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## Proposal for Consulting Services Implementation and Design Program for Fukuoka Sea Life Park

Harrison Price Company

Powell Enterprises

Delawie, Bretton, Wilkes

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A Proposal For Consulting Services

IMPLEMENTATION AND DESIGN  
PROGRAM FOR FUKUOKA  
SEA LIFE PARK

Prepared for:

Sumitomo Corporation  
September, 1988

Prepared by:

HARRISON PRICE COMPANY  
970 W. 190th Street, Suite 580  
Torrance, California 90502

in Association With

POWELL ENTERPRISES and  
DELAWIE/BRETTON/WILKES



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## I. INTRODUCTION

In July of 1988, Harrison Price Company completed an analysis of the feasibility of developing a world class oceanarium in Fukuoka, Kyushu, Japan. The findings were strongly positive, and it was concluded that operating profits would support an order of magnitude investment of \$300 million, which in turn, would be sufficient to construct the finest marine life park in the world.

The study concluded that the next steps to be taken in the implementation process would be: (1) Refinement and development of the attractions and exhibit content of the proposed park as a prelude to design development. (2) Preparation of design schematics, and a physical master plan from which accurate construction costs would be prepared. (3) Preparation of comprehensive operating and capital budgets, along with an implementation program for the project.

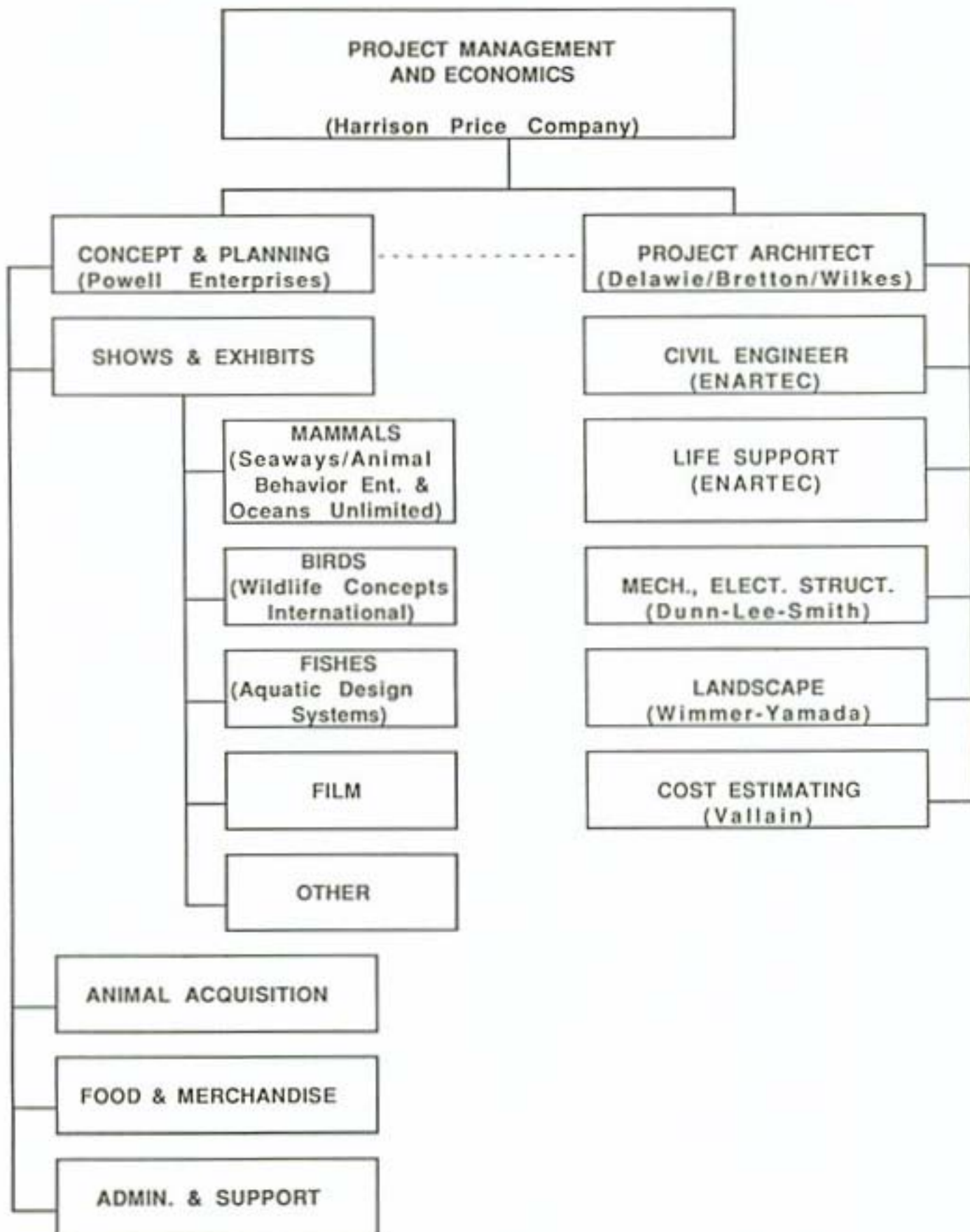
The following proposal for consulting services has been tailored to meet these needs. It represents a joint effort on behalf of a consortium of exceptionally well qualified experts in all facets of marine park design, engineering, economics, management, and operations. Every key professional discipline is represented, with each individual consultant having a proven record of performance, and experience in working together as a team.

Because of logistics and travel cost considerations, travel to Japan will be limited to visits by key members of the planning team, with most of the planning and design work to be done in Los Angeles and San Diego. However, there is need for on-site civil engineering studies which can be performed most economically by a Japanese firm. Accordingly, the scope of work for the engineering has been outlined in the proposal, and a budgetary provision has been made to allow for the professional interpretation and integration of civil studies into the design program. It is anticipated, however, that the engineering field work and on-site supervision will be contracted for separately by Sumitomo.

## II. SCOPE OF WORK AND METHOD OF APPROACH

Figure 1 on the following page presents the organizational structure of the planning team. As shown, Harrison Price Company will be responsible for overall project management and economics, with Powell Enterprises responsible for concept and planning studies, while Delawie/Bretton/Wilkes will be responsible for architecture, design, and engineering analyses. Consultant and subcontractor responsibilities and relationships are as shown, with the name of the selected subcontracting organization or individual denoted in parentheses.

**Figure 1**  
**SUMITOMO-FUKUOKA SEA LIFE PARK**  
**PLANNING ORGANIZATION**



Source: Harrison Price Company.



