successive years. Recently, Western notified Tudor that the contract has been renewed through July 1986. Work on various assignments is continuing as the second year begins.

Ed Barbour has completed a final draft of "Power Value Determinations — Guidelines," a written set of guidelines to be applied throughout Western's organization for determining values of power for various engineering and resource justification applications. The guidelines develop recommendations from general economic theory and concepts which evolved from historical development of federal agency procedures for economic analysis, and extend to recommendations of administrative and staffing requirements to maintain updated power values. Ed is beginning a second set of guidelines which will cover the broader area of economic and financial analysis.

Tudor's subcontractor, Stone and Webster Management Consultants, Inc., has completed development of an automated system for billing customers for demand and energy charges for Western's Loveland Area Office. They have also investigated for the Loveland Area Office an exchange agreement whereby Western's preference customers in Kansas would be provided service from federal generating facilities in Colorado and Wyoming. Stone and Webster staff have also been working with the Sacramento Area Office on a computerized system expansion model for the Central Valley Project.

Gene Buffum continues his work at the Sacramento Area Office analyzing the operation of Western's major substations. He has completed an analysis of the Tracy Substation, and is coordinating efforts of Tudor's San Francisco office staff.

Nelson Jacobs is the Project Manager for the contract. Clarence Colyn is the technical reviewer of work under the various assignments.

Picnic



San Francisco

The third year at Roberts Park in the Oakland redwoods was a charm for the San Francisco office picnickers. Even an uninvited summer rainstorm did little to quench the enthusiasm for good food and fellowship.

An impressive array of home-made salads, breads, vegetable dishes, desserts and wine accompanied the traditional fare of delicious steaks, corn, beans and hamburgers; and all were cheerfully consumed between handshakes, anecdotes, and raindrops. Special guests Agnes and Les Helgesson braved the weather for an afternoon of visiting with friends, old and new.

Hardier individuals worked off their meals and generated a little heat with rousing games of volleyball and softball until insistent showers forced them to leave the field to the ducks.

The picnic planning committee included Helen Mayotte, Rich LaRowe, Gerry Gibney, Gale Alters, S.T. Su, Don Scapuzzi, Steve Van Til, and Al Beane.



from left to right

Paul Potter, Bob Janopaul and Gerry Gibney sport the latest in picnic hats.

Nearly-weds Steve Van Til and Karen Ganse show how to stay warm on a chilly day.

Sue Myrdal, Irene and Dave Willer, and Pat and Louis Riggs pause for a visit before lunch.

Cindy and Jeff Ghilardi and family, Sue and Bob Myrdal, Janie Estep, Rosemary and Kurt Scholz enjoying a dry table and great food.

Adam, Michelle and Carol Gibney.

One of Roberto Iniguez' lively jokes keeps captive audience Eva Spatenka, Pat and Louis Riggs, and wife Josefina in stitches.



Picnic

Denver

The Denver office summer picnic was held on a Friday evening in August at Nelson and Dawn Jacobs' backyard pool and volleyball court. After some competitive volleyball and lawn darts, a few brave souls cooled off in the pool. John Williams again did the honors at the grill while the ladies provided the desserts. Everyone enjoyed the hot dogs, hamburgers and desserts before relaxing on a beautiful Colorado evening.

from left to right

Mary Baldassano, Janet Williams, Dawn and Nelson Jacobs and Dave and Linda Darling at poolside.

Clarence Colyn offers some constructive criticism of John Williams' work at the grill.

Dawn and Nelson Jacobs, John Williams, Dave Darling and Jeff Stevens relaxing after sampling some great desserts.



Award

Mike Goldberg and TUDOR Honored



Miami-DCM Guideway and Metrorail Aerial Structure

The James F. Lincoln Arc Welding Foundation named Mike Goldberg as "Gold Award" winner in its 1985 Awards Program for Advancement of Arc Welded Design, Engineering and Fabrication. Mike's entry in the Awards for Papers program described the design and fabrication of the welded curved guideway spans for the Miami Downtown People Mover. These multiple-span structures challenged both the design engineers and the fabricator due to their sharp curvature (75-foot minimum radius) and their geometric complexity. About 40 percent of the People Mover's four miles of guideway are horizontally curved. Computers were used extensively, not only by Tudor in designing the structures, but also by the fabricator, Bristol Steel and Iron Works, in developing the plate geometry.

The Foundation presented Mike with a check and a certificate, and Tudor was presented with an engraved plaque, which is now on display in the San Francisco office.

Mike was Project Engineer for design and construction services. The primary designers of the curved guideways were Wu-Chieh Chen, Steve Gold, Eva Spatenka and Walter Zien. Other key participants in Tudor's design and construction services efforts were Responsible Principal Paul Potter, Project Manager Rainer Rungaldier, Karen Chew, Alfred Korbmacher, Jim Richardson, Charlie Tsang, Darryl Tyson, Richard White, and Don Yamagishi. Bruce Babcock, on loan from PB/T Atlanta, served as Tudor's field representative during critical stages of construction. Congratulations to all of the above for their contributions to this award-winning project!

Picnic

Seattle

Once again the Seattle staff gambled on the weather at Flaming Geyser State Park and ... well, it didn't rain very much and it wasn't too cold. In fact, the office enjoyed the full complement of planned activities, and Tudor spirit prevailed over occasionally threatening skies.

The park is located on the Green River, approximately 25 miles southeast of Seattle, near Tudor's Mud Mountain and Howard Hanson hydro feasibility projects. It features city park comforts in a rural setting.

Seattle office functions are renowned for the quality and quantity of food provided and consumed. Barbequed salmon prepared with a variety of sauces and garnishes was the featured entree. This was complemented by a bewildering array of salads, breads, vegetables, pies, cakes, brownies, and other desserts.

The weather relented enough to permit a wide range of organized (?) activities, including tug-of-war, water balloon toss, three-legged sack race, and, for the more sedentary, Trivial Pursuit. There was also ample opportunity and setting for plain old-fashioned visiting and relaxing.

from left to right

Marilyn Handeland, Ed Peters, Barbara Blunt and Don Scapuzzi check the salmon.

Marilyn Handeland, Ed Peters, DeWitt Jensen, Donna Janes, and Diane Browning in the buffet line.

Carol and Matthew Jensen, Ames and Sandra O'Neill comparing notes at feeding time.

Three-legged sack race.

Darrel Chambers and DeWitt Jensen take time out from the activities.

Water balloon toss.



People and Places

ENGINEERS FOR MARTA

Darin Johnson and Heidi Ouren joined Tudor directly from their respective engineering schools a year and a half ago to work on the Interstate 90 project for Mercer Island. Since that project is virtually complete, they have both accepted invitations to transfer to Atlanta to work on MARTA. The Seattle office held a farewell party for them on September 7, at the home of Tom and Sandra O'Neill. The evening featured a taste of Atlanta cuisine for the soon-to-be transplanted Northwesterners: ham biscuits, pickled okra and watermelon rind, pecan tarts, crab croquettes, and pecan bread sandwiches.

WATERPOWER '85

The September international conference on hydropower — Waterpower '85 — at Las Vegas, Nevada, was well attended by Tudor personnel. In addition to their presence at the exhibits and technical programs, several authors presented papers on technical and economic issues of hydropower development. Dave Willer, Hugh Brown and S.T. Su from the San Francisco office, and Ed Barbour, John Williams and Nelson Jacobs from the Denver office were presenters. Bill Gray from San Francisco also attended the conference.



Dave Willer and S.T. Su at Tudor exhibit.

SMPS

Ed Peters represented Tudor at the September National Convention of the Society for Marketing Professional Services in New Orleans. Ed is a board member and past president of the Seattle chapter and is Chairman of the National Committee to Improve Consultant Selection Policies.

PING-PONG Tournament

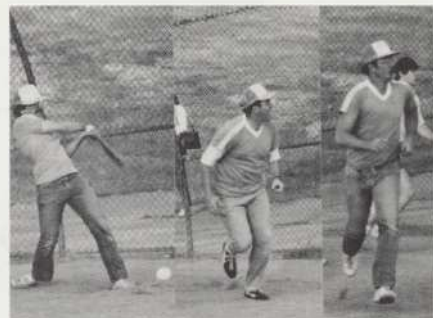
The sixth annual San Francisco office ping-pong tournament began in April, and lasted for almost two months. This was the first tournament held since our office move. The players were pleased with the new larger basement ping-pong room, even though some of them occasionally had to duck under the ceiling pipes. Twenty-three contenders signed up to play. The tournament had double elimination format, with winners progressing up one ladder, and first-time losers getting a second chance by competing along the "back ladder." Wu-Chieh Chen regained his title, which he had lost for the last two years, by defeating Mark Nothaft in a vigorous match at High Noon on June 7. The final score was three games to one.

