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Proposal

Boston Redevelopment Authority

RECONSTRUCTION OF PIER 3
Charlestown Navy Yard



Fay, Spofford & Thorndike, Inc.

Engineers

November, 1988



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November 9, 1988

Boston Redevelopment Authority
Room 943
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Subject: Pier 3 Reconstruction

Gentlemen:

FAY, SPOFFORD & THORNDIKE, INC. (FST) is pleased to submit ten (10) copies of our proposal to provide engineering services for reconstruction of Pier 3 at the Charlestown Navy Yard. We view this project as an important element in the ongoing revitalization of this site, and as an exciting opportunity to contribute to the public's use and enjoyment of Boston's waterfront.

To fully address the diverse issues to be encountered during this project, we will work in association with two highly qualified firms, THE HALVORSON COMPANY, INC. (THC) and HALEY & ALDRICH, INC. (H&A). THC is a landscape architecture firm which has established an outstanding reputation in its field, and which has been responsible for numerous public space improvement projects in the Boston area. Of particular relevance is THC's experience with planning and design of parks sited along urban waterfronts. FST and THC have formed a strong working relationship through our collaboration on numerous projects.

H&A offers a wealth of experience on waterfront development projects in the Boston area and across the United States. FST and H&A have developed a unique working relationship on relevant work, as H&A has provide geotechnical services on numerous waterfront construction projects for FST. In addition, the two firms have worked together on many transportation and urban design projects in the Boston area.

Two MBE/WBE firms will make significant contributions to the project. PRELLWITZ/CHILINKSI ARCHITECTS, a woman-owned architectural firm, will be responsible for architectural design, and BRYANT ASSOCIATES, INC., a minority business enterprise, will perform all topographic and hydrographic surveys.

Boston Redevelopment Authority

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November 9, 1988

FST will assume the lead role in project management, and for all waterfront engineering. The firm will also be responsible for structural, civil, mechanical, and electrical engineering, as well as regulatory coordination.

FST personnel assigned to the work have gained much of their experience on waterfront design, which has, for many years, represented a major portion of the firm's work. FST has a national reputation in the field of waterfront facility design. The scope of this work ranges from improvements to municipal piers and wharves to large-scale construction projects. Of particular relevance to this project is our ability to combine the specialized engineering skills associated with waterfront construction, with a sensitivity to the urban design and public use issues that will be paramount in the Pier 3 reconstruction. For example, FST recently provided civil, structural, electrical, and mechanical engineering services for the new USS Nautilus Submarine Force Library and Museum at the Naval Submarine Base in Groton, CT, a project recognized with receipt of the 1986 Naval Facilities Engineering Command/American Institute of Architects First Honor Award. Combined with THC's extensive waterfront park design experience, these skills and experience will assure our responsiveness to the Authority's goals.

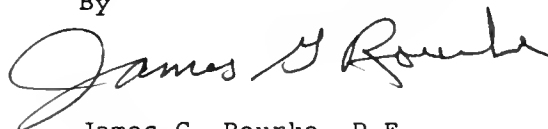
The project team is committed to completing this work within the time frame established by the Boston Redevelopment Authority, and is able to offer the Authority a depth of staff which will assure this schedule. The team's ability to meet this time commitment is strengthened by the experience of key project team members working together on related projects. As indicated in our proposal, minority and woman staff members and residents of the City of Boston will play significant roles on this project.

In summary, we believe that this project team offers a unique combination of skills to assure that the Pier 3 reconstruction makes a significant contribution to the viability of this waterfront site, and would welcome the opportunity to work with the Boston Redevelopment Authority on this challenging project.

Very truly yours,

FAY, SPOFFORD & THORNDIKE, INC.

By



James G. Rourke, P.E.
Vice President & Director

JGR:co

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I. EXECUTIVE SUMMARY

I. EXECUTIVE SUMMARY

The revitalization of the Charlestown Navy Yard has been a highly successful venture which has contributed significantly to the development of mixed-use public recreational and open space in the City of Boston. As part of the on-going process to enhance the viability of public space at this site, the **BOSTON REDEVELOPMENT AUTHORITY (BRA)** intends to reconstruct and restore the deteriorating Pier 3 structure for public recreational use. **FAY, SPOFFORD & THORNDIKE, INC. (FST)**, in association with **THE HALVORSON COMPANY, INC (THC)** and **HALEY & ALDRICH, INC. (H&A)** offers considerable background and experience in the issues which must be addressed during implementation of the Pier 3 Project. Our integrated project approach coordinates all analyses and design required to not only rehabilitate and reconstruct the pier structure itself, but more importantly, to develop this site to its full potential as an open space making its own unique contributions to Shipyard Park as a whole.

Our previous work on waterfront facilities, including parks and museums, and THC's extensive and diversified work on waterfront parks, gives our team the depth and experience so necessary in developing the alternatives and conceptual ideas which will form the basis of successful project implementation.

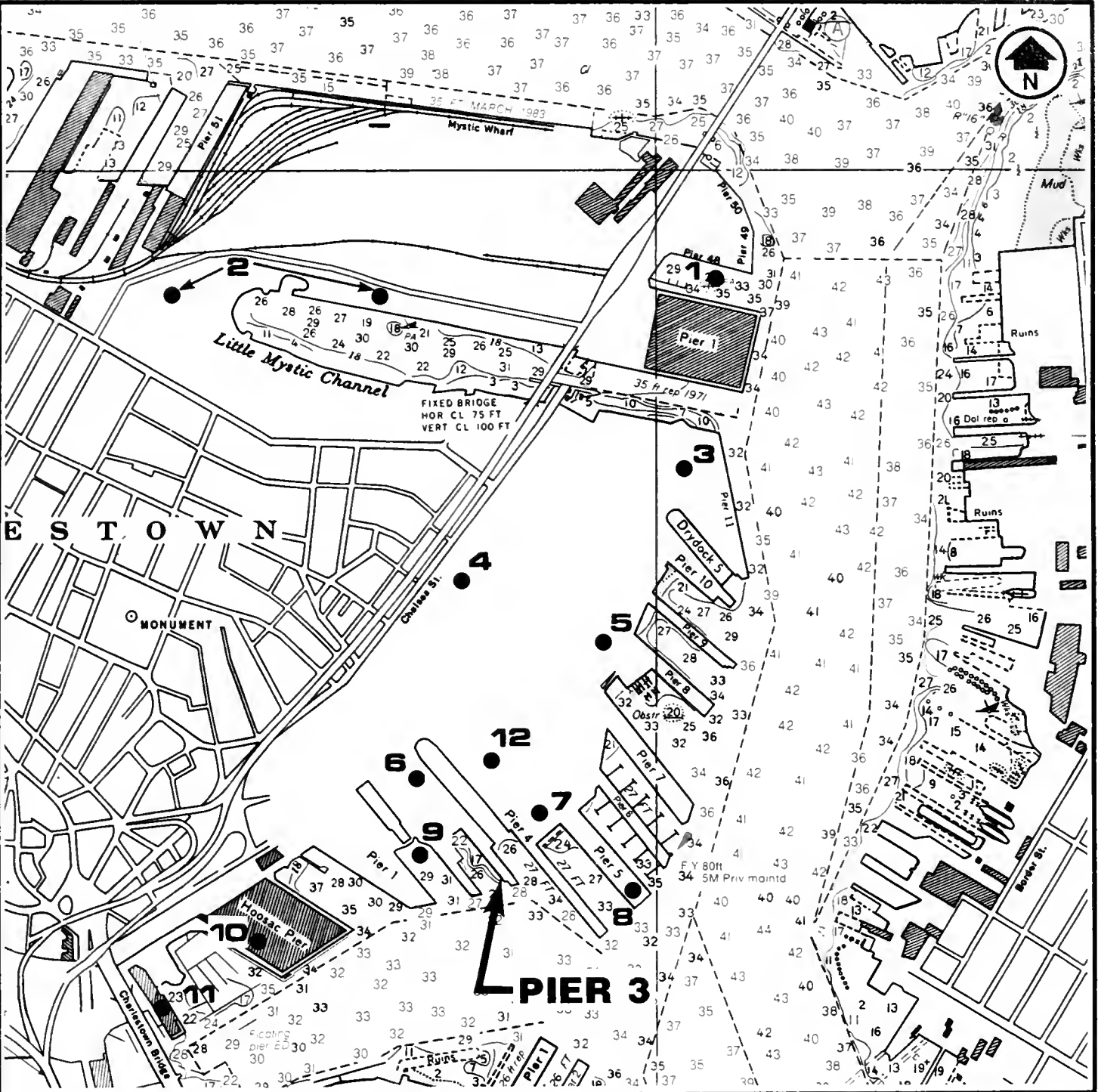
The Team has the capabilities to respond to each aspect of the scope of services. This experience incorporates extensive waterfront work, including piers, bulkheads, and dredging. H&A has a broad background in similar work, and we are proud to have worked with H&A on award-winning projects from coast to coast. Of considerable value in evaluating the condition and construction of the underwater portions of existing structures is the availability of a certified diver on our Team who is also an engineer.

The following page illustrates the experience of project team members on projects in the vicinity of the Charlestown Navy Yard.

Coordination with the agencies with environmental review authority and liaison with the interested public is critical to the project. Today, permitting forms a context into which every project must fit. A thorough understanding of the context and development of project recommendations, which can be readily permitted, is the goal of this effort.

Pier 3 was constructed as an approach and refit pier for Drydock 2. Although the drydock is not an active issue in the scope of this project, we feel that FST's extensive experience in drydock design is an asset. FST is preeminent in this field.

In addition to outstanding technical qualifications, the Team is responsive to the tenets of Affirmative Action/Equal Employment Opportunity and to the Boston Redevelopment Authority's guidelines for City of Boston residents, minority, and women in the staffing of the project. We have assigned City of Boston, minority, and women staff members to key positions in this project. **BRYANT ASSOCIATES, INC.**, a minority-owned firm, will perform all surveys, and the WBE firm of **PRELLWITZ/CHILINSKI ARCHITECTS** will provide architectural services.



1. Moran Container Terminal & Mystic Pier No. 1
2. Port Terminal Development Program, MPA Contract #3.212
3. Development Of Parcels 4, 5, 6, & 7, Boston Naval Shipyard
4. Constitution Office Park, Boston Naval Shipyard
5. Anchorage Apartments, Boston Naval Shipyard
6. Pile Consultation - Shipyard Park
7. Pier 5 Development, Boston Naval Shipyard
8. Building 197 Addition, Boston Naval Shipyard
9. Charlestown Drydock No. 1 Extension
10. Constitution Plaza
11. Waterfront Development, Tudor Wharf
12. Shipyard Park

TEAM MEMBER EXPERIENCE - VICINITY OF PIER 3

II. PROJECT APPROACH

II. PROJECT APPROACH

A. Introduction

The Pier 3 reconstruction at the Charlestown Navy Yard has the potential to become another dynamic addition to the navy yard's revitalized system of public open spaces. The Pier's location suggests that Pier 3 can fulfill two distinct roles within the navy yard context. The first role, and perhaps the most fundamental, will be the development of the pier as a link with existing and proposed open space activities. The second major role will be the development of Pier 3 as a unique destination point.

At present Pier 3 stands as an incomplete and ill-defined space between Shipyard Park and the adjacent National Historic Park. It also stands between the primary entry to Charlestown Navy Yard and a commanding view of Boston's inner harbor. The reconstruction of the pier must recognize that the pier is a physical and a visual link for both the immediate area and the Boston inner harbor. However, the fundamental criteria for the design's development should be that the pier's identity not attempt to compete with the inherent interest of the harbor. A successful design concept should reflect the simple, powerful, historic quality of the site and also enrich it with new, equally memorable forms and spaces.

The pier's development should be compatible with and perhaps inspired by nautical themes and the traditional nautical character of the working waterfront. The park should strive to become an integral part of the larger open-space network by using some of the design vocabulary established in adjacent projects. The introduction of special elements can impart an identity to the space so that it does not get lost in the scale and variety of the surrounding waterfront.

With careful attention to the vocabulary of the surrounding context, the spatial relationships between Pier 3 and adjacent public places, and the potential of the site itself, Pier 3 can link the Charlestown Navy Yard's network of parks while offering a unique waterfront experience.

B. Project Management

Our approach to project management is based on the following key steps in the development of complete construction documents for the work.

1. Understand the client's goal. The successful start-up of a project begins with all parties developing a clear understanding of the client's goals for the project. In the initial development of the plan, several individual goals may be identified. There may also be incompatible goals which must be reconciled early in the initial phase of the project.

EXISTING CONDITIONS



Sinkholes at Bulkhead



Southside Bulkhead



Existing Pier Features

Therefore, after an initial meeting with the client, our Team will study the BRA's overall goals, and make broad evaluations of the site, functional size requirements, and financial resources required to meet these goals. Alternatives will be developed and discussed with the BRA to start the process of determining the most suitable means of meeting the projects goals.

2. Make clear, concise and easily understood graphical presentations of alternatives. This step is important in affirming that communication between all parties is clear, and that the relative merits of various alternatives can be identified and evaluated.
3. Prepare tabulated schematic cost summaries for appropriate alternatives so that relative costs and cost-to-benefit implications of these alternatives can be clearly understood.
4. Maintain an open communication with the client throughout the project. This can be accomplished by the following methods:
 - A. Periodic reporting meetings.
 - B. Copy client on all correspondence.
 - C. Prepare and furnish client with minutes of all meetings with client, agencies, community, and others.
 - D. Written progress reports.
 - E. Inform client in advance of all working meetings to offer his representative the opportunity to attend.

C. Project Design

1. Preliminary Design

The central challenge for the design of Pier 3 will be to successfully accommodate all of the site's major functions: providing a setting and orientation to the Navy Yard waterfront; interpreting this part of the Boston waterfront's history; and providing for a variety of active and passive waterfront recreational activities.

The preliminary design phase, which includes schematic design and design development, will focus on the development of suitable program concepts to expand the public recreational use of the pier.

During schematic design we will develop alternates for providing for the public recreational use of the pier. The alternates will address:

1. Safe and comfortable pedestrian movement.
2. Boating facilities and dockage.
3. Recreational fishing area.
4. Park amenities including benches, shelter, restrooms and concession stand.

5. Amphitheater and stage area.

6. Maritime oriented educational exhibits and facilities.

The successful integration of these features into the project must include the input of the regulatory agencies and concerned community groups. Community liaison specialists will coordinate this task.

We will determine the location of adjacent property lines and the pier and bulkhead line. This data will be utilized in establishing the seaward limit of the pier restoration.

Pier 3 can be developed as a unique destination point at Charlestown Navy Yard. Developing the Educational Boat Building School as an apprenticeship facility that can be observed and appreciated by both residents and visitors is the type of appropriate activity that can draw people to the pier, provide them with a greater understanding and appreciation of harbor activity and establish a unique educational identity for Pier 3. An educational theme can be expanded on with the addition of harbor-oriented graphic exhibits and permanent signage.

We will investigate alternate pier structure types and methods of rehabilitation of the existing bulkhead structure. Our evaluations will address related environmental impacts, initial construction costs, and long term maintenance impacts on cost and operations at the facility.

We have visited the site and reviewed available drawings of the existing construction. We observed sink holes in the pavement adjacent to the bulkhead, a condition we have observed many times at facilities of this type and age. It is due to soil material being washed through holes in the bulkhead. Our experience indicates that while local repairs can be made, they are usually not cost effective on a life cycle basis.

The outer 225 feet of the pier will be constructed over open water in an area previously occupied by a timber pier. The remaining 300 feet of the proposed reconstruction will involve a section of existing Pier 3 which abuts Drydock No. 2. Existing features in this section include the concrete walls and crane supports for the drydock, a central rectangular soil filled sheet pile cofferdam, and timber or concrete decks supported on timber piling.

New construction alternatives must address the possibility of encountering obstructions such as portions of the old timber piles which may have been left in place when the pier was demolished.

Site visits will be made to photographically record the character of the surrounding area and document existing conditions. Research of historic/archival records and documents will be performed. This information will be utilized throughout the project to insure that the historic nature of the site and its surroundings are recognized. This concept applies with equal importance to not only the overall concept and theme of the park but also to the selection and detailing of its components such as benches, railings, lighting and surface finishes.

When appropriate, renderings and large size plans will be prepared for presentation purposes to illustrate various concepts with respect to facility use and amenities. This work will be developed based on interaction with the BRA and other agencies.

Design development will proceed after approval of the schematic design. The approved schematic arrangement for the recreational features of the facility will be further developed in this phase. The scope and general detail of the repair, rehabilitation or replacement of the existing pier structures will also be presented. The preliminary plans prepared in this phase will indicate all components of the project in their proposed locations and with all principal components sized.

Outline specifications will be prepared noting the type and quality of the materials proposed for use. A construction cost estimate will be prepared which will accompany the submittal of the preliminary design to the Authority for review and comment.

2. Construction Contract Documents

Final construction contract drawings and specifications will be prepared which will incorporate comments from the previous submittal.

Variation from the previously approved concepts will not be made without prior approval of the Authority. A construction cost estimate will be prepared for the work. Prior to submittal of the completed documents for bidding purposes, the final construction contract documents will be furnished for review and comment, and comments will be incorporated into the work.

D. Field Investigations and Other Special Services

Field investigations will include the following:

- o Soil Borings and Test Pits
- o Hydrographic and Topographic Survey
- o Existing Conditions Survey

Soil Borings and Test Pits

Based on previous experience at Pier 5 and Flagship Wharf, we expect a geologic transition to be disclosed along the length of the Pier 3. Along the shoreline at the northwest end of Dry Dock 2, we anticipate natural ground conditions below a layer of man-made fill. The natural deposits would consist of glacial till, a dense mixture of cobbles, gravel silt and clay, commonly described as hardpan. The surface of this deposit dips with increasing distance away from the shoreline. A layer of clay was then deposited over the hardpan.

The location of the transition from hardpan to clay and the thickness and properties of the clay will be factors to consider in the design of the new pier facility. New sheet piling, for example, may require embedment in the glacial till in order to develop adequate tow resistance. The depth to and density of the till would then be an important design and construction issue. The depth of the glacial till is also an important factor in the design of bearing piles for the pier. Based on our experience at the Navy Yard, we know we must look for this till to clay transition and we will implement a subsurface exploration program to obtain this information.

Based on our assessment of the site geology, site access and general conditions of the pier, we will conduct a subsurface exploration program consisting of machine excavated test pits and test borings. Borings will be completed on land and over water on barge mounted equipment. We anticipate three water borings and six land borings. The location of the land borings will be adjusted to account for utilities, tie-rods, pier and deck conditions, etc. Test pits will be excavated to expose and sample fill material within the cofferdam and to check conditions behind the existing wood sheeting. The proposed locations of the borings and test pits are indicated schematically in the attached figure. Soil samples will be recovered and tested for engineering and chemical properties.

We will monitor the field explorations on a full-time basis to log soil conditions and to adjust sampling procedures to suit field conditions. Laboratory physical property soil testing will be completed on selected samples. Test pit and test boring logs and reports of field explorations, sketches of pier geometry, profiles of subsurface conditions and summaries of engineering-soil test will be assembled in a Data Report which will serve as a reference document for the design of the pier.

Hydrographic and topographic surveys will be made. The hydrographic survey will extend 25 feet from the new pier envelope. Topographic surveys will include the establishment of a construction baseline and benchmark as well as locating prominent existing features and invents of existing utilities for tie-in purposes.

The condition of the existing steel sheet pile bulkhead will be visually inspected. Since the maximum corrosion of a steel bulkhead typically occurs at and just below Mean Low Water, it is anticipated that the inspection can be made from a boat or the adjacent floats. However, the project team includes a registered professional engineer who is also a certified scuba diver, in the event that diver inspection is necessary.

E. Environmental Regulatory Requirements

We understand that documentation for a Notice of Intent and a Chapter 91 License have been prepared. Depending upon the final scope of the reconstruction work, these documents may require modification. It is anticipated that permits/approvals will have to be obtained from the following agencies:

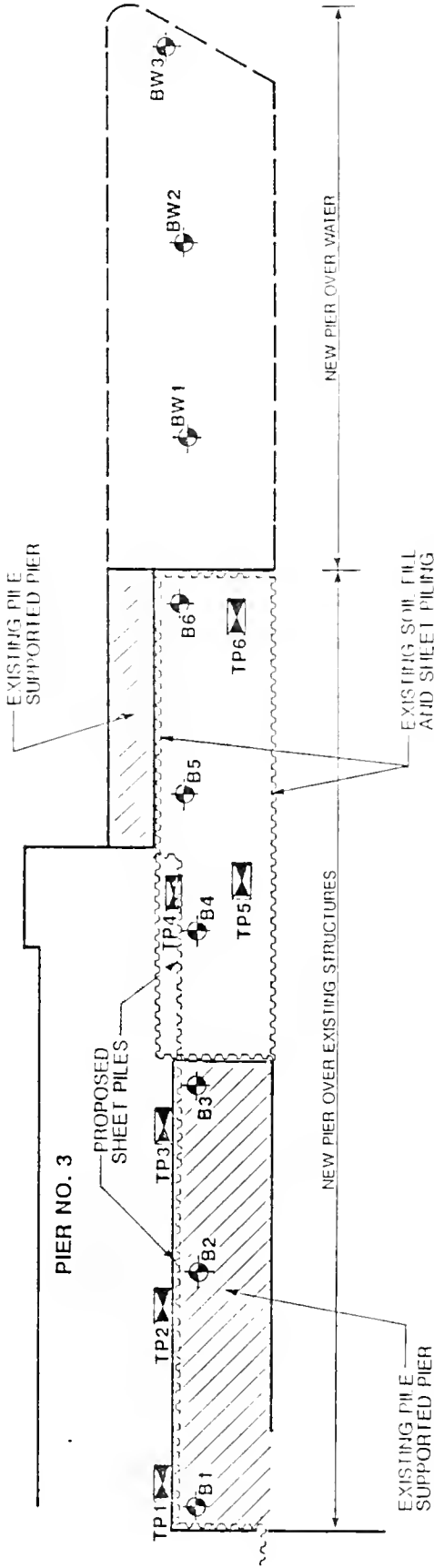
1. Boston Conservation Commission - Order of Conditions. This requires the filing of a Notice of Intent and appropriate public notice.
2. Department of Environmental Quality Engineering, Waterway Regulation Program - Chapter 91 License.
3. Department of Environmental Quality Engineering, Division of Water Pollution Control - Water Quality Certification.
4. Massachusetts Environmental Policy Act Unit - Environmental Notification Form (ENF). From this, a determination is made of whether or not an Environmental Impact Report (EIR) is required.
5. Massachusetts Office of Coastal Zone Management - Determination of Consistency.
6. U.S. Army Corps of Engineers - Department of U.S. Army Permit.

The work associated with completing applications and notification submittals will commence after BRA concurrence with the schematic design. A number of the permit requirements have mandated review periods and the timely filing of permit applications is necessary to avoid regulatory delays.

Each of the original applications/notifications will be submitted to the Authority in draft form for approval. Upon receipt of approval the appropriate final applications will be prepared and submitted to the Authority along with the required number of copies for distribution to reviewing agencies.