A high degree of coordination between the various disciplines will be necessary, and this will be accomplished by conducting a series of planning charrettes, as well as through informal meetings. In this manner, specialized consultants engaged in planning the various animal exhibits and attractions will have direct input into the design process. Likewise, considerations of engineering, life support systems, and presentation aesthetics will be integrated into show, exhibit, and operational planning as well as into architecture and park design. And throughout the entire planning process, economic considerations will be a balance wheel regulating the planning effort. In this context, it is important to note that the key firms and individuals have had substantial experience in working directly with one another.

The specific elements of the work program are as follows:

## **1. SITE ANALYSIS**

Prior to the preparation of the master plan, a civil engineering and planning analysis of the site shall be prepared by a local civil engineering group, to be retained by Sumitomo. This group will provide input to the project architect and civil engineering consultant. The study will include, but not necessarily be limited to, the following items:

- 1.1 Preparation of a base map of the site including topography, existing improvements and utilities, boundaries, and easements. Map should be done at 1:1000 scale with 0.5 meter contour intervals. Provide survey ties. Prepare acreage summary. Identify any deed restrictions.

- 1.2 Preparation of a soils report to include the following information:

- Site description
  - Geology and subsurface conditions including:
    - Groundwater
    - Geologic Hazards
    - Flood levels resulting from Tsunamis and Seiches
  - Foundations recommendations for:
    - Buildings
    - Slabs on grade
    - Pools
    - Stadiums

- 1.3 Identification of existing access routes and route capacities.

- 1.4 Determination of locations and capacities of all utilities serving site including:

- 1.41 Electrical - available power supply, voltage and frequency.
  - 1.42 Telephone - available capacity.
  - 1.43 Domestic Water - available capacity, pressure and quality (analysis).

- 1.44 Sea Water - Intake, discharge and permit requirements and water quality.
- 1.45 Sewer - Size, capacity, elevations and discharge and permit requirements.
- 1.46 Storm Drain - Size, capacity, elevations, discharge and permit requirements.

All existing utilities should be surveyed and the information transferred to the topographic map as discussed in 1.1 above.

- 1.5 Neighboring and adjacent land uses and land use plans, zoning, permitted and prohibited uses, all will be analyzed.
- 1.6 Weather patterns and microclimates will be evaluated, including:
  - 1.61 99 and 97.5 percentile winter temperatures and 2.5 percentile summer temperatures and humidities.
  - 1.62 Wind data (velocities and directions).
  - 1.63 Annual, monthly, and maximum hourly precipitation.
- 1.7 Fresh and ocean water quality will be analyzed, including:

salinity (S)	T.S.S.
temperature range	turbidity
pH	color
D.O.	iron
C.O.D.	manganese
B.O.D.	V.O.C.
S.S.	T.O.C.
ammonia	copper
nitrate	lead
nitrite	cadmium
phosphate	chromium
fecal coliforms (S)	nickel
total coliforms (S)	T.D.S. (F)
total bacteria	mercury
arsenic	silver
zinc	phenol
fluorine	n.c. hard (F)
chloride (F)	total hard (F)
sodium (F)	aluminum (F)
barium (F)	potassium (F)
selenium (F)	chlorine (F)
sulfate (F)	

and any other organic or inorganic contaminants which may be suspected present in the vicinity. (S) indicates testing for salt water only and (F) for fresh water only.



## 2. GENERAL PLAN OF LAND USE

### Phase Summary

The feasibility study identifies both major attractions and ancillary facilities of the project. Ancillary facilities include not only food, merchandise, education, administration, and operations, but may also include life support systems, utilities, parking, people movers, plazas, and other aspects of the project which must be planned to promote a successful sea life park. This phase will develop a general plan defining the location of major attractions, ancillary facilities, site intensity zoning, public and private areas, circulation, phasing, and reserved areas for future expansion.

### Process

The process will begin with a team charrette which will review and identify site opportunities and limitations based on the information obtained in Phase 1 Site Analysis. The team will also review the fifteen (15) major attractions and ancillary facilities identified in the feasibility study. These elements may be revised or new attractions proposed in response to the site analysis and additional study. This phase will establish a general plan for the land use and project phasing.

### Area of Study

2.1 Show and exhibit adjacency requirements - "The Park Experience."

2.2 Circulation system requirements:

2.21 Park entry and exit points.

2.22 Primary and secondary road system location, size, and capacity requirements.

2.23 Parking area locations and capacities.

2.24 Interior circulation requirements.

2.241 Primary access roads.

2.242 Service and maintenance roads.

2.243 Pedestrian paths and walkways.

2.244 Visitor transit systems.

2.3 Utility systems location and capacity requirements.

2.4 Land use allocation by major park area or thematic concept:

2.41 Land area.

2.42 Building area.

2.43 Building footprint area.

2.44 Open space, landscape, and waterscape.

## Work Product

The General Plan of Land Use will be presented in a written report addressing each item identified in Sections 2.1 through 2.44 and with the following line drawings:

(Maximum 5 line drawings total.)

One (1) overall project site plan 30" x 40" at 1:2500m.

One (1) ea. plan 30" x 40" at 1:2500 m. illustrating:

- A. Major attractions and anticipated intensity of use
- B. Visitor circulation plan
- C. Service and support circulation plan
- D. Phasing plan

One (1) copy of each plan will also be provided at 11" x 17" for inclusion in the final report.

### 3. CONCEPT DEVELOPMENT AND ELABORATION

#### Phase Summary

The General Plan and Feasibility Study will provide an outline for the concept development of the site, major attractions, and ancillary facilities. This phase will develop concepts for up to twelve (12) major attractions and ancillary facilities identified in the initial park phase.

#### Process

The concept design will begin with a team charrette to develop broad goals and objectives for the identified major attractions, and ancillary facilities. These will define exhibit purpose, story line, unique features, and relationship to neighboring attractions and circulation. Individual teams composed of specialists most familiar with specific requirements and design will focus on the concept development for each attraction.

#### Area of Study

3.1 Live Animal Presentations. Show content and facility descriptions will be prepared for performing animal shows, major sea life attractions, walk through exhibits, and static and interactive displays that feature live mammals, birds, and fish. The issues to be addressed include:

3.11 Articulation of the story lines, show content, and presentation themes.

3.12 Presentation frequency, scheduling, and analysis of cycle times.



- 3.13 Show, exhibit, and display venue requirements, in terms of sizing, design envelope, and general architectural program, including:
  - 3.131 Seating capacities, viewing areas, and/or ride capacity requirements.
  - 3.132 Staging requirements as appropriate.
  - 3.133 Backstage and animal facility needs.
  - 3.134 Environmental, mechanical, electrical, plumbing, and tankage requirements.
- 3.14 Animal requirements and options:
  - 3.141 Species inventory.
  - 3.142 Training lead time.
  - 3.143 Specimen availability and cost parameters.
- 3.2 Film Attractions. Show and facility descriptions for film presentations (IMAX and Showscan).
  - 3.21 Story line options:
    - 3.211 Available film library.
    - 3.212 Film production budget parameters.
  - 3.22 Presentation frequency, show cycle time, and hourly presentation capacity.
  - 3.23 Venue requirements, theater capacities, design envelope, and general architectural program.
- 3.4 Non-animal Attractions: Activity options and programs, thematic statements, sizing, capacity requirements, design envelope, and general architectural program for:
  - 3.41 Children's play center.
  - 3.42 Lake stadium events and program.
  - 3.43 Light Show and Laser Fountain.
- 3.5 Food Service and Merchandise. Facility description for major food and merchandise venues.