The number three through number eight ranked players are Gate Gelana, Rainer Rungaldier, Perry Lin, David Silveira, Ocie Williams, and Hans Pokorny.

Following the singles tournament, the top eight players paired up in four teams to compete in a doubles tournament. The finals match was won by the team of Mark Nothaft and Ocie Williams, over the team of Rainer Rungaldier and Perry Lin.

SEATTLE SOFTBALL

The Seattle office finished its first season in the Co-Ed Engineering League with a 5 and 5 record. This puts the team in the middle of league standings, but gives them the satisfaction of having beaten most of the higher placing teams, including the "Number 1." Showing strategic foresight, the team also narrowly lost two non-league games to a Washington State Department of Transportation team. The team looks forward to next year and hopes the pizza will be as good.



Looking sharp on the field, Peter DeBoldt, Dave Alden and Roger Mason.

NEW FACES . . .

Tudor welcomes new employees:

. . . for san francisco

Mike Ellegood
Marketing



Carol Johnson
Accounting



. . . for denver

Clarence Colyn
Electrical Engineer



Congratulations

Steve Van Til and Karen Ganse, daughter of Bob and Joan Ganse, were married September 7, 1985, at St. Stephen's Episcopal Church, Orinda, and honeymooned in Jamaica.

Ronald W. Dusterdick has been elected a Senior Member of the Institute of Electrical and Electronics Engineers, Inc.

Avry and Niva Dotan of San Francisco have a new son, Thomas, born August 19, 1985.

Kelvin and Victoria Yee of San Francisco on the arrival of their daughter, Catherine Delia, July 19, 1985.

THE TUDOR QUARTERLY is published by Tudor Engineering Company for the information and enjoyment of its employees, their families, and friends.

CONTRIBUTING AUTHORS: Steve Alters, Roslyn Ball, Wu-Chieh Chen, Roberto Iniguez, Nelson Jacobs, Ed Peters, and Bob Toothman.

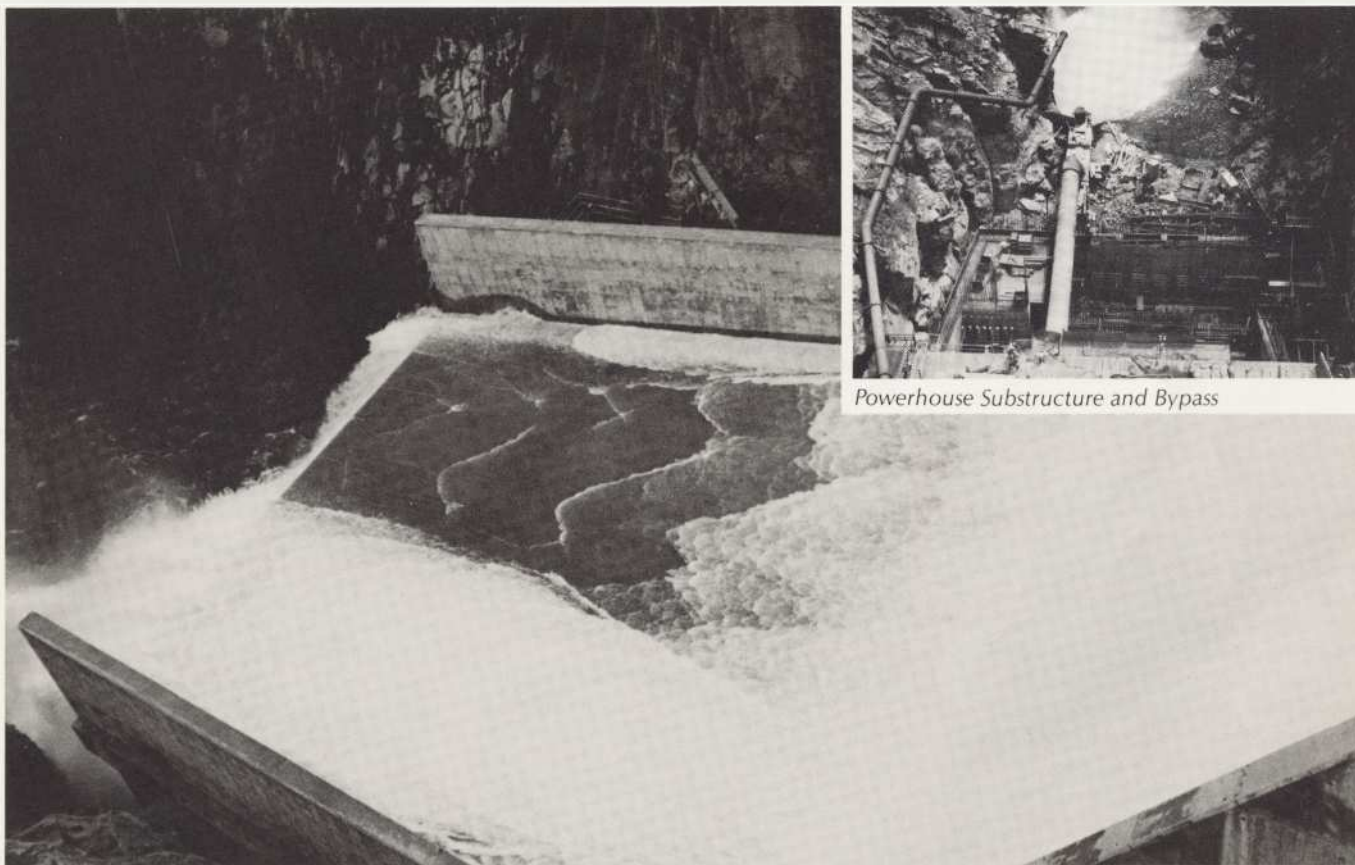
EDITING AND PRODUCTION STAFF: Frank Chiappella, Paula Dierkop, Jim Flannery, Grant Larsen, and Greg Reichert.

TUDOR

Quarterly

Fall 1985

Siskiyou Roof Deck and Spillway



Powerhouse Substructure and Bypass

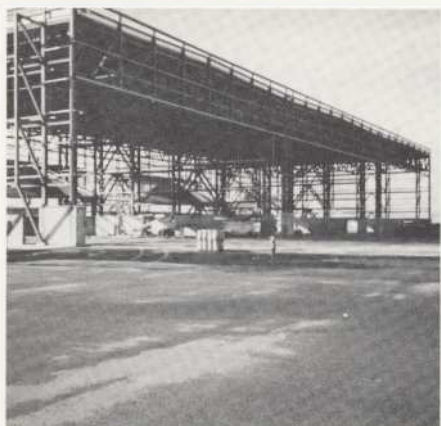
Placement of specially designed concrete for the powerhouse roof deck at the Lake Siskiyou Power Project was successfully completed on November 1, 1985, just before the start of the winter runoff season. The powerhouse roof work has been considered an unusual and difficult task when compared to typical hydro projects. It is unusual because the roof also serves as the spillway for passage of flood water; it is difficult because the powerhouse is located at the bottom of a canyon with no road access, and the pour must be carried out while there is no reservoir spill.

Approximately 2,000 cubic yards of concrete were placed during a continuous, non-stop pour which lasted for 36 hours. Total area covered was 8,500 square feet with an average depth of six feet. Using a combination of a remix chamber and a high speed conveyor belt system speeded up the pour to an average rate of 55 cubic yards per hour. The fast rate of pour and the special concrete mix design with a controlled fly ash to water and cement ratio were implemented to ensure that no vertical or horizontal cold joints developed during the extensive pour. Oral Conyers and Jeff Ghilardi were present at the job site during the pour.

With the completion of the powerhouse roof, Tudor's services that cover primarily the civil portion of the project, are essentially complete. Axel Johnson Engineering is currently installing turbine/generator equipment; the project is scheduled to be on-line mid-March 1986.