DRY DOCK NO. 2

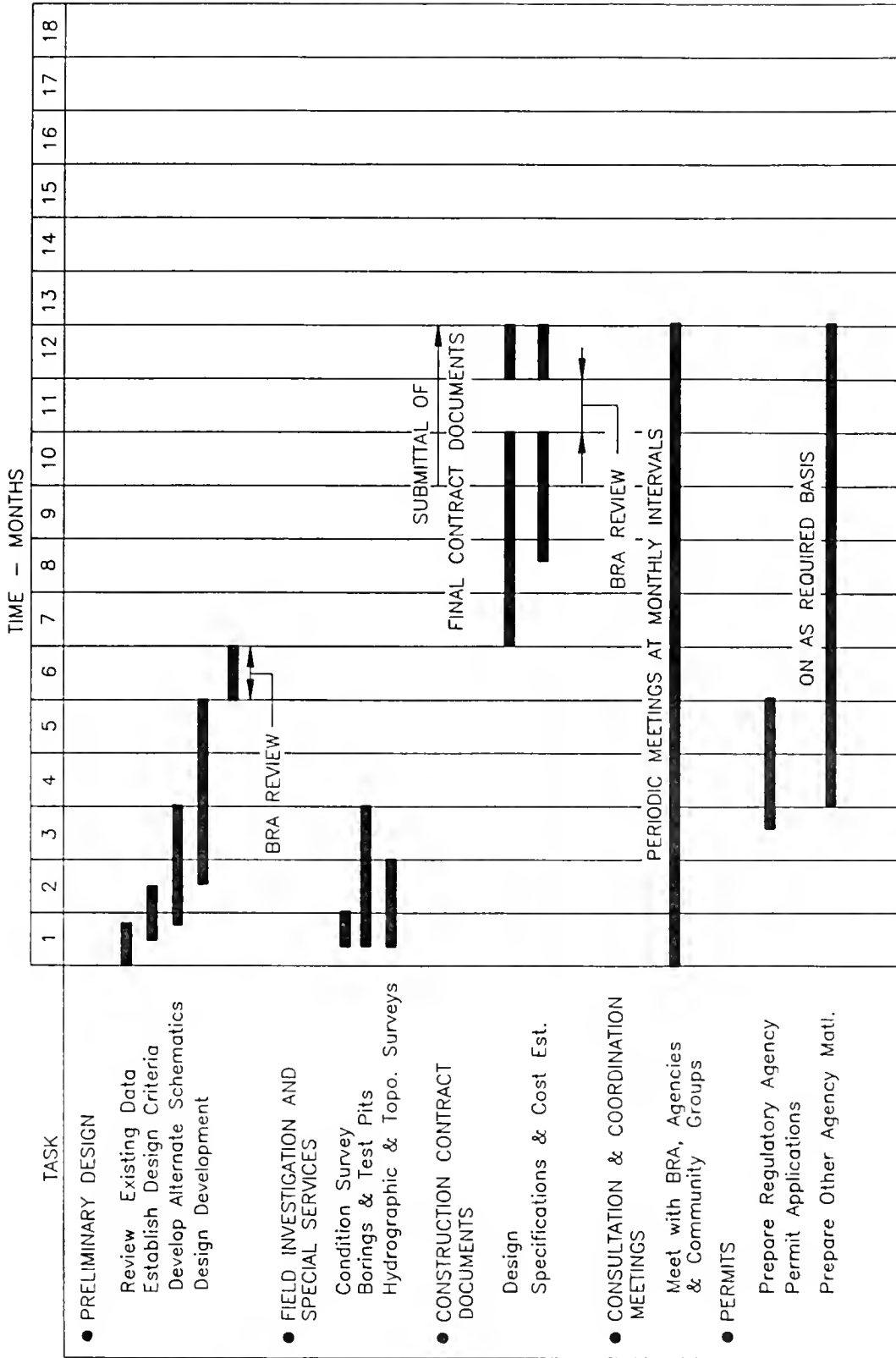


PLAN
SUBSURFACE EXPLORATIONS



III. PROJECT SCHEDULE

PROJECT SCHEDULE



IV. PROJECT ORGANIZATION

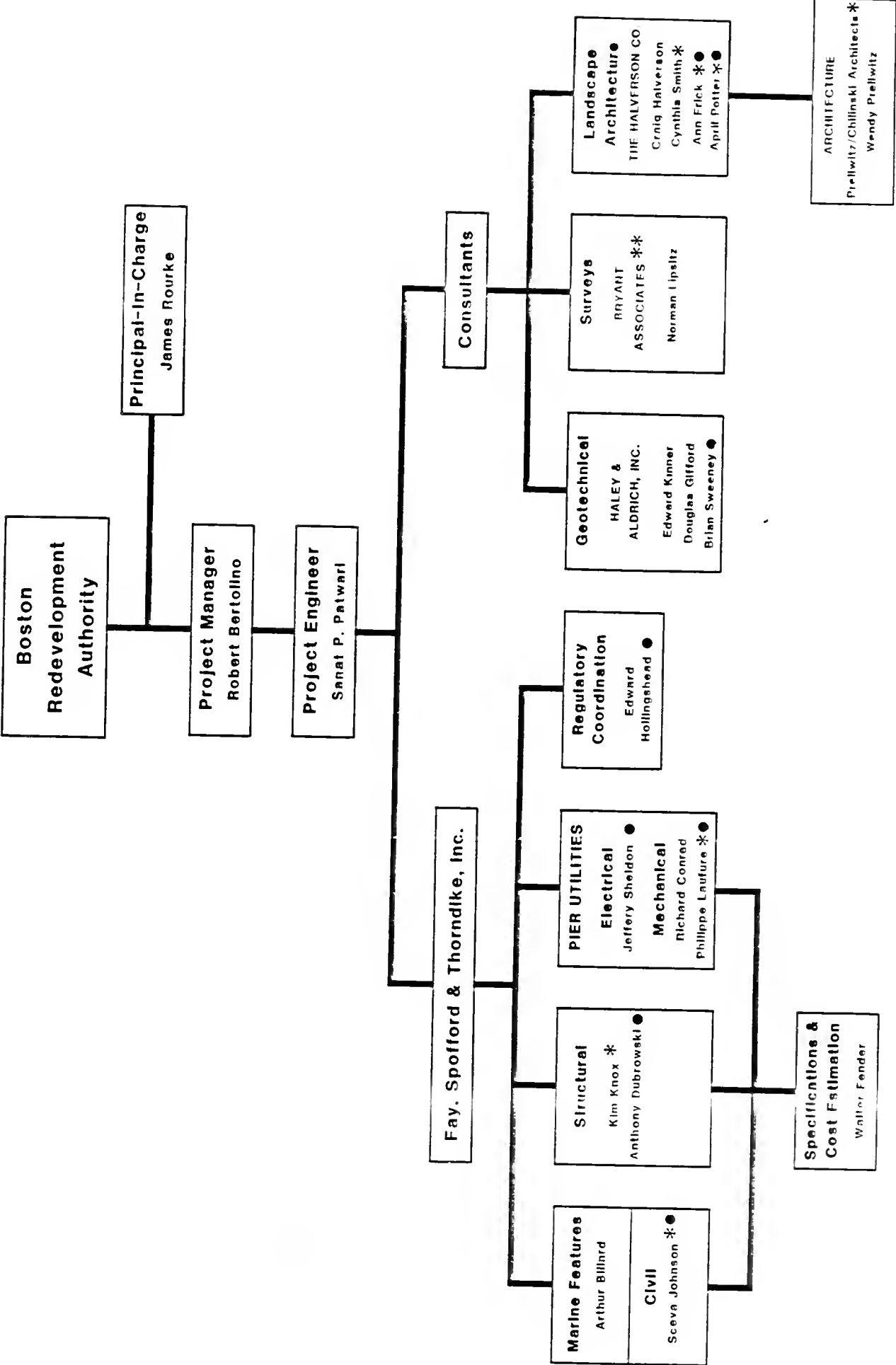
IV. PROJECT ORGANIZATION

As prime consultant, FST will be responsible for overall project management. The firm has committed to this project top managerial and technical personnel who represent many years of experience on related waterfront design projects, and who will bring to this work the proven ability to assure a technically excellent product completed within established budgetary and time guidelines. Assigned as **PRINCIPAL IN CHARGE** is **JAMES G. ROURKE, P.E.**, Vice President of FST, and Manager of the firm's Waterfront Department. In this role, he will assure full corporate responsiveness to the needs of the project and will assume responsibility for all contractual matters and for top-level technical review. In his 24 years at FST, he has directed and designed projects for marine facilities of all types, ranging in scope from improvements to municipal piers and terminals to large-scale design projects for the U.S. Navy. Examples of his relevant work include pier and ferry terminal design for the Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority, and improvements to a town pier in Duxbury.

Assigned as **PROJECT MANAGER** is **ROBERT E. BERTOLINO, P.E.** Mr. Bertolino is Deputy Manager of FST's Waterfront Department and has 21 years of experience with the firm. As Project Manager, Mr. Bertolino will be responsible for top-level technical review and overall coordination of all aspects of the project. The many Boston-area waterfront facility planning and design projects in which he has served in this role include a fireboat and passenger ferry pier at Logan International Airport, design of a commuter boat and fish pier in Hull, improvements to municipal wharves and piers in Provincetown and Duxbury, a marine structures and beach restoration project in South Boston, and structural design for Shipyard Park.

SANAT P. PATWARI, P.E. will serve as **PROJECT ENGINEER**. In this capacity, he will direct the day-to-day conduct of the project and supervise technical personnel assigned to the work. During his 24 years of structural engineering experience, he has had design and management responsibilities on numerous projects involving waterfront facilities including drydocks, piers, and wharves and appurtenant structures. Representative of his relevant experience, Mr. Patwari was in charge of structural design and drawings for the new submarine pier at the USS Nautilus Memorial Library and Museum in Groton, CT, designed for truck and heavy crane loads as well as mooring the retired Nautilus submarine. His experience with structural design for waterfront facilities also includes large naval construction projects at locations across the United States.

Additional waterfront engineering experience is provided by **ARTHUR B. BILLARD** and **WALTER H. FENDER, P.E.** Mr. Billard and Mr. Fender specialize in design of waterfront facilities of all types, including piers, wharves, bulkheads, drydocks, and ferry terminals. Marine details will be the responsibility of Mr. Billard, and Mr. Fender will be responsible for specifications and cost estimates. Other FST staff members assigned to this project include electrical, civil, structural, and mechanical engineers who will be responsible for design of supporting structures and utilities associated with the pier reconstruction.



- * Minority/Woman Staff
- ** MBE/WBE Firm
- Boston Resident

PROJECT ORGANIZATION

JAMES G. ROURKE
VICE PRESIDENT & DIRECTOR
PRINCIPAL-IN-CHARGE



Mr. Rourke has directed and designed projects for port and harbor facilities of all types as well as transit, highway, and bridge projects. With FST since 1964, he heads the firm's Waterfront Department.

REPRESENTATIVE RELEVANT EXPERIENCE

Currently, Mr. Rourke is directing the design for rehabilitation of Mattakeesett Court Pier, Duxbury, MA. His relevant waterfront experience also includes design of piers, wharves, bulkheads, and mooring dolphins for the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority and for the Maine Port Authority.

He has played a key role in many waterfront projects for the U.S. Navy including development of conceptual design for a state-of-the-art submarine overhaul facility with an enclosed drydock and pumping station, at Portsmouth Naval Shipyard, NH; concept study for land level facility for vessel construction and repair, including ships lift and transfer systems, piers, wharves, bulkheads, and ship construction bays at Mare Island Naval Shipyard, Vallejo, CA; supervision of design and coordination for the TRIDENT-class submarine drydock, Bremerton, WA.

Other waterfront work has included supervision of inspection and evaluation of structural, mechanical, and electrical systems for certification of six drydocks and replacement of Drydock No. 6 superflooding sill at Puget Sound Naval Shipyard; design supervision for modifications to Drydock No. 2 and crane trackage system reconstruction at Portsmouth; and design supervision of a mooring system for LNG tankers at a fuel handling and storage facility in NH. He was also involved in design of piers and a 520 ft. by 193 ft. clear span rigid frame deep truss cover building in Kings Bay, GA for the Navy.

Recent work at FST has also included an assignment as part of the preliminary engineering for the proposed new Third Harbor Tunnel under Boston Harbor. Mr. Rourke directed the structural evaluation of the effects of this tunnel passing over a rapid transit tunnel. He has directed design of many diverse projects, including sewage treatment plants, major viaducts and highway bridges, for example, the Route I-91 viaduct in Springfield, Route I-93 doubledeck viaduct in Charlestown, and bridges on Route 93 in NH, Route 29 in NJ, and Route 95 in MA.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Merrimack College, B.S. Civil Engineering, 1964
Northeastern University, M.S., Civil Engineering, 1966

PROFESSIONAL SOCIETIES

Boston Society of Civil Engineers Section, ASCE; American Concrete Institute; Society of American Military Engineers

ROBERT E. BERTOLINO
ASSOCIATE
PROJECT MANAGER



Mr. Bertolino has been with FST since 1963 and has specialized in structural design and analysis, primarily for port and harbor works. He has extensive experience in all areas of waterfront planning, design, and the implementation of construction.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Bertolino was Project Engineer for relocation of a fireboat and ferry pier at Logan Airport; design of a commercial fishing and recreation pier, Provincetown, MA; structural design and coordination of other departments for a commuter boat and commercial fish pier at Hull, MA. He has also been responsible for maritime work for MDC in South Boston which included seawall rehabilitation, riprap slopes, and permit and licensing associated with MDC facilities.

Among his highly relevant credentials are his role as Structural Project Engineer for Phase I of Shipyard Park in Charlestown, MA and for development of the award-winning mooring pier for the USS NAUTILUS museum for the U.S. Navy in Groton, CT.

His extensive Navy experience includes Project Engineer for modernization of Pier F, Charleston Naval Shipyard, SC; design of Explosive Handling Wharf No. 1 at King's Bay, GA; new drydock caisson sill structure design at Drydock 2, Portsmouth, NH Naval Shipyard; structural design of caisson gates for Drydock 1, Charleston and TRIDENT submarine drydock, Bangor, WA; condition survey and design of structural repairs for DD 2 expansion and modifications of crane trackage, Portsmouth Naval Shipyard.

He served as Field Engineer on the construction of a ferry terminal at Hyannis, MA. Other waterfront related experience includes investigation of the suitability of an existing 25,000 DWT tanker wharf structure for mooring 60,000 DWT tankers; investigation of methods for rehabilitation of an existing bulkhead and providing a barge berth; design of piers, wharves, anchored bulkheads, fender systems, mooring dolphins, and transfer bridges. He has been responsible for the preparation of contract documents for dredging projects including field surveys, dredge material analysis, and environmental impact reports.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Northeastern University, B.S., Civil Engineering, 1967
Northeastern University, M.S., Structural Engineering, 1974

PROFESSIONAL SOCIETIES

Boston Society of Civil Engineers Section, ASCE

**SANAT P. PATWARI
PRINCIPAL ENGINEER
PROJECT ENGINEER**



Mr. Patwari's responsibilities include project management, conceptual design, foundation and structural analysis, supervision of design, feasibility and cost analyses, specifications, field investigations and reports. During his 24 years including 18 years at FST, he has had extensive experience on projects involving waterfront structures including drydocks, piers, and wharves; bridges and highways; sewage and water treatment facilities; dams; power plants; industrial buildings and parking garages.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Patwari's relevant experience includes serving as Project Structural Engineer for the the Nautilus Memorial Pier in Groton, CT, one component of a new museum and library complex. His experience with structural design for waterfront facilities also includes Explosive Handling Wharf No. 1 at the Naval Submarine Base, Kings Bay, GA; ships lift and transfer system, Mare Island Naval Shipyard, CA; caisson seat for Drydock No. 2, Portsmouth, NH Naval Shipyard; the TRIDENT-class submarine drydock, Bangor, WA; and certification reports for three drydocks and modification of Drydock No. 2 and caisson at Charleston Naval Shipyard in South Carolina. Also, at Logan International Airport, he provided structural design for a new ferry and fireboat pier.

Presently, he is providing structural design for a \$90 million section of the Central Artery-North Area Project, a complex highway interchange on viaduct structure, connecting I-93, the Central Artery, and approaches to the Tobin Bridge in Charlestown, MA. He was also involved in design of a \$50 million underground rapid transit station and pocket track structure on the Los Angeles, CA Metro Rail Project.

Mr. Patwari also served as Project Engineer for MDC Belle Isle Siphon headhouse rehabilitation in East Boston, and has supervised design of large drainage conduits for the Worcester Redevelopment Authority.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Gujarat University (India), B.E., Civil Engineering, 1962
Tufts University, M.S., Civil Engineering, 1964

PROFESSIONAL SOCIETIES

Fellow: American Society of Civil Engineers
Member: Boston Society of Civil Engineers Section/ASCE

ARTHUR B. BILLARD
SENIOR ENGINEER
SPECIAL MARINE FEATURES



Mr. Billard began his engineering work at FST in 1951 as an apprentice draftsman. His subsequent broad and extensive experience is in all phases of applied engineering. This has provided him with an excellent background for solving unusual problems of layout and design and for evaluating, developing, coordinating and implementing complex engineering details.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Billard's recent experience has included planning, layout, conceptual and schematic design of various port and industrial facilities and final design of special components, including piers, wharves, drydocks, closure caissons, construction cofferdams, well-unwatering systems of deep cofferdams, marine cargo terminals, ferry terminals, ferry transfer bridges, and special crane and railroad trackwork systems.

His specialties include dimensional coordination and control for all components of entire projects; locations, details, and arrangements of utilities; crane and railroad track components including switches, special frogs and crossings; cofferdam details; resilient fender details; and coordination and arrangement of contract drawings.

He has extensive experience on projects for the U.S. Navy. Recent examples of this work include the drydock and caisson for TRIDENT-class submarines, Bangor, Bremerton, WA; caisson inspection and repairs for Drydock No. 2, Portsmouth Naval Shipyard; new crane trackwork systems at Berths 6 & 7 and Drydock No. 2 at Portsmouth; new entrance and caisson seat for Drydock No. 2 and additional crane rail system at Drydocks Nos. 1 and 3 and Berths 11, 12 and 13, also at Portsmouth. He was involved in civil engineering design associated with the Berthing Pier at the Naval Station, Pascagoula, MS and was responsible for layout, drainage design, and alignment. Previous work at Portsmouth includes reconstruction of Drydock No. 3, deepening Berths 11, 12 and 13, and new crane trackwork at Berths 11, 12 and 13.

He also worked on ferry terminals at Woods Hole, Vineyard Haven, Oak Bluffs, Hyannis and Nantucket, MA. He was a key man on certification of three drydocks at Charleston Naval Shipyard; a wharf and bulkhead at Oak Bluffs, MA; a pier and bulkhead at Plymouth, MA; a container terminal, bulkhead, and railroad trackwork at Castle Island in Boston; a deepwater terminal at Ogdensburg, NY; seven ferry terminals in Penobscot Bay, ME; and inspection of Maine State Pier, Portland, ME.

He is presently involved in a project at Portland for the Maine Department of Transportation on the Peaks Island Ferry Terminal, evaluating the adequacy of existing pier facilities to handle new, larger ferry boats.

**WALTER H. FENDER
SENIOR ENGINEER
SPECIFICATIONS & COST ESTIMATING**



Mr. Fender's work has concentrated on preparation of specifications, cost estimates, reports, and studies for heavy waterfront construction. Projects have included port and terminal facilities, wharves, piers, bulkheads, cofferdams, drydocks, and crane rail systems at drydocks and piers. He has been with FST since 1969.

REPRESENTATIVE RELEVANT EXPERIENCE

Recent and continuing projects on which Mr. Fender has served as Project Engineer include an evaluation of waterfront conditions in Marshfield, MA; design for rehabilitation of the town pier as well as preparation of grant applications and environmental permits for Green Harbor, MA; concept studies for a lobsterman's terminal in East Boston, MA for Massport; review of marine construction documents for wastewater treatment, Milwaukee, WI; review of bridge fender damage claim, McArdle Bridge, Boston, MA; and review of mooring dolphin damage claim, Northville Terminal, Riverhead, LI, NY.

Mr. Fender served as Coordinating Project Engineer for the mooring pier, building services, and site utilities at the award-winning NAUTILUS Memorial Submarine Force Library and Museum at Groton, CT.

He has supervised the preparation of specifications and/or cost estimates for diverse waterfront projects including dredging, beach nourishment, and rehabilitation of MacMillan Wharf, Provincetown, MA; commuter boat and commercial fish pier, Hull, MA; restoration of granite walls, stone slopes, and beach areas in South Boston, MA for the Metropolitan District Commission; pier repairs and dredging at Massachusetts Maritime Academy for the MA State College System; shore bollards and quick release hooks for deep water LPG terminal at Newington, NH; and ferry terminals at Woods Hole, Vineyard Haven, and Hyannis, MA for Woods Hole, Martha's Vineyard and Nantucket Steamship Authority.

Naval projects for which he has prepared specifications and cost estimates include modifications to drydock pumphouse and caisson for Drydock No. 1, Charleston Naval Shipyard, SC; replacement of crane trackage, Portsmouth Naval Shipyard, NH; berthing pier, Pascagoula, MS; drydock and caisson for TRIDENT-class submarines, Naval Submarine Base, Bangor, Bremerton, WA; and new caisson sill entrance structure and wall repairs, Drydock No. 2, Portsmouth Naval Shipyard, Portsmouth, NH. His waterfront experience also includes preliminary studies for marine cargo terminals at Searsport and Portland, ME for the Department of Transportation; and studies to modify an oil tanker facility Cousins Island in Maine..

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

University of New Hampshire, B.S., Civil Engineering, 1962
Northeastern University, Project Administration Course, 1970
Suffolk University, M.B.A., 1972

ANTHONY DUBROWSKI
ENGINEER
STRUCTURAL ENGINEERING



Mr. Dubrowski's assignments at FST have included a wide range of projects involving structural analysis, design of new facilities, and evaluation and rehabilitation of existing structures. He has also been involved in architectural design of various buildings for water and sewage treatment, military, and commercial facilities. Mr. Dubrowski is a Boston resident and has been a member of the FST staff since 1972.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Dubrowski provided engineering support for FST's multidisciplinary engineering services for Shipyard Park in Charlestown. This involved redevelopment of a portion of the Charlestown Navy Shipyard by the Boston Redevelopment Authority and included a multi-level fountain, play areas, and landscaped areas.

He has provided engineering support on a number of waterfront projects for the U.S. Navy. At Portsmouth Naval Shipyard, he was involved with Drydock Nos. 1 and 3 and Berth 6. He was responsible for the architectural design of several TRIDENT Drydock support buildings at the Naval Submarine Base, Bangor, Bremerton, WA. For the recent Explosive Handling Wharf No. 1 Project at Kings Bay, GA, he was responsible for design of the wharf support building. He was also involved with a rehabilitation project at Drydock No. 3, Boston Marine Industrial Park, for EDIC.

Other FST experience involves design of buildings and tanks for rehabilitation and expansion of sewage treatment facilities in St. Albans, VT, Somerset, MA, and Webster, MA. This included design of the operations, preliminary treatment and chlorination facilities, as well as the design of primary settling, aeration, sludge digestion and final clarifier tanks. Also, he contributed structural design for the Combined Sewerage Overflow Facility for the City of Worcester, MA.

