



Agenda Item #: \_\_\_\_\_

# Staff Report

## City of Manhattan Beach

**TO:** Honorable Mayor Montgomery and Members of the City Council

**THROUGH:** Richard Thompson, Interim City Manager

**FROM:** Jim Arndt, Director of Public Works  
Steve Finton, City Engineer

**DATE:** November 16, 2010

**SUBJECT:** Consideration to Approve an Agreement with Moffatt & Nichol for Structural Inspection Services to Assess the Condition of the Manhattan Beach Pier (\$89,826)

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**RECOMMENDATION:**

Staff recommends that City Council approve an agreement with Moffatt & Nichol in the amount of \$89,826 to perform a full structural inspection of the pier.

**FISCAL IMPLICATION:**

Funding for this project in the amount of \$90,000 was appropriated for this project through the fiscal year 2010-11 Capital Improvement Program (CIP).

<b>BUDGET</b>	
FY2010-11 CIP; Project # 11839E; State Pier and Parking Fund	\$90,000.00
<b>TOTAL BUDGET</b>	<b>\$90,000.00</b>

<b>EXPENDITURES</b>	
Moffatt & Nichol Inspection Services	\$89,826.00
<b>ESTIMATED BALANCE AFTER COMPLETION</b>	<b>\$174.00</b>

**BACKGROUND:**

The Manhattan Beach Pier is a reinforced concrete structure constructed between 1917 and 1920. In the 1950s, the County of Los Angeles completed a major repair project where pneumatically placed concrete was placed on areas showing deterioration. This project resulted in an almost freeform shape of the piles and girders. In the 1980s, corrosion in the reinforcing steel caused concrete to spall from the structure causing hazardous conditions for persons walking under the pier. In 1988, the City entered into an operating agreement with the State of California where the City took over maintenance responsibilities for the pier. Also in 1988, a full structural

assessment of the pier was conducted that identified structural deficiencies and recommended rehabilitation. In 1992, the latest major rehabilitation project was completed. This project included the full removal and replacement of the pier deck and much of the support structure. Other than lights and railing repairs, this was the last significant rehabilitation work performed on the pier and no further condition assessments have been conducted.

## **DISCUSSION:**

The pier is subjected to large recurring wave forces and exists in a corrosive marine environment where structural deterioration is accelerated. It is recommended that a recurring inspection program be initiated for the pier such that deterioration can be detected early and mitigated efficiently.

### Request for Proposals

On August 3, 2010, the City issued a request for proposals (RFP) for inspection of the pier. The RFP requested that consultants recommend an inspection regimen conforming to National Bridge Inspection Standards (NBIS). Three proposals were received on September 15, 2010.

A committee of City staff reviewed the proposals received and conducted interviews with each respondent. Staff evaluated the level of firm experience, the proposed inspection regimen and the cost effectiveness of the proposed regimen. Staff ranked the firms and proposals as follows:

1. Moffatt & Nichol (\$89,864)
2. URS Corporation (\$81,430)
3. Halcrow (\$55,313)

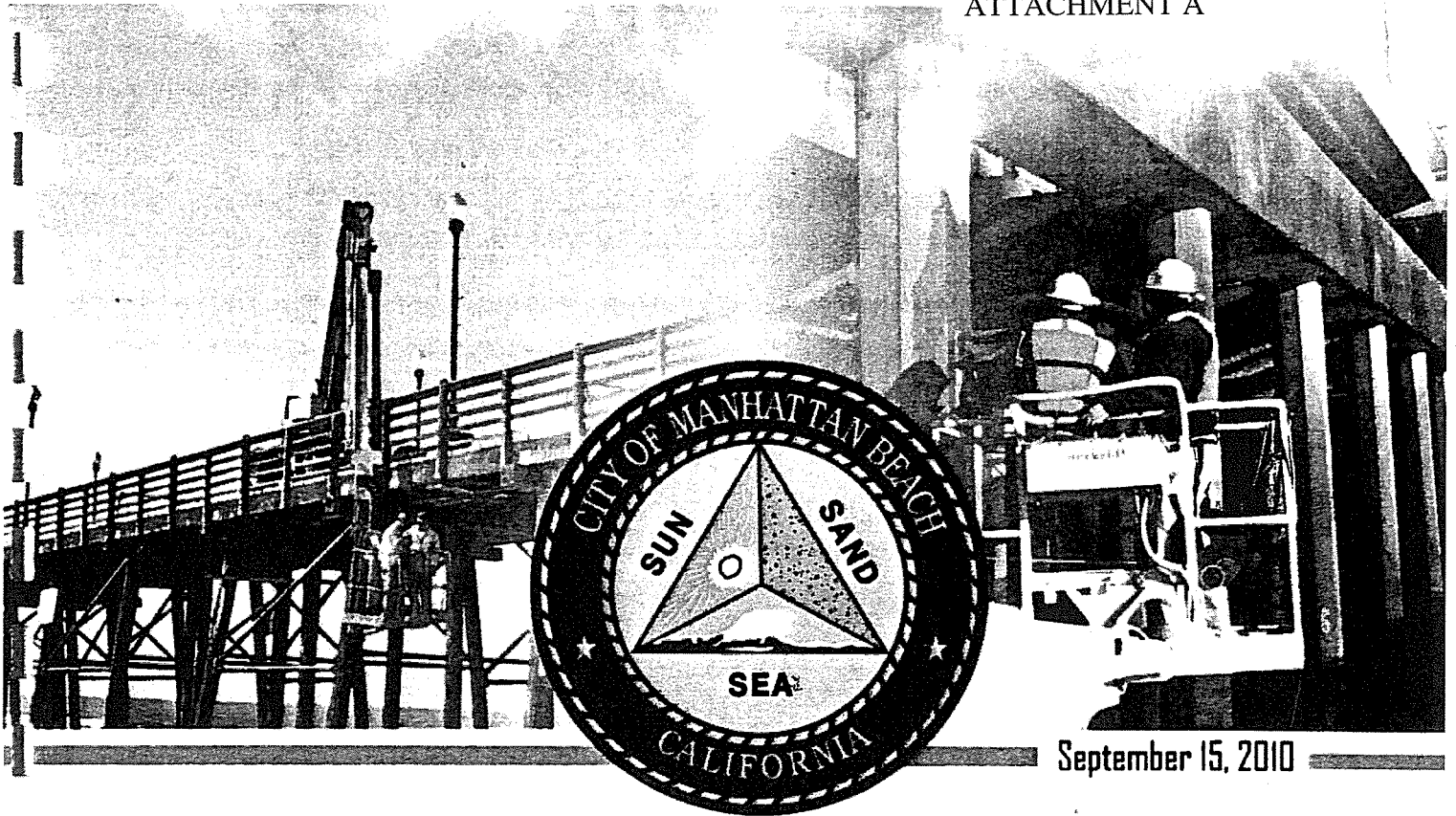
Staff recommends entering into an agreement with Moffatt & Nichol to perform the inspection. Moffatt & Nichol is the firm that conducted the inspection in 1988 and designed the 1992 pier rehabilitation. Moffatt & Nichol propose to use staff members that were involved in the 1992 project that demonstrate intimate knowledge of the pier. Additionally, the 1992 rehabilitation project has performed very well for 18 years which is a testament to the expertise of Moffatt & Nichol. Staff believes Moffatt & Nichol's superior demonstrated expertise warrants their higher fee to inspect this important landmark. The proposed inspection regimen includes the following:

- Structure Monitoring - Land survey to establish control points on the pier to detect any vertical or horizontal movement over time.
- Above Water Inspection - Inspection of deck, railing, utilities, understructure and piles above the water line to detect deterioration, cracking, spalling and/or corrosion.
- Underwater Inspection - Use of dive vessel and divers to inspect piles underwater. This task will include a full hands-on inspection of all wet piles from the ocean bottom to the water line. Additionally, marine growth would be removed by divers on 10% of wet piles at three one-foot horizontal strips to detect any cracking, spalling and/or loss of pile girth.
- As built Plans - Development of a full as-built plan for the pier including locations of current deterioration.
- Inspection report and Cost Estimate for Recommended Repairs.

Typically, marine structures are inspected biennially with a full in-depth inspection every 5 years. The proposed inspection regimen would be a starting point for a recurring inspection program. Upon completion of the recommended inspection contract by Moffatt & Nichol, staff will have better knowledge of the condition of the pier. Although staff does not detect any significant deterioration on the pier at this time, it is possible that the recommended inspection may identify deterioration that would require rehabilitation. The level and location of the deterioration would dictate whether the repairs be performed immediately or through future CIPs.

Attachment A: Moffatt & Nichol Proposal

xc: Henry Mitzner, Controller



City of Manhattan Beach

# Structural Inspection and Engineering Services Pier Condition Assessment





3780 Kilroy Airport Way, Suite 600  
Long Beach, CA 90806

(562) 426-9551 Fax (562) 424-7489  
www.moffattnichol.com

September 15, 2010

Steve Finton, City Engineer  
City of Manhattan Beach  
1400 Highland Avenue  
Manhattan Beach, California 90266-4795

Subject: Proposal to Provide Structural Inspection and Engineering Services – Pier Condition Assessment

Dear Mr. Finton:

Moffatt & Nichol is uniquely suited to provide the structural inspection and assessment of the Manhattan Beach Pier. The firm has firsthand knowledge of the pier having been the engineer for the last major rehabilitation. This knowledge, coupled with our inspection and assessment expertise, will allow Moffatt & Nichol to provide on-target services for this project most expeditiously.

Inspecting, planning, rehabilitating and designing marine facilities are the primary focus areas of Moffatt & Nichol. The firm is well-known and highly regarded as the pioneering leader in marine facility engineering and, in addition, we consistently demonstrate our impressive credentials in underwater inspection, condition assessment, and rehabilitation design to our local clientele. Moffatt & Nichol has been providing professional underwater inspection services to clients worldwide for over 30 years using experienced, in-house engineer-divers. With 45 engineer-divers on staff, 15 of which are local to Southern California, Moffatt & Nichol has the depth of expertise to serve the City of Manhattan Beach with both expertise and experience.