Projects

NAS CORROSION FACILITY



Corrosion Control Facility Steel Frame

Construction of the \$12.9 million Corrosion Control Facility at Naval Air Station (NAS), Alameda is over 50 percent complete as of the end of 1985. The prime contractor, Tutor-Saliba of Los Angeles, and a large group of subcontractors, have made the following progress: all underground concrete work and concrete slabs are in place except that for the industrial waste treatment plant which is almost ready for pouring; 95 percent of all underground utilities are in place; structural steel framing and girt installation for the hangar and support building are complete; placement of masonry block, siding and roofing is continuing; most of the tank farm and some of the stripping and blasting process piping have been installed; and some mechanical equipment, such as the fire pumps, is on site, but mechanical installation has not begun.

Project work has been delayed by the decision not to proceed with a planned change order that would have revised the stripping bays' air supply system and located the related exhaust system adjacent to the support building. Instead, an exhaust system compatible with the existing contract documents will be installed under separate contract beginning late in 1986 when it is estimated that Tutor-Saliba will complete their work.

Tutor's Project Manager Lou Salaber, working with Bob Ganse and Hans Pokorny, is providing construction contract support services. Joe Culpepper is the site representative for the Navy's Resident Officer-in-Charge of Construction.

FRIANT Project Complete

The Winter 1985 report on the Friant project briefly described the successful installation of hydroelectrical equipment at the River Outlet power plant.

The River Outlet power plant began commercial operation on April 15, 1985, after all startup and performance tests were satisfactorily completed. Equipment installations at the Friant-Kern and Madera power plants were completed in July and September 1985, respectively. Testing of the Madera plant could not be completed and initial performance tests on the Friant-Kern unit could not be started because of low head and discharge problems associated with a year of below normal precipitation.

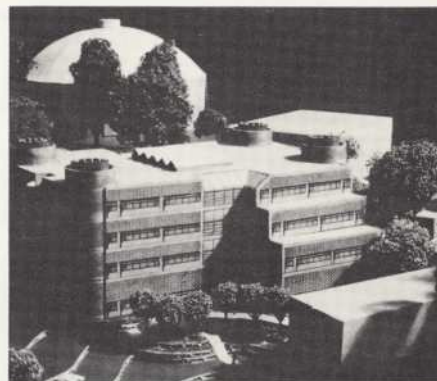
The winter months of 1986 are expected to provide the necessary volume and head of water to complete performance testing and startup of commercial operation. Madera power plant is scheduled for further testing and startup in February 1986. Friant-Kern was tested in January 1986 at approximately two-thirds rated output and began the required 30-day performance testing. It is anticipated that full operation of all three power plants will begin in March 1986.

The successful completion of this project was the result of hard work and dedication by many individuals who participated in the design and construction phases of the project. Following are the names of some of these individuals: Dave Willer, Responsible Principal; Roberto Iniguez, Project Manager; Jim Gormly, Deputy Project Manager; Oral Conyers, Manager of Field Engineering Services; Bill Gray, Resident Engineer; Jim Richardson, Office Engineer; Kurt Scholz and Greg Reichert, Project Engineers.



Friant Dam and Power Plant

Advanced Materials Lab.



On November 15, 1985, the regents of the University of California approved the design of the Advanced Materials Laboratory (AML) for the Lawrence Berkeley Laboratory (LBL). The AML is one of the facilities of the future Center for Advanced Materials (CAM). The presentation of the project to the regents was made by Howard Grant of Reid & Tarics Associates, a member firm of the Keller & Gannon/Tudor project design team. The team has been working on studies and preliminary design for this facility since November 1984. The facilities construction cost is estimated at about 17 million dollars.

The AML project includes an approximately 80,000 square foot building together with attendant equipment, site improvements, and parking accommodations. The building will be located in the Berkeley Hills, just below the "old" LBL cyclotron.

The building will contain laboratory and office support spaces designed in a flexible, modular plan to facilitate future changes to accommodate research programs. Two rectangular wings are offset in the east-west direction around a central area. In addition, the wings are stepped down from the fourth floor to the second floor to echo the hillside and to reduce the apparent mass of the building. The four-story steel-frame structure will provide a first floor main entrance at the base of the site, and connections from the third and fourth floors to the upper hill-area buildings. Approximately 180 persons will be employed at the new facility.

The structure will provide facilities for CAM research programs in polymers, ceramic/metal interfaces, electronic materials, and light metal alloys. Work in these areas will be focused on providing American industry with an enhanced scientific base from which it can improve its competitive standing.

Projects

El Vado Project



El Vado Power Plant

On November 20, 1985, Los Alamos County, New Mexico, awarded Avery Structures, Incorporated (ASI) of Buena Vista, Colorado, a contract for the construction of the El Vado Dam Power Project. Bids were opened in Los Alamos on August 29, 1985. ASI, at approximately \$4.9 million, was the lowest of six bidders, and was about 16 percent below the Engineer's estimate.

Start of construction has been delayed because of the late receipt of the Federal Energy Regulatory Commission License. Now all license requirements are falling into place and construction is expected to begin in February 1986.

Bill Gray will be the Resident Engineer for this project. He and his family will move from Fresno to Los Alamos after work is completed at Friant Dam. As at Friant, Bill will be working with the U.S. Bureau of Reclamation, operators of the dam. A major concern of the Bureau is the monitoring of the ancient slide material during the powerhouse excavation. In geologic time, estimated to be 10,000 years ago, there was a massive landslide in the area of the dam left abutment. Part of the construction work, in addition to a monitoring program, will be rock anchors up to 80 feet deep and shotcrete slope protection.

The contracts for the manufacture of owner-furnished equipment are on schedule. The penstock valve and associated equipment have been fabricated, and will be delivered to the contractor before civil construction at the El Vado site is in full swing. The turbine, generator and electrical equipment are being fabricated, and will be delivered to the site for installation.

Mercer Street Corridor

The Seattle Engineering Department has retained Tudor to write a scope of work for preparing a preliminary road design and related improvements for the Mercer Street corridor. During the past year Tudor has developed conceptual alternatives for solving the "Mercer Mess," Seattle's worst traffic congestion problem. The conceptual phase was intended to support the City's land use planning effort for redeveloping the South Lake Union area for high tech industry and major recreation. The preferred alternative would convert Mercer Street to six-lane, two-way operation. In addition, a reversible, two-lane expressway would run in a tunnel under the center of Mercer Street. The project would require complex ramps at either end to connect with the I-5/Mercer Street Interchange, and with the surface streets around Seattle Center. The likely cost is in the range of \$50 to \$100 million. The City is hopeful that this alternative can help resolve a problem of more than 20 years' standing.

Tudor's detailed scope of work will cover all activities necessary to decide the future of the project. These activities include developing more refined design layouts for key elements of the project. For example, many factors will constrain the geometric arrangement of the ramp connections which must serve several different traffic movements. The project also must be coordinated with a proposed major park development on Lake Union and urban development proposals for the area. The scope of work will include preparation of a Draft Environmental Impact Statement. Tudor will submit the scope of work for review, and if it is approved for funding by the City Council, work will begin early in 1986.

Tudor's preliminary design team includes DeWitt Jensen, Darrel Chambers and Einer Handeland. Tudor's principal subconsultants include Parsons-Brinckerhoff, transportation planning; Centrac, engineering support; the NBBJ Group, urban design; Jones & Jones, park and landscape design; and Shapiro Associates, environmental.

Kirkwood Power Plant

The Kirkwood Powerhouse Addition is becoming a reality as the procurement and general construction contracts have been bid and awarded, and work is underway.

The contract for General Construction was awarded to Tutor-Saliba of Sylmar, California. Work at the site was delayed until late November awaiting receipt of formal environmental approvals. The contractor is making every effort to regain lost time and still meet the original on-line date of April 1987.

The most critical item resulting from the late start was the installation of the cofferdam which was completed by the end of December. To facilitate the cofferdam installation, Tutor-Saliba diverted the Tuolumne River through a 6-foot diameter corrugated steel, arch culvert pipe about 350 feet long around the construction area. This installation required a smooth sloped bed on the river bottom. Some 4,000 sand bags were placed in the river to divert the water, and will remain throughout the cofferdam installation. The steel sheet piling cofferdam will be erected on a steel beam sill resting on a concrete cutoff wall. The upper waler of the sheet pile wall will be braced by inclined heavy angles, and lateral support will be provided by rock anchors drilled and grouted into bedrock. Excavation has begun also for the powerhouse addition and the new permanent road.

The contract for Generating Machinery and Equipment was awarded to Sulzer Bros. Inc., San Francisco, a part of Sulzer Escher Wyss, Switzerland. Various components are being manufactured in Switzerland, Norway, Germany, Spain and Japan. The contract for Main Power Equipment was awarded to Powell Electrical Manufacturing Company, Houston, Texas, and the transformers are being manufactured in Canada.