- 3.51 Identification of thematic dining and merchandising opportunities, either as adjuncts to displays and exhibits, or in a separate environment, (e.g. fishing village or seaport).
- 3.52 Facility requirements, sizing, seating capacities, design envelope, and general architectural program for:
  - 3.521 Sit down restaurants.
  - 3.522 Cafeterias.
  - 3.523 Food courts or fast food operations.
  - 3.524 Merchandise GLA.
- 3.6 Support Facilities: Sizing, design envelope, and general architectural program for:
  - 3.61 Animal care facilities.
  - 3.62 Maintenance and operations buildings and yards.
  - 3.63 Scientific and research activities and buildings.
  - 3.64 Administration buildings.

#### Work Product

The Concept Development and Elaboration Phase will be presented in a written report summarizing the design goals, objectives, and design solutions for the twelve (12) major attractions and ancillary facilities as identified in the General Plan of Land Use Phase and this phase. The report will address issues identified in 3.1 through 3.64 of this section.

The twelve (12) attractions and ancillary facilities will be presented in concept line drawings and sketches. The following line drawings will be developed for the selected attractions or ancillary facilities.

(Maximum 12 attractions at 5 drawings each and 1 site plan -- total 61 drawings).

#### Buildings

Two (2) floor plans 30" x 40" at 1:200 m.  
 Two (2) elevations 30" x 40" at 1:200 m.  
 One (1) section 30" x 40" at 1:100 m.  
 One (1) site plan revised to reflect current park/attraction status.

Concept drawing should not be considered final and will be schematic in content and style.

#### 4. MASTER PLAN DEVELOPMENT

##### Phase Summary

This phase will refine and elaborate the schematic design and planning and prepare the final schematic documents describing the project, the site plan, twelve (12) attractions and ancillary facilities. These documents and drawings will illustrate size, location, theme, and other design and planning issues.

##### Process

The process of developing the final documents will follow a three week review of the concept phase by the client to provide for minor fine tuning of the established concept prior to preparation of the final documents. Prior to development of these drawings and exhibits, the graphic coordination of the art work will be established to provide continuity in the presentation. This will also include the final editing of the written descriptions of the plan and design elements.

##### Area of Study

Additional study during this phase will involve only minor adjustments in response to client comments.

##### Work Product

The Master Plan of Development will be presented in a written report addressing both general plan issues and individual attractions, features, or facility descriptions. The final master plan drawings will include the following:

(Maximum 12 attractions at 5 each and 3 other drawings -- total 63 drawings.)

- 4.1 One (1) final land use plan - rendered 30" x 40" at 1:2500 m.
- 4.2 One (1) site plan illustrating circulation and parking 30" x 40" at 1:2500 m.
- 4.3 One (1) aerial rendering (bird's eye), approximately 30" x 40".
- 4.4 Maximum two (2) floor plans for each of twelve (12) major attractions or ancillary facilities - rendered.
- 4.5 Maximum two (2) exterior elevations for each of twelve (12) major attractions or ancillary facilities - rendered.
- 4.6 Maximum one (1) section for each of twelve (12) attractions and ancillary facilities.



- 4.7 Detailed construction cost opinion prepared by a professional cost estimator.
- 4.8 Written summary of off-site improvement based on information provided in Phase 1 site analysis and projected need.
- 4.9 Written summary of each attraction, featured area, or outlining construction type and general materials and finishes.

## **5. ANIMAL ACQUISITION AND BUDGET**

During the concept development stage of the planning process, the required animal inventory will have been identified in some detail, with generalized cost parameters for each show or exhibit. However, once the master plan is approved, and prior to the Design Development phase of work, the availability, legal and logistical constraints for the acquisition, collection and keeping of the required animals must be determined. This master planning phase of work will thus develop a Scope of Work for a subsequent acquisition and collection program. The acquisition and collection program will deal in appropriate detail with availability, collection methodology, timing of collection, animal holding facility requirements during construction, and the budget cost of animal acquisition and maintenance. The acquisition and collection program will identify those species most necessary to park operations, and those most difficult to acquire (such as killer whales), so that fortuitous acquisition opportunities can be capitalized on.

## **6. ECONOMIC MASTER PLAN**

In conjunction with preparing the design elements, project economics will be refined further. This will include:

- 6.1 Cost-benefit analysis of the different elements of the park, as a planning input to concept and facility design. It is anticipated that economics input will be a crucial element in defining the scope of activity and content of the park, and will be integrated throughout the design process.
- 6.2 Refinement of attendance projections to reflect attendance build-up as the park gains maturity, and forecast of annual expected attendance for the first 10 years of operation.
- 6.3 Refinement of per capita spending potentials, as the details of the attraction, and food, beverage and merchandise potentials become more evident.
- 6.4 Refinement of operating cost budgets for the first 10 years of operation.
- 6.5 Preparation of preliminary capital budget that reflect:



- 6.51 "Hard" construction costs, as developed in the design program and master plan, along with the appropriate level of architectural and engineering fees.
- 6.52 "Soft" construction costs, including legal and accounting fees, miscellaneous fees, management and administration costs, overhead, and related items.
- 6.53 Show production costs.
- 6.54 Miscellaneous costs and contingency allowances.
- 6.55 Project financing costs, under agreed upon cost of capital formulae.
- 6.6 Preparation of discounted cash flow analysis covering the development and construction period, and the first 10 years of operation, and determination of the internal rate of return.
- 6.7 Integration of all concept, design and economic analyses into a comprehensive plan of project implementation.

### **III. TIME AND BUDGET**

An elapsed time of 24 weeks will be required to complete the scope of work as outlined. Early in the planning process, it may be possible to develop a "fast-track" time line that could compress the time schedule, and this will be explored. But for planning purposes, a 24 week schedule has been planned for. Work can commence within 10 days of receipt of a verbal authorization to proceed.