He participated in design services for the MBTA's Heavy Maintenance Facility, Charlestown, MA. Diversified assignments have also included preparation of a feasibility study and final design for an additional floor level to an existing structure for General Electric in NH.

Presently, he is involved in design for renovation and upgrade of various military family housing units for the U.S. Army Corps of Engineers in the New England area. This contract consists of work orders at COE facilities on an as-needed basis and involves diverse types of repairs.

He is also involved in a feasibility study for the construction of a new baggage handling facility at Logan Airport, Boston, MA.

EDUCATION

Wentworth Institute, Associates, Electronic Engineering, 1970
Wentworth Institute, Associates, Architectural Engineering, 1972
Northeastern University, B.E.T., Mechanical-Structural Engineering, 1981

**KIM KNOX
ENGINEER
STRUCTURAL ENGINEERING**



Ms. Knox has been a member of the Structural Department at FST since 1980. She has extensive experience in the areas of analysis and design of structures including marine facilities, bridges, and rapid transit structures. Her experience includes extensive knowledge of computer applications to structural design.

REPRESENTATIVE RELEVANT EXPERIENCE

The diverse projects that Ms. Knox has been involved with at FST include the structural design of several marine facilities. Representative examples include the live load rating of multi-span commercial piers at Provincetown, MA, structural and mechanical renovation for the modernization of the pumphouse at Drydock 1 for Charleston Naval Shipyard, South Carolina, and the design of an anchored bulkhead for Slip 3 at the Woods Hole Ferry Terminal in Massachusetts.

Currently, Ms. Knox is Assistant Project Engineer for bridge replacement design for the Towns of Lawrence and Billerica, MA and the rehabilitation of seven bridges under the Emergency Bridge Program for CT DOT.

Ms. Knox was involved in design of the superstructure for the Central Artery North Area Project involving demolition of ramps connecting I-93, Route 1 and the Central Artery in Charlestown, and replacement with a multi-level trumpet-shaped loop ramp interchange.

For the MDPW, she has designed bridge replacements in Worcester, Norfolk, Lenox, Bridgewater, and Brookfield and has determined live load ratings of numerous municipal bridges including steel, concrete, timber, and masonry structures. She was a member of the bridge inspection team for a project to inspect over 300 on-system bridges.

Ms. Knox participated in design of the MBTA's Southwest Corridor Project in Boston, including coordination with the adjacent Copley Place Project, and utilization of the air rights for the Berkeley Street Substation and Back Bay Station.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Tufts University, B.S., Civil Engineering, 1977
Tufts University, M.S., Civil Engineering, 1978

PROFESSIONAL SOCIETIES

Committee on Employment Conditions of the Boston Society of Civil Engineers; American Society of Civil Engineers; Boston Society of Civil Engineers Section/ASCE; Society of Women Engineers

JEFFREY P. SHELDON
SENIOR ENGINEER
ELECTRICAL ENGINEERING



Mr. Sheldon is experienced in the design and installation of electrical distribution systems both interior and exterior, overhead and underground, and at many different voltage classes; interior lighting; area lighting and flood lighting; motor power and control circuits; fire and other alarm systems; audio systems; and instrumentation and process control systems. Since joining FST in 1979, has worked on a variety of projects including parklands, highways, piers and wharves, rapid transit systems, vehicle maintenance buildings, sewage treatment plants, pumping stations, water supply facilities, and airports. Mr. Sheldon is a Boston resident.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Sheldon's experience with waterfront facilities includes rehabilitation of Pier F at Charleston Naval Shipyard, SC, for design of lighting and power, both to the pier facility and to the ships. He was also involved with the Explosive Handling Wharf, Kings Bay, GA, provided similar electrical design. He prepared the electrical portions of concept design studies for a state-of-the-art submarine overhaul facility for Portsmouth Naval Shipyard. Other waterfront-related engineering experience includes an assignment as Electrical Engineer on a Value Engineering team for several studies for the Department of the Navy for projects at Coco, FL and Alexandria, VA, which involved review of A/E plans to determine possible areas for cost savings.

He served as Deputy Chief Electrical Engineer providing construction related services for rapid transit traction power, traction power substations, and tunnel lighting for the MBTA's Southwest Corridor Project in Boston and coordinated closely with the landscape architects in the development of lighting for the linear parkland associated with this project.

His work also includes electrical design as part of extensive renovations to the MBTA's Vehicle Maintenance Facilities in Everett and the Albany Street Bus Garage in Boston. At Everett, a completely new electrical distribution system was designed, while, at Albany Street, he contributed design for a new lighting system. Also for the MBTA, Mr. Sheldon was involved in electrical design for Dudley Street Station.

Mr. Sheldon's diverse experience includes electrical design for a computerized airfield lighting control system at Logan International Airport in Boston; electrical design for additions and renovations to a wastewater treatment plant; modernization of a water treatment facility; and modernization of a groundwater pumping station.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Tufts University, B.S., Electrical Engineering, 1970
Northeastern University, M.S., Electrical Engineering, 1975

**PHILIPPE LAUTURE
JUNIOR ENGINEER
MECHANICAL ENGINEERING**



Mr. Lauture, a Boston resident, joined the staff of FST as a Draftsman while still an undergraduate. After receiving his degree in Mechanical Engineering in 1986, he was assigned to the firm's Mechanical Department. In his brief professional career thus far, he has amassed significant mechanical engineering experience on a variety of diverse projects.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Lauture has worked on two recent major projects for the U.S. Navy: the design of a new pumphouse for Drydock No. 1 at Charleston Naval Shipyard, Charleston, SC and the design of a new berthing pier at Pascagoula, MS. In the first instance, Mr. Lauture was responsible for design components of the plumbing system in the pumphouse. At Pascagoula, he worked on the design of the drainage system in the steam plant.

Under the firm's continuing contracts with the Massachusetts Bay Transportation Authority for the renovation and rehabilitation of various facilities, Mr. Lauture played a key role on the Albany Street Bus Garage Project which included the renovation of fixture units and partial design of the plumbing system. For another MBTA facility, the Charlestown Heavy Maintenance Shop, Mr. Lauture contributed to the plumbing and fire protection design.

Another area of experience is in the work associated with the development of wastewater treatment facilities, supporting FST's Environmental Department. Mr. Lauture completed an assignment on plumbing design associated with operations and specifically, sludge filtration processes, at the Wastewater Treatment Facility in Bellows Falls, VT and also designed the roof drainage system and some aspects of the plumbing for the Wastewater Treatment Facility Project in Somerset, MA.

One of his present assignments is part of an open-ended contract with the U.S. Army Corps of Engineers, New England Division. As a component of several work tasks at Fort Devens, Mr. Lauture is responsible for design of renovations of fixtures and minor plumbing rehabilitation work.

He has also worked on a project for a private sector client, locating sewer lines which will require removal and designing a new drainage system for buildings.

EDUCATION

Southeastern Massachusetts University, B.S., Mechanical Engineering, 1986

**SCEVA S. JOHNSON
ENGINEER
CIVIL ENGINEERING**



Mr. Johnson has extensive civil engineering design experience. In his 16 years with FST, he has been responsible for many stages of design and preparation of alignment, profile, right-of-way, signing (layout and location) and lighting, and grading plans for various projects. His particular area of expertise is alignment, profile design, and property computations. He also has extensive experience with application of computer programs to solve complex engineering problems. His diversified experience also includes a number of airport assignments. Mr. Johnson is a Boston resident.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Johnson has been involved in a number of the most complex transportation improvement projects in the Boston area. Recent design work included alignment, profile, and preparation of contract documents for the North Area - Central Artery project, which consists of the reconstruction of a complex double-deck viaduct and tunnel interchange. He was responsible for determination of right-of-way requirements for Third Harbor Tunnel/Depressed Central Artery project, also in Boston.

He had extensive involvement in the design of the \$744 million Southwest Corridor Project for the MBTA, with responsibilities including data collection for existing utilities and buildings; survey coordination; community participation; design and computations for railroad and transit track alignments and profiles; street layouts; invert slab geometrics; right-of-way and land acquisition plans; railroad and transit station platform layouts; specifications and estimates; and shop drawings review.

He has also been responsible for civil engineering design for a number of waterfront projects for the U.S. Navy. He prepared alignments, profiles, and grading plans as well as some utilities relocations for the TRIDENT Submarine Drydock at Naval Submarine Base, Bangor, WA. He served in a similar capacity for a drydock project at Portsmouth Naval Shipyard, NH.

He has also been involved in several interstate highway projects in NJ, NH, and MA; Boston's Melnea Cass Boulevard; an EIS for I-95 in MA; a major urban arterial roadway in NH; and the areawide TOPICS/Urban Systems program in several Massachusetts communities.

He has participated in airport design projects at Logan International where he provided civil engineering design in the 1985-1986 and the 1986-1987 Airfield Improvements Program and the North Cargo Apron project. He was also responsible for design components of the relocation and extension of Taxiway D at Nantucket Memorial Airport.

EDUCATION

Northeastern University, B.S., 1972, Civil Engineering

**RICHARD P. CONRAD
SENIOR ENGINEER
MECHANICAL ENGINEERING**



Mr. Conrad has over 35 years of mechanical engineering experience. He has prepared specifications, cost estimates, installation drawings, purchased equipment, and supervised installation of many HVAC, dust and pollution control systems. His duties included design, coordination, and supervision of dust collector, piping, baghouses and HVAC equipment systems including dust collector maintenance procedures. His experience also includes computer room air conditioning, heating systems, and design of controlled environments.

REPRESENTATIVE RELEVANT EXPERIENCE

Among Mr. Conrad's highly relevant experience is his mechanical engineering effort for the award-winning USS NAUTILUS Pier and Submarine Force Museum for the U.S. Navy at Groton, New London, CT. He was responsible for design of heating and cooling at the Museum and provision of utilities to the submarine.

Other recent projects include an energy audit for the Somerset, MA wastewater treatment plant, and heating and ventilating equipment, laboratory and office air conditioning, and heating boiler installations for the St. Albans (VT) wastewater treatment plant, presently under construction.

He conducted a mechanical systems survey inclusive of HVAC, plumbing, and fire protection systems for Charles River Park in Boston. Included in this was an evaluation of the existing physical plant and estimates of life expectancy, maintenance costs, possible modifications for energy savings and operational improvements, etc. to determine efficiency, code conformance, potential modifications, and energy savings.

He designed heating, air makeup, and air conditioning at Northwest Airlines cargo terminal and offices at Logan Airport, Boston, MA, and renovations to the Albany Street Bus Garage for the MBTA including heating, ventilating, and air conditioning. This involved installation of air makeup equipment, exhaust fans, heating, and ventilating units. Also for the MBTA, Mr. Conrad was responsible for design of a new heating plant for the Cabot Maintenance Facility in Boston with underground steam distribution piping, steam boilers, and boiler feedwater system.

REGISTERED PROFESSIONAL ENGINEER

EDUCATION

Worcester Polytechnic Institute, Plant Engineering Program, 1984
Worcester Polytechnic Institute, Project Management Seminar, 1982

PROFESSIONAL SOCIETIES

Massachusetts Society of Professional Engineers; American Society of Heating, Refrigerating & Air Conditioning Engineers - Boston Chapter

**EDWARD D. HOLLINGSHEAD
PRINCIPAL PLANNER
REGULATORY COORDINATION**



Mr. Hollingshead, a Boston resident, has participated in diverse planning projects in both the public and private sectors. Public sector background includes employment with two regional planning agencies, involved in transit studies conducted for regional transit authorities, highway improvement projects, air quality planning, and review of environmental documents. He co-authored the first comprehensive guide for local officials which explained the State/Federal Planning and Funding process for Highway and Transit Projects in MA. He has prepared numerous environmental documents since joining FST in 1985.

REPRESENTATIVE RELEVANT EXPERIENCE

Mr. Hollingshead has coordinated and prepared the environmental documentation for many FST projects. He has also been responsible for filing permit and license applications with regulatory agencies, and providing coordination among the submittals for the clients to the various agencies involved. A number of recent projects have involved regulatory coordination for waterfront projects.

Recently, he was responsible for preparation of an Environmental Assessment for the U.S. Navy documenting the impacts of new facilities proposed for Portsmouth Naval Shipyard, NH. Environmental analyses addressed alternatives to the proposed action and documentation of existing conditions in the area. Areas of study included historic and cultural resources, zoning and land use, socioeconomic, traffic, navigation, coastal zone management, infrastructure, water quality, hydrodynamics, geology and sediments, bathymetry, aquatic biology (including a highly specialized study of a seasonal lobster fishery), terrestrial ecological resources, air quality, noise, and vibration.

He developed a coordinated permitting program for a proposed waterfront development including residential and marina facilities at Lynn Harbor, MA. For this project, in addition to coordination with the MEPA Unit, Coastal Management Office, Corps of Engineers, and Division of Waterways, Mr. Hollingshead was responsible for preparation of an Environmental Impact Report.

He has also directed a number of transportation planning and traffic studies. He was Project Manager for a comprehensive transportation needs study in Maine of the Route 196 Lewiston - Auburn Corridor. Included in this project was a detailed analysis of area demographic and economic conditions. The client for this work was the Lewiston - Auburn Comprehensive Transportation Study and the Maine Department of Transportation.

EDUCATION

University of Massachusetts, B.S., Natural Resources, 1975
Boston State College, M.S., Urban and Regional Planning, 1979
Harvard University, Urban Waterfront Development Seminar, 1986

CRAIG C. HALVORSON
Principal

Mr. Halvorson was graduated with honors from the University of Massachusetts in 1966. He was recipient of the Certificate of Merit for Excellence in the study of landscape architecture from the American Society of Landscape Architects. He began his professional career with the firm of Mason and Frey in Cambridge, Massachusetts. In 1968 he returned under scholarship to the University of Massachusetts for graduate study in Landscape Architecture and Regional Planning. Concurrently, he worked for the office of Research, Planning and Design Associates in Amherst, Massachusetts. Upon completing his graduate degree he joined the firm of Johnson and Dee in Avon, Connecticut.

In 1971 Mr. Halvorson returned to Cambridge, Massachusetts accepting an offer from Carol R. Johnson & Associates, Inc. He remained with that office for nine years. As Senior Vice President he was involved in management decisions in addition to his responsibilities as a principal designer and project manager. Between 1973 and 1975 he was an adjunct professor of landscape architecture at the Rhode Island School of Design in Providence, Rhode Island. In 1984 Mr. Halvorson served as a member of the AIA Regional Design Assistance Team in Albuquerque, New Mexico.

In 1980, he founded The Halvorson Company, Inc., a firm specializing in landscape architecture and site planning. Mr. Halvorson serves as President of the firm and is a Director. He is a registered landscape architect in the states of Massachusetts, Maine, Rhode Island, Connecticut and Virginia. He is also certified with the Council of Landscape Architectural Registration Boards.

CYNTHIA WEBSTER SMITH
Senior Associate

After ten years of professional practice at the SWA Group and Sasaki Associates, Ms. Smith has joined The Halvorson Company, Inc. as a Senior Associate. Her experience includes comprehensive park and open space planning and design; urban design; waterfront, corporate and institutional work.

Ms. Smith received her Bachelor of Landscape Architecture at the University of Oregon in 1976. She then worked for six years at Sasaki Associates in Watertown, MA. where her responsibilities as an associate ranged from conceptual design through preparation of construction documents including the recently completed Smithsonian South Quadrangle project in Washington, D.C. and several waterfront park projects.

In 1984 she received a Master of Landscape Architecture in Urban Design from Harvard University. She joined The SWA Group in the same year as a project team captain and designer. While at The SWA Group Ms. Smith worked on the planning and design of several projects including the Springside project, a 35 acre, 100 unit residential development which included preservation of 20 acre historic landscape designed by Andrew Jackson Downing; several office park developments and a mixed use waterfront development. She was project landscape architect for a 1,000 acre resort/ residential development, Heritage Greylock, which has received a 1987 Boston Society of Landscape Architect's Award.

Ms. Smith has been an instructor in Landscape Architecture for the Radcliffe Seminars. She is also the New England Representative for the Alumni Council for Harvard University, Graduate School of Design and is the Vice President for the Boston Society of Landscape Architects. She is a Registered Landscape Architect in the Commonwealth of Massachusetts.

ANN FRICK

Associate

Ms. Frick was graduated from Bowdoin College in 1977 with a Bachelor of Arts degree in history. In 1983 she received a Master of Landscape Architecture degree from the University of Virginia. While in Virginia she worked for the Charlottesville firm of Rieley & Associates as a staff landscape architect.

Ms. Frick joined the firm of William Pressley & Associates, Inc. in 1983, where her responsibilities included design and presentation before public agencies, client coordination, the preparation of contract documents, and site supervision. She was made an associate in 1984 and a Senior Associate in 1985, by which point her representative projects included various projects for Harvard University, urban site design for New England Medical Center, and a number of commercial developments.

Ms. Frick joined The Halvorson Company, Inc. in 1985 as a staff landscape architect becoming an Associate in 1988. Her responsibilities include project administration and management, site design and construction document preparation. She is a registered landscape architect in the Commonwealth of Massachusetts and a resident of Boston.

APRIL POTTER

Ms. Potter was graduated from Cornell University in 1986 with a Master's Degree in Landscape Architecture. While pursuing her degree she was employed by the Campus Planning Office and wrote landscape design guidelines for several towns participating in the Department of Regional Planning's small town revitalization program. Prior to graduate school Ms. Potter worked for two years with Theodore Osmundson & Associates of San Francisco, California.

Upon receiving her degree, Ms. Potter joined the firm of Keith French & Associates in Portland, Maine. She was responsible for conceptual design, design development and the preparation of construction documents for a variety of projects including a downtown revitalization project, a recreational and athletic waterfront complex and a number of commercial and institutional projects.

In 1988, Ms. Potter joined The Halvorson Company, Inc. where she is a staff landscape architect with responsibilities for site design and construction document preparation. Ms. Potter is a resident of Boston.

Edward B. Kinner

Principal and Senior Vice
President
Haley & Aldrich, Inc.

Experience

1970 - Present

Haley & Aldrich, Inc.

Project Manager for geotechnical aspects of a broad range of projects. Experience includes geotechnical design and construction aspects of pipelines, wastewater and water treatment plants, sewerage pumping stations and below grade combined sewer overflow collection structures at numerous locations. Other projects include liquefied gas and fuel storage tanks.

Dr. Kinner's experience includes construction on soft ground includes embankment stability evaluations for design of highways constructed on sensitive marine clays in New England. Provided independent assessment of undrained shear strength of foundation clays for an offshore diked disposal area, Chesapeake Bay, Maryland. Conducted failure investigations of wharf and waterfront retaining structures founded on sensitive clay, Portland, Maine. Evaluated foundation stability of existing 12.5 mile long Great Salt Lake Causeway, Utah, founded on clay and salt foundation conditions.

Dr. Kinner has had numerous waterfront structure projects involving bulkheads, trestles, mooring bollards and drydocks. He served as geotechnical project manager for the Trident drydock, Bangor, WA involving design of a graving drydock of the gravity type. Work included design and management of a state-of-the-art subsurface exploration program within soils exhibiting unique artesian pressures, design of construction phase and in-service phase artesian pressure relief systems, slope stability for seismic conditions, and the geotechnical aspects of the design and construction performance monitoring of a deep-water steel sheetpile cellular cofferdam.

Project manager for geotechnical studies concerning feasibility of a ship lift and transfer system, Mare Island Naval Shipyard, Vallejo, CA; performed safety evaluations for eleven existing graving drydocks; geotechnical project manager for Explosive Handling Wharf, Trident submarine base, Kings Bay, Georgia.

Experience includes the geotechnical design and construction for low to medium rise buildings, involving piles, caissons and spread footings. Other work includes the geotechnical design of the MMWEC fossil fuel power plant, Ludlow, MA, and three 15 MW wood fired electric generating plants northern New England.

Edward B. Kinner
Haley & Aldrich, Inc.
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Geotechnical Project Manager for environmental impact study of the depression of the Central Artery, Boston, MA.

1961 - 1965 Officer in the U.S. Navy dealing in marine propulsion and communications

Education

Rensselaer Polytechnic Institute, Troy, NY, B.C.E. 1961
Massachusetts Institute of Technology, Cambridge, MA
S.M. 1967, Sc.D. 1970

Professional Registration

Massachusetts, Rhode Island

Professional Societies and Other Activities

American Society of Civil Engineers - Member
Boston Society of Civil Engineers Section, ASCE - Member
(President, 1981 to 1982)
Earthquake Engineering Research Institute
International Society of Soil Mechanics and Foundation
Engineering
Seismic Advisory Committee to the Massachusetts State
Building Code Commission (1975 to 1981)
Technical Advisory Committee on Seismic Design Provisions,
Massachusetts State Building Code, Boston Society of Civil
Engineers Section, ASCE (1981 to 1986)

Honorary Societies and Awards

Chi Epsilon, Sigma Xi
1983 Thomas A. Middlebrooks Award, American Society of Civil
Engineers

Publications and Papers

Over 10 papers in national/international journals/conference proceedings.

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AGA

Douglas G. Gifford

Associate and Vice
President
Haley & Aldrich, Inc.

Experience

1965 - Present

Haley & Aldrich, Inc.

Project Manager and Associate-in-Charge for the completion of the evaluation and inspection of more than 30 dams from 1978 through 1981. Analysis and design of remedial measures for control of seepage for dams in Burlington, Mass., Millinocket, Me., and Goshen, Conn. Engineering analysis of settlement and seepage problems leading to failure of the Erie Canal during a tunnel project. Investigation of seepage problems for cofferdams in marine and on land environments.

Mr. Gifford served as Manager of Field Instrumentation Services for Haley & Aldrich and has applied instrumentation to measure in-situ behavior of soil and rock structures including monitoring of earth and rock anchors, measurement of deflections and earth loads on tunnel linings, and in-situ temperature measurements. Pertinent examples of field instrumentation projects include instrumentation of 200 ft. high highway rock slope in the area of a major rock slide; 40 to 60 ft. deep braced excavation utilizing combinations of internal bracing, tieback, soldier piles and lagging, steel sheeting and slurry trench-diaphragm wall systems; performance testing of earth and rock anchors to determine tendon loads and creep in grouted anchor zones; monitoring of earth load, water pressure, surface settlement, and liner deflections during tunneling and pipe jacking in soft ground; use of cross hole seismic velocity measurements with impact energy source to determine elastic moduli of soil and rock.

Project Manager and Associate-in-Charge of geotechnical engineering of projects including structure foundations, soft ground and hard rock tunnels, earth embankments, and braced excavation. Directed the investigation of soil and foundations conditions in Bangkok, Thailand for design of twenty miles of tunnels (7 ft. to 13 ft. diameter), pile footing foundations and slope stability, problems in soft clay. Evaluated potential land subsidence problems in soft clay due to continuous pumping of ground water. Completed research report for the U.S. Department of Transportation evaluating the utilization of tunnel muck produced from soft ground and rock tunnels.

Project Manager and Associate-in-Charge of subsurface investigation and foundation design for Worcester Centrum in Worcester, Massachusetts.