Moffatt & Nichol is proud of their 65-year history in providing waterfront facility design services from the Long Beach base of operations. The firm's reputation has been fostered through our marine projects completed in 44 states and over 60 countries. Moffatt & Nichol's marine engineering project experience is unmatched and includes:

- ✓ More than 1500 marine structure inspection and assessments
- ✓ More than 50 miles of piers and wharves
- ✓ More than 80 miles of waterfront bulkheads
- ✓ More than 30 offshore or fixed pier ship mooring projects
- ✓ More than 50 miles of breakwaters, jetties & groins
- ✓ More than half a billion cubic yards of dredging
- ✓ 10 federal Design Memorandums (USN & USACE)
- ✓ More than 4000 acres of wetlands created
- ✓ Participation in over 200 waterfront environmental study projects
- ✓ More than 50 numerical and/or physical model studies

As Project Manager, Mr. Tom Spencer, S.E. will be available to support the City's needs under this contract, bringing to you his personal experience in conducting underwater and above water inspections on over 1200 waterfront facilities and extensive experience in determining the cause of degradation, designing cost effective repairs and extending the service life of marine facilities. Mr. Spencer served as a Contributing Author of the ASCE Underwater Investigations Standard Practice Manual.

### VALUE-ADDED SERVICES

Moffatt & Nichol brings tremendous insights to the City on this contract and one of our principal objectives will be to add value to your waterfront maintenance program. This added value is the result of five primary factors:

- ✓ Deep Bench of Engineer-Divers to Respond Quickly – Moffatt & Nichol holds ADCI certification and has over 30 engineer-divers, allowing us to respond quickly should the need arise.
- ✓ Full Services to Handle ANY Waterfront Assignment – Moffatt & Nichol has the most diverse marine/waterfront capabilities of any firm in the U.S.
- ✓ No Learning Curve Saves You Time and Effort – Moffatt & Nichol's extensive expertise can be used to help you tailor and refine the specific requirements for each assignment, saving you time and effort.
- ✓ Effective Service Life Extension Improves the Program – Moffatt & Nichol is the only waterfront engineering firm in North America using a new, state-of-the-art software package to quantitatively evaluate alternatives for service life extension to select the optimum remediation strategy.

Moffatt & Nichol looks forward to continuing our long-term professional relationship with the City by exceeding your expectations under this contract. Please contact me directly should you have any questions regarding our enclosed Statement of Qualifications.

### MOFFATT & NICHOL



Thomas E. Spencer, SE  
Project Manager

- Enclosures:
- 1) Statement of Qualifications
  - 2) Cost Proposal (separate sealed envelope)

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## INTRODUCTION

Moffatt & Nichol is uniquely qualified to provide this condition assessment for the Manhattan Beach Pier. Moffatt & Nichol is familiar with this facility having performed the inspection and rehabilitation study in 1988 and subsequently designed the repairs and deck replacement was completed in 1992. Proposed Project Manager, Thomas Spencer, SE is one of the co-managers of the Moffatt & Nichol's Inspection and Rehabilitation (I&R) Practice and will serve as Dive Team Leader. Mr. Spencer holds the requisite NBIS certification. Our proposed Assistant Project Manager, James Crumpley, SE managed the Manhattan Beach Pier Rehabilitation Study and the subsequent design effort for the previous rehabilitation construction. If selected for this contract, all work will be performed in-house by Moffatt & Nichol personnel, with the exception of the surveying portion which will be performed by Dulin and Boynton Licensed Surveyors, Inc.

Moffatt & Nichol has been involved in the design, inspection and repair of waterfront structures and bridges since the company was founded in 1945. In recent years facility inspection and rehabilitation has become a formal area of practice within the firm. The engineer-divers of the I&R Practice undergo periodic formal training to maintain their knowledge of the latest equipment, procedures and certifications up-to-date. Membership and participation in the American Concrete Institute (ACI) committees; ACI 357 "Offshore and marine Concrete Structures"; ACI 364 "Rehabilitation", ACI 546 "Repair of Concrete" and the International Concrete Repair Institute (ICRI) help ensure that the latest trends developed in the industry are incorporated in a timely fashion, ensuring that this information is incorporated into quality projects.

**Understanding the History...** The Manhattan Beach Pier was constructed between 1917 and 1920. In the 1950s the County of Los Angeles initiated a major repair project on the pier where pneumatically placed concrete was applied to areas showing deterioration. This project resulted in an almost freeform shape to the piles and girders. In the 1980s corrosion in the reinforcing steel caused concrete to spall, and the falling debris became a hazard to persons passing under the pier. A major rehabilitation project, designed by Moffatt & Nichol, was completed in mid-1992.

Since the 1992 rehabilitation did not replace all of the concrete in the pier girders and piles, it is likely that additional deterioration has occurred in the last 18 years and additional repairs may be necessary.

The City of Manhattan Beach requires a thorough assessment of the current condition of the pier and its various elements. The goal of this assessment is to provide a baseline for a planned periodic inspection and maintenance program, and to identify areas that should be repaired in the near-term.

### 1. RECOMMENDED INSPECTION PROGRAM

The following outline is presented to illustrate Moffatt and Nichol's overall project approach.

**Kickoff Meeting** - Conduct a kickoff meeting that includes all stakeholder personnel from the City, facility tenants and lessees. This should include the City's Engineering Project Manager; maintenance personnel; lifeguards; concessionaire; and aquarium personnel.

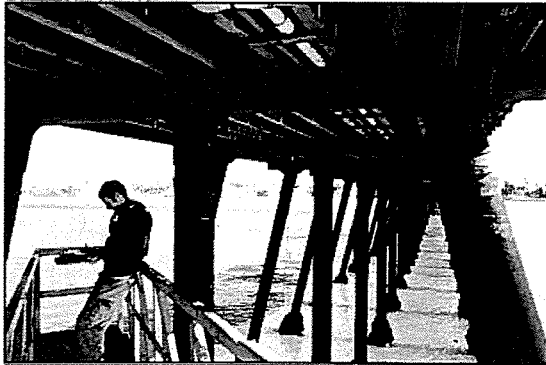
**Record Drawings/Historic Data** - Review the available documentation to develop draft field note sheets. Document the dimensions and details required for confirmation to allow preparation of as-built plans.

**Survey** - Conduct a baseline survey of the pier, noting the alignment and elevations of the pier and the critical members. Incorporate the information into the as-built plans. This Survey will be performed by under the supervision of Mr. Douglas Boynton, PLS No. 4787 (Dulin and Boynton Licensed Surveyors, Inc.). This firm has over 70 years experience in the surveying industry.

**Above Deck Inspection** - Above water inspection will be performed in such a manner so as to be least interruptive to facility tenants. If possible, pedestrian and/or vehicle access to the outboard end of the pier will be maintained at all times. The visual inspection will be conducted for all accessible components to assess the overall



condition. Inspect decking, handrails, and lighting per the National Bridge Inspection Standards (NBIS). The pier deck will be examined using sounding methodology to locate areas of concrete cracking, spalling and delamination related to reinforcing steel corrosion.



**Under Deck Above Water Inspection -**

Conduct a visual inspection of all accessible components to assess the overall condition. Inspect pier structure and other pier components critical to the safety of the structure and personnel. This includes hands-on examination of the pier deck by sounding to locate areas of concrete cracking, spalling and delamination related to reinforcing steel corrosion. The under deck inspection of structural members and utilities will be performed with a man-lift or "snooper" chosen so as to not exceed the allowable load capacity of the deck in its existing condition. The inspection would be completed using a three man crew; two people conducting the

inspection and one monitoring the snooper topside.

**Core Extraction/Laboratory Testing/Chloride Ion Profiling -** A limited concrete core extraction and testing program will be performed. This information is very beneficial when developing repair methodologies having long-term effectiveness. The goal of this coring and testing program is to assess chloride contamination. The degree of chloride contamination has a direct relationship to the potential for concrete damage as a result of corrosion of the reinforcing steel. Testing can allow for an evaluation of chloride contamination (in accordance with ASTM C 1152 – acid soluble method) using tests taken incrementally as a function of depth of penetration from the exterior of the concrete surface.

Two 2-in. diameter cores will be taken from each of the concrete deck, pile cap and above water portions of concrete piles. The core holes will be filled using a non-shrink grout. The concrete cores will be tested at 1/2-in. increments from the surface working towards the center of the core. It is expected that the higher concentration of chloride will occur at the surface, generally dropping-off as a function of depth of concrete from the exterior. The chloride ion corrosion threshold is typically accepted as being 500 PPM, although the technical literature presents threshold values ranging between 125 ppm (0.5 lb/CY) and 1,175 ppm (4.7 lb/CY).

OPTIONAL TASK  
NOT INCLUDED IN CONTRACT



**Underwater Inspection -** Perform a routine inspection as described in NBIS. Underwater inspection will be performed using engineer-divers. The inspection will include 100% Level I (general observation) and 10% Level II (removal of marine growth) of all concrete piles. The underwater inspection will be conducted from a surface-supplied air (SSA) equipped diving vessel anchored adjacent to the pier and outboard of the surf. The underwater inspections will be coordinated with a "low-surf" window to take advantage of improved below water visibility. Conduct the inspection of the piles in the surf zone at high tide for the outboard piles and at low tide for the inshore piles. The Level II will remove

the marine growth at three elevations on ten-percent of the piles to assess the underlying material.

**Assessment and Report -** The results of the inspection will be analyzed and noted on drawings of the pier. An evaluation will be made regarding the overall condition of the pier as well as individual elements. A structural engineering assessment will be performed to determine if there is any degradation of the pier's capacity to support public use of the pier.