**Figure 2** on the following page sets forth the details of the project schedule. The schedule shows the sequence of performance of the various major phases of the planning effort, with concept development scheduled to begin early in the planning program to ensure that the requirements of specific exhibits and attractions are fully considered in the land use plan.

Three formal client conferences are planned, with the first taking place near the end of the concept development phase, the second occurring after completion of concept development and the general land use plan, but before the final master plan is drafted, and the final one at the conclusion of work. In addition, it is expected that there will be frequent informal client-consultant conferences on an as-need basis.

To accomplish the scope of work as outlined, a budget of \$418,000 should be made available, with the distribution of the budget among principal consultants as follows:

Figure 2

# SUMITOMO - FUKUOKA SEA LIFE PARK PROJECT SCHEDULE



Support



Primary

Program Element

## *SITE ANALYSIS*

Site Conditions

Engineering Studies

## *CONCEPT DEVELOPMENT*

Live Animal Shows

Live Animal Exhibits

Non-Animal Attractions

Food & Merchandise

Support Programs & Facilities

## *GENERAL PLAN OF LAND USE*

Park Theme & Adjacencies

Circulation & Utility Systems

Land Use Allocation

## *DESIGN MASTER PLAN*

Detailed Site Plan

Building Plans, Elevations, Sections

Presentation Drawings

Engineering Support Studies

Construction Schedule & Budget

## *ANIMAL ACQUISITION PLAN*

## *ECONOMICS MASTER PLAN*

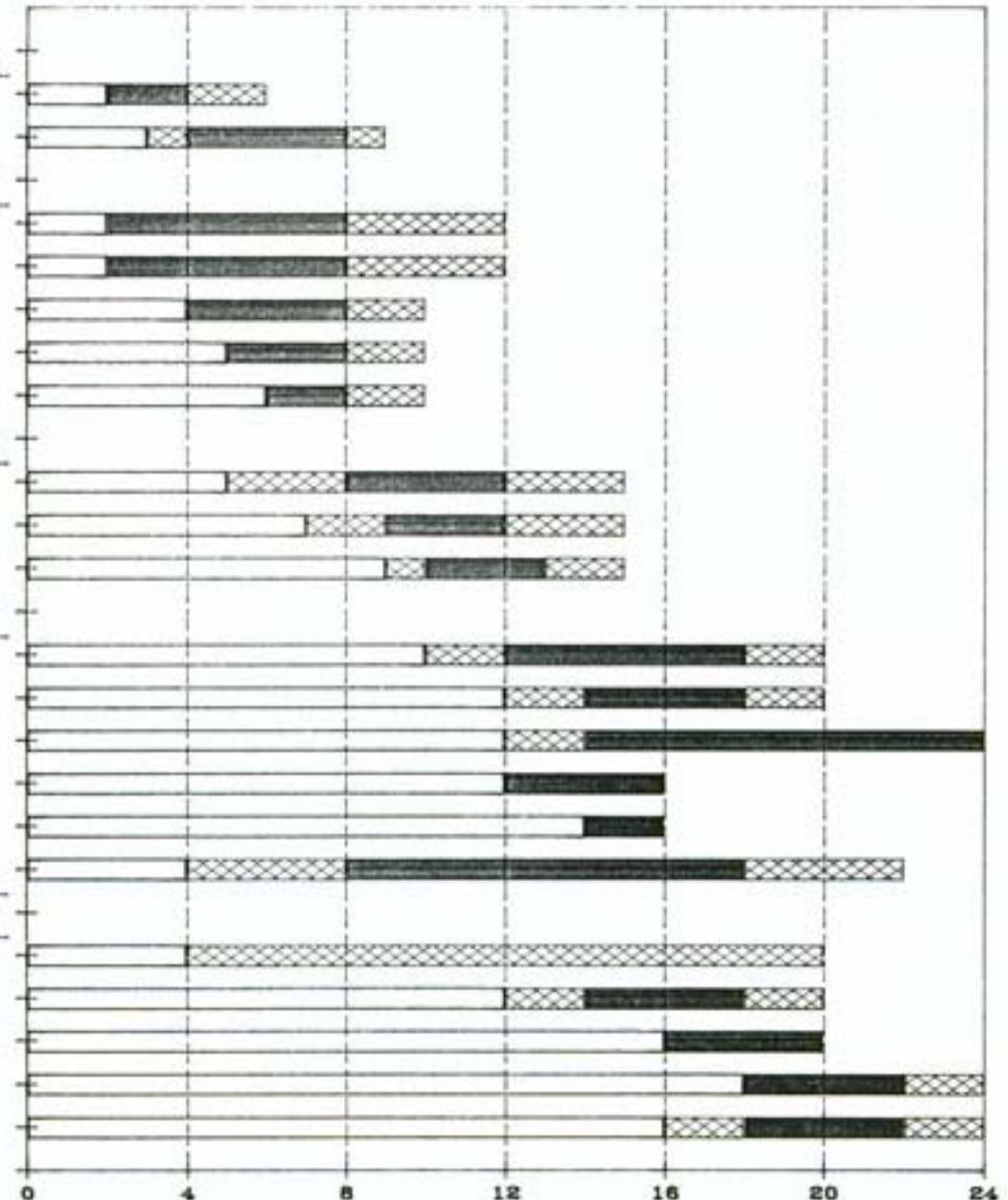
Cost-Benefit Analyses

Operating Budget

Capital Budget

10 Year Cash Flow Analysis

Implementation Plan & Report



Weeks



Delawie/Bretton/Wilkes and consultants, per organization chart	\$228,000
Powell Enterprises and consultants, per organization chart	\$110,000
Harrison Price Company	<u>\$ 80,000</u>
TOTAL	\$418,000

The budget includes all charges for professional time, materials, and expenses, with the following exceptions:

1. On-site civil engineering work, as discussed earlier.
2. Travel expenses, to be reimbursed at direct out of pocket costs. Overseas travel will not be undertaken without prior written client authorization.
3. Report publication costs, to be reimbursed at 110 percent of direct out of pocket costs.
4. Extra design studies or graphics presentations outside the defined scope of work which have been specifically authorized by the client.

Harrison Price Company will act as the prime contractor for the project, with subcontract agreements subject to Sumitomo's approval. Billings will be submitted monthly for time and expense charges incurred during the prior month, and are due and payable on receipt. The invoices will provide appropriate supporting detail, noting the distribution of funds to all subcontracting parties.

For a project of this nature, a retainer in the amount of \$75,000 is requested at the time of project acceptance, with the retainer amount to be applied to the final billing.

#### IV. PROFESSIONAL QUALIFICATIONS

The project team has been carefully selected to provide a balance of in-depth experience and talent in the planning, design, management, and operation of marine parks. All work will be done by, or under the direct supervision of the principals of each firm.