Kirkwood Cofferdam and Diversion Pipe

Projects

Lake Mendocino



160-foot section of steel tunnel liner.

The Lake Mendocino Power Project received a much deserved shot in the arm in mid-April when the Corps of Engineers approved operating the Contractor's bypass pumping system. Tudor's Project Manager Gordon Marsh, Steve Van Til, and others, had spent many hours reviewing the system. When the modified system was tested, it operated as predicted.

The Contractor began installing the 12-foot diameter steel liner sections in June, and completed the 720-foot liner in approximately 4 weeks by working 16-hour days. Ted Purcell spent weeks at the site assisting Resident Engineer Bob Beal monitoring the Contractor's work. The Contractor pulled the steel liner sections into the tunnel using a large winch anchored in the upstream end of the tunnel. The first pull was a 160-foot-long section of 1-inch-thick steel liner which weighed 250,000 lbs. Once this pull was completed, the remaining seven 80-foot-long, 72,000-lb., 3/4-inch steel liner sections were relatively easy. Grout was pumped into the annular space between the liner and the original tunnel concrete.

Other work included demolition of a section of the existing reinforced concrete outlet chute, and construction of the concrete plenum structure at the tunnel outlet. The structure, designed to divert water flows to the power penstocks, the bypass piping, or down the outlet chute during high flood releases, was both conventionally reinforced and post-tensioned. Steve Gold observed the placement efforts of the steel and post-tensioning subcontractors. All construction in the tunnel, control tower, and plenum area was monitored by Corps of Engineers personnel from Sacramento.

During the 1985 construction season, Sally Simone assisted with change orders and field requirements from the San Francisco office. Gloria McCoy, construction office secretary, operated the office smoothly and handled reams of correspondence, contractor submittals, and other paperwork. Jim Gormly, Don Guild, Ron Dusterdick and Bill Untiedt provided mechanical and electrical assistance during the pump testing and turbine-generator installations. Oral Conyers has provided overall field management direction to Tudor's construction-related efforts.

When this 3.5 Megawatt power plant is completed in 1986, the City of Ukiah will have a reliable, long-term source of power that can be remotely operated and monitored from City offices.

Western Contract

Tudor's Denver office is continuing work on several major assignments for the Western Area Power Administration (Western), Golden, Colorado.

Ed Barbour is providing Western with guidelines for determination of power values and for economic and financial analyses.

Gene Buffum of the San Francisco office has completed an evaluation of Western's Tracy Substation as a part of the work within Western's Sacramento Area Office. Gene is supported in this work by Cesar Formoso.

Ron Wright's and Doug Gruber's assignments in Western's Salt Lake City Area Office have been extended through February 1986. Ron is working in the rate and repayment area, while Doug is working in the marketing, conservation, and renewable energy programs.

Clarence Colyn is directing and supervising the work of Tudor's subcontractor, Stone and Webster Management Consultants. A major task being performed is an inventory of all metering points within Western's Loveland Area Office control area, and includes development of a computer program to allow Western to determine system losses, transformer loading and losses, and coincidental and non-coincidental peak loads as a basis for billing Western customers.

Nelson Jacobs is Project Manager for the Western contract.

Monorail Rehabilitation

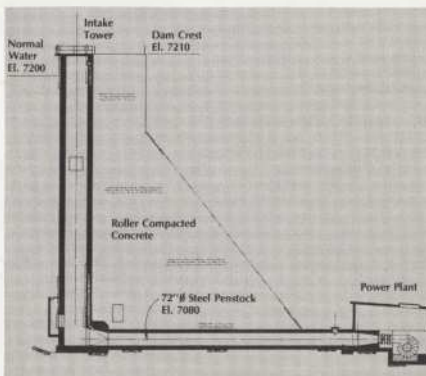
The Seattle Engineering Department has issued a notice to proceed with final drawings, specifications and cost estimates for the rehabilitation of the Seattle Monorail. Tudor is responsible for civil and structural design as a member of a team led by Raymond Kaiser Engineers. The team has been developing preliminary designs to refurbish the 1962 system, and to accommodate the Westlake Mall development, which will occupy the site of the current downtown station.

Tudor will design the civil and structural aspects of a temporary station to be used during construction of the Westlake Mall. Tudor also will design rehabilitation of the existing mile-long aerial guideway and a new section of guideway to accommodate the new station. The team developed criteria for the new permanent station, which is being designed by the developer's architects, RTKL and the Callison partnership. Tudor's Project Manager is Bela Vadasz, assisted by Roger Brassfield, civil design and coordination, and Richard Rudolph, structural design.

STAGECOACH

Tudor is working with Woodward-Clyde Consultants on the design and specifications for the 140-foot high, roller-compacted concrete Stagecoach Dam, located on the Yampa River near Steamboat Springs, Colorado. Woodward-Clyde Consultants is managing the project, and Tudor is providing structural and hydraulic engineering for the design of the spillway outlet works and powerhouse. Scheduled completion date for the drawings and specifications is February 1986.

Tudor's design team includes John Williams, Project Manager; Sal Todaro, Resident Engineer.



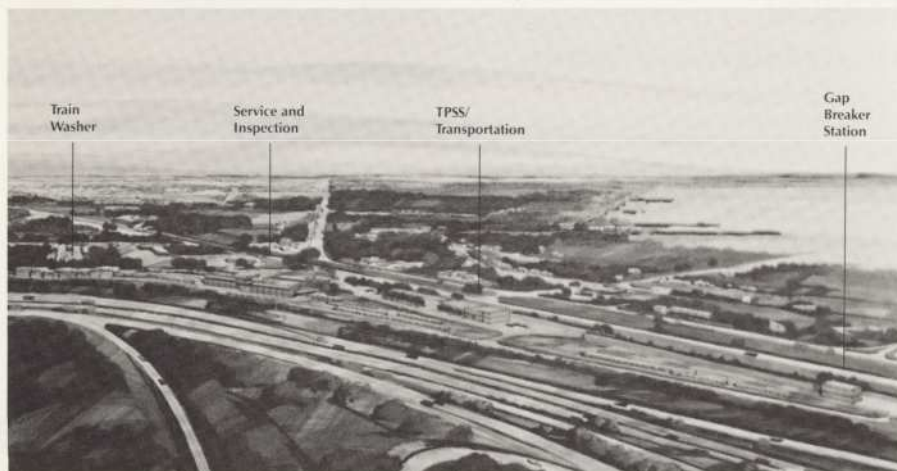
Stagecoach Dam and Power Plant

Projects

MARTA South Yard and Shops



Service and Inspection Building



The Metropolitan Atlanta Rapid Transit Authority (MARTA) opened bids on October 23, 1985, for construction of Project No. CS650, "South Yard and Shops." The low bid of \$19.245 million was submitted by Frank J. Rooney, Inc., of Fort Lauderdale, Florida. Construction is expected to begin in February 1986.

The project site is just west of I-85, and west of Atlanta's Hartsfield International Airport. In addition to storage space for 96 transit vehicles, the project includes a 55,000 square foot Service and Inspection Building, Train Wash Facility, Traction Power Substation/Transportation Building, and Gap Breaker Station. The site is being graded as a part of Project No. CS623; trackwork and the procurement and installation of traction power equipment will be accomplished under follow-on contracts.

Civil, structural, architectural, and yard electrical design was performed by Parsons Brinckerhoff/Tudor Atlanta; the New York office of Parsons Brinckerhoff Quade and Douglas, Inc., provided the building mechanical and electrical design. Don Malick was project conceptual designer and served as Project Manager during final design.

The opening of bids in January 1986 for construction of MARTA's College Park Station will mark the end of facilities design required for the southward extension of the MARTA rail system to Atlanta's airport. Revenue service to the airport is scheduled to begin June 1988.

SLAC Linear Collider

The day when the "big bang" in miniature scale will be regenerated at the Stanford Linear Accelerator Center's (SLAC) Linear Collider project is coming closer. Construction of the approximately 9,000 feet of tunnel and cut-and-cover structure is complete. Installation of the supporting elements for the electron-positron beam tube and guiding magnets in the tunnel is in progress.