GA

Douglas G. Gifford
Haley & Aldrich, Inc.
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Education

Harvard University A.B. 1964, B.S. 1965
Massachusetts Institute of Technology S.M. 1971

Professional Registration

Massachusetts

Professional Societies

American Society of Civil Engineers
Boston Society of Civil Engineers Section, ASCE
South East Asian Society of Soil Engineering
Association of Soil and Foundation Engineers, Associate
Director, 1980

Special Studies and Courses

Soil Mechanics Program for Practicing Engineers and Teachers
directed by Dr. Arthur Casagrande, 1965.

Publications and Papers

"The Performance of Jetted Sand Drains in a Sensitive Clay",
S.M. Thesis, M.I.T., 1971

"Undrained Strength of Soft Bangkok Clay", with C. C. Ladd and
Z. C. Moh, Proceedings, Fourth Asian Regional Conference on
Soil Mechanics and Foundations Engineering, Bangkok, Thailand,
July 1971

"Statistical Analyses of Undrained Shear Strength of Soft
Bangkok Clay", with C. C. Ladd and Z. C. Moh, presented at
Conference on Application of Statistics and Probability of
Soil and Structural Engineering, Hong Kong, September 1971.

"A Case Study of the Bauer Earth Anchor" with M. C.
Oosterbaan, Proceedings, ASCE Specialty Conference on Per-
formance of Earth and Earth-Supported Structures, June 1972 -
Vol. I

Douglas G. Gifford
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Publications and Papers (Continued)

"Performance of Embankments with Sand Drains on Sensitive Clay", with C. C. Ladd and J. J. Rixner, Proceedings, ASCE Specialty Conference on the Performance of Earth and Earth-Supported Structures, June 1972 - Vol 1

"Rama IV Drainage Scheme" with C. E. Kline, J. S. Lovewall and R. J. Jenny, Tunnels and Tunneling, September 1973

"Behavior of Shallow Footings Near A Diaphragm Wall" with E. G. Johnson and M. X. Haley, ASCE Annual Convention, San Francisco, CA, 17-21 October 1977

Muck Utilization in the Urban Transportation Tunneling Process, with T. K. Liu, R. P. Stulgis, D. L. Freed, U. S. Department of Transportation, Report No. UMTA-MA-06-0025-77-15, 384 pp., 1977

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Bryan P. Sweeney

Senior Engineer
Haley & Aldrich, Inc.

Experience

1987 - Present

Haley & Aldrich, Inc.

As a Senior Engineer, Dr. Sweeney is responsible for foundation recommendations, retaining wall design of braced excavation systems, and analysis of geotechnical instrumentation data. Since joining Haley & Aldrich, he has participated on numerous projects including the geotechnical aspects of the 75 State Street Building, Boston, MA, and I-93 and Central Artery North Section, Charlestown, MA. He has also been involved in the subsurface exploration and recommendations for office/commercial buildings and retaining walls in Lexington and Lawrence, MA.

1976 - 1980

Parsons, Brinckerhoff,
Quade and Douglas
Boston, MA

During his five years with the firm, Dr. Sweeney was a Design Engineer for the Harvard Square Subway Station project in Cambridge, MA, and the MBTA Orange Line Tunnel in South Cove, MA. Other geotechnical assignments included site and subsurface investigations, laboratory and field monitoring, preconstruction surveys and construction monitoring. His responsibilities included finite element analysis and design of tunnels, excavation support systems, and shallow and deep foundations. Additional experience included participation in many phases of structural projects. Structural responsibilities included analysis and design of retaining walls, abutments, buildings, culverts, subway stations, simple and continuous span bridges.

1984 - 1985

Dr. G. Wayne Clough
Stanford University
Stanford, CA

Dr. Sweeney conducted engineering analyses for the BART Muni Turnaround in San Francisco, CA. In addition to this project his responsibilities included finite element analysis and design of tunnels, excavation support systems, and shallow and deep foundations.

1982 - 1983

Stanford University
and Virginia Tech

Research Assistant involved in evaluating ground response to advance shield tunneling by collecting and analyzing field data. Dissertation research involved cone penetrometers, calibrations chambers and in-situ methods to evaluate liquefaction potential.



Bryan P. Sweeney
Haley & Aldrich, Inc.
Page 2

1981 - 1982

Stanford University

Teaching Assistant responsible for lectures, demonstrations and grading undergraduate and graduate experimental soil mechanics classes.

Education

University of Notre Dame	B.S.C.E.	1976
Stanford University	M.S.C.E.	1982
Stanford University	Ph.D.	1987

Professional Registration

Massachusetts

Professional Societies

Boston Society of Civil Engineers
American Society of Civil Engineers, Associate Member
International Society of Soil Mechanics and Foundation
Engineering
Earthquake Engineering Research Institute

Honorary Societies and Awards

Chi Epsilon, Civil Engineering Honor Society, President, 1976
Featured Research Assistant, Virginia Tech Research Magazine

Publications and Papers

"Development of A Design Technology for Ground Support for Tunnels in Soil, Volume III. Observed Behavior of an Earth Balance Shield in San Francisco Bay Mud", with G. W. Clough, R. J. Finno and E. Kavazanjian, report prepared for the U.S. Department of Transportation, Stanford University, June 1982.

"Ground Deformations Induced by an Earth Pressure Balance Shield in Silts and Clays", with G. W. Clough and R. J. Finno, for Tunneling Technology Newsletter, National Research Council, U.S. National Committee on Tunnel Technology, December 1982.

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Bryan P. Sweeney
Haley & Aldrich, Inc.
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Publications and Papers (continued)

"Measured Soil Response to EPB Shield Tunneling", with G. W. Clough and R. J. Finno, prepared for the Journal of Geotechnical Engineering, ASCE, Vol. 109, No. 2, February 1983.

"Portable Mini-Cone System for Field Liquefaction Studies", with G. W. Clough, Proceedings of the 3rd National Conference on Earthquake Engineering, Volume 1, Charleston, South Carolina, August 1986.

"Design of a Large-Scaled Calibration Chamber", with G. W. Clough, to be published in the ASTM Geotechnical Testing Journal in 1988.

0097z/587

NORMAN I. LIPSITZ

Chief of Surveys

EDUCATION/REGISTRATION

A. E. Wentworth Institute

Registered Land Surveyor in the States of Massachusetts, Rhode Island and Connecticut

MEMBER: American Congress on Surveying and Mapping

EXPERIENCE

Mr. Lipsitz's professional career spans more than 17 years of experience in all phases of land surveying of which 4 years have been with Bryant Associates.

At Bryant Associates, Inc., Mr. Lipsitz is the Chief Surveyor responsible for all field survey personnel, deed research, calculations, preparation of right-of-way drawings, property plans and related surveying requirements associated with various projects undertaken by the firm. Current projects include surveying services for the Central Artery - North Area for the Massachusetts Department of Public Works. He is also involved as the Chief Surveyor for the redevelopment of the Columbia Point Housing Authority and the North Station Transportation Improvement Project for the Massachusetts Bay Transportation Authority.

Mr. Lipsitz supervises the activities of Bryant Associates four (4) survey parties, including scheduling, coordinating the reduction of field notes and plotting of the field information.

Prior to joining Bryant Associates, Inc., Mr. Lipsitz was involved in all the surveying for the Southwest Corridor Project (Orange Line Relocation) for the Massachusetts Bay Transportation Authority. This involved surveying of existing conditions, surveying of property lines for the proposed takings and preparation of all right-of-way drawings required.

WENDY PRELLWITZ

Professional Experience

Prellwitz/Chilinski Architects Inc.: President and founding partner, 1982.

Wendy Prellwitz/Architect: 1981.

Specialized in retail and restaurant projects.
Consulting architect to Benjamin Thompson & Associates Inc.-Strawbridge and Clothier Food Hall;
The Pavilion at the Old Post Office.

Benjamin Thompson & Associates Inc.: 1977-1981.

Project Interior Architect-Harborplace retail development, Baltimore, Maryland; the Black Pearl Restaurant; Bostix Kiosk and The Landmark Inn at Faneuil Hall Marketplace; Saint Anthony Main retail complex, Minneapolis.

Boston Redevelopment Authority: 1976-1977.

Historic restoration guidelines-Charlestown Naval Shipyard.

Harvard Medical School Planning Office: Interior Project Architect 1973-1976.

Renovation projects-administrative offices, dormitory spaces, and laboratories.

Yguado Association: Planner 1972-1973.

Land use studies, zoning and development guidelines-Las Vegas and Taos, New Mexico.

Registration

Massachusetts

Education

Rhode Island School of Design, 1972, BFA with honors, Interior Architecture.

Rhode Island School of Design, 1976, Bachelor of Architecture.

Service

Board Member, Friends of Sandcastles
Instructor, Boston Architectural Center
Visiting Critic, Rhode Island School of Design

Exhibitions

"Women in Architecture"-1986, 1987, 1988

BSA annual group show

School of the Museum of Fine Arts, Boston, 1986, 1988

Group shows

V. QUALIFICATIONS OF THE TEAM

V. QUALIFICATIONS OF THE TEAM

This project team has been assembled to offer the BRA a unique combination of skills and experience on projects involving the diverse issues encountered on projects of this type, as well as a depth of staff in each firm which will assure responsiveness to the BRA's schedule and budgetary requirements. Following are descriptions of relevant projects completed by the team members.

A. RELEVANT EXPERIENCE

FAY, SPOFFORD & THORNDIKE, INC.

FST is a multidisciplinary engineering firm of over 250 which has provided services to a wide variety of public and private sector clients for nearly 75 years. The diverse disciplines represented by the firm's professional staff includes civil, structural, mechanical, environmental, electrical, and transportation engineers, as well as specialists in related disciplines. Since its inception, waterfront engineering has been a major component of the firm's expertise, and FST has established a national reputation in this field. The range of relevant experience varies from very large and complex naval waterfront construction projects to smaller-scale design work focused on improving and expanding public recreational and commercial use of municipal waterfront facilities.

These marine engineering skills are supplemented by extensive experience in urban planning and design, and the ability to successfully integrate technical engineering issues with aesthetic and related public space design considerations.

The caliber of this work is best evidenced by the numerous awards FST has received over the years, and by the many clients who repeatedly call upon FST to take the lead in designing their commercial and recreational waterfront areas. Representative clients and organizations which have recognized the quality of FST's work with awards and commendations include the American Institute of Architects, the Naval Facilities Engineering Command, Portsmouth Naval Shipyard, and the American Consulting Engineers Council. Indeed, FST is recognized by the U.S. Navy as a leading expert in the design of drydocks, piers, wharves, and other naval facilities, and is repeatedly called upon by the Navy to undertake complex design projects where difficult conditions require innovative approaches and solutions.

Highly relevant work includes the USS Nautilus Submarine Force Library and Museum at the Naval Submarine Base in Groton, CT a new facility consisting of a museum and library, a mooring pier for the NAUTILUS submarine, and outdoor exhibition areas. This project was recognized with the 1986 Naval Facilities Engineering Command/American Institute of Architects First Honor Award. Here, FST was responsible for a variety of the same structural, electrical, civil, and mechanical engineering services, as well as site development issues, which will also be major components of the Pier 3 reconstruction project.

FST's involvement in planning and design of waterfront facilities in Boston dates back to 1918, with the design of the Boston Army Base. Our work has been completed for both public agencies and private developers involving studies and design of commercial piers, container terminals, wharves, bulkheads, drydocks, ship berthing facilities, and waterside commercial developments. The firm has played an important role on several projects recently undertaken as part of the renaissance of Boston's waterfront. This work includes consultation on the proposed mixed-use Fan Pier in South Boston and the Rows and Fosters Wharf Developments. In previous Boston waterfront parkland work, FST provided multidisciplinary engineering services at Shipyard Park.

Other projects in the Boston area demonstrate the firm's relevant expertise. For the MDC, FST recently completed investigations and prepared contract documents for restoration of the granite masonry seawall and beach area at Castle Island, Head Island, Kelly's Landing and the beach area adjacent to the L Street Bath House. Also for the MDC, FST developed design for Pemberton Pier in Hull. For the Massachusetts Port Authority, FST designed a new pier facility in the Bird Island Flats area of East Boston as part of a plan to expand access to Logan International Airport.

Public use of waterfront space was also the focus of projects in Provincetown and Marshfield. In Provincetown, FST was responsible for rehabilitation of MacMillan Wharf, involving design of berthing piers for the fishing boat fleet, pier utilities, dredging, rehabilitation of the existing wharf structure, and assistance in obtaining all requisite licenses and permits from regulatory agencies.

For rehabilitation of Marshfield's Town Pier, FST provided planning services for the reconstruction of an existing timber pier, truck loading platform and Harbormaster's Office, and construction of a refrigerated building. Other key project components include anchored floats, gangways, a boat ramp, slope protection, drainage, utilities, and dredging adjacent to the existing anchorage areas. Services included preparation of alternative concept designs, development of sufficient detail on preferred alternative to support preparation of the CFIP grant application and preparation of all environmental permit applications.

FST has a thorough familiarity with the environmental permitting process which is often critical to the implementation of many waterfront development projects. For example, for a proposed condominium and recreational development in Lynn Harbor, FST prepared a Draft EIR involving analysis of wind, shadow, traffic, air quality, noise, dredging, and water quality impacts, and coordination with and approval from a variety of permitting agencies.

Following conceptual design of an innovative submarine overhaul facility at Portsmouth Naval Shipyard in New Hampshire, FST prepared an Environmental Assessment of potential environmental impacts of the facility. In other recent work, the FST prepared a Draft and Final EIR for Clippership Wharf in East Boston.

CONSULTANTS

THE HALVORSON COMPANY, INC. (THC) is a young organization with a growing reputation for excellence in the field of landscape architecture and open space planning. THC brings to the team a group of talented designers with the proven ability to recognize a site's unique character and to produce imaginative and practical designs which enhance its use and value to the public. Numerous of the firm's projects have involved planning and design of active and passive public spaces on urban waterfront and riverfront property.

THC's design experience is well represented on several projects within the City of Boston. For the Mayor's Office of Capital Planning, THC completed a comprehensive survey and evaluation of Boston's parks, square and urban wilds, documented as Volume II of Boston's Open Space Plan. The firm was also recently selected, by national competition, for design of Post Office Square Park in the City's financial district. FST and THC are presently working together on the Boylston Street Improvements Project, a major project involving production of a master plan for a comprehensive and cohesive streetscape improvement plan along Boylston Street from Arlington Street to the Fens. Other relevant collaborations between the two firms include site preparation work at Kendall Square in Cambridge as components of a major urban revitalization project, and landscaping a waterfront park at the Woods Hole ferry terminal site.

The architectural firm of **PRELLWITZ CHILINSKI ARCHITECTS** is a Cambridge-based firm whose principals represent many years of design experience in the Boston area. Representative projects include retail space at South Station, Faneuil Hall design criteria, Rowes Wharf Restaurant, renovation of The Corner Mall in downtown Boston, renovation of two commercial buildings in Inman Square, Cambridge, and carry-out food establishments in Quincy Market and Cambridge.

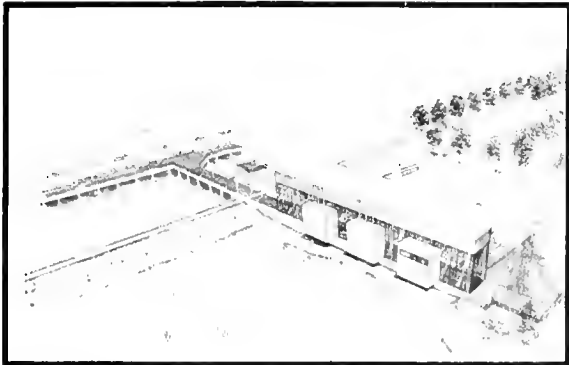
HALEY & ALDRICH, INC. (H&A) is a geotechnical engineering firm which offers unique capabilities in soils analysis and foundation design associated with waterfront construction. Much of H&A's waterfront engineering experience has been as consultant to FST on major naval facilities construction projects throughout the U.S. In addition, the two firms have worked together on many transportation and urban design projects in Boston and the surrounding area. H&A has a wealth of experience in the vicinity of the Charlestown Navy Yard including Moran Container Terminal, modifications to Drydock No. 5, Constitution Office Park, Pier 5 Development, and Constitution Plaza, to name a few.

BRYANT ASSOCIATES, INC. (BAI) is also a firm with which FST enjoys a long-standing relationship. Currently, FST is providing diverse services to BAI on the Early Site Preparation Contract for the MWRA's Deer Island Sewage Treatment Plant Project. BAI, as consultant to FST, has provided both surveying and civil engineering services on numerous projects within the City of Boston. BAI's relevant experience includes design contracts for parks in Charlestown and East Boston, seaside parks on Cape Cod for the National Park Service, and Revere Beach and Nahant Beach improvements.

Following are descriptions of relevant projects completed by the project team.

USS NAUTILUS SUBMARINE FORCE LIBRARY AND MUSEUM

Naval Facilities Engineering Command
Groton, CT

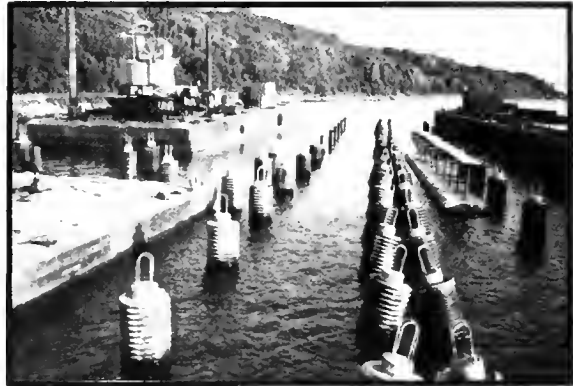


Rendering

After 450,000 miles of travel since its launching more than 30 years ago, the USS NAUTILUS, the world's first nuclear-powered submarine, returned home to become the focal point of a new complex at Groton, CT. The USS NAUTILUS Submarine Force Library and Museum facility has been designed to attract visitors with an interest in submarine technology and life beneath the sea.

The project consists of a new building to house the Library and Museum collection of artifacts; a mooring pier to exhibit the NAUTILUS; walkways and outdoor exhibition areas; restoration

of an adjacent cove; demolition of existing structures; and clearing and regrading of a nearby property to provide an overlook to the site.



Foundation Piles

FAY, SPOFFORD & THORNDIKE, INC. (FST) was responsible for conceptual, preliminary, and final design of the submarine's mooring pier, an arrangement which holds the NAUTILUS on 60-foot steel tubular arms. In addition, FST provided site development and building services, including mechanical and electrical engineering and grading and drainage design.



The USS NAUTILUS Returns Home

SHIPYARD PARK

Boston Redevelopment Authority
Charlestown, MA

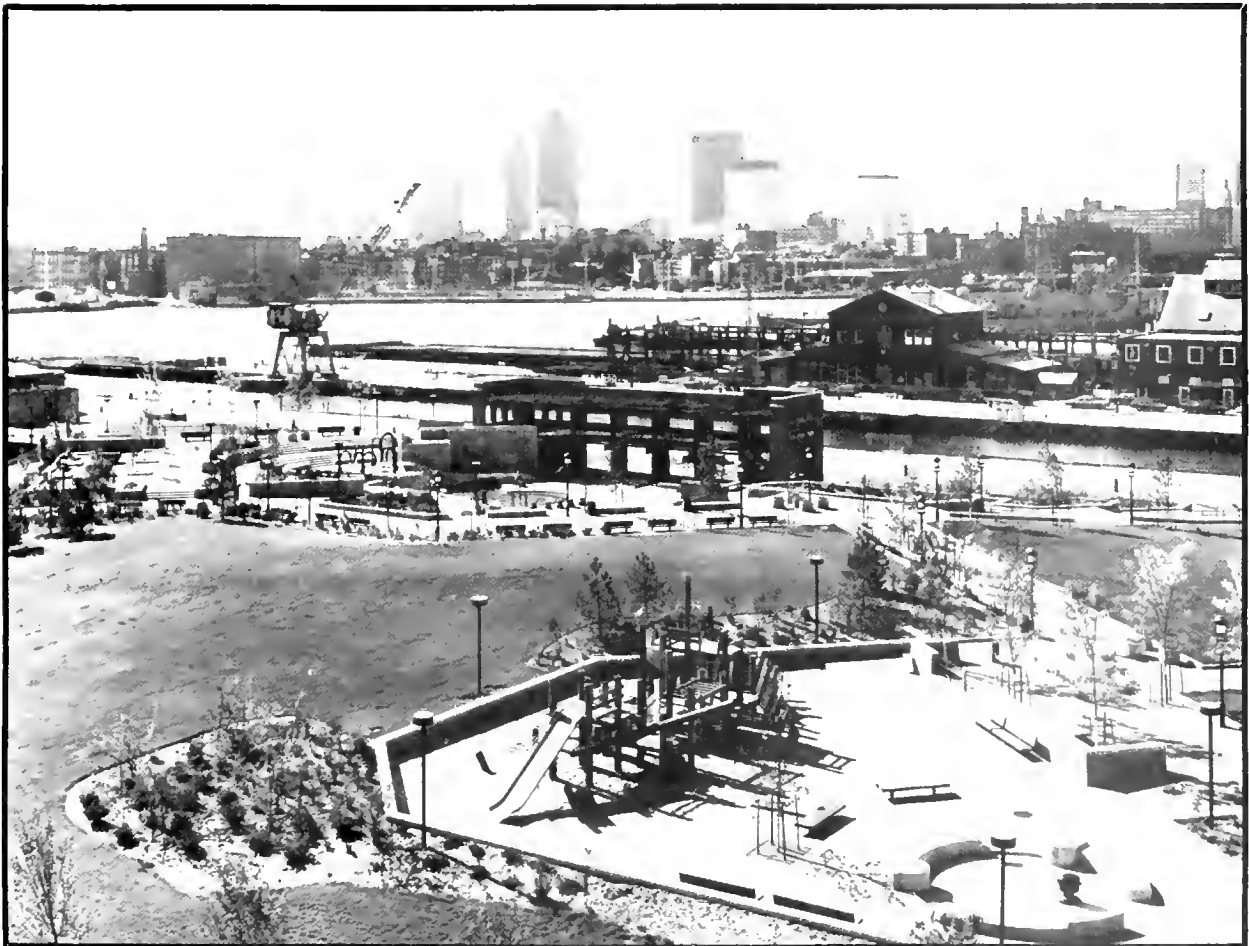


FAY, SPOFFORD & THORNDIKE, INC. (FST) provided multidisciplinary engineering services for Phase I of the redevelopment of a portion of the Charlestown Navy Yard by the Boston Redevelopment Authority. Major structures in this urban park include a rehabilitated Pavilion Building and an amphitheater. In addition, there are such other amenities as a multi-level fountain, an overlook which affords views of Boston Harbor, a play area, and landscaped areas.

FST was responsible for the soils engineering and structural engineering services for reinforced concrete walls, building rehabilitation, and pavement basement slabs. In addition, FST provided engineering services associated with water supply, lighting, drainage, and site grading.



Fountain



Park View

FERRY AND FIREBOAT PIER

Massachusetts Port Authority
Boston, MA



In the early 1980s, the Massachusetts Port Authority planned a major development of the Bird Island Flats area of East Boston to expand Logan International Airport and create an entirely new air cargo handling complex. FAY, SPOFFORD & THORNDIKE, INC. (FST) was selected to design a new pier facility, consisting of a concrete deck and two large landing floats with gangways and a canopy for weather protection, to serve harbor ferries and the fireboat.