Harrison A. Price, Chairman of Harrison Price Company will act as project manager, and will be assisted by William H. Stevenson, Executive Vice President of the firm. Frank Powell, with more than 25 years of on-line and executive experience in the design, construction, and operation of the Sea World parks, will be primarily responsible for conceptual and operational planning of the project, for the coordination of wildlife consultants, and for the preparation of the animal acquisition plan. Michael



Wilkes will be responsible for the architectural and design program, and for the coordination and supervision of design and engineering subcontractors.

A statement of professional qualifications for Harrison Price Company is attached, and the staff biographies for all of the key subcontractor participants are presented on the following pages.

## V. ACCEPTANCE

This proposal may be accepted by signing and returning a copy, along with the retainer check in the amount of \$75,000 to Harrison Price Company. As noted above, a verbal authorization will be sufficient to initiate the work program, with formal acceptance to follow.

Respectfully submitted,

Harrison A. Price  
Chairman

HAP:su

Accepted by: \_\_\_\_\_  
Name and Title

Date : \_\_\_\_\_

# HARRISON PRICE COMPANY

**Harrison A. Price**  
**Chairman**

**Education:** BS, California Institute of Technology, 1942  
Graduate work, civil engineering, University of Michigan, 1944  
MBA, Stanford University, 1951; first in class of 200+  
Registered Professional Engineer

## **Related Work Experience:**

1951-1953	Stanford Research Institute, Los Angeles, California Research Economist
1953-1956	Stanford Research Institute, Los Angeles, California Manager, Southern California Division
1956-1958	Harvey Aluminum, Milan, Tennessee General Manager, Defense Plants Division
1958-1973	Economics Research Associates, Los Angeles, California Founder/President
1973-1976	Planning Research Corporation, Los Angeles, California Senior Vice President
1976-1977	Planning Research Corporation, Washington, D.C. Senior Vice President, Marketing
1977-1978	Planning Research Corporation, Washington, D.C. Chairman
1978-	Harrison Price Company, Los Angeles, California Chairman

## **Corporate Directorships:**

1967-1971	Scope Industries, Los Angeles, California
1973-1977	Sea World, Inc., San Diego, California
1968-1972	American Nucleonics, Glendale, California
1973-1978	Planning Research Corporation, Los Angeles, California
1976-1979	McCulloch Oil Corporation, Los Angeles, California
1979-1984	The Bekins Company, Glendale, California
1980-	Electronic Scales International, San Luis Obispo, California
1980-	HealthCare U.S.A., Santa Ana, California
1981-1985	Great Lakes Properties, Inc., Torrance, California
1985-	Air Conditioning Company of California (ACCO), Glendale, CA

## **Civic and Cultural Trusteeships:**

1972-1975	Los Angeles Performing Arts Council
1964-1978	Southern California Choral Music Association
1960-1963	Chouinard Art School
1961-1963	Los Angeles Conservatory of Music
1961-	California Institute of the Arts
1980-	Mayor Bradley's Committee on African Economic Trade Development
1980-	Los Angeles County Economic Development Council



# HARRISON PRICE COMPANY

William H. Stevenson  
Executive Vice President

Education: BA, Stanford University, 1953  
Concentration: History and Economics  
  
MBA, University of Southern California, 1960  
Concentration: Marketing and Finance

## Work Experience:

1953-1955	Commissioned Officer, United States Marine Corps, intelligence and operations.
1955-1957	McCormick & Company, market and financial analyst.
1957-1962	Anheuser-Busch, Inc., Western Region Administrator.
1962-1965	Economics Research Associates, Senior Economist and Vice President.
1965-1982	Forbes, Stevenson & Baldrige, Partner.
1982-	Harrison Price Company, Vice President Real Estate, and Executive Vice President.

## Background:

Mr. Stevenson has been engaged continuously and exclusively in economics consulting since 1962. Prior to joining Harrison Price Company, he had 20 years of consulting experience in the fields of industrial economics, litigative economics, real estate economics, recreational economics, and business planning. His earlier industrial experience focused on consumer products market research, market administration, production planning, and financial analysis.

In industrial economics, market feasibility studies, acquisition and disposition analyses, and business planning studies have been conducted for a variety of consumer and industrial products and processes, including fresh and processed fruits and vegetables, beer, wine, electronics products, medical instruments, oil field equipment, chemicals and gases, and photographic products.

In litigative economics, Mr. Stevenson has testified as an expert witness in both state and federal court on matters of contention that essentially are economic in character. Issues have included life and worklife expectancy, earnings loss or impairment, property loss, loss of use of producing assets, business loss attributable to wrongful actions, industrial and business outlook and corporate valuations, asset division and valuation in divorce, real estate and tax disputes, and zoning matters.

In real estate and land use economics, he has conducted a wide range of feasibility, market support, and planning studies for



## HARRISON PRICE COMPANY

mixed use projects, office buildings, shopping centers of all kinds, resorts, hotels, and residential developments in all price and density ranges. Projects have been located throughout California, Hawaii, Arizona, Washington, Oregon, Nevada, Idaho, Colorado, Oklahoma, Texas, and Tennessee. Clients have included some of the nation's leading land developers, land owners, major railroads, architects, engineers, and planners.

In recreational economics, projects have included resorts, amusement parks, zoos, automobile and horse race tracks, golf courses, ski resorts, marinas, art and special interest museums and attractions, motion picture theaters, and performing arts complexes. Project locations have included California, Arizona, Hawaii, Washington, Nevada, Wisconsin, Missouri, Indiana, Tennessee and Michigan.

## Homer Delawie

Chief Executive Officer

Delawie/Bretton/Wilkes Associates, AIA

Homer Delawie is the founder and CEO of Delawie/Bretton/Wilkes Associates (DBW), a design-oriented architectural and planning firm. Mr. Delawie heads a staff of 20 architects and planners who form the creative nucleus of an award-winning design team. The San Diego firm has received over 40 AIA design awards for a wide spectrum of projects including medical facilities, libraries, office buildings, shopping centers, government buildings, residential complexes, military structures, and aquatic attractions. DBW has also developed a reputation for excellence in master planning and urban design.

Mr. Delawie received his Bachelor's degree in architectural engineering from California State Polytechnic University. He entered private practice in San Diego in 1958, founding his firm three years later. He is past president of the San Diego Chapter of the American Institute of Architects (AIA) and served on its board of directors from 1962-1969. He was the first practicing architect to be appointed to the San Diego Planning Commission and served on the commission from 1969-1982.