The findings of the inspection and assessment will be presented in a report with a description of the process and conditions found along with illustrative photos and drawings. Individual pier elements will be presented in tabular form showing the element type its location in the structure and its condition at the time of the inspection. The "As-built" survey will be included in an appendix.

Any areas that are deemed to require repairs will be identified; repair concepts details and estimated cost will be developed and included in the recommendations section of the report.

**Report Preparation** - Report preparation would be performed in a format acceptable to the City of Manhattan Beach. The report should contain an Executive Summary, clear narrative; accurate figures, photos; cost estimates (escalated forward to the construction fiscal year); and supporting documentation.

a) Repair Recommendations. Repair recommendations will be made considering the following criteria:

1. Expected remaining service life of the pier structure as a whole.
2. Minimizing environmental impacts.
3. Ease of execution. Repairs requiring use of floating barges or barge mounted cranes should be avoided, if possible - due to problems associated with weather-induced waves.
4. Maintaining Open Facilities. The pier is occupied by the public and businesses. If possible, repairs should be configured for execution with minimal or no pier closures.
5. Ease of maintenance. General Services personnel should be involved with review of the repair concepts with a goal of minimizing maintenance – particularly as relates to the pier utilities.

b) Record Drawings (As-built Plans). These will be prepared in accordance with the City of Manhattan Beach guidelines. Any identified deficiencies will be shown on a CADD layer within the drawings.

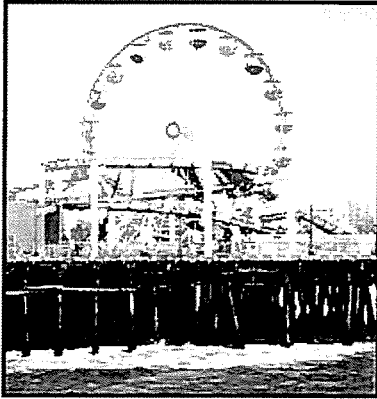
c) Cost Estimates. These should be prepared in accordance with the City of Manhattan Beach guidelines. It will be necessary to properly differentiate on the drawings between existing conditions and work to be performed under the construction contract. Careful thought should be given to the definition of unit-price quantities as relates to maintenance-driven repair activities. Repairs should be configured to minimize "down-time" necessary to repair or rehabilitate utility systems, as they are continually used by the restrooms, the restaurant and (potentially) for firefighting.

**Design Services.** Moffatt and Nichol is prepared to provide follow-on design services, if necessary. This would allow for a seamless transition from inspection to design and implementation of a viable repair program. The same engineering professionals involved in inspection and report preparation are routinely involved in the design and construction of repairs to concrete structures.

**Construction Period Services.** If a repair project is undertaken, it is recommended that the City retain the waterfront structural engineer to provide "hands-on" inspection related to any concrete repair work, to aid in controlling construction costs. Likewise, careful thought to be given to providing sufficient in-field time for structural engineer evaluation of location-specific above deck repairs.

## 2. EXPERIENCE ON SIMILAR PROJECTS

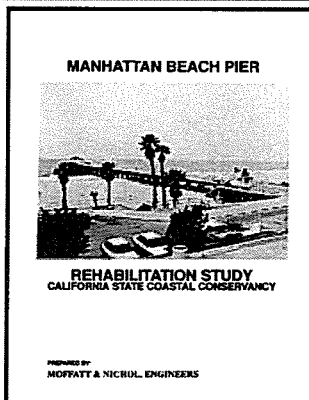
### Santa Monica Pier, Santa Monica, California



Moffatt & Nichol provided design engineering for a \$4.5 million rehabilitation of the Municipal and Newcomb piers, which comprise the Santa Monica Pier. This three-phase project included structural repair, deck upgrades, and replacement of pier appurtenances. Construction work included removal of asphalt surfacing and strengthening of the Municipal Pier deck to the beginning of the proposed Phase 4 upgrade and the rehabilitation and strengthening of the Newcomb Pier. Moffatt & Nichol also provided Construction Management services for Phase 3 of the construction.

Moffatt & Nichol conducted the Santa Monica Pier Infrastructure Assessment Study. Included in this study was a comprehensive condition assessment of all pier structural elements, utilities and appurtenances supported on the pier, upgrade studies and recommendations, maintenance guidelines, and recommendation for a ten year improvement program. In addition all of the inspection data was formatted and input into the City's GIS system. The recommendations and ten-year improvement plan were adopted by the City Council as the City's Ten-Year Plan for the Santa Monica Pier.

### Manhattan Beach Municipal Pier Rehabilitation, Manhattan Beach, California



In 1988 Moffatt & Nichol prepared a study for the rehabilitation of the deteriorated 1920 concrete pier for the California State Coastal Conservancy. This study used value engineering procedures to develop a rehabilitation recommendation that would restore the structural capacity of the pier while preserving the historic look and feel.

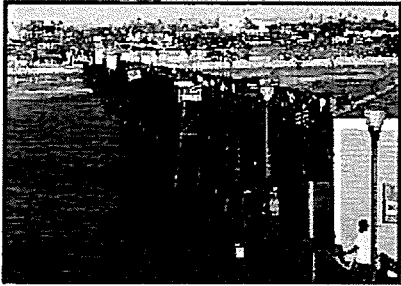
Moffatt & Nichol prepared plans and specifications for repair and preservation of the unique substructure, replacement of the non-repairable superstructure, and, in collaboration with an architect, provided for a new building at the outboard end matching the architecture of the original 1920 "Round House". Moffatt & Nichol also provided consulting services during construction, including approval of contractor submittals, weekly on site construction coordination meetings, and approval of contractor progress payments.

### Inspection/Repair Imperial Beach Pier, Imperial Beach, California



The Port of San Diego, as part of a major maintenance project, retained Moffatt & Nichol to perform a thorough above and below water assessment and make recommendations for repairs. This was done in order to keep the maintenance of the facility on a regular schedule with the goal of maximizing service life. The project is unique because of the open ocean setting of the pier, and the hybrid combination of steel pipe piles; steel superstructure; timber piles and timber superstructure. The facility also has a mechanized steel stair / ramp / boat landing structure located at the outboard end of the pier that requires special consideration.

**Inspection/Repair Oceanside Pier, Oceanside, California**



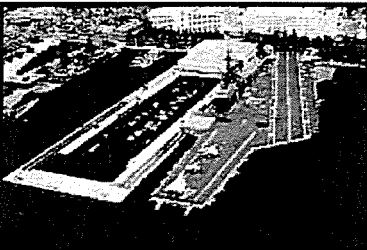
As part of a larger Beach Area Improvements planning project, Moffatt & Nichol was retained to perform a complete above and below water inspection and assessment of this historic open-ocean timber and steel pier structure. The object of the assessment was to develop rehabilitation schemes which would serve to expand the usual service life of the pier for an additional 25 years. Tasks included above deck, below deck and below water inspection of the structure and appurtenances, including electrical and wet utilities. Project deliverables included assessment report, rehabilitation schemes and cost estimates.

**Inspection/Repair California Open Ocean Piers, State of California - Department of Parks and Recreation**



The scope of Work for this project included above and below water inspection, of five open-ocean and 13 bay-protected timber or concrete pier facilities. Moffatt & Nichol performed the work in a variety of climatic conditions including zero visibility, extremely cold water and high altitude. Locations included Malibu; Ventura; Gaviota; San Simeon; Santa Cruz; San Francisco; and Lake Tahoe. The work product included complete condition report with conceptual repair schemes and cost estimates.

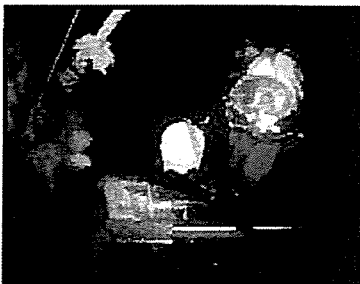
**Former Navy Pier Rehabilitation - Home of U.S.S. MIDWAY - San Diego, California**



on-site and open during construction.

Moffatt & Nichol has been consulting with the Port of San Diego in regards to the acquisition and rehabilitation of this important downtown bay front property. Services began with an initial assessment prior to acquisition of the property by the Port, and have continued with complete inspection and design of repairs including jet grouting below mole retaining wall; concrete repair; concrete deck overlay and storm water collection and treatment. A significant challenge was the execution of the repairs with the U.S. Navy and USS Midway Aircraft Carrier Museum remaining

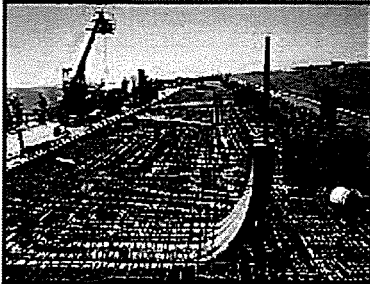
**N62473-06-D-3006 - Indefinite Quantity Contract Underwater Inspection and Assessment, NAVFACENGSERCTR Worldwide**



inspections resulted in Moffatt & Nichol being retained to produce construction documents for repair of the inspected facilities and to provide construction administration services.

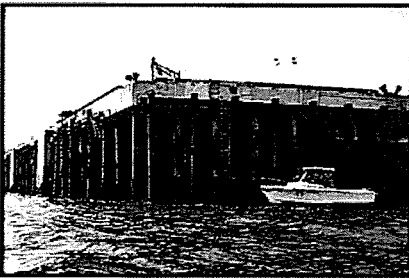
Moffatt & Nichol has been providing above and below water marine waterfront facility inspections and assessments for the U. S. Navy since 1967. Firm principals Matthew Martinez, SE, Thomas Spencer, SE, and Ron Heffron, PE are contributing authors to ASCE Standard Practice Manual for Underwater Investigations (ASCE No. 101). Facilities inspected include hundreds of piers, quaywalls, mooring dolphins, caissons, wharves, revetments, drydocks, cyclopean seawalls, marinas, cables, ramps and fender systems constructed of timber, steel, and reinforced concrete located in the U.S. and internationally. Many of these underwater

**N62473-06-D-1008 I/Q Waterfront Construction and Repairs Southern California**



Moffatt & Nichol received project ratings of “excellent” or “exceptional” for more than 80% of the projects evaluated. Phrases such as “outstanding”, “detail oriented”, “well-developed”, “great customer service” and “above and beyond requirements” were commonly used. Projects ranged from 1391 Project Documentation development, preparation of inspections and report projects; to multi-million dollar rehabilitation of major pier facilities.