Construction of the Collider Experimental Hall (CEH) is about 70 percent complete. The detector pit and computer control building construction is on a critical path to provide for physics equipment installation in Spring, 1987. Currently, the approximately 20-year-old linear accelerator is being modified for the SLC experiments. Electrons and positrons will ultimately be "shot" down the two-mile long linear accelerator into the SLC ring at velocities approaching the speed of light. When electrons and positrons collide, matter is transformed into pure energy. Such an "event" — depending on what kind of particles the equipment detects — will enable physicists to make deductions as to the origin of the universe. Scientists hope to prove that the four forces observable in the micro and macrocosmos (weak and strong force, electromagnetism and gravity) are really manifestations of one basic force. This unified theory has existed for some time, and the physicists who work with the SLAC may prove or disprove it.



Collider Experimental Hall

Projects

HELENA VALLEY STUDY

In October, Tudor was selected by the Helena Valley Irrigation District to perform licensing studies for a potential hydroelectric power plant at the existing Helena Valley Pumping Plant in Montana. The work is being performed in the Denver office, with support from the San Francisco office; Nelson Jacobs is Project Manager. Bruce Braaten and Sal Todaro are providing technical input for the first phase — a pre-reconnaissance level evaluation and screening of several alternative project configurations, and reconnaissance level evaluation of a selected alternative.

The proposed project will be located at an existing pumping plant associated with the Bureau of Reclamation Canyon Ferry Dam near Helena. The pumping plant is unusual as it contains two turbine-driven pumps that supply pumping from Canyon Ferry Reservoir to the District's irrigation system. Some alternatives being considered would modify the existing pumping plant into a generating facility, while other alternatives would include a new hydroelectric plant. The reconnaissance study will be completed in January 1986, after which time a decision will be made whether to proceed with a feasibility study and FERC licensing studies.

Morrison-Maierle, Inc., of Helena is providing the hydrology and reservoir operation studies under a subcontract with Tudor. OEA Research, Helena, under subcontract with Tudor, is performing environmental studies. OEA has worked previously with the Denver office, performing environmental studies for proposed projects at Tiber Dam and Fresno Dam. Fred Ruud, a Bureau retiree, is Tudor's consultant to analyze possible modification of the existing turbine-driven pumps.



Helena Valley Pumping Plant

BRIDGE LIGHTING Rehabilitation

The Seattle Engineering Department has given Tudor notice to proceed on the final design phase of a project to rehabilitate street lighting on several bridges. Tudor, in association with Elcon Associates, a minority-owned electrical engineering firm, conducted an earlier inspection and recommendation phase that covered seven bridges, including the Aurora Ship Canal Bridge. The inspections revealed that cracked electrical power conduit casings used for ground return had created incomplete circuits and illumination failures. Repairs and replacements for these wiring problems will be designed during the final phase. Tudor's lead staff person is Darrel Chambers.

TUDOR Hosts Highway Seminar

The Highway Capacity Manual, produced by the Transportation Research Board, describes the officially accepted techniques for determining Level of Service (LOS) and other measures of traffic capacity that establish the need for highway and traffic improvements. The 1985 edition of the manual represents a major revision of the calculation techniques including extensive use of personal computers. Tudor arranged for Dr. Alex Sorton, one of the authors of the new manual, to visit Seattle for a week in November, and to conduct a seminar for public agency and consulting firm staffs. Dr. Sorton teaches at Northwestern University's Traffic Institute in Evanston, Illinois, and has worked with Tudor on several projects, including the bicycle facility analysis for the West Seattle Bridge. Tudor and Dr. Sorton had organized a previous seminar in Seattle covering the latest design practices for pedestrian and bicycle paths.

There were over 40 attendees including personnel from the Seattle Engineering Department, King County, Washington State Department of Transportation, and several other agencies. Several personal computers were made available for participants' hands-on experience with the new techniques. In addition to classroom activities, Tudor sponsored a get-acquainted social hour the first evening of the seminar. Einer Handeland and Darrel Chambers organized the seminar.

People

New Faces . . .

Tudor welcomes new employees:

. . . for San Francisco

Kirit Shah
Structural Engineer



Congratulations

Marilyn and Wu-Chieh Chen of San Francisco, a son Jesse Chien-Hsu, born October 23, 1985.

Yoshimi and Greg Reichert of San Francisco, a son Yoji Karl, born November 11, 1985.

Gerry Earnest, wife of Clyde Earnest, recently earned a sufficient number of master points to become a Life Master of the American Contract Bridge League.

THE TUDOR QUARTERLY is published by Tudor Engineering Company for the information and enjoyment of its employees, their families, and friends.

CONTRIBUTING AUTHORS: Jack Biederman, Roberto Iniguez, Nelson Jacobs, Doug Mansfield, Heinz Mueller, Ed Peters, Ted Purcell, Greg Reichert, Jim Richardson, Rainer Rungaldier, Lou Salaber, Kurt Scholz, and S.T. Su.

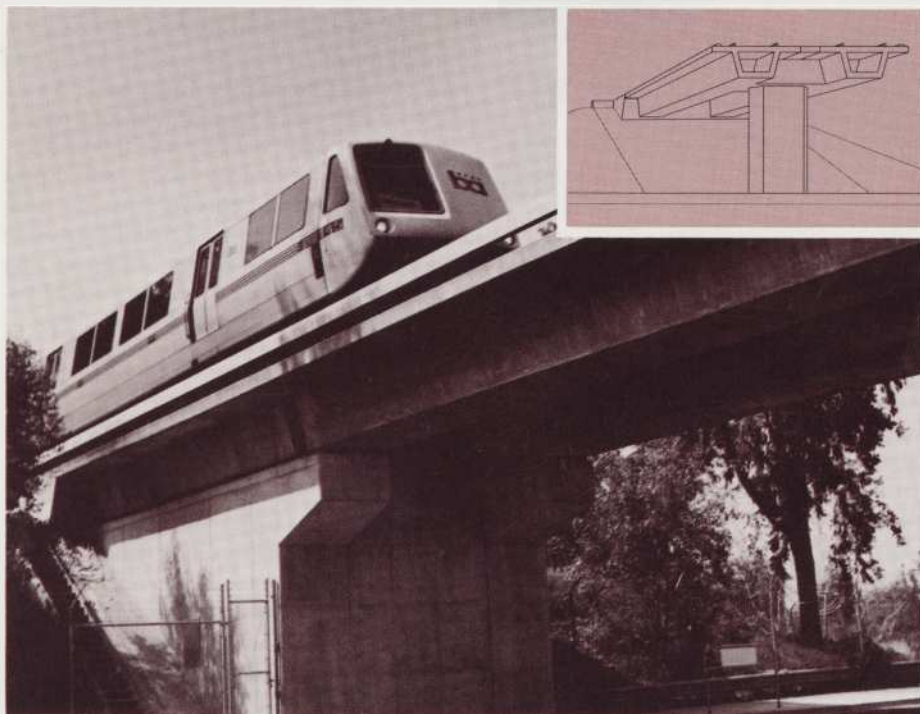
EDITING AND PRODUCTION STAFF: Frank Chiappella, Paula Dierkop, Jim Flannery, Grant Larsen, and Greg Reichert.

TUDOR QUARTERLY

WINTER 1985

BART BRIDGE STRENGTHENING

BART bridge at Bancroft after redesign. (Insert, original design)



With the substantial completion of construction inspection on February 13, 1985, a small but challenging project came to a successful conclusion. It began in December 1979 when BART commissioned Tudor to perform a study of the elevated structures of the entire system. This study was triggered by BART's intention to purchase a fleet of new and heavier cars. The principal result of the study, which was completed in April 1980, was the recommendation to strengthen the two BART bridges at Bancroft Road and Oak Grove Road in central Contra Costa County that were constructed as part of the original Test Track.

In August 1980, BART engaged Tudor to perform a follow-up study to develop feasible alternatives for the strengthening of the two bridges. The final report for this study was submitted in January 1981. BART accepted Tudor's recommendations, and in November 1982, signed an agreement with Tudor for preparation of plans and specifications, and for construction engineering services. Construction of this project started in June 1984.

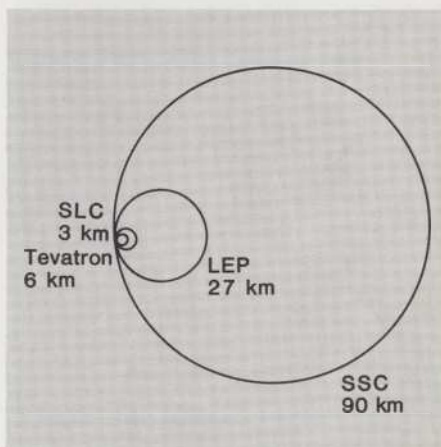
The strengthening requirements for the two bridges presented an interesting structural engineering challenge. The solution of the problem also had to be architecturally acceptable. The selected scheme involved the construction of new support piers around the existing ones, and a subsequent load transfer of the main bridge girders to new bearings. All of this work was successfully accomplished without interruption of street traffic and with minimal interference with BART operations.