In 1972, Mr. Delawie was elected a fellow of the American Institute of Architects College of Fellows in the field of design and community service, an honor given to only about five percent of all architects nationwide. That same year, he was also honored by the California Council, AIA with the "Architects Service Award" for outstanding leadership in the architectural profession; in 1981 he received the Council's "Public Service Award." In 1982, he was honored by the California Chapter of the American Planning As-

sociation for his "Outstanding Contribution to Planning."

Besides his work on the Planning Commission and his efforts to ensure rational planned growth in San Diego, Mr. Delawie has been actively involved in a number of community activities. He has lent his support, time, and efforts to the preservation of Balboa Park and he initiated and coordinated a citizens' effort to defray the costs of acquiring and preserving a significant section of Presidio Park. Mr. Delawie and his wife were the first chairpersons for the KPBS Auction and he was chairman of the KPBS Community Advisory Board its first four years. He is currently on the board of directors of The Children's Museum of San Diego. He also lectures at local schools to encourage youths to design better living environments.



## Michael B. Wilkes, AIA

Director of Design

Delawie/Bretton/Wilkes Associates, AIA

Michael B. Wilkes is a partner in the firm of Delawie/Bretton/Wilkes Associates, AIA, where he serves as Director of Design. His areas of expertise include design development and programming for large and small projects. The firm, lead by Homer Delawie, a Fellow in the American Institute of Architects, has won over 40 design awards.

He was project designer for the Sea World Shark Exhibit in San Diego, California, and the Shark Encounter in Orlando, Florida. The San Diego Shark Exhibit is a 450,000-gallon solar heated aquarium. Sea World Florida's Shark Encounter contains 650,000 gallons of water, two theatres, and features viewing through a 125-foot long acrylic tube. Viewers are moved through the tube along a moving sidewalk.

The firm also designed Sea World's two Penguin Encounters. The San Diego Penguin Encounter, the first of its kind, displays both Antarctic and Tropical penguins. The 33,000-square foot facility contains an Antarctic Penguin Exhibit with a 40,000-gallon aquarium and an Alcid Bird Exhibit with a 20,000-gallon aquarium. The Penguin Encounter at Sea World, Ohio, is approximately two-thirds the size of the San Diego facility and exhibits only Antarctic penguins.

Currently, Wilkes is designing the Lake Superior Center located in Duluth, Minnesota, and a competition entry for an aquarium in Yokahama, Japan. Lake Superior Center, a 50,000-square foot project, features Lake Superior and demonstrates its role in the regional economy, climate, and history.

Mr. Wilkes was project principal and designer for the "Old Ferry Landing," a 45,000-square foot commercial complex which won a 1984 design competition sponsored by the San Diego Unified Port District. He was largely responsible for developing and coordinating the architecture and planning on the First San Diego River Improvement Plan which planned 350,000 square feet of retail, 750,000 square feet of office, two hotels and 1,500 housing units while returning the existing degraded San Diego River to a park-like setting. Currently he is working as Project Designer for the firm on Starboard Station, a 27-story mixed use project with hotel, office, museum and rail station.

Mr. Wilkes has served on the Board of Directors of the AIA/San Diego Chapter from 1982 to 1986 and as its President in 1985. He was President of the San Diego Architectural Foundation in 1986 and is currently serving as Secretary of the California Council, AIA.

Mr. Wilkes received his bachelor's degree in architecture from the University of Oregon. He is licensed to practice architecture in California, Arizona, Texas, Ohio, and Florida. He holds a National Council of Architectural Registration Boards certificate.

## Raymond S. Keyes

President

Aquatic Design Systems

Keyes has a Master Degree in marine biology from San Diego State University. He worked for Sea World 15 years, starting as an aquarist in 1970, and promoted to Curator of Fishes in 1975. His work included the research leading to and the heading of the design and construction of Sea World's Shark Encounter, a 400,000 gallon tank of 70 specimens, from giant sting rays to bull sharks. He has become a noted authority on sharks and has contributed his knowledge to many television and radio shows, as well as scientific publications.

While at Sea World, Ray developed new and innovative animal transport technology that led to the successful husbandry of large delicate sharks. Ray is recognized as an international authority on all aspects of aquarium technology and animal care.

Keyes has worked for the Bureau of Commercial Fisheries in La Jolla, San Diego State University Zoology Department and Mariculture Research Corporation. He founded Aquatic Design Systems in 1984 and now designs, constructs, and maintains large ponds, water features and large commercial aquariums. He completed three 3,000 gallon aquariums for the lobby of an office building for a large San Diego developer in April of 1987. The identical design of the three 3,000 gallon aquariums was recently completed in Phase 2 of a twin office complex which opened in the fall of 1988.

Currently Keyes is designing and constructing a million dollar waterscape project for Le Meridian, San Diego at Coronado. The project includes a fountain and seven water features comprised of bubbling streams, cascading waterfalls and still lagoons with fishes and birds. The largest feature is more than 300 feet long and holds over 100,000 gallons of water. Keyes is also consulting in the design of a \$12-million project for the Natural History Center in Duluth, Minnesota, a \$10-million 1.2 million gallon shark community for Marineland of Canada at Niagara Falls, the \$60 million San Diego Aquarium, and the Hakkei Island Project in Japan, among others.



## William Scott Drieschman

President

Wildlife Concepts International

Scott Drieschman has 18 years experience in the field of zoology, specializing in aviculture. He began his career with Sea World of California in 1970 and for the next 16 years held various positions within the Animal Department at Sea World, culminating in appointment as Assistant Curator of Aviculture in 1976 and Curator of Aviculture in 1980.

As Curator, he was responsible for the daily operation of the world's largest penguin and waterfowl collection, the management of a large annual budget, the review and revision of all construction plans (including the Penguin Encounter), and the development of new processes and procedures associated with aviculture.

During Drieschman's years with Sea World of California, many innovative aviculture technologies were pioneered, including the development of a portable field incubator; collection and artificial incubation of penguin eggs, hand-rearing of penguins, establishment of Antarctic penguins in a controlled environment, use of video to record and study penguin behavior under harsh conditions, development of a bio-telemetric egg to record incubation temperature of penguin embryos, and installation of a multi-station computer system for the aviculture department.

He designed the present video system currently in use at the Penguin Encounter at San Diego. This system consists of a remote control two-color camera system

with integrated recording and playback utilizing 5 recorder/playback machines. This system incorporates 20 monitors for viewing by both the public and staff. He also co-produced the 37-minute videotape presentation currently played at the Encounter.

In 1986, Drieschman left Sea World to form his own company, Wildlife Concepts International. Since that time he has been involved in many projects both in the United States and abroad, including the penguin and puffin exhibits for the New York Zoological Society, Central Park Zoo; the Duluth Aquarium for the Bayfront Park Development Association, Duluth, Minnesota; the penguin exhibit for the Jurong Bird Park, Singapore; the penguin exhibit at the West Edmonton Mall, Edmonton, Alberta; and aviary and waterfowl pond design and animal husbandry management for The Park at Coronado, Coronado, California.