**Structural Evaluation of Pier T, Berths T122 – T128, Port of Long Beach**



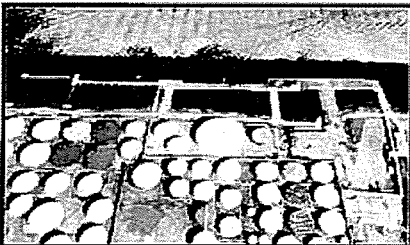
As a sub-consultant, Moffatt & Nichol Blaylock was tasked with performing complete above and below water inspection including steel sheet pile closed-cell cofferdams; concrete wharf; timber fender systems; and mooring hardware. Deliverables included full report containing figures; above and below water photos; and supporting data.

Testing included concrete core extraction and petrographic testing of 1950s-era piling to determine remaining service life as well as compressive strength. Samples of concrete reinforcing steel were removed and tested to establish the yield strength of the steel.



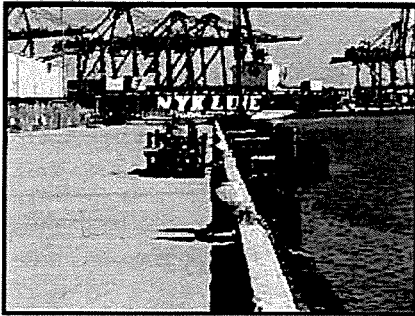
Moffatt & Nichol Blaylock performed evaluation of the nonfunctioning cathodic protection system and coating of the steel sheet pile closed-cell cofferdam structure. An 18-foot deep excavation at the back of the structure exposed buried portions of the steel sheets and tie rods. Ultrasonic thickness measurements were taken below water, above water and at the excavated elements.

**MOTEMS Audit and Structural Evaluation – Westway Marine Oil Terminal Berths 70-72, Port of Los Angeles**



Above and below water engineering inspection of this facility was performed in support of a Marine Oil Terminal Engineering Maintenance Standards (MOTEMS) audit for the facility. The structures included the main concrete wharf; access ramp; pipeline trestles; and timber/concrete mooring dolphins. Mooring/Berthing analysis and wharf load-capacity studies were also included as part of this effort.

### Vopak Marine Oil Terminal Reconfiguration & Upgrade, Port of Long Beach



Moffatt & Nichol investigated Vopak's chemical facility at Long Beach in accordance with the California State Lands Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) regulations. The condition of the existing wharf was evaluated and recommendations for upgrades or modifications were made in association with petroleum product delivery improvements.

The scope of the MOTEMS evaluation included above-and under-water field inspections and engineering analyses. The extensive audit of the existing wharf and the equipment included review of existing operations, geotechnical evaluation and assessment, structural condition assessment, mooring and berthing analysis, structural and seismic evaluation of the berth, fire protection, piping and pipeline assessment, and mechanical and electrical equipment evaluation along with the management of the project.

### Wharf Inspection Program, Port of Los Angeles



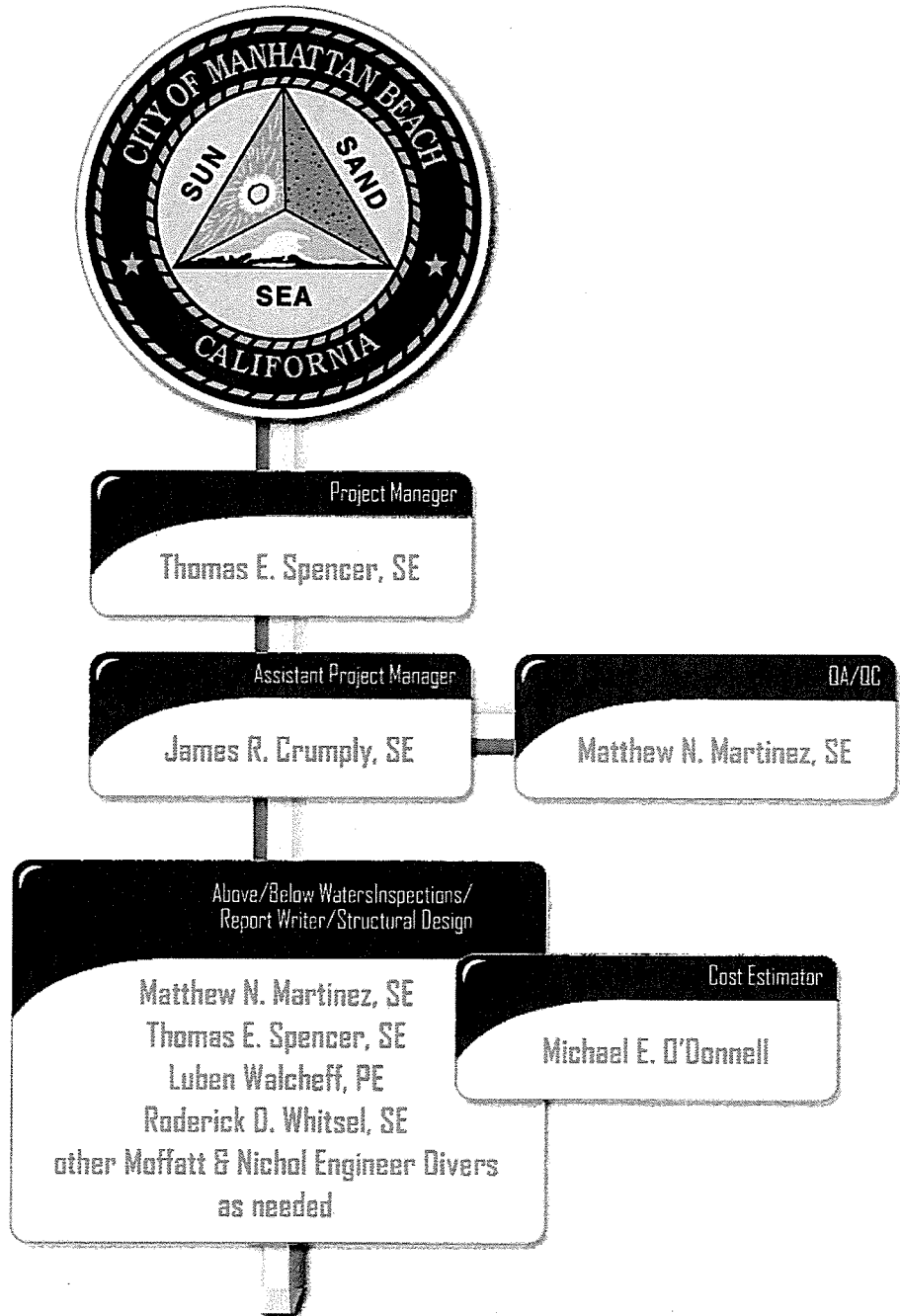
Moffatt & Nichol was the primary service provider in a multi-year contract to perform above and below water structural inspection services for concrete wharves at the Port of Los Angeles (POLA). Tasks included collection of data from Regular Underwater, Regular Above Water, Principal Inspections and Special Inspections for entry into the "AIRIS" database. Structural repairs were made from documents generated from the Principal Inspection data.

One hundred percent of the inspection work was performed by Moffatt & Nichol engineer-divers. Facilities included wharves; piers, sheet pile bulkheads; and fender systems comprised of concrete, steel, timber, plastic and other materials.

### 3. QUALIFICATIONS OF PROPOSED STAFF

#### Project Organization Chart

The Organization Chart below depicts the expected flow of communication between the City of Manhattan Beach and Moffatt & Nichol project managers Tom Spencer and Jim Crumpley. Moffatt & Nichol looks forward to serving the long-term needs of the City of Manhattan Beach from the firm's home office in Long Beach, California.



Team Member Resumes

**THOMAS E. SPENCER, SE**

**PROJECT MANAGER/DIVE TEAM AND FIELD INVESTIGATION LEADER**

REGISTRATION:

Structural Engineer, California, S3063

Professional Engineer, California, C38791

**NBIS Bridge Inspector Certified**

EDUCATION:

BS, Civil Engineering, Oregon State University

EXPERIENCE:

Mr. Spencer has more than 27 years of experience in the design of waterfront structures. He has particular expertise in water-related design and inspection as an engineer/diver on a wide range of marine structures including ocean and harbor piers, wharves, graving docks, breakwaters, steel and concrete bulkheads, fender systems, and reservoirs. The inspection work included above and below water investigations, including non-destructive testing and photography of the various facilities. This work was conducted for various clients including: U.S. Naval Facilities Engineering Command, State of California, Department of Parks and Recreation; Port of Los Angeles; Washington State Department of Transportation; the San Diego Unified Port District, and the Port of Los Angeles. Mr. Spencer's engineering experience also includes the design and seismic analysis of buildings and related items for hospitals, schools, and commercial structures.

RELEVANT EXPERIENCE:

Inspection/Repair California Open Ocean Pier, California Parks Department Engineer Diver for above-and below-water inspection of 14 pier facilities in California. Tasks included development of repair schemes, cost estimating, and report preparation.

D-250 Surface Transportation Pier, San Nicolas Island, California Quality Assurance Manager for preparation of design-build solicitation package. Tasks included on this award-winning project included concept development, cost estimates, and above/below water inspection of completed project.