Mike Goldberg was the Project Engineer, supported by Walter Zien; Rainer Rungaldier was Project Manager and Paul Potter was Principal-in-Charge. The firm of Harding Lawson Associates provided soils engineering services.

SSC

The joint venture of RAYMOND KAISER ENGINEERS/TUDOR/KELLER GANNON-KNIGHT (RTK) was notified on March 5, 1985, it had been selected by the Department of Energy for negotiations of a contract to prepare conceptual designs for the Superconducting Super Collider (SSC). The contract will call for the RTK team to prepare conceptual designs which will include preparation of the generic site development plans, and then proceed to traditional conceptual design of conventional facilities and supporting infrastructure for a site-specific SSC facility.

The primary features of the facility consist of the large main ring (90 to 160 km in circumference) and an injector, several experimental halls, and campus areas. The main ring will consist of a beam enclosure, 9 to 10 feet in diameter, to house two 20 trillion electron volt (TeV) particle accelerators with counter-rotating beams contained within the superconducting magnets. The campus area will contain the principal offices, laboratories, heavy and light assembly buildings, and warehouses. The estimated cost of the conventional features of the SSC facility is in the range of \$1 to \$2 billion.



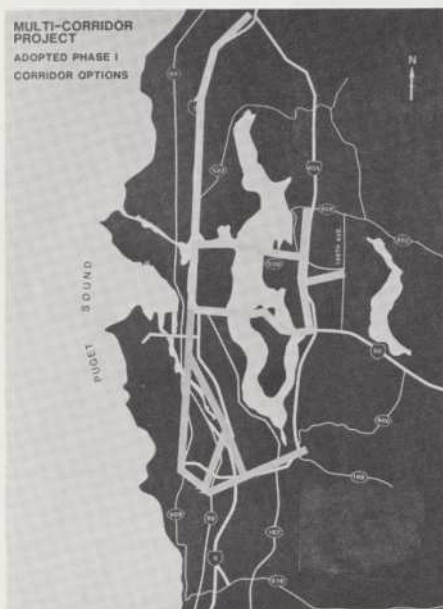
The relative sizes of the Stanford Linear Collider (SLC); Tevatron, Fermilab, Chicago; Large Electron-Positron Collider, Franco-Swiss; and the SSC main ring.

MULTI-CORRIDOR STUDY

Seattle METRO has selected the team of Raymond Kaiser Engineers and Tudor Engineering Company, to study alternative transit routes and technologies connecting the Seattle central business district with the East, South and North portions of the region. This project augments the North Corridor Study which the same team completed early in 1984.

Except for the Tudor-designed Waterfront streetcar, METRO currently relies entirely on buses for its transit operations. Traffic projections indicate that all major highway and transit corridors will reach capacity soon. Providing additional transit capacity is seen as a major contributor to avoiding future grid lock. The multi-corridor study is one of the first steps in planning for additional transit services.

The study will develop and evaluate conceptual designs for all of the major features of both advanced bus and rail transit systems: routes, stations, vehicles, and maintenance and operations facilities. Tudor has primary responsibility for structural analysis, particularly for modifications to the Lake Washington floating bridges. The SR-520 floating bridge would require widening, which Tudor analyzed for an earlier study. The new I-90 floating bridge includes transit lanes, and its design will be reviewed to ensure compatibility with different transit vehicles. Tudor is also assisting with the alignment and with project coordination. Bela Vadasz is Project Manager; Roger Brassfield is Project Engineer; and Dick Rudolph is Structural Engineer for the study.



Multi-Corridor project map

MERRITT DAM POWER



Spillway and river outlet

The Ainsworth Irrigation District has selected Tudor to prepare a pre-feasibility study for addition of a hydroelectric plant to Merritt Dam in north-central Nebraska. The dam, which is owned by the Bureau of Reclamation, is operated and maintained by the District. The facility was originally constructed to provide summer irrigation water to farmlands east of the dam by way of a 50-mile-long canal and a series of lateral canals.

The purpose of the pre-feasibility study will be to identify technically feasible alternatives for a hydro installation at the dam, and to explore possible financing arrangements and power sales agreements for the District. The District Board will use the study to decide whether or not to proceed with a full feasibility study of one or more of the alternatives. It appears that the challenge of the study will be not in finding a technically feasible plan of development or in securing attractive financing for the project, but rather in finding a good potential power purchase arrangement. A current power surplus in Nebraska has depressed the price of energy.

Nelson Jacobs is the Project Manager, assisted by Jeff Stevens, Project Engineer, and Ed Barbour, Chief Economist.

STREET REALIGNMENT BRIDGE LIGHTING

The Seattle Engineering Department has selected Tudor to prepare designs for widening and realigning of a half-mile section of Graham Street, an arterial connecting the South Beacon Hill area with Interstate 5. The existing street is steep, only 22 feet wide, and has a 55-foot radius hairpin turn. The City wants to straighten the alignment to eliminate the hairpin turn which will require filling a ravine on a steep slope. DeWitt Jensen will be responsible for the design.

The City has also asked Tudor to recommend modifications to the streetlight wiring on several City bridges. The original design used the wiring conduit as the ground return. Frequent conduit breaks cause short circuits and loss of illumination. Tudor will inspect and recommend improvements for nine bridges including the 3,000-foot-long George Washington Bridge across the ship canal, and the Ballard, University and Montlake bascule structures. Wilson Binger is responsible for the project.

BELLEVUE INTERSECTION

The City of Bellevue, which lies directly across Lake Washington from Seattle, is one of the fastest growing municipalities in the Pacific Northwest. Bellevue has just awarded Tudor its first project with the City, an analysis of the intersection of 130th Avenue NE and 24th Street. These streets are arterials in a growing residential area adjacent to SR-520 and an active commercial-industrial district. Significant traffic volumes on 24th Street and a severe sight distance problem in the vicinity of the unsignalized intersection will be studied. Tudor will recommend alternatives and design the adopted solution. Darrel Chambers is Project Engineer, assisted by Peter DeBoldt.



Bellevue intersection

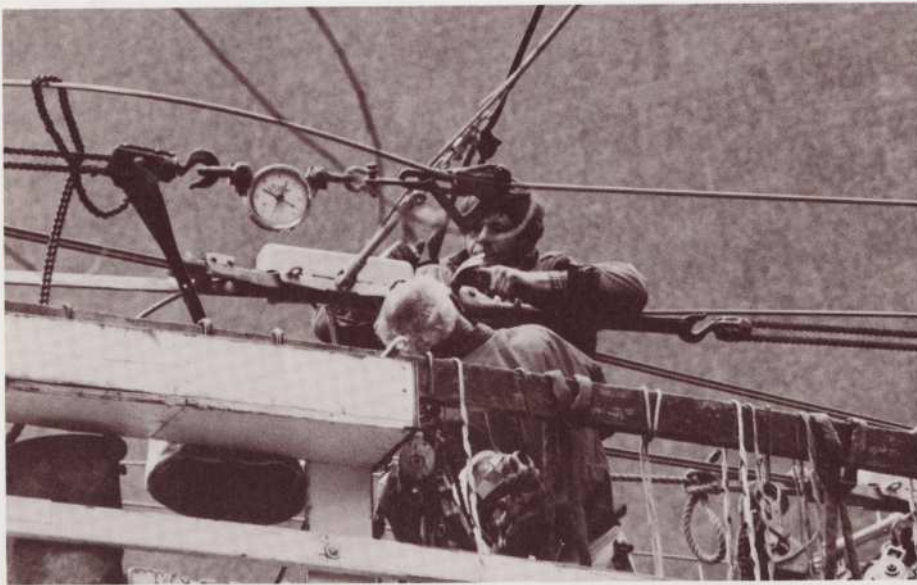
TROLLEY OVERHEAD

Approximately one year ago, an article was printed on the innovative solutions developed for rehabilitating and expanding the trolley coach overhead wire system on San Francisco's Market Street. The solution basically relies on rebuilding the ornate Path-of-Gold poles which already exist on Market Street as a first priority to support the new wires. In descending order of priority other solutions include: rebuilt and raised traffic signal poles; building eyebolts; and adding new poles. This approach allows a reduction of 270 in the total number of poles on Market Street. Construction began in July 1984 on the first phase and in January 1985 on the second phase. The total project is scheduled to be complete and operational by Thanksgiving 1985.