Drieschman has made nine trips to the Antarctic, two to the Arctic and many other trips throughout the world to study birds and other animals. He has published numerous articles in both technical and popular journals, with subjects ranging from bioacoustical aspects of the Killer whale in Antarctica to zoological exhibit design.

He has received numerous awards from the industry, including the prestigious AVY award from the American Federation of Aviculture.



## Stephen Leatherwood

Director  
Oceans Unlimited

Stephen Leatherwood is Senior Research Biologist with Hubbs Marine Research Center, a position he has held since he joined the staff in December, 1978, after ten years with the U.S. Navy's Marine Mammal Research Unit.

He is also Director of Oceans Unlimited, a private consulting firm specializing in marine mammals and their conservation.

In his 20 years in research, the majority of Leatherwood's studies have focused on the natural history and behavior of marine mammals (polar bear, otters, sirenians, seals, whales, and dolphins), though he has also published on seabirds, sharks, turtles, and fisheries. He has been principally interested in such questions as a) what marine mammal species live in a given ocean area; b) why do they live in areas which appear to us qualitatively the same; c) how many of them are there; and d) how do they manage to coexist with competitors and enemies? Much of his recent work has focused on effects of human activities (e.g., oil drilling, fishing and pollution) on marine mammals. Pursuing answers to those questions, he has traveled from the Arctic to the Antarctic, and to virtually every major ocean area.

Leatherwood has authored over 100 scientific papers in technical journals, two dozen chapters in popular and technical books and field guides to the cetaceans of both coasts of North America. His newest completed books are The Sierra Club Handbook of Whales and Dolphins, written with colleague Randy Reeves and renowned marine artist Larry Foster, an Academic Press textbook on the biology of gray whales, co-edited with Mary Lou Jones and Steven Swartz, well known

authorities on gray whales, and the Sea World Book of Dolphins, a children's book written with Reeves. He is currently involved in the following: writing The Sierra Club Handbook of Seals, Sirenians, and Otters, with Reeves and Brent Stewart; writing a series of children's books on wildlife for Harcourt Brace Jovanovich; editing an Academic Press book on bottlenose dolphins, with Reeves; editing a volume of collected papers on killer whales, with Johann Sigurjonsson; and editing a volume of collected papers on marine mammals of the Indian Ocean, with Greg Donovan of the International Whaling Commission (IWC).

Leatherwood is an advisor to the small cetacean subcommittee of the IWC; a member of the IUCN Species Survival Commission; Associate Director of the Center for Research on Indian Ocean Marine Mammals, based in Sri Lanka; Research Associate with the University of San Diego; Adjunct Professor in Biology at San Diego State University; and a member of the Boards of Advisors of the California Mammal Center, the Whale Center, the American Cetacean Society, and Cetacean Society International, to mention a few. He is active in numerous projects in marine conservation, most focusing on interactions between human and marine mammals.



## Frank A. Powell, Jr.

President

Powell Enterprises

After 14 years with a small family-run textile business in Philadelphia, Pennsylvania, Frank Powell began his career in the marine park industry in 1961 as Vice President and General Manager of the Philadelphia Aquarium, overseeing it from groundbreaking, through construction, to operation.

Powell joined Sea World in 1967 and remained there for the next 18 years until he retired in 1985 as Executive Vice President and Member of the Board of Directors. He was also Chairman of the Board of Trustees of the Hubbs Sea World Research Institute, a non-profit operating foundation.

During his tenure at Sea World, Powell participated in the design, construction and operation of the Sea World parks in San Diego, Ohio, Orlando and the Florida Keys. He was General Manager of Sea World's Magic Mountain theme park in Valencia, California in the opening year. He was also responsible for the operation of the Atlantis Restaurant (1000 seats), Sea World Marina (200 slips) and Captain Kidds Seafood, a fast food chain. He reported directly to the Chairman and Chief Executive Officer of Sea World Enterprises. While in his position at Sea World, attendance, revenues and profits achieved record growth.

Powell was responsible for overall management, direction and coordination of park operations. He had complete P&L responsibility. As a member of the Senior Management Committee and Chairman of the Operations Committee, he participated in establishing 5-year operating plans, projections of capital improvements and budgets.

In 1985, Powell formed his own company, Powell Enterprises, which provides services in economic analysis, architectural design, engineering and construction of life support systems, animal acquisition and husbandry, veterinary medicine, animal behavior, show production, graphics and other services related to the display of aquatic mammals, birds and fishes.

Powell Enterprises is currently providing consulting services to Marineland, Niagara Falls, Canada--a 1.4 million gallon shark tank exhibit with 400-seat restaurant; Bayfront Park Development Association, Duluth, Minnesota--a fresh water aquarium, museum theatre, and visitor center on Lake Superior; Hope Group and San Diego Gas and Electric--conversion of a downtown steam generating plant into an aquarium complex; and Shimizu Construction Company, Tokyo, Japan--the 60-acre Hakkei Island and Seaside Park Development Project in Yokohama City, Japan.

Powell is a Professional Fellow of the American Association of Zoological Parks and Aquariums. He is a member of the Board of the San Diego Chamber of Commerce, is Executive Vice President of the San Diego Oceans Foundation, and serves on the Advisory Boards for Scripps Aquarium Associates and for Scripps Aquarium and Oceans Science Center Building.

A native of Collingswood, New Jersey, he received his BA degree from Franklin and Marshall College in Lancaster, Pennsylvania.



## Nestor G. Ramos

President

Enartec Consulting Engineers

Nestor Ramos is well known for his design of Life Support Systems for marine animal exhibits throughout the United States. His 24 years of experience in civil engineering includes 16 years in Life Support System design and construction.

After graduation from the University of Buenos Aires in 1963 with a degree in civil engineering, he began his career with the California Department of Water Resources.

Ramos joined James M. Montgomery, Consulting Engineers in 1966 and progressed to Vice President/Principal and Manager of the San Diego office. While designing the water treatment systems for several Sea World exhibits, he became well-versed in the specialized design considerations required for Life Support Systems.

In 1972, he moved to Brazil for two years to manage the firm's Sao Paulo office and oversee the design and construction of a water supply system and a 750-mgd water treatment plant owned by the Metropolitan Water Company of Sao Paulo.

After his return to the San Diego office, Ramos was Project Engineer for numerous pipeline, pumping station, and reservoir projects in Southern California. He was construction manager on several large water treatment projects and he also developed water supply/distribution Master Plans for three water districts.