Fireboat at Mooring

FST furnished preliminary and final design, and services during construction including consultation, resident inspection, shop drawing review, and the preparation of as-built drawings.



Gangway, Float, and Canopy

Construction of the new facility required dredging and FST prepared the requisite environmental assessment and environmental permit applications for the project. In addition to the pier itself, FST designed riprap placement for slope stabilization, the concrete pier deck, and timberwork for dolphins and the wave barrier.

The firm was responsible for utility design including water supply, sewer system piping and manholes, drainage, electrical service for both lighting and communications, as well as grading, surface treatment of the access driveway, and security fencing.



During Construction

PEMBERTON PIER

Metropolitan District Commission
Hull, MA

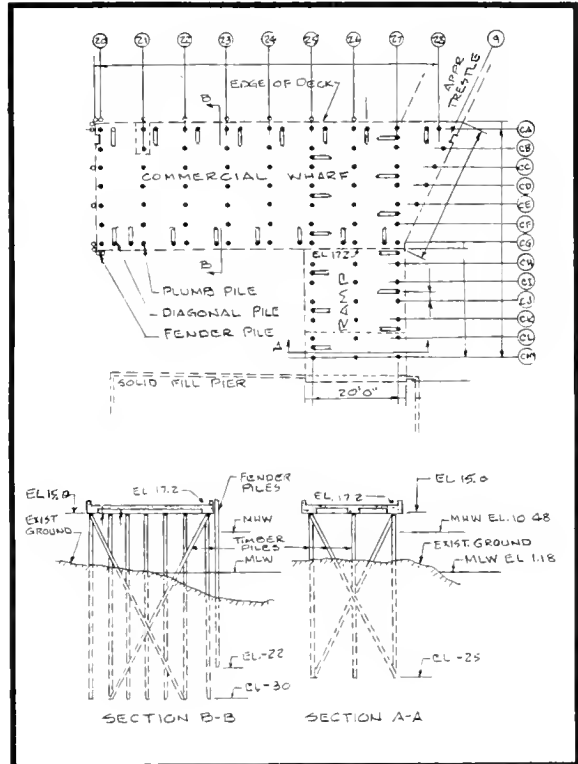


Pier Facility

Under contract to the Metropolitan District Commission (MDC) for various maritime work, FAY, SPOFFORD & THORNDIKE, INC. (FST) developed the design for Pemberton Pier in Hull, MA. The facility consists of two wharves connected by an approach trestle. One wharf is for commercial and fishing boat use; the other serves commuter boats.

The project required the removal of the existing pier and dredging to accommodate the new facility. FST was responsible for the preparation of environmental permit and license applications on behalf of the MDC for the requisite regulatory approvals. The new facility was designed with timber pile-supported reinforced concrete wharf decks. Other components of the project included the fender systems; floats and gangways; davit; and extension of a boat launching ramp. The work also included design of repairs to a granite masonry seawall.

Support utilities were designed by FST as well and included sewerage service to the wharf, pier lighting, and provisions for future power, communications, and water services.



Pile Plan

HARBORSIDE LANDING

Lynn Harbor Development L.P.

Lynn, MA



FAY, SPOFFORD & THORNDIKE, INC. (FST) provided consulting services for a 452-unit condominium and recreational development on a 10+ acre parcel of filled land in Lynn Harbor. The residential component included a pair of 27-story towers and two 16-story buildings. While several environmental permit and approval procedures were applicable, the preparation of an Environmental Impact Report (EIR) under the Massachusetts Environmental Policy Act (MEPA) constituted the vehicle for the broadest review.



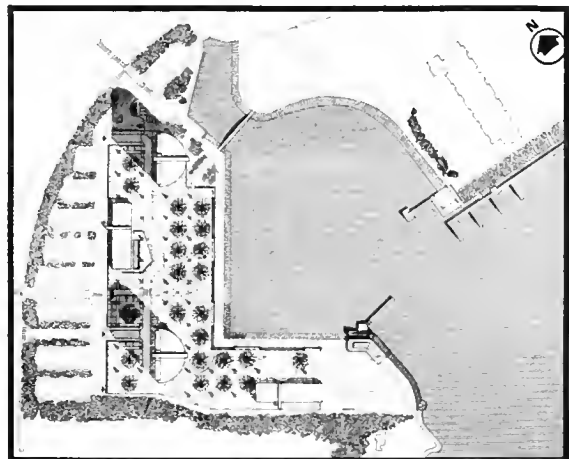
View towards Northwest

FST prepared the Draft EIR with analysis of wind, shadow, traffic, air quality, noise, water quality, dredging and disposal, public space, and other impacts. The project also required a Chapter 91 waterways license. Research revealed that the entire site was located in an area of previously-filled land, between the historic (1647) lines of mean high and extreme low water, and is therefore private tidelands. Accordingly, the Commonwealth's jurisdiction

under Chapter 91 was significantly reduced to fishing and fowling rights.

Project design sought consistency and compatibility with an adjacent Heritage State Park. In response to agency requests, various aspects of the design were modified. For example, the proponent added a new pier and a separate building on a waterfront park to allow the park management agency to operate a public boating program.

FST prepared both Draft and Final EIR documents, addressing the complex legal framework into which this project fits, meeting its requirements, and working closely with permitting agencies and the design team. The environmental documents have been declared complete and accepted by the MEPA Unit. In addition, permit and license applications were prepared and submitted for the Chapter 91 license, a Corps of Engineers Section 404 permit, a Wetlands Act Notice of Intent, and a determination of consistency with the Office of Coastal Zone Management.



Site Plan



CELLULAR COFFERDAM FOR TRIDENT DRYDOCK

Naval Facilities Engineering Command
Bangor, Bremerton, WA



General View

When the Navy required a new drydock to accommodate the TRIDENT submarine at the Naval Submarine Base, Bangor, Bremerton, WA, FAY, SPOFFORD & THORNDIKE, INC. (FST) was selected to design the facility. Environmental considerations dictated that the drydock be located in deep water, 600 feet offshore. For construction to take place in-the-dry, a cofferdam was designed to resist water depths of nearly 80 feet.

An earth-filled steel sheet pile cellular design met the requirements, which included that the structure become a permanent laydown area for the completed drydock. The cofferdam is among the first in the United States to be constructed using high strength steel sheet piling and extruded wye connections to resist high interlock tensions and the deepest without internal stability berms.

Unusual site conditions were encountered with high artesian pressures in the underlying aquifer sands and gravels. Studies indicated that there was a risk of failure of the glacial till during dredging if the pressures were not reduced. Additional major pressure reduction was also required to permit cofferdam basin unwatering.

An onshore, artesian pressure relief, pumped well system was designed along with several

back-up systems. Pressure relief pumped wells were also subsequently installed within alternate arcs in the cofferdam after fill compaction. The wells were converted to gravity type and incorporated into the drydock system to provide the permanent level of artesian pressure relief and backup required for drydock service conditions. During construction, artesian pressures were lowered by 110 feet with no adverse effect to groundwater levels beyond the boundaries of the Base.



Interior View

The project was recognized as one of the most difficult ever undertaken by the Naval Facilities Engineering Command and FST's design has received numerous awards and commendations.



AMERICAN SOCIETY OF CIVIL ENGINEERS

OUTSTANDING CIVIL ENGINEERING ACHIEVEMENT AWARD-1988

The Southwest Corridor Project



Temporary Bracing—Slurry Wall



Slurry Wall Under Construction



Heath Building Underpinning



Section One Parkland



Yarmouth St. Ventilation Shaft



Back Bay Station

Pay, Spofford & Thornsbake, Inc.

CELEBRATING 75 YEARS



OF ENGINEERING EXCELLENCE

FAY, SPOFFORD & THORNDIKE, INC.

SOUTHWEST CORRIDOR PROJECT WINS OUTSTANDING CIVIL ENGINEERING ACHIEVEMENT AWARD

The American Society of Civil Engineers has announced its OUTSTANDING CIVIL ENGINEERING ACHIEVEMENT AWARD for 1988. In national competition, the Southwest Corridor Project in Boston was selected. It took a cast of thousands to design and build the \$744 million project for the Massachusetts Bay Transportation Authority (MBTA). The credit list runs to more than 35 design firms acting as consultants or designers and informally, the number could be several times that many, considering the involvement of community members in the nine neighborhoods involved.

Heading the design cast is FAY, SPOFFORD & THORNDIKE, INC. (FST), in Joint Venture with KAISER ENGINEERS, INC., who served together as Coordinating Consultant for the entire 4.7-mile relocation of rapid transit, commuter rail, and Amtrak lines from downtown Boston to Forest Hills; as Designers of Section One, one of three design sections; and as Designers for corridor-wide Systems elements.

FAY, SPOFFORD & THORNDIKE, INC. (FST), with offices in both Lexington and Boston, begins its 75th anniversary year with this award. Founded in 1914, FST provides the highest caliber of multidisciplinary engineering and planning services to both public and private sector clients and offers a staff of more than 250 skilled individuals to meet engineering challenges and needs.

The visionary project is a public policy success story. Back in the late 1960s, the Southwest Corridor Project was to be the last link in the inter-

state highway system. Neighborhood protest stopped the road and a far-seeing planning effort transferred the emphasis and ultimately, funds, to mass transit and rail to answer inner city and regional transportation needs.

An antiquated elevated segment of the MBTA's Orange Line was relocated to an open-cut right-of-way, below ground level, and a cut-and-cover tunnel section. A 52-acre linear park was designed atop the depressed trackway, creating a virtual roof garden in an area once blighted by demolition. Nine new transit stations answer passenger needs in style and comfort.

Completed below budget, construction combined state-of-the-art and traditional engineering techniques. Structures over tidal mud flats required complex foundation designs. Slurry wall methodology provided excavation support, maintained groundwater levels, and protected adjacent historic buildings, some only a few feet away. Systemwide trackwork and ventilation systems were designed to isolate and mitigate noise, pollution, and vibration impacts.

Community involvement never stopped. Citizens continued to participate through the whole program, with more than 1,000 meetings, neighborhood committees, Task Forces, and a bilingual newspaper. An educational training program for local area residents was developed by FST, to bring high school students to intern in the project's offices, learn the fundamentals of engineering and architecture, and expand their career horizons.



Fay, Spofford & Thorndike, Inc.

191 Spring Street
P.O. Box 802
Lexington, MA 02173
(617) 863-8300

20 Park Plaza
Suite 927
Boston, MA 02116
(617) 426-8666

RELEVANT PROJECTS

The Halvorson Company, Inc. provides comprehensive professional services in site planning, landscape architecture and site engineering.

The services that The Halvorson Company, Inc. can provide include:

- Site inventory and mapping
- Site analysis, programming and feasibility studies
- Land planning
- Conceptual and schematic design
- Contract and bid document preparation
- Construction observation

Clients for these and related services include city and municipal governments and agencies, institutions, architects and engineers, and private development corporations. The following is a representative list of projects and clients:

MARKET LANDING PARK

Newburyport, Massachusetts

Client: Kathleen D. Field
Former Community Development Director
City of Newburyport, Massachusetts
(401) 351-4300

Project Description: Urban waterfront park on historic Massachusetts town.

Project Similarity: The park serves as a link between the town center and the waterfront.

Key Personnel: Craig Halvorson, Principal-in-Charge
John Tingley, Project Designer

COASTAL CEMENT PARK

Boston, Massachusetts

Client: Mr. Lawrence D. Mammoli
Director of Engineering
Economic Development & Industrial Corporation
10 Drydock Avenue
Boston, Massachusetts
(617) 725-3300

Project Description: Primary park serving Boston's expanding industrial waterfront area.

Project Similarity: The park serves as a visual gateway to the Boston Harbor and provides significant pedestrian access to commercial waterfront activities.

Key Personnel: John Tingley, Principal-in-Charge
and Project Designer

FRONT PARK

Cambridge, Massachusetts

Client: Ms. Eileen Woodford
Office of Community Development
57 Inman Street
Cambridge, Massachusetts 02139
(617) 498-9034

Project Description: Design of a one-acre park that connects the developing residential and commercial East Cambridge district to the Charles River waterfront. Park development marks partial restoration of original Charles Eliot plan for the area.

Project Similarity: The park is a link in a major pedestrian circulation system which provides both visual and physical access to the Charles River for Cambridge residents and office workers.

Key Personnel: Craig Halvorson, Principal-in-Charge

POST OFFICE SQUARE PARK

Boston, Massachusetts

Client: Robert M. Weinberg, President
Friends of Post Office Square, Inc.
50 Federal Street
Boston, MA 02110
(617) 423-1500

Project Description: This new park will provide a valuable open space link between the Boston Common and Boston's increasingly pedestrianized waterfront.

Project Similarity: This park is one of the major pedestrian crossroads in downtown Boston. The Halvorson Company, Inc. is creating a park design which will communicate the spirit and uniqueness of Boston to both Boston residents and the thousands of tourists which visit Boston annually.

Key Personnel: Craig Halvorson, Principal-in-Charge

MYSTIC CENTER DEVELOPMENT

Medford, Massachusetts

Client: Ms. Valerie Winig
Cabot, Cabot and Forbes
60 State Street
Boston, Massachusetts
(617) 722-8354

Project Description: Previous to the development of the office park, a shopping center and parking lots abutted a portion of an existing Metropolitan District Commission (MDC) park. After a land swap between the developer and the MDC, the development was able to enjoy a closer view of the river and the MDC was able to incorporate part of the development's open space into the park. The developer is also funding the renovation of the park, which abuts the office development.

Project Similarity: Both public and private interests compete for waterfront access, both physical and visual. The Halvorson Company, Inc. has been able to effectively work with both the developer and MDC in developing a mutually beneficial park plan.

Another relevant aspect of the project is that the park has an existing small craft marina that is a significant factor in the park design and renovation. Daily boat access and trailer parking have been incorporated in the design in such a way that it does not detract from the pedestrian and water orientation of the park.

SURVEY OF BOSTON OPEN SPACE

Boston, Massachusetts

Client: Ms. Mary Nee, Executive Director
Mayor's Office of Capital Planning
City Hall
Boston, Massachusetts
(617) 725-3494

Project Description: Comprehensive inventory and evaluation of 250 parks, squares, malls and urban wilds throughout Boston's 16 neighborhoods. Survey involved evaluation of recreational facilities by neighborhood.

Project Similarity: The Halvorson Company, Inc. knows how to conduct a thorough site analysis for park masterplanning and development. We know how to gather the necessary information about parks, both existing and proposed, and put that information to optimum use in designing a park that is responsive to diverse community interests.

POINT PARK

Cambridge, Massachusetts

- Client:** Mr. Joseph Tulimieri, Executive Director
Cambridge Redevelopment Authority
336 Main Street
Cambridge, Massachusetts
(617) 492-6800
- Project Description:** When coming from Boston this park is a gateway to both the City of Cambridge and one of its fastest growing areas, Kendall Square/Cambridge Center. The park is also the most intensely used pedestrian crossroads between MIT, the Kendall Square office community and the MDC's Memorial Drive parkway.
- Project Significance:** The park's design serves both public and private interests and successfully controls pedestrian circulation in order to minimize pedestrian/vehicular conflicts and congestion.
- Key Personnel:** John Tingley, Principal-in-Charge and Project Designer

**REVERE BEACH RESERVATION PARK DEVELOPMENT
MASTER PLAN AND PHASE ONE**

Revere, Massachusetts

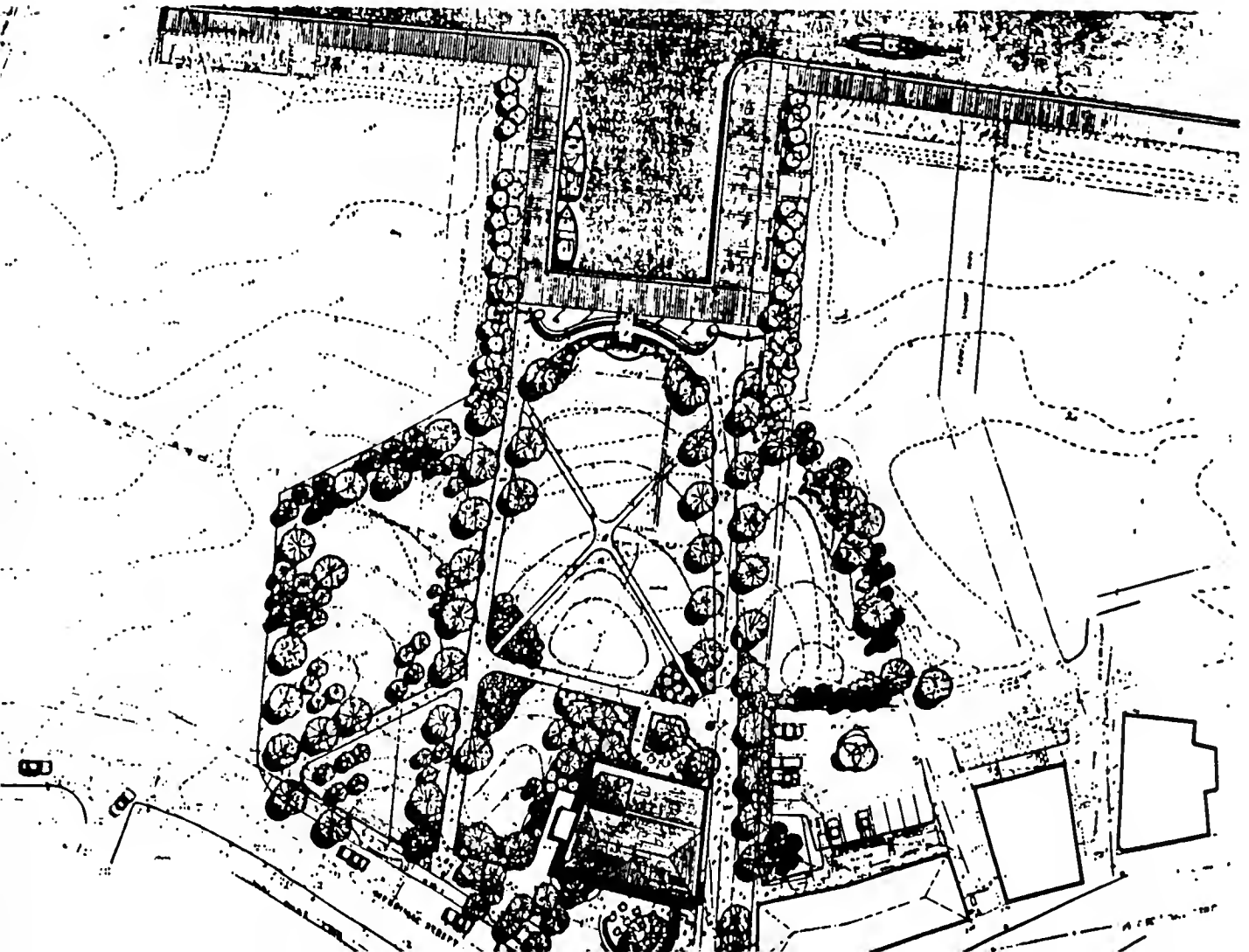
- Client:** Ms. Julia O'Brien
Director of Planning
Metropolitan District Commission
20 Somerset Street
Boston, Massachusetts 02108
(617) 727-9693
- Project Description:** Master plan for historic Revere Beach covering fifty acres of natural parkland, promenades, amusements and visitor services along three miles of beach front. A first phase waterfront park has been built which includes: renovation of an existing bandstand, design of a new pedestrian park shelter based on historic examples, pedestrian oriented signage, graphics and landscaping.
- Project Similarity:** This successfully completed waterfront park is a focal area along a linear pedestrian walkway. Portions of the park are separated by roadways. The park directs one's focus to the ocean.
- Key Personnel:** Craig Halvorson, while a Senior Vice President at Carol R. Johnson and Associates, Inc. was both the project manager for the master plan and the first phase park.
- John Tingley, while at Carol R. Johnson and Associates, Inc. was project designer for the first phase park development.

MARKET LANDING PARK

Newburyport, Massachusetts

Market Landing Park was developed as the central public open space linking downtown Newburyport and the historic waterfront. The park will also provide the focus for a new hotel and condominium development. Park designs were prepared by The Halvorson Company in collaboration with the Newburyport Redevelopment Authority and Steffian Bradley Associates, Inc., architects for the hotel and condominium development.

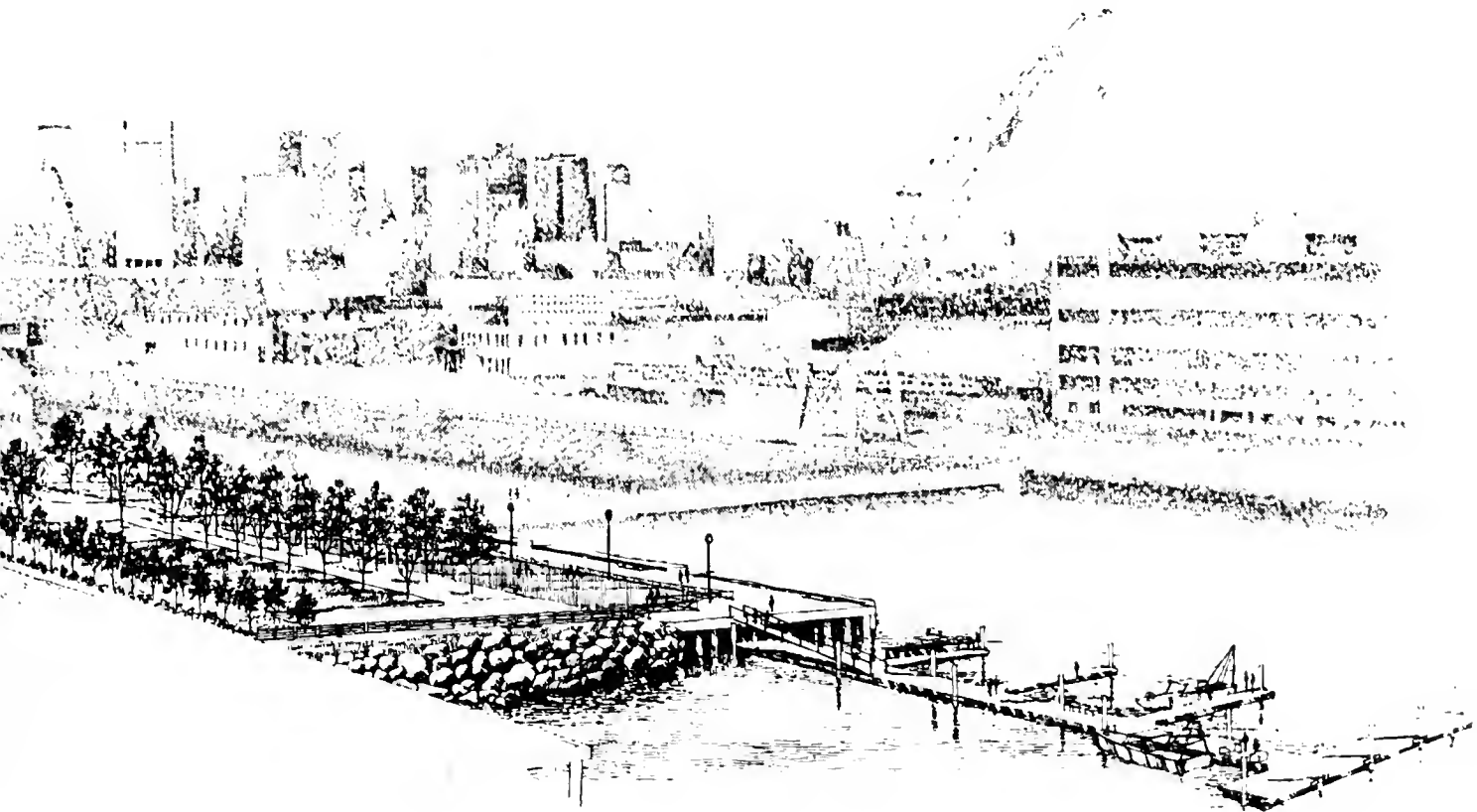
The park provides a passive open space which creates a physical and visual link with the neighboring downtown shopping districts and affords a generous civic gathering area. The design responds to and supports the unique federal style of the surrounding architecture and insures that the charm and character of this historic port city is maintained.