I/Q Contract - Waterfront Construction and Repairs at Various Locations within Southern California, SWDIV SBAFT Project Manager for a wide variety of marine structure projects including concrete pier, wharf, and quay wall rehabilitation; above-and below-water inspection; hydrographic surveying and dredging; development of design-build solicitation packages; structure load capacity studies; and miscellaneous delivery orders.

I/Q Contract - Design and Engineering Services for Underwater Facilities Assessment, Government Facilities Worldwide NFESC ECDT Project Manager for numerous above-and below-water inspection delivery orders for facilities located on the U.S. West Coast, Hawaii and Japan. Deliverables included reports with above and below water photographs, CAD drawings, repair recommendations and cost estimates. Many of the reports also include materials assessment including petrographic analysis and other methodologies. A number of the inspection projects resulted in follow-up tasks to design repairs for the facilities - particularly in the Puget Sound and Pearl Harbor areas.

Wharf Inspection Program, Port of Los Angeles Project Manager for multi-year contract to perform above and below water structural inspection services for concrete wharves at the Port of Los Angeles (POLA). Tasks included collection of data from Regular Underwater, Regular Above Water, Principal Inspections and Special Inspections for entry into the "AIRIS" database. Structural repair plans and specifications were developed under his supervision.



**JAMES R. CRUMPLEY, SE**

**ASSISTANT PROJECT MANAGER**

REGISTRATION:

Structural Engineer, California, S2519

Professional Engineer, California, C19871

EDUCATION:

BS, Architectural Engineering, California State Polytechnic College

EXPERIENCE:

Mr. Crumpley's responsibilities involve the design of several open-ocean pier structures and the administration of large-scale, multi-disciplinary engineering projects. His experience includes the management of waterfront and landside developments including railroad, piers, marinas, bulkheads, heavy civil works projects where inspection, evaluation and remedial measures are required.

RELEVANT EXPERIENCE:

Manhattan Beach Municipal Pier Rehabilitation, Manhattan Beach, California Project Manager for the rehabilitation of the deteriorated concrete pier. The work included repair and preservation of the unique substructure, replacement of the non-repairable superstructure, and a design of a new building at the outboard end matching the architecture of the original 1920 "Round House". Jim Crumpley also provided consulting services during construction including approval of contractor submittals, weekly on site construction coordination meetings, and approval of contractor progress payments.

Santa Monica Pier, Santa Monica, California Project manager for the Santa Monica Pier Infrastructure Assessment Study. Included in this study were a comprehensive condition assessment of all pier structural elements, utilities and appurtenances supported on the pier, upgrade studies and recommendations, maintenance guidelines, and recommendation for a ten year improvement program. In addition all of the inspection data was formatted and input into the City's GIS system. The recommendations and ten-year improvement plan were adopted by the City Council as the City's Ten-Year Plan for the Santa Monica Pier.

Stearns Wharf, Santa Barbara, California Project Manager for the design for replacement of portion pier destroyed by fire, and upgrading of fire protection and electrical systems in remaining portion. Replacement design included over an acre of timber wharf, the 65 foot long boat access ramp with its jib crane and winch system, protective timber dolphins, and a new non-combustible concrete deck on steel pile platform to support the reconstructed buildings lost in the fire. The upgrading included adding new branches to the dry deluge fire sprinkler system, and complete replacement of the electrical supply system and addition of greater fault protection. Project was fast track with the contractor working as design progressed.

Huntington Beach Municipal Pier, Huntington Beach, California Project Manager for design of a new award winning municipal pier to replace the 74-year-old, storm-damaged historic Huntington Beach Municipal Pier. New pier retained the historic architectural style of original pier, e.g. haunches at the pile caps and corbels supporting light standards, while meeting current seismic and wave design criteria. The new concrete pier was also designed for highway truck loading, and includes the first use of fiberglass trench cover designed for highway trucks

**MATTHEW N. MARTINEZ, SE**

**QUALITY ASSURANCE/QUALITY CONTROL/ENGINEER-DIVER/ FIELD INVESTIGATION**

REGISTRATION:

Structural Engineer, California, S3045

Professional Engineer, California, C36857

**NBIS Bridge Inspector Certified**

EDUCATION:

BS, Architecture Engineering, California Polytechnic University, San Luis Obispo

AA, Architecture, San Diego Mesa College

EXPERIENCE:

Mr. Martinez has more than 28 years of experience in the inspection and repair of engineering structures for the United States Navy; San Diego Unified Port District; the Port of Los Angeles; other government agencies, and private institutions. He has acted as project manager and/or project structural engineer for the design of numerous repairs to marine waterfront facilities (piers, wharves and seawalls); new marine structures, dredging projects, design-build solicitations, and marine structural engineering studies. He has particular expertise in above-and below-water inspection of waterfront structures and engineering analysis of same as an engineer/diver.

RELEVANT EXPERIENCE:

Inspection/Repair Imperial Beach Pier Project Manager for above-and below-water inspection and repair of steel and timber pier. The inspection resulted in repairs consisting of replacement of timber decking; replacing damaged or missing piles; and recoating and repair of steel superstructure.

Inspection/Repair Oceanside Pier, City of Oceanside, California Project Manager for inspection and assessment of concrete/timber/steel historic municipal pier. The tasks include above and below water inspection; assessment of damage; and development of repair concepts.

P-250 Surface Transportation Pier, San Nicolas Island, California Project Manager for preparation of design-build solicitation package. Tasks included on this award-winning \$13 million project included concept development; cost estimates and above/below water inspection of completed project.

Inspection/Repair California Open Ocean Pier, California Parks Department Project Engineer for above-and below-water inspection of 14 pier facilities in California. Tasks included development of repair schemes, cost estimating and report preparation.

Repair Former Navy Pier, Unified Port of San Diego Project Manager for \$8 million rehabilitation of historic Navy Pier, now home of USS Midway Aircraft Carrier Museum. Tasks include inspection; reports; plans, specifications and cost estimates; and construction period of services.

I/Q Contract - Waterfront Construction and Repairs at Various Locations within Southern California, SWDIV SBAFT Project Manager for a wide variety of marine structure projects including concrete pier, wharf, and quay wall rehabilitation; above-and below-water inspection; hydrographic surveying and dredging; development of design-build solicitation packages; structure load capacity studies; and miscellaneous delivery orders.

I/Q Contract - Design and Engineering Services for Underwater Facilities Assessment, Government Facilities Worldwide NFESC ECDET Project Manager for numerous above-and below-water inspection delivery orders for facilities located on the U.S. West Coast, Hawaii and Japan. Deliverables included reports with above and below water photographs, CAD drawings, repair recommendations and cost estimates. Many of the reports also include materials assessment including petrographic analysis and other methodologies. A number of the inspection projects resulted in follow-up tasks to design repairs for the facilities - particularly in the Puget Sound and Pearl Harbor areas.

**LUBEN WALCHEFF, PE**

**ALTERNATE DIVE TEAM LEADER/ ENGINEER-DIVER/ FIELD INVESTIGATION**

REGISTRATION:

Professional Engineer, California, C50538

**NBIS Bridge Inspector Certified**

EDUCATION:

BS, Structural Engineering, University of California, San Diego

BA, Aquatic Biology, University of California, Santa Barbara

EXPERIENCE:

Mr. Walcheff has 18 years of structural engineering experience involving design and above and below water inspection of a wide range of marine waterfront facilities including design of new (and repair of existing) piers, wharves, quay walls, fender systems, floating docks, dredging and other miscellaneous structures. This work was conducted for various clients, including: U. S. Naval Facilities Engineering Command - Southwestern, Pacific and Chesapeake Divisions; NAVFACENGSECTR, ECDDET; The San Diego Unified Port District, Washington State Department of Transportation, Port of Los Angeles, and various oil companies in the North Sea, Gulf of Mexico and offshore California.

Mr. Walcheff holds numerous diving certifications including certification as a commercial diver in the U.S. and U.K. He is qualified as an Inspection Team Leader in accordance with Section 3.4.2 "Manual for Condition Evaluation of Bridges" American Association of State Highway Transportation Officials. He also holds a Certificate of Training for Safety Inspection of In-Service Bridges given by the National Highway Institute, Federal Highway Administration.

RELEVANT EXPERIENCE:

Waterfront Facilities Inspection Naval Bases at San Diego and Point Loma Project Engineer diver for above and below water inspection project involving assessment and repair for more than 25 separate pier facilities operated by the U.S. Navy throughout the San Diego region. Tasks include development of repair recommendations, cost estimates and report preparation.

I/Q Contract - Waterfront Construction and Repairs at Various Locations within Southern California, SWDIV SBAFT Project Engineer for a wide variety of marine structure projects including concrete pier, wharf and quay wall rehabilitation; above and below water inspection; hydrographic surveying and dredging; fender systems; structure load capacity studies; and miscellaneous delivery orders.

Above and Below Water Inspection and Assessments Worldwide, NAVFACENGSECTR, ECDDET Engineer diver for projects with U.S. Navy Waterfront Facilities Inspection Program for the period between 1989 and the present. He has performed structural engineering investigations, non-destructive testing, and preparation of reports containing repair recommendations and cost estimates. As a follow-up to the investigations, he has performed engineering design and construction period services for repairs to numerous facilities. Geographical locations include the San Diego, Los Angeles, and San Francisco Bay areas of California; Washington, Hawaii, and Japan.

Wharf Inspection Program, Port of Los Angeles Assistant Project manager/engineer-diver for multi-year contract to perform above and below water structural inspection services for concrete wharves at the port of los angeles (pola). Tasks included collection of data from regular underwater, regular above water, principal inspections and special inspections for entry into the "airis" database. Structural repair plans and specifications were developed under his supervision.