During these years with JMM, Ramos designed and supervised construction of various life support and treatment

facilities for Marineland of the Pacific, Walt Disney Enterprises, Sea World, the National Aquarium in Baltimore, and WED's Sea Pavilion.

Ramos founded ENARTEC Consulting Engineers, Inc., in 1981, and is still very much involved in project development and design. He designed the Life Support Systems for the 5-MG killer whale complex at Sea World of Florida, the Animal Care Pools for Sea World of California, and the Seven Seas Complex at the Brookfield Zoo near Chicago.

Although Ramos is well known for his design of aquatic animal Life Support Systems, he has received recognition for technical excellence in other areas of water and wastewater engineering, including an "Outstanding Civil Engineering Achievement" award by the San Diego Section of the American Society of Civil Engineers (ASCE), and a "Project of the Year" award by the American Public Works Association.

He is a member of several professional associations and societies, including the American Society of Civil Engineers, the American Water Works Association, the American Public Works Association, the American Concrete Institute, the California Water Pollution Control Association, and the International Ozone Association.

His published papers include, "Design of Tunnel Liners for Internal and External Pressure," Technical Paper No. 45 for the California Department of Water Resources, and "The Practical Use of Ozone in Large Marine Aquariums," for the Journal of the International Ozone Association, 1980.



## Bruce R. Stephens

Director

SeaWays/Animal Behavior Enterprises

Bruce Stephens' 16 years experience in the oceanarium/marine mammal and zoological parks industry includes work in facilities design, animal behavior, show production, and public relations.

After extensive study in behavioral psychology at San Diego State University, Stephens joined Sea World in 1971. During his first five years there as Marine Mammal Trainer, Head Killer Whale Trainer, and Department Manager, he was involved in the operation and development of the Animal Behavior Departments for the California, Ohio and Florida Sea World parks.

Stephens was appointed Director of Animal Behavior for Sea World of California in 1976 and continued in this position for nine years until he formed his own company in 1985.

While with Sea World he conceived and implemented an advanced marine mammal training technique, employing high levels of variability, which has become the standard of the industry and has resulted in significant improvement in behavioral reliability and animal health. He acquired training expertise with a wide range of marine mammals (15 species) while developing new performance elements using advanced signal mechanisms such as underwater tone systems.

Stephens evolved new husbandry behaviors which allow physical exams, blood samples, measurements and specimen collection to be performed under behavioral control rather than physical restraint, resulting not only in improved health and reduced stress for the animal, but also in

considerable reduction in manpower requirements.

At Sea World, Stephens was instrumental in developing many new marine mammal show concepts. These include the most advanced Killer whale performances ever presented, as well as new shows with smaller whales, sea lions, walrus, and many other species. He often represented Sea World in television, radio and print interviews, describing the park's position on important issues, accomplishments and future plans.

His public relations experience also included organizing and conducting tours for important visitors to Sea World, introducing them to the park's animals, facilities and philosophy. This process was essential in reinforcing friendships important to the park's continuing operation as well as neutralizing occasional hostility against zoological institutions.

Since establishing his own company in 1985, SeaWays/Animal Behavior Enterprises, Stephens provides consulting services to zoos and aquaria, including animal behavior, staff development, facilities design, management, and performance production services. For the National Aquarium in Baltimore, he contributed to the design of the new Marine Mammal Pavilion at Pier 4. In conjunction with Powell Enterprises, he also participated in the design of the Lake Superior Center, an impressive new fresh water aquarium in Duluth, Minnesota.

Stephens is currently President of the International Marine Animal Trainers Association.



## PATRICK A. CASE

Vice President and  
Principal Engineer

Patrick Case's strengths represent a unique blend of technical and managerial skills. He is able to maintain an overall perspective on progress and functioning of a project while attending to the day-to-day decisions and details of complex system design.

He received his Bachelor of Science degree in civil engineering in 1971, and his Master of Science degree in sanitary engineering in 1972, both from California State University, San Jose. He is a registered Civil Engineer in California and Texas.

Case began his career with Jorgensen-Tolladay Engineers. His work there provided a broad base of practical experience, including wastewater collection and treatment needs assessments, municipal wastewater predesign studies, water treatment systems analyses, operation and maintenance manuals, industrial wastewater treatment studies and design, environmental impact studies, and structural calculations for commercial and industrial buildings.

He joined John Carollo Engineers in 1974, where he prepared wastewater facilities planning studies for several California communities. He also managed a predesign study for a proposed 140-mgd San Diego South Bay Secondary Treatment Plant, and participated in a number of other wastewater studies for the City of San Diego.

His design experience included work with the 75-mgd high purity oxygen activated sludge wastewater treatment project at the County Sanitation Districts of Orange County Plant No. 2, the 7.5-

mgd activated sludge and effluent filtration facilities for the Timpanagos Special Services District, Utah, and an interceptor sewer for Quincy, California.

In 1980, Case joined Daniel, Mann, Johnson & Mendenhall (DMJM), a career choice which greatly strengthened his technical and management skills. For two years he coordinated the engineering aspects of the San Diego Centre City redevelopment projects. This included preparing project cost estimates and budgets, engineering, technical planning, scheduling and overall coordination of redevelopment projects from the initial planning stages through completion of construction. It also involved the design and construction management of major storm drains, sewers, water lines, and hardscape improvements in the central business district. This project required resolving the sometimes conflicting needs of many people--various contractors, several regulatory agencies as well as the Board of Directors and staff of the Centre City Development Corporation.

After concluding DMJM's work in San Diego, Case joined Al-Kawther Water Industries, Inc. He coordinated the design and materials procurement for a 12.3-mgd seawater reverse osmosis plant for the Arabian American Oil Company (ARAMCO), and spent several months on-site in the Eastern Province of Saudi Arabia coordinating a multi-discipline team of consultants in construction and startup of the project.

Case joined ENARTEC in 1984 and is now Vice President and Principal. He has designed and managed several



projects, including the mechanical systems for a 1050 kW cogeneration facility for the University of San Diego, and various Life Support Systems for marine parks and aquaria. For Sea World of California, he designed the Animal Holding Pools and associated Life Support Systems, and coordinated all site improvement work. He was part of the design team for the Life Support Systems for Marine World/Africa USA and was also responsible for project coordination.

As part of the design team for the Life Support Systems at Sea World of Texas, Case was responsible for pilot testing advanced wastewater treatment processes incorporated at the Texas park. Inclusion of these processes is expected to represent a significant step forward in the design of closed-loop water treatment systems for exhibits.

He is currently Project Manager and principal designer of the Life Support Systems for the new exhibits at the John G. Shedd Aquarium in Chicago.