COASTAL CEMENT PARK Boston, Massachusetts

Coastal Cement Park is the primary pedestrian open space for the rapidly expanding Marine Industrial Park being developed by the Economic Development Industrial Corporation (EDIC). EDIC leases individual development parcels to private developers with the stipulation that along with each facility being privately developed, an amenity be made available for public use and enjoyment. Cementos Del Norte, a Spanish consortium, donated Coastal Cement Park to the public in exchange for the rights to develop a storage facility for dry cement being shipped from Europe. The park has been successfully completed and compliments the strong geometric forms of the storage silos.

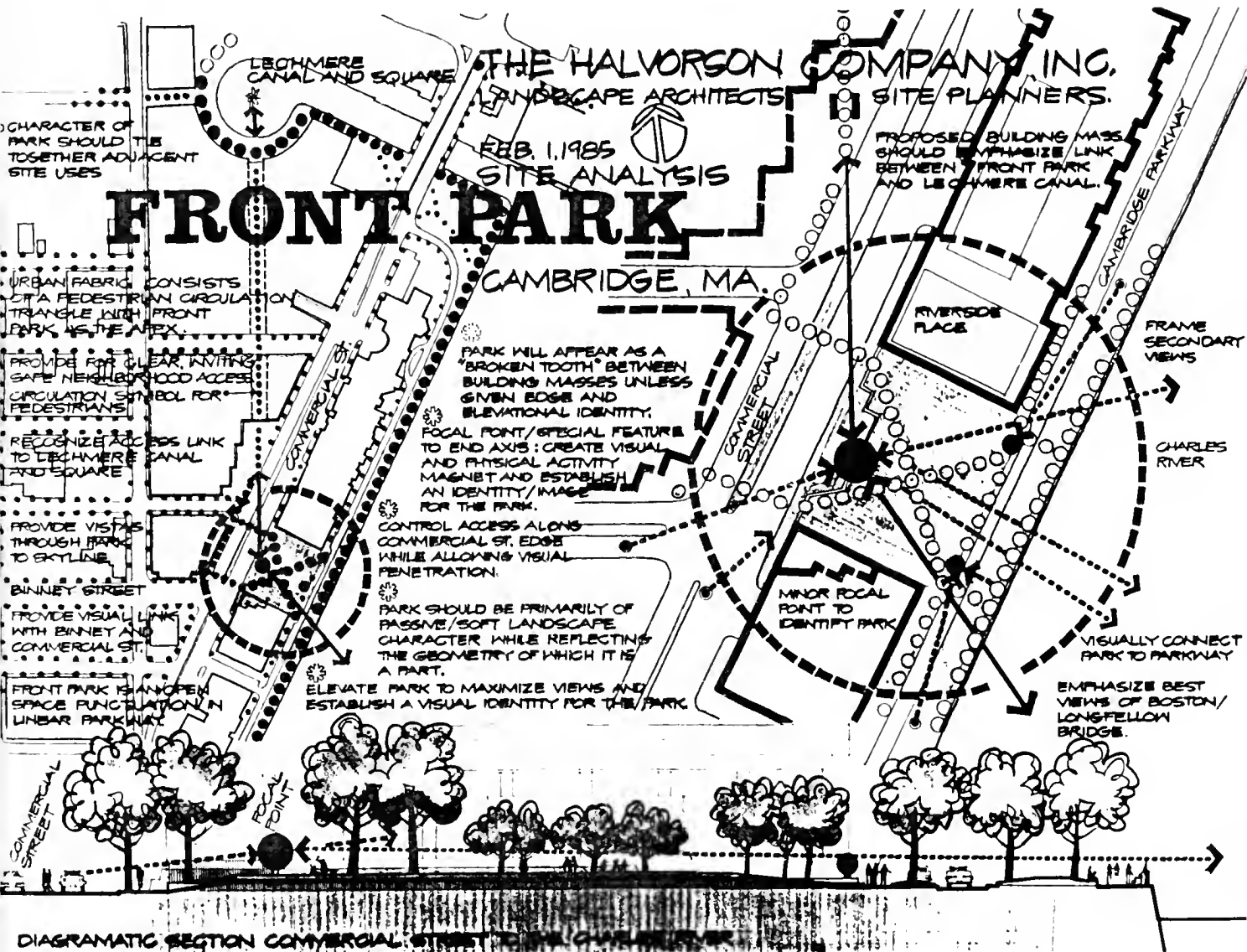
This project has just recently received the Top Honor Award in the 1988 "Excellence On The Waterfront" competition sponsored by the Waterfront Center of Washington, D.C. This award applauds the compatibility of a working waterfront, an industrial facility, and a park. The Boston Society of Architects also highlighted the achievements of Coastal Cement Park in presenting a design award to EDIC for the development of the Marine Industrial Park.



FRONT PARK
Cambridge, Massachusetts

"The Front" along the Charles River was originally conceived by Charles Eliot as an important element within his East Cambridge Waterfront Plan. Although never implemented, Eliot's park concept was reborn, in part, as Front Park in the City of Cambridge's East Cambridge Riverfront Plan of 1978.

The park has become a pivotal element in the open space network of the East Cambridge Riverfront. Front Park is designed to be a simple, yet elegant gateway from the emerging technical and commercial districts and the existing residential neighborhoods, to the Charles River. With its completion in 1987, it has provided an important public open space for a revitalizing East Cambridge.

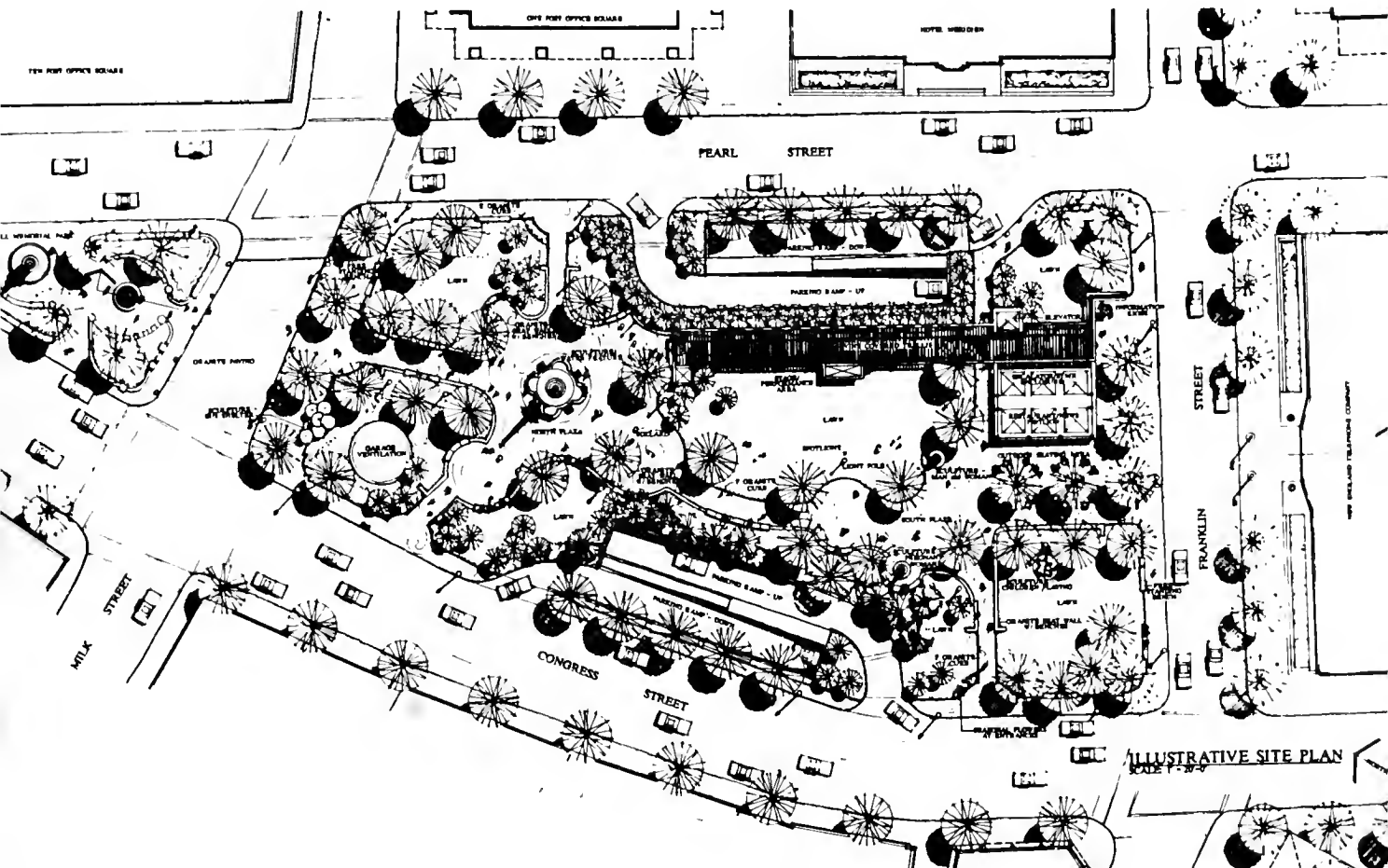


POST OFFICE SQUARE PARK

Boston, Massachusetts

The Halvorson Company, Inc. has been selected, by national competition, as the designer of this 1.7 acre park in the heart of Boston's financial district. This new downtown open space will be at street level over a 7 story below-grade parking garage.

The Halvorson Company design combines, in delicate balance, the intense and festive urban character of the downtown with tranquility and refuge. The park is designed to be rich in detail and visual interest, recognizing and reflecting the area's architectural heritage. The predominance of lawns and vegetation provides welcome relief and contrast to the dense urban fabric surrounding the park. A plaza at each end of the park provides the settings for major park focal elements of a fountain and sculpture which will draw people into the space. A garden pavilion overlooking the South Plaza incorporates pedestrian access to the underground garage, a cafe, and a newsstand.

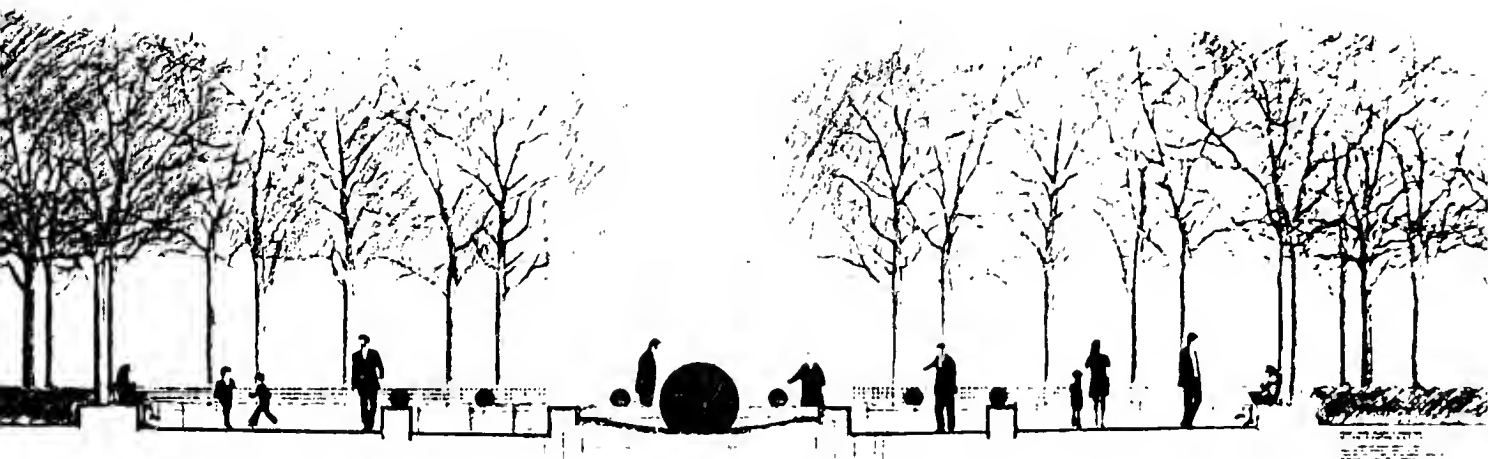


POINT PARK
Cambridge, Massachusetts

Point Park constitutes the final phase of the major Main Street development for Kendall Square in Cambridge. Working with the architecture and urban design firm of Monacelli Associates, The Halvorson Company, Inc. is developing the landscape design for this park which will serve both as a gateway into Cambridge from Boston and as a crossroads between the academic community of the Massachusetts Institute of Technology and the rapidly developing high-technology research and development community of Kendall Square.

A primary unifying element of the park's design is a sculpture intended to strengthen these two primary park functions: the park as gateway and the park as the center of an important and expanding high-technology community.

As one of the area's major public open spaces, the park will be a welcome pedestrian amenity amidst major commuter and service traffic routes.



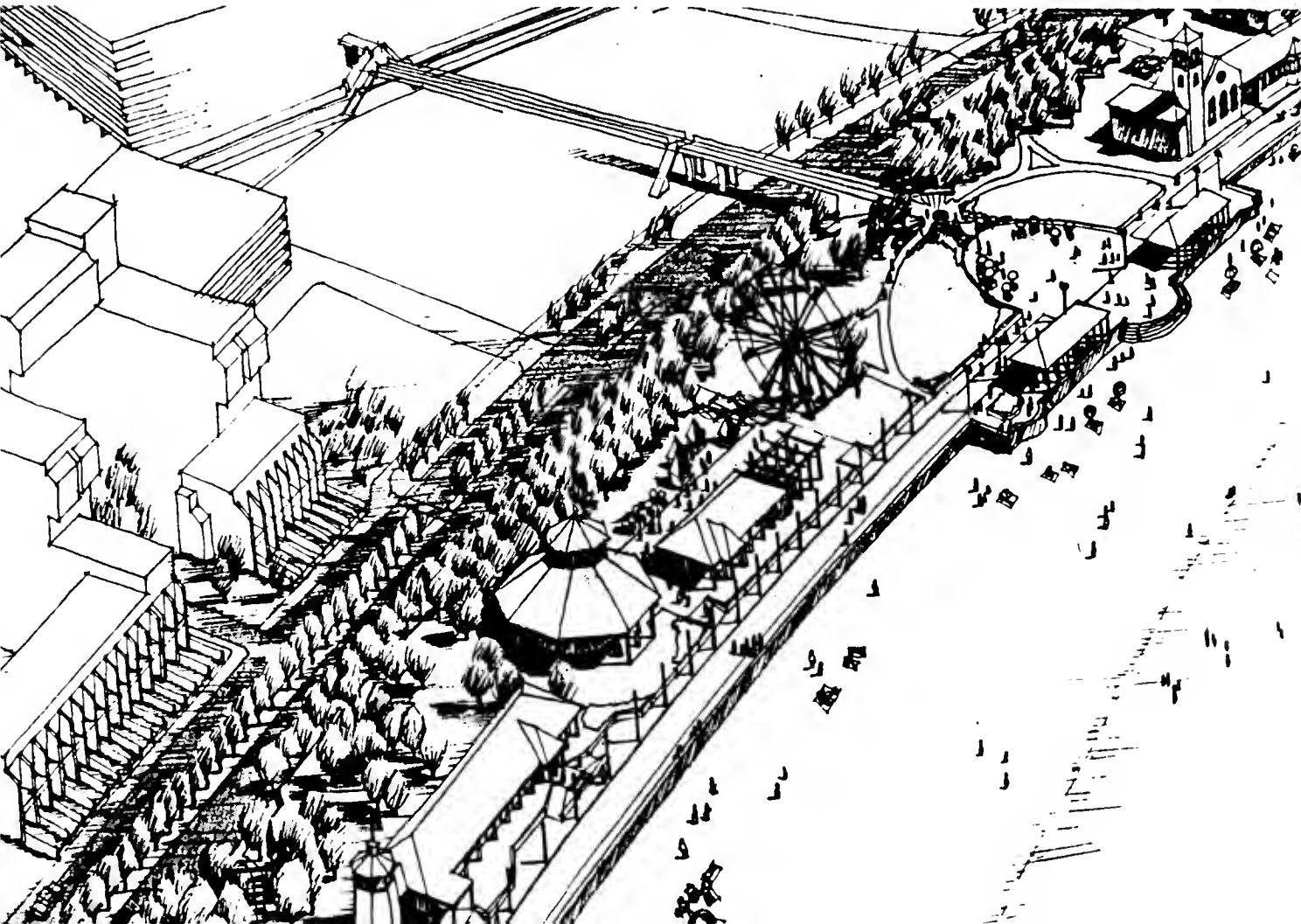
REVERE BEACH RESERVATION PARK DEVELOPMENT MASTER PLAN AND PHASE ONE*

Revere, Massachusetts

The master plan for historic Revere Beach establishes planning and design guidelines for fifty acres of natural parkland, promenades, amusements, and food and sanitary facilities along three miles of beach front. It received the 1981 American Society of Landscape Architect's Honor Award for Planning and Analysis.

The completed Phase One Development provides a landscaped park and viewing terrace as the entrance to the historic bandstand area.

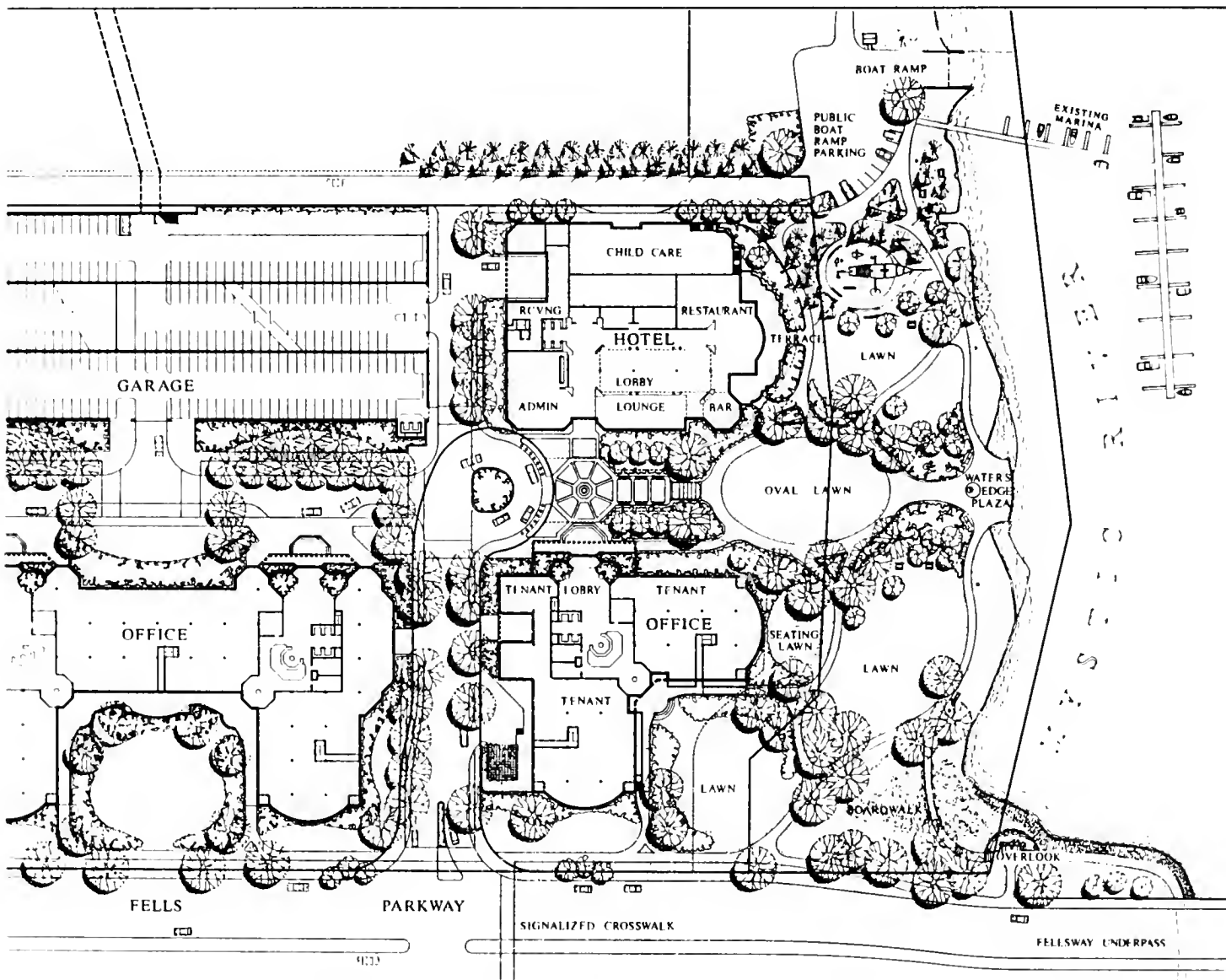
*Craig Halvorson was project manager and principal designer for both projects prior to establishing The Halvorson Company.



MYSTIC CENTER DEVELOPMENT Medford, Massachusetts

The Halvorson Company, Inc., prepared a landscape design solution for the 16 acre office building and park site located at the intersection of routes 16 and 28 in Medford, Massachusetts.

The Mystic Center Development Plan connects the private development of offices, a hotel and restaurant, and a regional parking structure with the public uses of a Metropolitan District Commission park and boat ramp. The design's central axis and oval lawn join the architecture's classically inspired forms with a traditionally informal New England park landscape in a way which encourages a casual flow of people throughout the site.



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PARTIAL LISTING OF EXPERIENCE
WITH WATERFRONT PROJECTS

Explosive Handling Wharf
No. 1
Kings Bay, GA

Geotechnical engineering services for design of 660 ft. long wharf for Trident class submarine. Services included subsurface explorations and laboratory testing; evaluation of alternative pile types and pile capacity; analysis of stability of dredged slopes for dredging; recommendations for slope protection; specifications and unit cost estimates in connection with final design.

New Pump Station
Drydock #1
Charlestown Naval Shipyard
Charleston, SC

Geotechnical engineering services during Phases I and II for the modernization of Pumping Station including analysis of subsurface conditions for structure design, evaluation of, ground movements, lateral earth support criteria, underpinning requirements and construction phasing.

Piers I, II, & III
Northern Avenue
Boston, MA

Geotechnical engineering studies in connection with Master Plan proposing extensive alteration of existing shoreline by dredging and filling for development of 18.4 acres to provide hotel, retail, commercial, residential and parking space.