**RODERICK D. WHITSEL, SE**

**DIVE TEAM LEADER**

**REGISTRATION:**

Structural Engineer, California, S5312

Professional Engineer, California, C62823

**NBIS Bridge Inspector Certified**

**EDUCATION:**

BS, Structural Engineering, University of California, San Diego

**EXPERIENCE:**

Roderick Whitsel has more than 20 years of U.S. Navy experience, most recently in the capacity of a combat diver (SEAL) and is now in the U.S. Navy Reserves. He has served two tours of duty in Iraq. As a professional engineer diver, his project assignments commonly include above and below water inspections; and design and repair of piers, wharves and other marine structures for the U.S. Navy, port authorities and other government entities. His engineering design experience includes concrete, steel, masonry and timber structural materials. Rod is a member of the Structural Engineers Association of San Diego.

**RELEVANT EXPERIENCE:**

Waterfront Facilities Inspection Naval Bases at San Diego and Point Loma Engineer-diver for above and below water inspection project involving assessment and repair for more than 25 separate pier facilities operated by the U.S. Navy throughout the San Diego region. Tasks include development of repair recommendations, cost estimates and report preparation.

I/Q Contract - Waterfront Construction and Repairs at Various Locations within Southern California, SWDIV SBAFT Design Engineer for a wide variety of marine structure projects including concrete pier, wharf and quay wall rehabilitation; above and below water inspection; hydrographic surveying and dredging; fender systems; structure load capacity studies; and miscellaneous delivery orders.

Above and Below Water Inspection and Assessments Worldwide, NAVFACENGSECTR, ECDDET Engineer-diver for projects with U.S. Navy Waterfront Facilities Inspection Program for the period between 2004 and the present. He has performed structural engineering investigations, non-destructive testing, and preparation of reports containing repair recommendations and cost estimates. As a follow-up to the investigations, he has performed engineering design and construction period services for repairs to numerous facilities. Geographical locations include the San Diego, Los Angeles, and San Francisco Bay areas of California; Washington, Hawaii, and Japan.

MOTEMS Audit and Structural Evaluation - Westway Marine Oil Terminal Berths 70-72, Port of Los Angeles Engineer-diver in support of a Marine Oil Terminal Engineering Maintenance Standards (MOTEMS) audit for the facility. The structures included the main concrete wharf; access ramp; pipeline trestles; and timber/concrete mooring dolphins.

Structural Evaluation of Pier T, Port of Long Beach Engineer-diver above and below water inspection including steel sheet pile closed-cell cofferdams; concrete wharf; timber fender systems; and mooring hardware. Preparation of report including figures; above and below water photos; and supporting data.

**MICHAEL E. O'DONNELL, PE**

**COST ESTIMATOR**

**REGISTRATION:**

Professional Engineer, California, C35219

**EDUCATION:**

BS, Civil Engineering, Stanford University

**EXPERIENCE:**

Mr. O'Donnell has extensive experience in construction operations and for over 26 years he worked for a general contractor as a construction Project Manager in Southern California. His experience includes planning and scheduling projects to finish below budget and ahead of the original schedule. He prepared construction cost estimates and updated and reviewed the CPM schedule with the project scheduler, making necessary modifications. Among Mr. O'Donnell's duties was to prepare estimates for numerous change orders to negotiate equitable revisions. These change orders included revisions to drainage, structures, earthwork, and structural sections. Mr. O'Donnell's 26 years of onsite construction management gives him a unique ability to prepare cost estimates and provide project quality control. The last few years with Moffat & Nichol he has prepared cost estimates, performed constructability and quality control reviews, and prepared specifications for a wide range of projects.

**RELEVANT EXPERIENCE:**

Tustin Ranch Road, Tustin California. Mr. O'Donnell reviewed 95% plans for constructability, consistency, quality, and design criteria. The project included one bridge, drainage, base, asphalt concrete, curb and gutter, sidewalk, earthwork, and construction staging.

Sixth Street Viaduct over the LA River, Los Angeles, California. Mr. O'Donnell assisted in developing equipment utilization estimates for the environmental documentation. He also assisted in preliminary cost estimates for the project. The project involves the demolition of the existing Sixth Street Viaduct and constructing a new structure about 0.5 mile long, retaining walls, drainage, and utilities.

Newport Ave. Grade Separation, Tustin, California. Mr. O'Donnell reviewed 95% plans for constructability, consistency, quality, and design criteria. He also assisted in developing a cost estimate for the project. The project included one bridge structure revising an at grade railroad crossing to a railroad underpass, drainage, base, asphalt concrete, curb and gutter, sidewalk, earthwork, a pump station, and construction staging.

French Valley Parkway Interchange, Riverside County, California. Mr. O'Donnell is assisting in plan review at all stages, developing existing utilities and pothole plans for utility coordination, cost estimates, and constructability reviews. The items estimated include drainage, earthwork, structures, and structural section quantities. Among Mr. O'Donnell's duties is to calculate the quantities and provide unit costs for the cost estimates. Moffatt & Nichol is responsible for designing improvements to I-15 to accommodate a new interchange at French Valley Parkway. The project includes a new French Valley Parkway, widening on I-15 for approximately 1 mile north of Winchester Road, and widening of existing Winchester Road off ramp including widening the existing bridge.

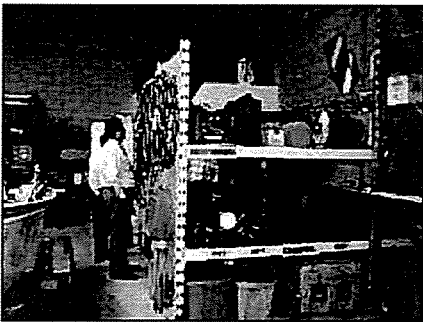
Valley Boulevard Grade Separation, City of Los Angeles, California. Mr. O'Donnell provided constructability review, plan review, and detailed construction cost estimate for the Valley Boulevard Grade Separation Overcrossing project which was located near the intersection of Valley Boulevard and Alhambra Avenue in Los Angeles. The project included construction of a grade separation between Valley Boulevard and a railroad crossing near Marianna Avenue to eliminate traffic congestion caused by the railroad crossing. Project also included retaining wall and abutment wall design.

## 4. BACKGROUND DISCUSSION

Moffatt & Nichol provides specialized expertise focusing on above and below water inspection and assessment of marine waterfront infrastructure. These inspections and assessments inevitably lead to repair or major rehabilitation projects with the goal of extending service life. Development of long-term maintenance planning is a specialty of the firm.

Moffatt & Nichol has routinely performed waterfront facilities inspections for purposes of structural assessment and repair since 1962. These inspections have taken place in a wide variety of marine environments in the United States and worldwide locations. Moffatt & Nichol has developed a national reputation as a leader in the assessment and rehabilitation of marine waterfront infrastructure. Over the past 30 years, this firm has been under contract, on a continuous basis, to perform engineering-based above water and below water inspection and repair of waterfront facilities for governmental entities including the U.S. Navy; Port of Los Angeles, Port of Long Beach, San Diego and Ventura; various state transportation departments; and other agencies. Moffatt & Nichol has performed more than 1500 waterfront facility inspections within the last 30 years.

### A. Capability to Respond to Time-Sensitive Projects



Moffatt & Nichol has 15 engineer divers in Southern California (more than 30 nationwide). The Moffatt & Nichol engineer dive crew maintains a fully equipped dive storage facility in Long Beach, with sufficient gear for multiple surface-supplied air and scuba diving crews simultaneously, as well as all the requisite non-destructive testing equipment, dive trucks and boats.

### B. Specialized Knowledge of Regulations, Inspection and Testing Procedures, and Equipment

Moffatt & Nichol has been performing above and below water inspections and repair of marine structures since the early 1980's. The firm's engineers have inspected and assess over a thousand structures, (many of them repeatedly); this has provided significant experience in the degradation mechanisms of concrete in a marine environment. The firm's engineer-divers thoroughly understand the safety/regulatory aspects associated with diving, as well as the specialized technical requirements associated with this practice. In 2009, the firm went through a rigorous Association of Dive Contractors International (ADCI) audit and now holds ADCI accreditation. All of the principal engineer-divers conducting the inspections are NBIS qualified. Reference the copies of the NBIS Certifications provided in the appendix section.

### Safety and Regulatory Compliance



Moffatt & Nichol's diving operations are conducted in strict compliance with ADCI Standards and OSHA's 29 CFR Part 1910.410. All divers conducting dive operations have received training which meets the stringent requirements of the U.S. Army Corps of Engineers Standard EM 385-1-1, or hold ADCI certification of Surface-Supplied Air Diver.

Moffatt & Nichol's Safety Diving and Vessel Operations Manual (SD&VO Manual) complies with both California and Federal OSHA requirements. The nine-member Dive Safety Committee meets quarterly to discuss safety issues and implement improvements to procedures or SD&VO Manual. Each Team Leader and Dive Supervisor meets stringent training and experience requirements that exceed the minimum regulatory requirements and are approved by the Dive Safety Committee in advance of any dive operation.

Dive crews are led by an Inspection Team Leader registered in the State of California as a Professional Structural Engineer or Civil Engineer with extensive structural experience. These in-house full-time professional engineer-divers perform all underwater inspections and engineering evaluations, ensuring consistency, quality, and adherence to schedules. Each surface-supplied air (SSA) underwater inspection team will consist of three or four persons; at least three of the four are engineer-divers. The professional engineer-diver (Team Leader) is responsible for supervising work, performing follow-up engineering analyses, and preparing detailed inspection reports. Each project has a Dive Supervisor, with responsibility for managing site logistics, ensuring diver safety, and ensuring compliance with regulatory requirements. Prior to mobilization, a field work plan will be executed and will be accompanied by a Job Safety Analysis.

Moffatt & Nichol's Dive Supervisor will complete a Job Safety Analysis (JSA) in addition to the technical preparation. The JSA assesses the diving objectives and physical environment to determine if there are any potential hazards that must be mitigated. Possible hazards include debris, currents, severe tidal conditions, heat, cold, differential pressure, and difficult access conditions. Potential hazard mitigation measures are incorporated into the project execution plan. The JSA will identify all emergency contacts in the region.