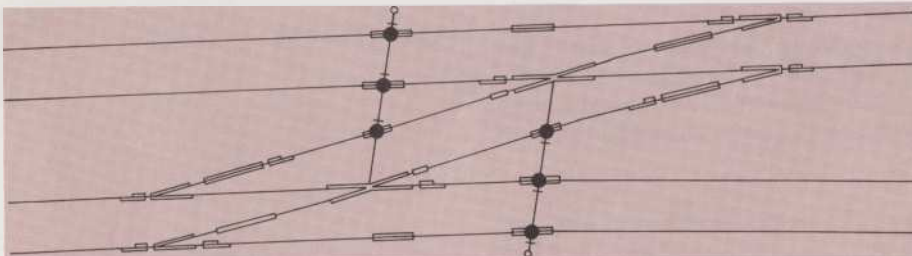
Reconstruction of the Path-of-Gold and traffic signal poles has been very successful except for problems associated with encountering unknown, and previously unplotted, utility lines in the area of the new, much larger foundations. These conflicts are being resolved case-by-case. As of this writing, several dozen building eyebolts have been installed and tested to one and one-half times the design load without any detrimental effects. New contact wires and switches are being installed by assembling the new hardware above the existing 600-Volt system which is "hot" except for brief periods when the new work is cut in.

Even casual observers of the work on Market Street and in the area of the Transbay Bus Terminal are struck by the complexity involved in this kind of project. Conflicts with pedestrians, automobiles, transit vehicles, and existing utilities are specially notable. Numerous details of a more subtle type are less conspicuous. For example, the cast iron decorative caps which top each of the three globes on a Path-of-Gold pole have been replaced with a Tudor-designed fiber-reinforced plastic version which is visually identical but reduces the weight of each casting from 34 pounds to 14 ounces.

Gerry Gibney as Project Manager and Lou Krug as Project Engineer are assisted by Ken Mathis, Don Moore, Walter Zien, Wu-Chieh Chen, Don Scapuzzi, Don Yamagishi, David Silveira, Darryl Tyson, and Andy Nguyen.



Overhead wire system being installed



A schematic design of the installed overhead wire system

WATERFRONT TRAFFIC

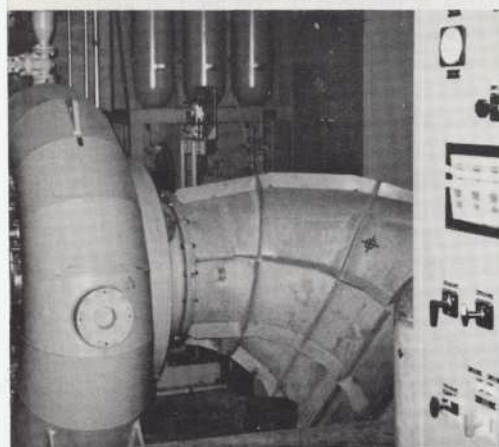
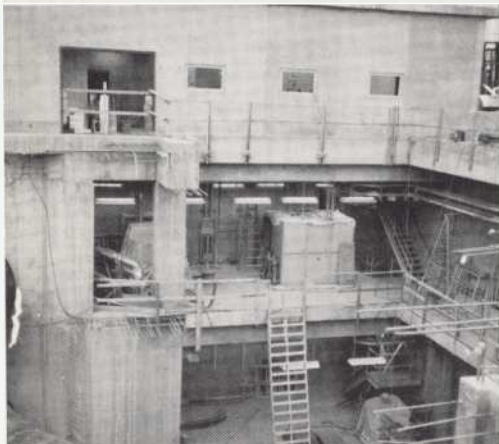
Tudor's Seattle office is conducting three separate but overlapping traffic studies on the Seattle Waterfront for the City, the Washington State Department of Transportation (WSDOT), and the Port of Seattle.

The Harborfront Environmental Impact Statement (EIS) is a City of Seattle project to analyze alternative development patterns for the Central Downtown Waterfront. Originally, this area was the center of marine cargo and industrial activity, but containerization and other technological changes moved most of these functions elsewhere. The area is devoted to commercial and recreational uses, although several industrial sites remain. There are a number of proposals for redeveloping the area including restricting Alaskan Way to two lanes and creating a pedestrian parkway, or realigning the roadway to create commercial-residential development sites and a cruise ship terminal. Transportation Development Associates (TDA), under the direction of William Eager, is the prime consultant and will handle land use and joint development issues. Tudor will prepare the traffic impact analysis, preliminary designs, and cost estimates. DeWitt Jensen is leading the effort for the Harborfront EIS with assistance from Cheryl Howell.

The Seattle Ferry Terminal is a principal feature and the single largest traffic generator of the downtown waterfront area. Tudor was the traffic and marine structures consultant for the team that designed a major expansion of the terminal in 1981 for WSDOT. The State has not been able to fund construction and has asked the prime consultant, TRA Architects, to separate the final design into smaller construction phases. The consultant team will also explain the original planning and design to new WSDOT staff members. Because traffic access and internal circulation was a major determinant of the design, Tudor will have a significant role in the revision. Einer Handeland, who performed original work on the project, is in charge of the revised traffic engineering.

The Port of Seattle headquarters at Pier 66 on the central downtown waterfront operates shipping facilities on Elliott Bay and the Duwamish waterway. The Port has asked Tudor to analyze traffic conditions at all of the cargo facilities, giving special attention to routes to and from principal arterials, and to the contribution of Port traffic to congestion. Tudor will analyze these factors for the present and for the year 2000. Einer Handeland and Darrel Chambers will lead the project.

FRIANT POWER



Upper left and above — Friant-Kern No. 1 turbine case Y-branch installation
Lower left — River outlet horizontal Francis turbine

It has been approximately seventeen months since construction of the Friant project began in October 1983. In our Spring 1984 issue, we reported the major accomplishments during the first eight months of construction. This update will report those events which have taken place during the last nine months.

William Gray was designated the project's Resident Engineer upon Craig Vernon's resignation. In addition, Jim Richardson has been assigned to Tudor's Friant field office.

The second critical "construction window" started on October 1, 1984, and was completed early in February 1985. In connection with this activity, Tudor's engineers in the San Francisco office had to improvise technical alternatives and develop a recovery plan to help the contractor maximize the progress of the work during this critical construction period. All work planned for this period was accomplished with minimal delays. All new valves are installed, and water is flowing again in both the Friant-Kern and Madera canals.

Of special significance is the fact that during this critical construction period a new contractor, Swinerton & Walberg Co., took over the job. Normally an event like this would have caused significant time delays. However, due to everybody's cooperation, particularly Bill Gray's and Tudor's field staff, the transition was accomplished effectively with minimum delays. The new contractor is eagerly working the necessary shifts to maintain the schedule.

The installation of equipment at the River Outlet power plant has been completed and PGandE's transmission line is ready to be interconnected. Testing of the unit and startup was completed in March. Commercial operation is scheduled for April 1985. Work progress at the Friant-Kern and Madera power plants has been significant. Commercial operation of these plants is scheduled for this summer.

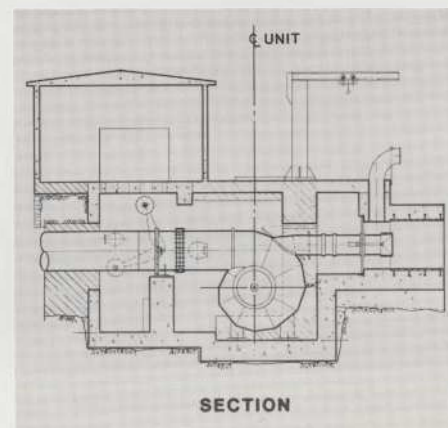
Many of the successful accomplishments on this project are the result of hard work and dedication by many Tudor employees, particularly Bill Gray, Jim Richardson and Royce Edwards at the site, and Jim Gormly, Bill Untiedt, Greg Reichert and Gary Durham in San Francisco.

BOWMAN Power Project

With an acceptable financing package put together, the Nevada Irrigation District is proceeding with construction of the 3.2 megawatt hydroelectric power plant at Bowman Reservoir, and a 10-mile 60 kV transmission line that will convey the energy to PGandE's transmission system at Lake Spaulding. Seven bids were received by the District in December 1984 for the combined power plant and transmission line construction; the successful low bidder selected was the Bechtel Constructors Corporation, San Francisco.