Newport Onshore Hotel and Marina
Newport, RI

Project consists of four 4-story structures, one 1-story commercial building, hotel office building, swimming pool and marina to be constructed on the site of an existing working marina.

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PARTIAL LISTING OF EXPERIENCE
WITH WATERFRONT PROJECTS

Fish Pier Condition Eval.
Portland, ME

Preliminary geotechnical engineering evaluation of ground settlement and apparent lateral movements of the steel sheet pile bulkhead of new Fish Pier.

Proposed Development of
Central Wharf
Portland, ME

Geotechnical engineering studies in connection with proposed wharf development consisting of two to five story retail stores, office and residential condominiums, and parking facilities.

Great Salt Lake Causeway
Utah

Provided design recommendations for slope protection of an existing 12.4 mile long earth fill railroad embankment which crosses the Great Salt Lake; the embankment was subjected to significant erosion due to wave attack when the lake level rose over 10 ft. during the period 1982 to 1984. Interim slope protection on the more exposed side of the embankment included placement of over 1200 surplus railroad boxcars, end to end, to provide a temporary "seawall".

Rambo Breach Bridge
Great Salt Lake, Utah

A 300 ft. long opening in an earth fill railroad embankment was required to equalize the water surface elevations between two water bodies separated by the embankment. A bridge was required across the opening to allow continued rail traffic. Geotechnical services included recommendations for design and installation of precast-

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PARTIAL LISTING OF EXPERIENCE
WITH WATERFRONT PROJECTS

prestressed concrete sheet piles at the abutments and bearing pile for the bridge; elaborate construction sequencing was required to excavate the new channel, in-the-dry, below the bridge and to install rip rap on the channel bed and at the abutment prior to allowing water flow.

Tanker Berths
South Boston, MA

Geotechnical engineering services for underwater cantilevered sheet pile bulkhead, a closure dike, repair measures for an existing seawall, design of sheetpile bulkhead, design of mooring dolphins.

Rouses Point Bridge
Rouses Point, NY to
Alburg, VT

Subsurface investigations and extensive stability analyses for proposed causeway at Lake Champlain.

Evaluation of Fender Pier at
McArdle Bridge

Undertook evaluation of damage due to impact of tanker truck. Services included preliminary analysis of pile conditions, survey of the fender pier above and below water level, determination of degree of damage and preliminary designs, cost estimates and requirements for repairs.

Submarine Overhaul Facility
Portsmouth Naval Shipyard
Portsmouth, NH

Provided assessment of required foundation and site development requirements. for a graving drydock. Geotechnical services included conceptual studies relative to foundation type, cellular cofferdam and earth support requirements, excavation

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WITH WATERFRONT PROJECTS

of soil and rock, rock support, groundwater seepage, and structure underpinning.

Lynn Bulkhead Repair
Lynn, MA

Review and evaluation of proposed alternative for repair of 700 ft. long anchored timber bulkhead behind marginal wharf along harbor waterfront. The timber had been severely damaged by marine borer infestation since a previous repair in 1938. Underlying weak clay soils, geometric constraints and corroded anchor rods, warranted replacement by a tieback-supported steel sheet piling bulkhead. Services included design analyses, contract documents, instrumentation, and construction monitoring.

Shiplift and Transfer System
Mare Island Naval Shipyard
Vallejo, CA

Compilation of available geologic and geotechnical engineering data within three study areas of the shipyard; geotechnical engineering analyses as required to support studies of technical feasibility and cost of proposed schemes; studies include evaluation of friction pile capacities, pile drag forces, soil settlements, choice of analysis earthquake, lateral earth forces and other items.

Condition Survey, Ship-
building Basin No. 8,
General Dynamics Shipyard
Quincy, MA

Subsurface explorations and installation of groundwater monitoring wells and piezometers for the purpose of evaluating groundwater levels and soil con-

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WITH WATERFRONT PROJECTS

ditions below the basin floor slab and within permanent steel sheet pile cofferdam cells. Geotechnical engineering analyses of the adequacy of the floor groundwater pressure relief system. Evaluation of interlock tensions within cofferdam cells with emphasis given to soil liquefaction susceptibility for earthquake loading.

Containment Structure for
Dredgings
State of Maine

Retained during construction to evaluate reasons for failure of a fabric lined containment structure constructed of wood piles. Evaluations included predictions of undrained shear strength of sensitive clays, foundation stability and equilibrium of lateral forces on walls of structure.

Hoboken Shipyard
No. 5 Bayonne Basin
Bayonne, NJ

Review of published data on earthquake history of the project area; recommendation of earthquake acceleration for seismic resistance analysis of the existing graving drydock. Review of available subsurface data and assessment of liquefaction susceptibility of foundation and backfill soils. Recommended lateral earth and water pressures for static and earthquake analyses of drydock walls.

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WITH WATERFRONT PROJECTS

Hadley Falls Unit No. 2
Cellular Cofferdam
Holyoke, MA

Geotechnical design recommendations for a temporary cellular cofferdam within the Connecticut River designed to retain about 50 ft. of water. Special evaluations of horizontal sliding, overturning and internal stability were required for a 60 ft. diameter cell founded on a sloping rock surface. Special drainage provisions were required for the cell fill to maintain stability. Construction consultation provided relative to stability of a connecting arc located upon a 6V to 1H, 40 ft. high rock slope.

Waterfront Wharf
State of Maine

Retained during the construction phase of a pile-supported wharf to undertake an independent assessment of the geotechnical aspects of the original design and to evaluate the reasons for construction problems. Emphasis was placed on evaluating soil shear strengths and the stability of a dredged underwater slope. Construction sequencing, including pile driving and dredging, was considered as it related to slope stability. Studies also included evaluation of the over-all stability of the project site during and following proposed site development earth surcharging. Provided independent assessment of possible remedial measures required to complete construction. Measures considered included two types of relieving platforms.



B. REFERENCES

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(617) 727-3267

James McCann
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Boston, MA 02108
(617) 727-5274

C. ABILITY TO WORK WITH PUBLIC AGENCIES

FST enjoys a longstanding relationship with numerous state, regional, and municipal agencies in Massachusetts. Indeed, a significant portion of the firm's work is with public agencies who have called upon the firm on a continuing basis over the course of many years to assist them in their planning and design projects. These clients include the Boston Redevelopment Authority, the Massachusetts Port Authority, the Massachusetts Bay Transportation Authority, the Metropolitan District Commission, Massachusetts Water Resources Authority, and several City of Boston Agencies. Through our participation on such complex projects as the Southwest Corridor Project and the Third Harbor Tunnel/Depressed Central Artery EIS/EIR, we have extensive experience coordinating among the various agencies involved in public construction projects in Boston, and a familiarity with their established procedures and guidelines for project approval and implementation.

FST is also very experienced in coordinating projects with local citizens and interested groups. On the MBTA's Southwest Corridor Project, literally hundreds of meetings (large and small) were held with local residents throughout the project's design and construction to assure the project addressed community concerns. FST is presently involved with coordinating conceptual design of the local roadway system in South Boston with area residents, major property owners, and city and state officials.

FST has long been involved in all aspects of waterfront planning, engineering, and construction. As a result, we have established a thorough understanding of the regulatory review procedures and requirements for necessary permits and approvals. Our experience has proven that early and regular coordination with public agencies is important to identify and address questions and concerns before they arise. FST has recently completed multiple permit applications for waterfront engineering development projects in Massachusetts. These projects include improvements to MDC facilities in South Boston and Hull, the Harborside Landing private development project in Lynn Harbor, reconstruction of facilities at Woods Hole and Nantucket terminals for the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority, and various piers and wharves in Duxbury, Nantucket, and Provincetown.

In all these cases, the work required extensive coordination and filing with local conservation commissions, the Massachusetts Department of Environmental Quality Engineering Division of Wetlands and Waterways, U.S. Army Corps of Engineers, the Massachusetts Office of Coastal Zone Management, and various advisory groups.

FST is presently involved in the environmental permitting for the Deer Island early site preparation project for the Massachusetts Water Resources Authority which involves development of a "superschedule" for the permitting process. This superschedule will identify all known permits that will be necessary, the mandatory review periods, and the information required to prepare the applications. All information will be placed on the critical path schedule and regularly updated to monitor the decision-making and permitting process.

Also, FST has coordinated with the Massachusetts Historical Commission on many occasions during the preparation of Environmental Impact Reports, particularly during the Environmental Impact Statement/Environmental Impact Report for the Depressed Central Artery/Third Harbor Tunnel, to which the Commission had extensive input. Also, FST coordinated with the Commission during a recent project for the MDC involving restoration of marine structures and beach area in South Boston.

D. ABILITY TO COMPLETE THE SCOPE OF SERVICES EXPEDITIOUSLY

FST has a demonstrated reputation for completing projects in a cost effective and expeditious manner. These projects have ranged from planning for the construction of the Third Harbor Tunnel/Depressed Central Artery and major construction at Logan International Airport to maritime work of all types. As an example of our ability to effectively manage large projects, FST, in joint venture, served as Coordinating Consultant and Section One Designer on the MBTA's Southwest Corridor Project, which recently received the ASCE's Outstanding Civil Engineering Achievement Award for 1988.

Of particular relevance to the Pier 3 reconstruction is a major waterfront project recently completed for the U.S. Navy at the TRIDENT Submarine Base in Kings Bay, GA. The Explosive Handling Wharf Cover Building is a 600-foot long, 240-foot wide, 140-foot high building. Its design, requiring a very tight time schedule from the very start of the work, was further complicated by the need to make substantial modifications to the structure midway through the project to accommodate project security concerns. FST met the deadline established for the project's completion.

These, and many other projects like them, demonstrate the firm's commitment and ability to meet its clients' scheduling and fiscal requirements, as well as its ability to quickly respond to changing design issues, community concerns, and regulatory considerations.

VI. FEE PROPOSAL

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

TEAM FEE PROPOSAL SUMMARY

TASK	FST	THC	P & C	H & A	BAI	TOTALS
1. PRELIMINARY ENGINEERING	\$93,357	\$46,605	\$11,055	\$21,358	\$0	\$172,375
2. CONSTRUCTION CONTRACT DOCUMENTS	\$167,806	\$52,827	\$13,805	\$7,880	\$0	\$242,318
3. PERMITS	\$18,212	*	*	\$4,528	\$0	\$22,740
4. FIELD INVESTIGATIONS	\$19,467	*	*	\$13,034	\$9,351	\$41,852
5. CONSTRUCTION PHASE SERVICES	\$47,883	\$16,367	\$6,214	\$11,096	\$0	\$81,560
6. CONSULTATION & COORDINATION MEETINGS	\$18,761	*	*	\$1,736	\$0	\$20,497
TOTAL LABOR	\$365,486	\$115,799	\$31,074	\$59,632	\$9,351	\$581,342
REIMBURSIBLE EXPENSES	\$5,900	\$8,000	\$2,200	\$27,410	\$400	\$43,910

* INCLUDED WITH OTHER TABLES

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

FAY SPOFFORD & THORNDIKE, INC. LEVEL OF EFFORT - PERSON HOURS

TASK	PRINCIPAL/ PROJECT MANAGER		PROJECT ENGR		ENGRING		DRAFTING		TECH STENO.		TOTAL HOURS	FEES
FEE PROPOSAL LABOR SUMMARY												
1. PRELIMINARY DESIGN	116		236		694		766		64		1876	\$93,357
2. CONSTRUCTION CONTRACT DOCUMENTS	216		580		1040		1440		60		3336	\$167,806
3. PERMITS	24		40		200		80		0		344	\$18,212
4. FIELD INVESTIGATION	20		80		160		100		16		376	\$19,467
5. CONSTRUCTION PHASE SERVICES	68		184		376		280		0		908	\$47,883
6. CONSULTATION & COORDINATION MEETINGS	114		114		0		80		0		308	\$18,761
Total FS & T Person-Hours	558		1234		2470		2746		140		7148	
Hourly Rate	\$75.00		\$60.80		\$53.50		\$41.00		\$27.70			
TOTAL: TASKS 1 TO 6	\$41,850		\$75,027		\$132,145		\$112,586		\$3,878			\$365,486

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

REIMBURSIBLE EXPENSES	PRELIMINARY ENGINEERING	CONTRACT DOCUMENTS	PERMITS	FIELD INSPECTION	CONSTRUCTION; PHASE	COORDINATION	TOTAL
FAY, SPOFFORD & THORNDIKE, INC							
1. PRINTING, PHOTOS AND REPORTS	\$500	\$1,500	\$300	\$300	\$200		\$2,800
2. TELEPHONE, FAX	\$200	\$200	\$100	\$100	\$100	\$200	\$900
3. COMPUTER	\$400	\$1,600			\$200		\$2,200
TOTAL	\$1,100	\$3,300	\$400	\$400	\$500	\$200	\$5,900

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

FAY SPOFFORD & THORNDIKE, INC. LEVEL OF EFFORT - PERSON HOURS

TASK	PRINCIPAL/ PROJECT MANAGER	PROJECT ENGR	ENGRING	DRAFTING	TECH STERS	TOTAL HOURS
1. PRELIMINARY DESIGN						
1.1 Review Existing Data	4	16	24			44
1.2 Develop Design Criteria	4	8	24			36
1.3 Prepare and Evaluate Schematics	16	60	220	300	16	612
1.4 Evaluate Demolition Option	4	6	24	10		44
1.5 New Bulkhead Parallel to DD2	4	6	20	10		40
1.6 New Pier @ Existing Cell	6	6	12	10		34
1.7 Evaluate Bulkhead Rehab. or Replace	4	14	26	12		56
1.8 New Pier Extension	4	24	40	120		188
1.9 Marinas, Floats	4	6	12	40		62
1.10 Deck Fittings, Ladders, Etc.	4	6	12	40		62
1.11 Park Structures	24	24	40	40		128
1.12 Utilities						0
- Electrical	4	8	32	72		116
- Sewer and Water	4	8	32	72		116
- Mechanical	4	8	24	40		76
1.13 Landscaping & Architectural Coordination	10	16	16			42
1.14 Geotechnical Coordination	4	8	16			28
1.15 Specifications	4	4	40		40	88
1.16 Cost Estimate	8	8	80		8	104
Sub-Total	116	236	694	766	64	1876

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

FAY SPOFFORD & THORNDIKE, INC. LEVEL OF EFFORT - PERSON HOURS

TASK	PRINCIPAL/ PROJECT MANAGER		PROJECT ENGR		ENGRING		DRAFTING		TECH STENO.		TOTAL HOURS
2. CONSTRUCTION CONTRACT DOCUMENTS											
2.1 New Pier	76		240		460		880		10		1696
2.2 Park Structures	16		20		80		40				156
2.3 Marinas, Floats	16		20		80		160				276
2.4 Dock Fittings, Ladder, Etc.	16		20		80		120				236
2.5 Utilities											0
- Electrical	4		20		60		80				164
- Sewer and Water	4		20		60		80				164
- Mechanical	4		20		60		80				164
2.6 Landscaping & Architectural Coordination	20		60								80
2.7 Geotechnical Coordination	20		70								90
2.8 Specifications	20		60		60				70		160
2.9 Cost Estimate	20		30		100						150
Sub-Total	216		580		1040		1440		60		3336

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

FAY SPOFFORD & THORNDIKE, INC. LEVEL OF EFFORT - PERSON HOURS

TASK	PRINCIPAL/ PROJECT		PROJECT		ENGRING		DRAFTING		TECH STENO.		TOTAL, HOURS
	MANAGER	ENGR	ENGR	ENGR	ENGRING	DRAFTING	TECH	STENO.	STENO.		
3. PERMITS	24	40	40	200	80					344	
4. FIELD INVESTIGATION										0	
4.1 Field Investigations	4	16	60							80	
4.2 Existing Conditions - Drawings and Report	4	24	60		60				8	156	
4.3 Special Investigations	12	40	40		40				8	140	
Sub-Total	20	80	160		100				16	376	
5. CONSTRUCTION PHASE SERVICES											
5.1 Shop Drawings	20	80	200		200					500	
5.2 Consultation	20	40	80							140	
5.3 Site Inspection	20	40	40							100	
5.4 Final Inspection & Report	4	8	16							28	
5.5 As-Built Record Documents	4	16	40		80					140	
Sub-Total	68	184	376		280				0	908	
6. CONSULTATION & COORDINATION MEETINGS											
6.1 BRA	60	60								120	
6.2 Community Groups & Abutters	30	30			40					100	
6.3 Public Agencies	24	24			40					88	
Sub-Total	114	114	0		80				0	308	

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

ROSELEY AND ALDRICH INC. LEVEL OF EFFORT - PERSON HOURS AND FEES

Task	:PRINCIPAL:ASSOC.		:SENIOR		:ENGR		:ENGR		:ASST		:ENGR		:SENIOR		:ASST		:GRAPHICS:WORD		:TOTL		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
1. PRELIMINARY ENGINEERING	34	40	44	64	68	12	4	4	24	30											
2. CONSTRUCTION CONTRACT DEDUCTION	10	14	20	24	32	4	0	0	12	8											
3. PERMITS	4	4	8	0	0	32	0	8	8	4											
4. FIELD INVESTIGATIONS	6	12	44	8	24	6	12	140	4	2											
5. CONSTRUCTION PHASE SERVICES	12	16	24	48	0	0	0	64	0	32											
6. CONSTRUCTION PHASE NEEDS	6	4	4	0	0	4	0	0	0	0											
TOTAL PERSON HOURS	72	90	144	144	124	58	16	216	48	76											
Rate	\$125.00	\$100.00	\$71.50	\$51.50	\$43.50	\$75.00	\$72.00	\$35.00	\$30.00	\$34.00											
Fees	\$9,000	\$9,000	\$10,296	\$8,856	\$5,394	\$4,750	\$1,152	\$7,560	\$1,440	\$2,584											

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

REIMBURSIBLE EXPENSES	PRELIMINARY; CONTRACT ENGINEERING; DOCUMENTS;	PERMITS;	FIELD INSPECTION;	CONSTRUCTION; COORDINATION; PHASE	TOTAL
HALEY & ALDRICH INC.					
1. PRINTING, PHOTOS AND REPORTS	\$125	\$290	\$350		\$790
2. TELEPHONE, FAX	\$65			\$62	\$165
3. COMPUTER	\$200			\$240	\$440
4. TEST PITS (SUB)			\$3,300		\$3,300
5. LAND BORINGS (SUB)			\$8,800		\$8,800
6. WATER BORINGS (SUB)			\$11,000		\$11,000
7. ERG. & CHEM TESTING			\$1,700		\$1,700
8. EQUIP. DIVING, SAFETY			\$885		\$885
9. SOIL HANDLING			\$150	\$180	\$330
TOTAL	\$390	\$290	\$26,185	\$482	\$27,410

Project: Pier 3 Charlestown Navy Yard Date Prepared 04-Nov-88
 Prepared by: DGG
 Haley & Aldrich, Inc. Services: Geotechnical Engineering

Engineering cost estimate for Task: Preliminary Design

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	4.25	\$125.00	\$4,250.00
Associate	5.00	\$100.00	\$4,000.00
Senior Engineer	5.50	\$71.50	\$3,146.00
Staff Engineer	8.00	\$61.50	\$3,936.00
Assistant Engineer	8.50	\$43.50	\$2,958.00
Sr. Environ. Geologist	1.50	\$75.00	\$900.00
Senior Geologist	0.50	\$72.00	\$288.00
Assist. Geologist	0.50	\$35.00	\$140.00
Graphics	3.00	\$30.00	\$720.00
Word Processor	3.75	\$34.00	\$1,020.00
Reproduction	0.50	\$26.50	\$106.00
			\$0.00
			\$0.00
Total	41.00		\$21,464.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Blueprints	50	\$1.00	1.00	\$50.00
Fax Mail	20	\$1.00	1.00	\$20.00
Computer equip.	10	\$20.00	1.00	\$200.00
Telephone	15	\$3.00	1.00	\$45.00
Presentation mtls.	1	\$75.00	1.00	\$75.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
Total				\$390.00

Project: Pier 3 Charlestown Navy Yard Date Prepared 04-Nov-88
 Prepared by DGG
 Haley & Aldrich, Inc. Services: Geotechnical Engineering

Engineering cost estimate for Task: Construction Documents

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	1.25	\$125.00	\$1,250.00
Associate	1.75	\$100.00	\$1,400.00
Senior Engineer	2.50	\$71.50	\$1,430.00
Staff Engineer	3.00	\$61.50	\$1,476.00
Assistant Engineer	4.00	\$43.50	\$1,392.00
Sr. Environ. Geologist	0.50	\$75.00	\$300.00
Senior Geologist	0.00	\$72.00	\$0.00
Assist. Geologist	0.00	\$35.00	\$0.00
Graphics	1.50	\$30.00	\$360.00
Word Processor	1.00	\$34.00	\$272.00
Reproduction	0.50	\$26.50	\$106.00
			\$0.00
			\$0.00
Total	16.00		\$7,986.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Fax mail	30	\$1.00	1.00	\$30.00
Blueprints	25	\$1.00	1.00	\$25.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
Total				\$55.00

Project: Pier 3 Charlestown Navy Yard Date Prepared 04-Nov-88
 Prepared by DGG
 Haley & Aldrich, Inc. Services: Geotechnical Engineering

Engineering cost estimate for Task: Reports for other Agencies

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	0.50	\$125.00	\$500.00
Associate	0.50	\$100.00	\$400.00
Senior Engineer	1.00	\$71.50	\$572.00
Staff Engineer	0.00	\$61.50	\$0.00
Assistant Engineer	0.00	\$43.50	\$0.00
Sr. Environ. Geologist	4.00	\$75.00	\$2,400.00
Senior Geologist	0.00	\$72.00	\$0.00
Assist. Geologist	1.00	\$35.00	\$280.00
Graphics	1.00	\$30.00	\$240.00
Word Processor	0.50	\$34.00	\$136.00
Reproduction	0.25	\$26.50	\$53.00
			\$0.00
			\$0.00
Total	8.75		\$4,581.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Report mtls.	10	\$25.00	1.00	\$250.00
Photographs	2	\$20.00	1.00	\$40.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
Total				\$290.00

Project: Pifer 3 Charlestown Navy Yard Date Prepared 08-Nov-88
 Prepared by DGG
 Haley & Aldrich, Inc. Services: Geotechnical Engineering

Engineering cost estimate for Task: Subsurface Explorations, Soil tests

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	0.75	\$125.00	\$750.00
Associate	1.50	\$100.00	\$1,200.00
Senior Engineer	5.50	\$71.50	\$3,146.00
Staff Engineer	1.00	\$61.50	\$492.00
Assistant Engineer	3.00	\$43.50	\$1,044.00
Sr. Environ. Geologist	0.75	\$75.00	\$450.00
Senior Geologist	1.50	\$72.00	\$864.00
Assist. Geologist	17.50	\$35.00	\$4,900.00
Graphics	0.50	\$30.00	\$120.00
Word Processor	0.25	\$34.00	\$68.00
Reproduction	0.25	\$26.50	\$53.00
			\$0.00
			\$0.00
Total	32.50		\$13,087.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Test pits (sub)	1	\$3,300.00	1.00	\$3,300.00
Land borings (sub)	1	\$8,800.00	1.00	\$8,800.00
Water borings (sub)	1	\$11,000.00	1.00	\$11,000.00
Eng. soil tests	1	\$150.00	1.00	\$150.00
Chemical soil tests	1	\$1,550.00	1.00	\$1,550.00
Diving supplies	1	\$750.00	1.00	\$750.00
Data rept. mtls.	10	\$35.00	1.00	\$350.00
Health & Safety equip	1	\$75.00	1.00	\$75.00
Hnu Meter	3	\$20.00	1.00	\$60.00
Soil Handling	1	\$150.00	1.00	\$150.00
Total				\$26,185.00

Project: Pier 3 Charlestown Navy Yard Date Prepared 03-Nov-83
 Prepared by: DGG
 Haley & Aldrich, Inc. Services: Geotechnical Engineering

Engineering cost estimate for Task: Construction Monitoring

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	1.50	\$125.00	\$1,500.00
Associate	2.00	\$100.00	\$1,600.00
Senior Engineer	3.00	\$71.50	\$1,716.00
Staff Engineer	6.00	\$61.50	\$2,952.00
Assistant Engineer	0.00	\$43.50	\$0.00
Sr. Environ. Geologist	0.00	\$75.00	\$0.00
Senior Geologist	0.00	\$72.00	\$0.00
Assist. Geologist	8.00	\$35.00	\$2,240.00
Graphics	0.00	\$30.00	\$0.00
Word Processor	4.00	\$34.00	\$1,088.00
Reproduction	2.50	\$26.50	\$530.00
			\$0.00
			\$0.00
Total	27.00		\$11,626.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Faxmail	25	\$1.00	1.00	\$25.00
Telephone	15	\$2.50	1.00	\$37.50
Computer equip.	6	\$40.00	1.00	\$240.00
Travel	60	\$3.00	1.00	\$180.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
Total				\$482.50

Project: Pier 3 Charlestown Navy Yard

Date Prepared 04-Nov-88

Haley & Aldrich, Inc.