### Execution of Field Work

The level of the inspection effort required in the field is affected by the quality of information available prior to the inspection. In some instances, for facilities which previously have not been inspected, it is necessary to conduct a baseline inspection to document the dimensions of the facility, number of piles, configuration, etc.



Above water inspections are performed using engineering personnel specially trained in to identify the degradation mechanisms found in concrete, timber and steel structures. For concrete structures, it is necessary to be able to locate damage related to corrosion of reinforcing steel; alkali-silica reaction; sulfate attack; and other mechanisms. To supplement observed field conditions, concrete cores are often extracted and subjected to laboratory testing to confirm the nature of the damage, and to aid in developing appropriate and long-lasting repairs.

Above water inspection of timber structures requires the ability to identify damage related to you fund this and insects, as well as excessive drying shrinkage. Steel structures are principally affected by corrosion in above water locations.



For underwater condition assessment inspections, a combination of Level I (Swim-by), Level II (Partial Marine Growth Removal), and Level III (Non-destructive Testing) inspection efforts are used. If repairs are intended to be executed based on the results of the inspection, a more detailed "Repair Design Inspection" is conducted in order to document the location, current size and estimated repair size for each defect to be repaired.

### Structural Assessment

If significant deterioration is observed on structural components, a structural evaluation of the localized damage is conducted to quantify the loss of load capacity. Evaluations of several component types (piles, beams, and deck) are performed as-necessary, including evaluation of varying levels of deterioration or distress on each component.

If damage or deterioration is confined to specific sections or to the entire structure, a global structural evaluation may be required to quantify load restrictions. Moffatt & Nichol uses a variety of computerized structural models such as MSC/NASTRAN v70, SAP2000 v9, and Staad/Pro to conduct these evaluations. Horizontal and vertical load resisting capacities of the structure are assessed.

### Service Life Modeling

Prior to preparing recommendations for remedial action, it is necessary to understand the remaining useful life of the structure. Service life modeling has become an increasingly cost-effective tool for concrete rehabilitation and protection. The STADIUM™ software is for service life modeling. The modeling will be used to estimate the remaining service life that can be accomplished using alternative repair schemes. Moffatt & Nichol is the only engineering firm in North America licensed to use this state-of-the-art technique to quantitatively evaluate service extension alternatives.



### Underwater Video and Photography

Moffatt & Nichol uses state-of-the-art suite of underwater cameras and lenses, which can be utilized to record field conditions. Camcorder systems with underwater housings are also available, depending on jobsite conditions. In this case, when required, voice-over is added to the video recording by the engineer-diver.

### Use of Partially Destructive and Non-Destructive Testing Techniques

Moffatt & Nichol routinely uses various non-destructive testing (NDT) techniques in conducting underwater inspection assignments. The methods, techniques and devices available for conducting NDT work have proliferated over the past 10-15 years. Experience has shown that while some of the devices on the market work as advertised, others often do not. Those that do work well often require careful control or special procedures with the apparatus. The key to successful use of these various NDT methods is extensive project experience and correlation with other methods.

### Inspection of Concrete Components



Concrete sampling and testing is useful under three scenarios; Chloride-ion penetration testing is used to determine if the level of chloride-ion infiltration into the concrete has reached the theoretical "corrosion threshold". This is useful for planning intervention strategies that focus on the protection of the reinforcing steel. A 2-in diameter core is preferred for such testing to avoid undue influence from large aggregates. Petrographic analysis is useful when visual inspection reveals deterioration, and the exact cause and extent is indeterminate. The experienced petrographer can use the concrete core samples to determine if the cause of deterioration is due to chemical deterioration of the concrete matrix, from such sources as sulfate attack, alkali-silica reaction, or delayed ettringite formation (DEF).

Four-inch cores are commonly taken for petrographic analyses. The third scenario is for establishing the transport mechanisms of concrete. This information is essential to accurate service life modeling using software such as the STADIUM™ model. Moffatt & Nichol obtains concrete cores above water using a lightweight, electric coring unit and carbide-tipped core bits. Below water, a hydraulic drill press with carbide-tipped core bits is used.

Using NDT techniques to inspect concrete components is less common because the majority of concrete defects are manifested externally where they are readily detectable. However, when underwater concrete components have deteriorated from chemical changes in the concrete matrix, such as delayed ettringite formation (DEF), sulfate attack or alkali-silica reaction (ASR), NDT tests may be correlated with strength tests obtained through coring the concrete. In this way, the inexpensive NDT method may be used to assess each pile in a large group without having to core each pile.

### Testing & Evaluation of Structural Material Samples

Moffatt & Nichol has extensive experience working with materials testing laboratories for waterfront condition assessment projects. The firm typically consults with companies dedicated to the extension of the concrete structure service life



through the integration of high technology inspection and testing, materials characterization and design, elaboration of repair plans, and service life prediction using advanced numerical models. Much of this work can be performed in-house after test data has been developed.

### **Professional Report Preparation**

A comprehensive report is prepared upon completion of the inspection. Moffatt & Nichol's proposed key staff members have extensive experience in preparing reports meeting a wide variety of client requirements for underwater inspection assignments and are intimately familiar with the requirements for report preparation and presentation. The majority of each inspection report will be written by the Team Leader for a given task. Other staff members who prepared engineering calculations and cost estimates will provide assistance in preparing the report. Quality Assurance personnel and the Project Manager will review each report prior to its submission.

### **Design and Engineering Services for Waterfront Facilities Repair**

#### **Rehabilitation / Repair Design**

The first step Moffatt & Nichol takes in developing a rehabilitation / repair approach is to prepare a Basis of Design Memorandum to guide the field inspection efforts. This document directs the field effort toward the significant defects and minimizes the need to record insignificant defects. The BOD Memorandum will document the basis of the repairs (in terms of design life expectancy), the types of defects to be repaired, and the rehabilitation method for each type of defect encountered. The memo will also document the criteria to be used for the repairs in terms of minimum cracks sizes to be repaired, criteria for reinforcing bar replacement, reinforcing bar splicing methods to be used, and guidelines for use of repair materials.

Moffatt & Nichol is at the forefront of waterfront rehabilitation design and understands the historic problems of ineffective repair techniques rampant on waterfront projects. Moffatt & Nichol does not blindly produce repair plans that consist of patching spalls, filling cracks, and jacketing piles. Effective repairs go far beyond these basic elements and require expertise that is far too uncommon in this specialized field. It will be Moffatt & Nichol's mission to deliver repair solutions that are optimized to the City's service life objectives for each facility.

#### **C. Other Expertise**

##### **Technical Qualifications**

Moffatt & Nichol's key staff members are recognized worldwide as pioneering leaders in marine facility inspection and rehabilitation. These individuals routinely set the standards for this work. This leadership role is evidenced by the following examples of technical leadership by Moffatt & Nichol's key staff members:

- Service as principal authors of new ASCE "Underwater Investigations Standard Practice Manual".
- Service as author of the Port of Los Angeles' new, state-of-the-art waterfront maintenance management program. This award-winning program combines detailed inspection and repair procedure manuals with a first-of-its-kind database for managing the vast amount of data. The program has standardized the procedures by which the Port inspects and maintains its 14 miles of waterfront facilities, making the maintenance process the most efficient and technically proficient anywhere in the world.
- Service as Project Manager and lead author of the California State Lands Commission's new Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS), incorporating the first-ever set of comprehensive underwater inspection and seismic upgrade standards that will impact all marine oil terminals in California. These recently completed standards became state law in 2005.
- Service on ACI Committee 546 - Concrete Repair, and contributing authors of the recently published "Concrete Repair Guide" and the "State-of-the-Art Report on Underwater Concrete Repairs."

## Equipment

Moffatt & Nichol maintains a comprehensive inventory of equipment necessary to support this contract, staged in Long Beach. This equipment compliment includes:

- A fleet of five dive support vessels
- Surface-supplied air diving equipment
- Superlite dive helmets and full face masks
- Hardwire and wireless communications gear
- Scuba diving equipment
- Underwater video and digital video
- GalvaPulse corrosion testing equipment
- Underwater digital cameras
- 35mm underwater cameras with framers
- Clearwater boxes for photos/video in turbid water
- Ultrasonic testing equipment
- Schmidt hammers
- Pachometers
- Corrosion potential measurement equipment
- Underwater concrete coring equipment
- Timber boring/coring equipment
- Dissolved oxygen testing equipment
- Pneumatic power tools such as chipping guns and drills
- High pressure and low pressure compressors
- Hydrographic survey equipment
- Fathometers
- Bathycorrometer for cathodic protection surveys

## Quality Control and Dive Safety Assurance Procedures

It is the policy of Moffatt & Nichol to strive for excellence in the quality of all work performed. In order to ensure that this policy is more than an objective, the firm has in-place a formal Quality Assurance/Quality Control (QA/QC) Program. Quality Assurance dictates the actions that take place along the way as a design progresses. Quality Control the checking that takes place at predetermined milestones confirms that the actions result in a quality project.

The primary objective of our quality efforts on this contract will be to place the burden of ensuring quality squarely where it belongs – on Moffatt & Nichol. If selected, the guiding philosophy on this contract's to ensure that quality is achieved with deliverables prior to the submittal reaching the Port.