Tudor Engineering Company will provide field inspection, contract administration, and engineering services during construction. This is a continuation of Tudor's participation in the development of hydropower at Bowman which began with feasibility studies and has included preparation of contract drawings and specifications for general construction and for procurement of the turbine, generator and valves.

Since the project area is located at about 5,400 feet in the Sierra and develops a healthy snowpack each year, site construction is not expected to begin until May 1985. The present project schedule shows an on-line date of October 1986. Jeffrey Ghilardi will be the Resident Engineer, and Paul Kneitz will continue as Project Manager.



Bowman Section

TUDOR CELEBRATES THE HOLIDAYS



Carol and Gerry Gibney arrive for the gala evening.

Louis and Pat Riggs, Agnes Nichols, Adolph Sandner, and Stan Froid pose for photo.

A view from the grand staircase of the cocktail party on the lower level of the club.

Old friends from the Seattle office are Keith Bull, Lou Salaber, Diane Bull and Phyllis Salaber.

SAN FRANCISCO CHRISTMAS PARTY

The Engineers Club was the scene of the annual San Francisco Office Christmas dinner dance on December 1. At the cocktail hour preceding the dinner, 200 employees and guests enjoyed a photo display of "Tudor on the Move" — a picture story of the relocation from 149 New Montgomery to new office space at 301 Mission.

Gerry Gibney, Master of Ceremonies, welcomed the new employees to the Tudor "family" and gave recognition to Bob Myrdal and his staff for their help in making the move a success.

Bob Janopaul offered warm holiday wishes to all, followed by Louis Riggs, who presented a 25-year service award to Don Yamagishi. Don and other award recipients were honored at a Service Award Luncheon on November 29. Awardees were Alfred Korbmacher, Mike Harrington, Don Moore, Heinz Mueller, and Doug Mansfield for 20 years; and Wu-Chieh Chen, Mike Goldberg, Don Scapuzzi, Bob Toothman, Darryl Tyson, and Jim Richardson for 10 years.

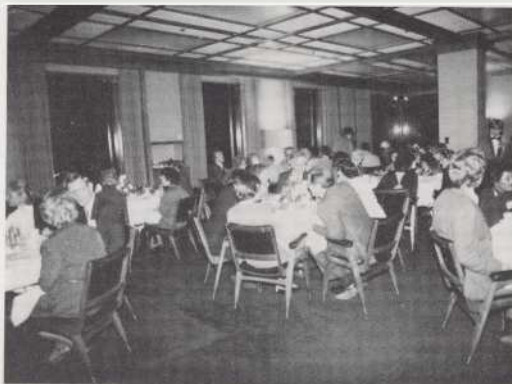
Special guests at the party were: Leslie and Agnes Helgesson, Stan and Harriette Froid, Joe and Kaye Carson, Bill and Blanche Davis, Adolph Sandner, Doug and Ann Mansfield, Henry and Helen Weast, and Horace and Hilda Burrier.

High above the city on the seventeenth floor, Tudor employees and guests enjoy dinner.

Karen Chew, Oral Conyers and Patricia Scapuzzi join for a toast.

Bob Janopaul and Louis Riggs congratulate Don Yamagishi on his 25th Anniversary with Tudor as Matsuko Yamagishi looks on.

Jimmy Diamond provides music for the after dinner dancing.





Bob and Beth Janopaul describe Tudor's prospects for 1985.

Pat Chambers and Carol Jensen enjoying baby Matthew Jensen.

Mary Bickerdike, Jack Bjork, and Mike Harrington renewing friendships.

Einer Handeland and Lisa Nepple taking delight in the party.

Einer and Marilyn Handeland with Polly Rae.

Wilson and Joyce Binger ready for the party to begin.

Judy Harrington and Eva Vadasz — friends from the BART days.

Donna Jaynes and Phillip Agosto sampling canapes.



TUDOR CELEBRATES THE HOLIDAYS

SEATTLE CHRISTMAS PARTY

The Seattle office held its 1984 Christmas party on December 8 in the Oak Room at the Washington Athletic Club. Special guests included Bob and Beth Janopaul, and Mike and Judy Harrington.

There were many festive highlights to the evening. Before dinner the club provided an excellent selection of hot and cold hors d'oeuvres. After everyone was seated, Tom O'Neill created suspense by asking for a "volunteer" from each table. He then welcomed everyone and introduced Bob Janopaul, who delivered a memorial tribute to the late Don Croft. At the conclusion of Mr. Janopaul's speech, Tom announced that the "volunteers" were to receive the centerpiece from their table.

The roast beef dinner was followed by hours of dancing to the music of Caravan. Roger and Jill Mason, recently moved from Boise, demonstrated the finer steps of western swing. Many other dance styles were in evidence as the evening proceeded. There were also some spirited and friendly discussions.

DENVER CHRISTMAS PARTY

The Denver office held its annual Christmas party on December 8 in the Matchless Room at the Denver Marriott. Special guests were Dave and Irene Willer from San Francisco. The evening began with cocktails and hors d'oeuvres, and was followed by an elegant filet mignon dinner. After welcoming speeches by John Williams and Dave Willer, Master of Ceremonies Sal Todaro entertained the group with a slide show presenting some of the more memorable projects the Denver office has been involved with during its five-year existence. The remainder of the evening was filled with spirited conversation, and with dancing to the pop sounds of Jake Martin & Company, a Denver group playing old and new musical favorites.



John Williams welcomes everyone to the party.

Dale Bowers, Jerry and Lynn Cross socialize after dinner.



Pam Stimpson, Mario Giordano, Lucy and Jeff Stevens visit before dinner.



Sal Todaro gives slide presentation.

Tom Rawlings seizes the moment.

Nelson Jacobs (Ole Blue Eyes) does it his way.

Jeanne and Ed Barbour — young at heart.

Bruce Braaten and Cliff Bjorgum trade tales of the north country.



NEW FACES . . .

Tudor welcomes new employees:

. . . for san francisco



Ron Dusterdick
Electrical Engineer



Jeffrey Ghilardi
Civil Engineer



Kevin Goodman
Civil Engineer



Kyle Granger
Word Processor



Richard LaRowe
CAD Supervisor



Perry Lin
Structural Engineer



Manuel Silveira
Office Clerk



Karen Yapp
Designer

. . . for seattle



Verdelle Ahnkiel
Drafter



Patty Arnquist
Secretary

. . . for denver



Vince Baldassano
Senior Drafter



Bruce Braaten
Civil Engineer



David Darling
Economist

USCOLD VISITS FRIANT

A February 27 site visit to the Friant Power Project was included in a field trip by 65 members of the United States Committee on Large Dams (USCOLD). The members agreed that the Friant-Kern Power Project was one of the "largest" small hydroelectric projects recently constructed. Other sites visited included the construction of Southern California Edison's Balsam Meadows underground power plant and PGandE's underground Kerckoff power plant.

QUARTERLY AWARD

Congratulations to the authors and the editing and production staff who create the Tudor Quarterly. Last October, Tudor entered three consecutive 1984 issues of the Quarterly in the Society for Technical Communication (STC) sponsored Northern California Region Technical Publications Competition, Newsletter Category. This January, Tudor was informed that the newsletter entry had earned the Award of Excellence. The entry has been forwarded to compete in the May 1985 International Technical Publications Competition (ITPC) at Houston, Texas.

The STC judges complimented the Quarterly with comments such as, "straight-forward writing," "simple, elegant, very effective design," and "crisp photographs." Hats off to the staff writers and editors! Our goal of providing employees and their families with a readable, informative newsletter has been confirmed.

CONGRATULATIONS

Cliff Bjorgum and Jeff Stevens of the Denver office have received their Professional Engineer Registration from the State of Colorado.

Jack Bjork and Jayne Curtis married February 16 in Seattle and honeymooned in South America.

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CONTRIBUTING AUTHORS: Paula Dierkop, Gerry Gibney, Roberto Iniguez, Paul Kneitz, Helen Mayotte, Ed Peters, Rainer Rungaldier, Jeff Stevens, Bela Vadasz and Dave Willer.

EDITING AND PRODUCTION STAFF: Frank Chiappella, Paula Dierkop, Jim Flannery, Alfred Korbmacher, Grant Larsen, Andy Nguyen, Greg Reichert and Charlotte Wheeler.