Prepared by DGG

Services: Geotechnical Engineering

Engineering cost estimate for Task:

Coordination with other Agencies

DIRECT COSTS

LABOR CATEGORY	ManDays	Rate	Total
Principal	0.75	\$125.00	\$750.00
Associate	0.50	\$100.00	\$400.00
Senior Engineer	0.50	\$71.50	\$286.00
Staff Engineer	0.00	\$61.50	\$0.00
Assistant Engineer	0.00	\$43.50	\$0.00
Sr. Environ. Geologist	0.50	\$75.00	\$300.00
Senior Geologist	0.00	\$72.00	\$0.00
Assist. Geologist	0.00	\$35.00	\$0.00
Graphics	0.00	\$30.00	\$0.00
Word Processor	0.00	\$34.00	\$0.00
Reproduction	0.00	\$26.50	\$0.00
			\$0.00
			\$0.00
Total	2.25		\$1,736.00

REIMBURSIBLES

Item	Number	Unit Cost	Charge	Total
Telephone	3	\$2.50	1.00	\$7.50
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
			1.00	\$0.00
Total				\$7.50

RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

TASK	LEVEL OF EFFORT - PERSON HOURS FEES AND EXPENSES					
	PRINCIPAL: DIRECT	PROJECT: DIRECT	PROJECT: ARCH	STAFF: L. S. ARCH	TOTAL: HOURS	FEES: EXPENSES
1. PRELIMINARY ENGINEERING	73	304	372	370	1119	\$46,605 \$3,200
2. CONSTRUCTION CONTRACT DOCUMENTS	84	160	470	664	1378	\$52,827 \$3,600
3. PERMITS	*	*	*	*	*	* *
4. FIELD INVESTIGATIONS	*	*	*	*	*	* *
5. CONSTRUCTION PHASE SERVICES	15	98	264	0	377	\$16,367 \$1,200
6. CONSULTATION & COORD. MEETINGS	*	*	*	*	*	* *
TOTAL PERSON HOURS	172	562	1106	1034	2874	
RATE	\$65.00	\$52.00	\$39.00	\$31.20		
PAYROLL	\$11,180	\$29,224	\$43,134	\$32,261		\$115,799 \$8,000

* INCLUDED WITH OTHER TASKS

	PRINCIPAL - IN-CHARGE				PROJECT DIRECTOR				PROJECT LANDSCAPE ARCHITECT			
	HOURS	SALARY RATE	MARK-UP	FEE	HOURS	SALARY RATE	MARK-UP	FEE	HDWRS	SALARY RATE	MARK-UP	FEE
1. SCHEMATIC DESIGN												
1.1 Site Analysis and Assessment	4.00	25.00	2.60	260.00	8.00	20.00	2.60	416.00	8.00	15.00	2.60	312.00
1.2 Site Visit and Photography	4.00	25.00	2.60	260.00	8.00	20.00	2.60	416.00	8.00	15.00	2.60	312.00
1.3 Map Existing Conditions	0.00	25.00	2.60	0.00	2.00	20.00	2.60	104.00	8.00	15.00	2.60	312.00
1.4 Archival/Historic Research	0.00	25.00	2.60	0.00	4.00	20.00	2.60	208.00	4.00	15.00	2.60	156.00
1.5 Client/User Program Analysis	1.00	25.00	2.60	65.00	8.00	20.00	2.60	416.00	4.00	15.00	2.60	156.00
1.6 Client/User Input	1.00	25.00	2.60	65.00	2.00	20.00	2.60	104.00	2.00	15.00	2.60	78.00
1.7 Base Sheet Preparation	0.00	25.00	2.60	0.00	2.00	20.00	2.60	104.00	10.00	15.00	2.60	390.00
1.8 Design Alternatives	6.00	25.00	2.60	390.00	20.00	20.00	2.60	1,040.00	30.00	15.00	2.60	1,170.00
1.9 Graphics: Sections, Enlarged Plans and Renderings	0.00	25.00	2.60	0.00	10.00	20.00	2.60	520.00	30.00	15.00	2.60	1,170.00
1.10 Cost Estimate	1.00	25.00	2.60	65.00	10.00	20.00	2.60	520.00	10.00	15.00	2.60	390.00
1.11 Meetings with Client and Public	8.00	25.00	2.60	520.00	20.00	20.00	2.60	1,040.00	10.00	15.00	2.60	390.00
1.12 Administration	2.00	25.00	2.60	130.00	20.00	20.00	2.60	1,040.00	10.00	15.00	2.60	390.00
SUBTOTAL				1,755.00				5,928.00				5,226.00
2. DESIGN DEVELOPMENT												
2.1 Site Visits/Photography	0.00	25.00	2.60	0.00	4.00	20.00	2.60	208.00	4.00	15.00	2.60	156.00
2.2 Revise Base Drawings	0.00	25.00	2.60	0.00	0.00	20.00	2.60	0.00	4.00	15.00	2.60	156.00
2.3 Program Revisions	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	4.00	15.00	2.60	156.00
2.4 Overall Design Studies	2.00	25.00	2.60	130.00	20.00	20.00	2.60	1,040.00	30.00	15.00	2.60	1,170.00
2.5 Detail Design Studies	2.00	25.00	2.60	130.00	10.00	20.00	2.60	520.00	30.00	15.00	2.60	1,170.00
2.6 Special Area/Special Element Studies	2.00	25.00	2.60	130.00	10.00	20.00	2.60	520.00	30.00	15.00	2.60	1,170.00
2.7 Materials and Product Research	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	8.00	15.00	2.60	312.00
2.8 Site Furniture/Signage Design Studies	2.00	25.00	2.60	130.00	8.00	20.00	2.60	416.00	16.00	15.00	2.60	624.00
2.9 Lighting Design Studies	2.00	25.00	2.60	130.00	8.00	20.00	2.60	416.00	8.00	15.00	2.60	312.00
2.10 Develop Special Details	2.00	25.00	2.60	130.00	8.00	20.00	2.60	416.00	8.00	15.00	2.60	312.00
2.11 Utilities Coordination	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	8.00	15.00	2.60	312.00
2.12 Client Coordination	8.00	25.00	2.60	520.00	8.00	20.00	2.60	416.00	8.00	15.00	2.60	312.00
2.13 City Agency Reviews and Modifications	6.00	25.00	2.60	390.00	8.00	20.00	2.60	416.00	4.00	15.00	2.60	156.00
2.14 Outline Specifications	0.00	25.00	2.60	0.00	12.00	20.00	2.60	624.00	4.00	15.00	2.60	156.00
2.15 Cost Estimate	2.00	25.00	2.60	130.00	12.00	20.00	2.60	624.00	12.00	15.00	2.60	468.00
2.16 Presentation Graphics	2.00	25.00	2.60	130.00	20.00	20.00	2.60	1,040.00	30.00	15.00	2.60	1,170.00
2.17 Meetings with Client and Public	8.00	25.00	2.60	520.00	20.00	20.00	2.60	1,040.00	20.00	15.00	2.60	780.00
2.18 Administration	2.00	25.00	2.60	130.00	30.00	20.00	2.60	1,560.00	10.00	15.00	2.60	390.00
SUBTOTAL				2,990.00				9,880.00				9,282.00
3. CONTRACT DOCUMENTATION												
3.1 Site Visits and Photography	2.00	25.00	2.60	130.00	6.00	20.00	2.60	312.00	20.00	15.00	2.60	780.00
3.2 Final Program Modifications	8.00	25.00	2.60	520.00	16.00	20.00	2.60	832.00	20.00	15.00	2.60	780.00
3.3 Final Client Modifications	4.00	25.00	2.60	260.00	12.00	20.00	2.60	624.00	32.00	15.00	2.60	1,248.00
3.4 Final detail design	8.00	25.00	2.60	520.00	16.00	20.00	2.60	832.00	30.00	15.00	2.60	1,170.00
3.5 Layout, Materials and Planting Plans	6.00	25.00	2.60	390.00	10.00	20.00	2.60	520.00	40.00	15.00	2.60	1,560.00
3.6 Special Area Plans	8.00	25.00	2.60	520.00	10.00	20.00	2.60	520.00	80.00	15.00	2.60	3,120.00
3.7 Detail Sheets	6.00	25.00	2.60	390.00	10.00	20.00	2.60	520.00	100.00	15.00	2.60	3,900.00
3.8 Client Coordination and Review	8.00	25.00	2.60	520.00	16.00	20.00	2.60	832.00	30.00	15.00	2.60	1,170.00
3.9 City Agency Review and Modifications	8.00	25.00	2.60	520.00	16.00	20.00	2.60	832.00	30.00	15.00	2.60	1,170.00
3.10 Specifications	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	20.00	15.00	2.60	780.00
3.11 Cost Estimate	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	20.00	15.00	2.60	780.00
3.12 Presentation Graphics	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	12.00	15.00	2.60	468.00
3.13 Meetings with Client and Public	12.00	25.00	2.60	700.00	12.00	20.00	2.60	624.00	16.00	15.00	2.60	624.00
3.14 Administration	8.00	25.00	2.60	520.00	24.00	20.00	2.60	1,248.00	20.00	15.00	2.60	780.00
SUBTOTAL				5,460.00				8,320.00				16,330.00

STAFF LANDSCAPE ARCHITECT

HOURS	SALARY RATE	MARK-UP	FEE	SUBTOTAL FEE	CONSULTANTS	EXPENSES
8.00	12.00	2.60	249.60	1,237.60		
8.00	12.00	2.60	249.60	1,237.60		
20.00	12.00	2.60	624.00	1,040.00		
8.00	12.00	2.60	249.60	613.60		
0.00	12.00	2.60	0.00	637.00		
0.00	12.00	2.60	0.00	247.00		
24.00	12.00	2.60	748.80	1,242.80		
20.00	12.00	2.60	624.00	3,224.00		
40.00	12.00	2.60	1,248.00	2,938.00		
10.00	12.00	2.60	312.00	1,287.00		
0.00	12.00	2.60	0.00	1,950.00		
0.00	12.00	2.60	0.00	1,560.00		
			4,305.60	17,214.60	1,200.00	18,414.60
4.00	12.00	2.60	124.80	488.80		
20.00	12.00	2.60	624.00	780.00		
2.00	12.00	2.60	62.40	556.40		
20.00	12.00	2.60	624.00	2,964.00		
10.00	12.00	2.60	312.00	2,132.00		
10.00	12.00	2.60	312.00	2,132.00		
10.00	12.00	2.60	312.00	962.00		
10.00	12.00	2.60	312.00	1,482.00		
10.00	12.00	2.60	312.00	1,170.00		
20.00	12.00	2.60	624.00	1,482.00		
10.00	12.00	2.60	312.00	962.00		
2.00	12.00	2.60	62.40	1,310.40		
4.00	12.00	2.60	124.80	1,086.80		
0.00	12.00	2.60	0.00	780.00		
20.00	12.00	2.60	624.00	1,846.00		
80.00	12.00	2.60	2,496.00	4,836.00		
0.00	12.00	2.60	0.00	2,340.00		
0.00	12.00	2.60	0.00	2,080.00		
			7,258.40	29,390.40	2,060.00	31,390.40
20.00	12.00	2.60	624.00	1,846.00		
40.00	12.00	2.60	1,248.00	3,380.00		
40.00	12.00	2.60	1,248.00	3,380.00		
60.00	12.00	2.60	1,872.00	4,394.00		
80.00	12.00	2.60	2,496.00	4,966.00		
120.00	12.00	2.60	3,744.00	7,904.00		
140.00	12.00	2.60	4,368.00	9,178.00		
20.00	12.00	2.60	624.00	3,146.00		
30.00	12.00	2.60	936.00	3,458.00		
10.00	12.00	2.60	312.00	1,430.00		
30.00	12.00	2.60	936.00	2,054.00		
30.00	12.00	2.60	936.00	1,742.00		
24.00	12.00	2.60	748.80	2,776.80		
20.00	12.00	2.60	624.00	3,172.00		
			20,716.80	52,826.80	3,600.00	56,426.80

4. CONSTRUCTION ADMINISTRATION

4.1 Bid Questions	2.00	25.00	2.60	130.00	2.00	20.00	2.60	104.00	8.00	15.00	2.60	312.00
4.2 Pre-Bid Conference/Bid Opening	2.00	25.00	2.60	130.00	4.00	20.00	2.60	208.00	4.00	15.00	2.60	156.00
4.3 Contractor Recommendations	2.00	25.00	2.60	130.00	6.00	20.00	2.60	312.00	8.00	15.00	2.60	312.00
4.4 Construction Observation	6.00	25.00	2.60	390.00	48.00	20.00	2.60	2,496.00	100.00	15.00	2.60	3,900.00
4.5 Inspection Reports	0.00	25.00	2.60	0.00	10.00	20.00	2.60	520.00	40.00	15.00	2.60	1,560.00
4.6 Shop Drawing/Sample Approvals	1.00	25.00	2.60	65.00	10.00	20.00	2.60	520.00	48.00	15.00	2.60	1,872.00
4.7 Punch Lists	1.00	25.00	2.60	65.00	10.00	20.00	2.60	520.00	32.00	15.00	2.60	1,248.00
4.8 Final Approval	1.00	25.00	2.60	65.00	8.00	20.00	2.60	416.00	24.00	15.00	2.60	936.00
SUBTOTAL				975.00				5,096.00				10,296.00

TOTALS

0.00	12.00	2.60	0.00	546.00	
0.00	12.00	2.60	0.00	494.00	
0.00	12.00	2.60	0.00	754.00	
0.00	12.00	2.60	0.00	6,786.00	
0.00	12.00	2.60	0.00	2,080.00	
0.00	12.00	2.60	0.00	2,457.00	
0.00	12.00	2.60	0.00	1,833.00	
0.00	12.00	2.60	0.00	1,417.00	
			0.00	16,367.00	1,200.00
					17,567.00

				115,798.80	8,000.00	123,798.80
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RECONSTRUCTION OF PIER 3
 CHARLESTOWN NAVY YARD
 BOSTON REDEVELOPMENT AUTHORITY

TASK	LEVEL OF EFFORT - -PERSON HOURS FEES AND EXPENSES					
	PRINCIPA: : ARCH	PROJECT : ARCH.	STAFF : ARCH.	TOTAL : HOURS	FEES : FEES	EXPENSE : EXPENSE
1. PRELIMINARY ENGINEERING	45	50	100	195	\$11,055	\$770
2. CONSTRUCTION CONTRACT DOCUMENTS	25	95	125	245	\$13,805	\$990
3. PERMITS	*	*	*	*	*	*
4. FIELD INVESTIGATIONS	*	*	*	*	*	*
5. CONSTRUCTION PHASE SERVICES	0	50	63	113	\$6,214	\$440
6. CONSULTATION & COORD. MEETINGS	*	*	*	*	*	*
TOTAL PERSON HOURS	70	195	288	553		
RATE	\$70.30	\$67.18	\$45.32			
PAYROLL	\$4,921	\$13,100	\$13,052		\$31,073	\$2,200

* INCLUDED WITH OTHER TASKS

BRYANT ASSOCIATES. INC.

CHARLESTOWN NAVY YARD
RECONSTRUCTION OF PIER 3
FAY, SPOFFORD & THORNDIKE, INC.

Manhour Breakdown

Chief Surveyor	20 Hrs @ 29.00/Hr	=	\$ 580.00
Sr. Technician	40 Hrs @ 16.50/Hr	=	660.00
Drafter	50 Hrs @ 12.00/Hr	=	600.00
Party Chief	64 Hrs @ 13.55/Hr	=	867.00
Instrumentperson	64 Hrs @ 10.50/Hr	=	672.00
Rodperson	64 Hrs @ 8.50/Hr	=	<u>544.00</u>
	TOTAL DIRECT LABOR		\$ 3,923.00
Overhead	116.7		<u>4,578.00</u>
	SUB-TOTAL		\$ 8,501.00
Fixed Fee	10%		850.00
Boat Rental			<u>400.00</u>
	TOTAL		\$ <u>9,751.00</u>

BOSTON REDEVELOPMENT AUTHORITY

CHARLESTOWN NAVY YARD - RECONSTRUCTION OF PIER 3

Project Billing Rates for Designated Start
One Year Duration January, 1989 to January, 1990

	<u>Project Assignment</u>	<u>Project Billing Rates</u>
James G. Rourke	Principal-in-Charge	88.40
Robert E. Bertolino	Project Manager	70.00
Sanat P. Patwari	Project Engineer	60.30
Arthur B. Billard	Marine Engineering	51.00
Sceva S. Johnson	Civil Engineering	50.20
Kim K. Knox	Structural Engineering	50.20
Anthony Durbrowski	Structural Engineering	48.10
Jeffery P. Shelton	Electrical Engineering	58.80
Richard P. Conrad	Mechanical Engineering	55.10
Edward Hollingshead	Regulatory Coordination	56.20
Walter H. Fender	Specifications/Estimates	54.00

Project rates are based on current rate, cost of living and merit increases, and a 2.6 multiplier.

Haley & Aldrich, Inc.
Cambridge, MA
File No. X-1751
7 November 1988

Reconstruction of Pier 3, Charlestown Navy Yard

Project Billing Rates

Edward B. Kinner, (Principal)	Project Director - Geotechnical Engineering	\$125/hr
Douglas G. Gifford (Associate)	Project Manager - Geotechnical Engineering	\$100/hr
Bryan P. Sweeney	Geotechnical Engineer	\$68.11/hr

- Notes: 1. Mr. Sweeney is a Boston resident and will also perform diving services.
2. Billing rates for Director and Manager are standard company rates. Billing rate for geotechnical engineer is based on current pay, adjusted for 1989 cost of living and merit; multiplier on direct pay 3.024.



THE HALVORSON COMPANY, INC.

Reconstruction of Pier 3
Boston Redevelopment Authority

Billing Rates

Craig Halvorson	Principal in Charge	\$ 65.00
Cynthia Smith	Project Director	\$ 52.00
Ann Frick	Project Landscape Architect	\$ 39.00
April Potter	Staff Landscape Architect	\$ 31.20

PRELLWITZ/CHILINSKI ARCHITECTS

Reconstruction of Pier 3
Boston Redevelopment Authority

Billing Rates

Wendy Prellwitz

Principal

\$ 70.30

**VII. AFFIRMATIVE ACTION &
BOSTON RESIDENCY COMPLIANCE**

VII. AFFIRMATIVE ACTION & BOSTON RESIDENCY COMPLIANCE

FAY, SPOFFORD & THORNDIKE, INC. (FST) has a longstanding tradition of hiring, training, educating, and advancing minorities and women, and since its inception, has complied both with the spirit and substance (approved by federal authority) of Affirmative Action and Equal Employment Opportunity. Affirmative Action applies to all our employment practices including recruiting, advertising, rates of pay, and other compensation and benefits. It also applies to many other activities of our organization, such as community involvement and youth opportunity programs.

As a long-established engineering firm, FST has consistently employed and sought to increase employment of members of minority ethnic groups and women, has established a tuition reimbursement program to encourage employees to improve their skills and training, and encourages, through paid time off, employees taking qualifying examinations (i.e., registrations) to their professional advantage. FST employees are further encouraged to participate in various professional societies such as the Boston Society of Civil Engineers, the Women's Transportation Seminar, and the Society of Women Engineers.

FST participates annually in the United Negro College Fund, utilizes minority students from Northeastern University and Wentworth Institute during their co-op work training curriculum, and advertises employment opportunities in Boston minority and neighborhood newspapers such as La Semana, Bay State Banner, South End News, and Sampan.

FST prohibits discrimination or denial of benefits of any activity, program, or employment process, especially with regard to assuring that Blacks, Hispanics, Asian Americans, American Indians, women, and handicapped persons, are treated fairly and equitably. No person will be discriminated against on the basis of race, creed, color, religious beliefs, national origin, ancestry, marital status, age, or gender.

Currently, approximately 29% of the firm's total employees are minorities and/or women. FST solicits and encourages minority/women firm participation on its projects, and utilizes the services of minority vendors or suppliers whenever possible.

During FST's joint-venture participation, as Coordinating Consultant and Section One Designer, for the MBTA's Southwest Corridor Project, FST was responsible for conceptualization, design, and implementation of an Education/Training Program to enable local project area high school students to work as interns in the project offices and learn the fundamentals of engineering and architecture. These minority and women interns have subsequently made new career choices, applied to, and been accepted in local colleges to enable them to continue this training.

FST's commitment to Affirmative Action/Equal Employment Opportunity and to the Boston Redevelopment Authority's Boston residency requirements is evidenced by the personnel assignments on this project and is further underscored by the composition of our project team. We would also note that for nearly 75 years, since 1914, FST has maintained offices in Boston. Throughout the project's implementation, we will continue to strive to maximize the commitment of Boston residents, women, and minorities in the staffing by FST and all of our subconsultant firms.

Five Boston residents on FST's staff will play key roles on the work. Anthony Dubrowski, Philippe Lauture (a minority staff member), Jeffrey P. Sheldon, Sceva Johnson (a minority staff member), and Edward Hollingshead, all residents of the City, will provide services in the areas of structural, mechanical, electrical, and civil engineering, and environmental permitting, respectively. In addition, Kim Knox, a female staff member at FST, will play a major role in structural engineering.

Our project team includes the minority-owned firm of Bryant Associates, Inc. of Boston which has been selected to perform all required survey for the project, and the woman-owned business enterprise, Prellwitz/Chilinski Architects.



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