**COST PROPOSAL**

Moffatt & Nichol  
Project Fee Proposal

Project Number: 0  
 Project Title: Pier Condition Management - Manhattan Beach Pier  
 Project Manager: Tom Sorenson  
 Project Principal: Mike McCreilly

Date: 08/16/10

Sub Mark-up: 10%  
 GDC Mark-up: 0%

Phase	Task	Title	CLASSIFICATION/RATES										Word Processor	CAD	General (Clerical)	LABOR TOTAL		
			Principal P-9, P-8	Supervisory Eng./Sci P-7	Senior Eng./Sci P-6	Eng./Sci III P-5	Eng./Sci II P-4	Eng./Sci I P-3	Staff Eng. P-1, P-2	Senior Tech. T-5	Designer T-4	CAD II T-3					CAD I T-2, T-1	
1	Pier Inspection		\$240.00	\$215.00	\$197.00	\$185.00	\$164.00	\$143.00	\$114.00	\$158.00	\$147.00	\$121.00	\$92.00	\$92.00	\$4.00	32.0	\$5,728	\$20,040
		Top of Dock		16.0												128.0	\$20,040	
		Absewater		32.0												80.0	\$13,744	
		Underwater															\$0	
2	Topside Survey																\$0	
3	As-built plans																\$0	
4	Identify & resolve structural deficiencies																\$0	
5	Recommendations																\$0	
6	Cost Estimate																\$0	
TOTAL SUBCONTRACTORS			6.0	176.0														\$66,786
TOTAL LABOR			\$1,440	\$27,090														\$66,786
TOTAL PROJECT SUMMARY																		\$66,786
III. OTHER COSTS																		\$0
A. Subcontractors																		\$0
1.		Corrosion Dredging	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2.		Topside Survey	\$8,500	\$7,160	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3.			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4.			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5.			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Subcontractors:			\$8,500	\$7,160	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
B. Other Direct Costs																		\$0
		Access	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Meals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Mileage/Rental Car	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Outside Reproduction	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Postage/Delivery	\$100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Telephone/Fax	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Travel/Per Diem	\$4,310	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Subcontractor and GDC	\$11,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Other Direct Costs:			\$15,910	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL PROJECT ESTIMATE																		\$82,696



For hourly/unit costs to be applied for extra work, please see the table below.

<b>Moffatt &amp; Nichol Staff</b>	
<i>Classification</i>	<i>Hourly Rate</i>
<b>Investigation Principal</b>	<b>\$198</b>
<b>Testing and Monitoring Principal</b>	<b>\$164</b>
<b>Testing / Monitoring</b>	<b>\$177</b>
<b>Support Technician Diver / Tender</b>	<b>\$121</b>
<b>Supervisory Engineer/Scientist</b>	<b>\$215</b>
<b>Senior Engineer/Scientist</b>	<b>\$197</b>
<b>Senior Engineer/Scientist / Principal Engineer-Diver / Team Leader (Inspection or Monitoring)</b>	<b>\$210</b>
<b>Engineer/Scientist III</b>	<b>\$185</b>
<b>Engineer / Scientist I</b>	<b>\$143</b>
<b>Staff Engineer / Scientist / Engineer Diver / Tender</b>	<b>\$156</b>
<b>Staff Engineer</b>	<b>\$114</b>
<b>Staff Engineer / Diver</b>	<b>\$127</b>
<b>CADD I</b>	<b>\$92</b>
<b>Word Processing</b>	<b>\$92</b>
<b>General Clerical</b>	<b>\$74</b>
<b>Principal Engineer / Scientist</b>	<b>\$240</b>
<b>Court Appearances</b>	<b>\$300</b>
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. <b>Moffatt &amp; Nichol's companywide standard hourly billing rate method of compensation is based on the direct salary cost of employees within each grade classification. Factors used to derive our standard rate schedule include 44.1% for fringe benefits (sick leave, vacation, holiday, and incentive pay); unemployment and other payroll taxes; and the contributions for social security, worker's compensation insurance, retirement, medical, and other group benefits. Overhead (including G&amp;A) is applied as 123.1% on salary cost; a complete definition of overhead (G&amp;A) will be provided in a separate document upon request. A factor of 15.0% is applied as a reasonable margin for contingencies, readiness to serve, and profit. For the expected employees on this project, the average multiplier for billable rates is 3.0. Direct non-salary expenses (subconsultants and direct project expenses) are normally reimbursed at the actual invoice cost plus an administrative charge to compensate for associated accounting, purchasing, contract administration, and risk. For the Port, this charge has been set at 5.0%.</b></li> <li>2. <b>All rates are inclusive of insurance meeting the requirements of the POLB, including Professional Liability Insurance, Commercial Liability Insurance, Automobile Liability Insurance, Worker's Compensation &amp; Employer's Liability Insurance, and Ocean Marine Liability Insurance.</b></li> <li>3. <b>The special rates included herein are based on M&amp;N's rate schedule for the preceding year, in keeping with our practice to offer discounted rates to the Port as a unique and highly valued client. The dive-related rates do reflect a modest premium over standard rates to reflect the additional cost of Workman's Compensation Insurance coverage related to this specialized work. We fully comply with the United States government auditing standards, generally accepted accounting practice, and are consistent and in conformance with the American Society of Civil Engineers most current revised manuals and reports in Engineering Practice No. 45 and the Port's Guidelines for Engineering Professional Services. M&amp;N can provide independent audits of our rates if requested.</b></li> <li>4. <b>Rates are valid for 2007 and are subject to a 4% escalation for subsequent years.</b></li> </ol>	

<b>Moffatt &amp; Nichol Reimbursable Expenses (unless otherwise provided in written agreement)</b>		
<i>Subcontracts or Outside Services</i>		<i>Cost +5%</i>
Reproductions In-House	Mylar Plots (Black & White)	\$2.00 / SF
	Color Plots	\$4.00 / SF
	Vellum Plots (Black & White)	\$1.00 / SF
	Bond Plots (Black & White)	\$0.50 / SF
	Drawing Reproduction	Cost
	Document Reproduction 8.5 x 11	\$0.10 / Sheet
	Document Reproduction 11 x 17	\$0.15 / Sheet
Outside Reproduction		Cost

<b>Moffatt &amp; Nichol Inspection &amp; Testing Equipment Billing Rate Schedule</b>		
<i>Item</i>	<i>Daily Rate</i>	<i>Weekly Rate</i>
25 ft - 54 ft Dive Vessel	\$700	\$2,840
18 ft - 21 ft Dive Boat	\$362	\$1,480
13 ft - 15 ft Fiberglass Inspection Boat	\$195	\$800
12 ft - 15 ft Jon Boat or Inflatable Boat w/Outboard Motor	\$123	\$500
Surface-Supplied Air Diving Station: (Surface-Supplied Air Equipment with Superlite Helmet or Full-Face Mask, Control Station, Hardwire Communications, LP Compressor, Volume Tank(s), Umbilicals, Wet and Dry Suits, U/W Dive Lights, Weights, Bailout Bottle & Harness, Stand-By Diver System, Backboard, Medical Kit, O2 Kit, and Peripherals)	\$425	\$1,700
Scuba Dive Station: (Two Scuba Set-ups Including: Buoyancy Compensators, six 80-100 cf Cylinders, Wet and Dry Suits, Weights, Masks, Regulators, Independent Secondary Air Source, Safety Lines, UW Dive Lights, Backboard, Medical Kit, O2 Kit, and Peripherals)	\$285	\$1,140
HP Compressor	\$145	\$580
Recompression Chamber and Associated Peripherals	5-Day Min	\$6,900
Consumables - batteries, film, development, gloves, air fills, compressor filters, compressor and generator fuel, etc.	\$50	\$200
Underwater Digital Still Camera System With Clearwater Box(es)	\$50	\$200
Underwater Camcorder Video System In Housing	\$150	\$600
Underwater Camcorder Digital Video System With Clearwater Box	\$210	\$840
Underwater CCTV Video System W/ Topside Monitor And Recorder	\$290	\$1,160
Above Water Digital Camera	\$30	\$120
Field Laptop Computer	\$50	\$200
Bathycorrometer	\$150	\$600
Ultrasonic Thickness Meter	\$75	\$300
GalvaPulse Corrosion Testing	\$150	\$600
Electronic Depth Sounder with Transducer	\$25	\$100
Fathometer, Recording	\$200 3-Day Min.	\$800
Differential GPS Unit	\$200	\$800
Dissolved Oxygen Testing Equipment	\$150	\$600
Concrete Coring Package, Above Water	\$155 Plus Drill Bits	\$620 Plus Drill Bits
Concrete Coring Package, Underwater	\$305 Plus Drill Bits	\$1,220 Plus Drill Bits

<b>Moffatt &amp; Nichol Inspection &amp; Testing Equipment Billing Rate Schedule</b>		
<b>Item</b>	<b>Daily Rate</b>	<b>Weekly Rate</b>
<b>2" Chloride Drill Bit (Each)</b>	<b>\$185</b>	
<b>4" Chloride Drill Bit (Each)</b>	<b>\$335</b>	
<b>Concrete Percussion Drill</b>	<b>\$115</b>	<b>\$460</b>
<b>Pachometer</b>	<b>\$90</b>	<b>\$360</b>
<b>Schmidt Hammer</b>	<b>\$35</b>	<b>\$140</b>
<b>Timber Coring Package</b>	<b>\$285</b>	<b>\$1,140</b>
<b>Compressor For Pneumatic Tools And Dive Support Operations - Up To 50 CFM</b>	<b>\$70</b>	<b>\$280</b>
<b>Dive Truck</b>	<b>\$110 Plus \$0.75 Per Mile</b>	<b>\$440 Plus \$0.75 Per Mile</b>
<b>Support Vehicle - Light Truck or SUV</b>	<b>\$85 Plus \$0.65 Per Mile</b>	<b>\$340 Plus \$0.65 Per Mile</b>
<b>Generator - Lightweight Portable 2.5 kw or Similar</b>	<b>\$40</b>	<b>\$160</b>
<b>Light Duty Airlift Excavator Unit</b>	<b>\$33</b>	<b>\$132</b>
<b>Hydraulic Power Pack, Up To 10 GPM @ 2000 psi</b>	<b>\$150</b>	<b>\$600</b>
<b>Hydraulic Tool Hose, Up To 200 Ft Length</b>	<b>\$45</b>	<b>\$180</b>
<b>Hydraulic Tools - Drill / Saw / Impact / Wrench / Etc.</b>	<b>\$85</b>	<b>\$340</b>