APPENDICES

VOLUME III

TECHNICAL APPENDICES SECTIONS

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Master Plan

2005 MASTER PLAN OF LAND USES

Long Beach Memorial Medical Center
Miller Children's Hospital

May 2005

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Section 1

INTRODUCTION

OPPORTUNITY

The 2005 Long Beach Memorial Medical Center Master Plan of Land Uses (2005 Master Plan) provides the framework for development of the Long Beach Memorial Medical Center campus (Campus). The Campus includes two licensed inpatient hospitals: Long Beach Memorial Medical Center (LBMMC) and Miller Children's Hospital (MCH) (Figure 1.01, *Long Beach Memorial Medical Center and Miller Children's Hospital*). Outpatient services are currently provided within the two licensed hospitals and eight other medical office buildings located throughout the Campus, with additional outpatient services provided in off-site office buildings.

In addition to the general need to expand the capacity of the LBMMC and MCH to meet state licensing requirements and California Senate Bill 1953 (SB 1953) requirements, special consideration was given to providing a dedicated facility to house the diverse treatment modalities of the Todd Cancer Institute (TCI), a programmatic component of the LBMMC. As of 2004, the TCI was operating from 24 disparate locations on and off the Campus and had completely outgrown the available facilities. SB 1953 established seismic requirements for existing hospitals in California and was signed into law in September 1994. This bill requires existing general acute care hospital buildings that are not in compliance with the Alfred E. Alquist Hospital Seismic Safety Act of 1983 to be either seismically retrofitted, changed to non-acute care use, replaced, or demolished. This is to be accomplished for all California hospital facilities by year 2030. The combined resources made available through community fundraising, philanthropic donations, and the passage of the Children's Hospital Bond Act (Proposition 61) by the voters of California in November 2004 provide

FIGURE 1.01 - Long Beach Memorial Medical Center and Miller Children's Hospital

LBMMC and MCH with the unique opportunity to initiate a comprehensive program of capital improvements on the Campus.

GOAL

The LBMMC and MCH are committed to improving the health and well-being of individuals, families, and its communities through innovation and the pursuit of excellence and to making the Campus into Southern California's preferred, operationally excellent, and fiscally sound provider of comprehensive, high-quality health services. The 2005 Master Plan provides for refinements to the existing pattern of land uses and new development to meet the existing and anticipated demands of the Long Beach community for health care services through year 2020. The 2005 Master Plan provides recommendations to organize the pattern of land uses and construct additional facilities to more effectively utilize the 54 acres of the Campus owned by Memorial Health Services within the City of Long Beach. The 2005 Master Plan identifies a series of capital improvements to provide expanded capacity for inpatient and outpatient services in conjunction with ambient population growth, in a manner that conforms to the requirements of SB 1953, and the state's licensing requirements. The Southern California Association of Governments (SCAG) and the Housing element of the City of Long Beach General Plan forecast a 6- to 9-percent growth rate to the year 2020, adding approximately 65,000 people to the City of Long Beach.

LONG BEACH MUNICIPAL CODE REQUIREMENT

This 2005 Master Plan was prepared by the operating institution, Memorial Heath Services, to comply with the City of Long Beach Zoning Code, Section 21.34.020,[1] which requires that all sites zoned as Institutional and having an area of greater than 40,000 square feet in the City of Long Beach to submit a Long-Range Development Plan that includes all development of the site and site expansions (within a zone designated as Institutional or under the institution's ownership, whichever is greater) anticipated over the next 20 years. The 2005 Master Plan is subject to review and approval by the City of Long Beach Planning Commission through the site plan review process.

APPLICABILITY

LBMMC and MCH propose to make significant changes to the previously adopted 1999 Master Plan; therefore, this revised 2005 Master Plan was developed. The 2005 Master Plan creates an opportunity to provide expanded state-of-the-art health care within a well-designed hospital campus. The 2005 Master Plan is applicable to development of the 54 acres located within the City of Long Beach (Figure 1.02, *Campus Boundaries*).

ORGANIZATION

Memorial Health Services is a private nonprofit organization responsible for administration and oversight of the two licensed hospitals (LBMMC and MCH), which are established, respected institutions in the Long Beach community, as well as an asset to the greater Long Beach area. This 2005 Master Plan includes a statement of goals and objectives, a description of the existing conditions as of year 2004, a description the process and analysis used to support development of the 2005 Master Plan, Long-Range Development Plan recommendations to meet anticipated needs through year 2020, and acknowledgment of the plan contributors.

This 2005 Master Plan provides a Master Plan of Land Uses, recommended capital improvements, and design guidelines to promote high-quality development within a single overall design concept that is compatible with the community that it is intended to serve. The 2005 Master Plan provides a conceptual framework for the reorganization of the pattern of the six primary land uses: (1) inpatient medical facilities, (2) outpatient medical facilities, (3) mixed-use facilities (nonresidential), (4) utilities,

[1] City of Long Beach. 1982. City of Long Beach Municipal Code (Ord. C-5831 § 1, 1982), Chapter 21. Available at: http://www.longbeach.gov/apps/cityclerk/lbmc/title-21/frame.htm

(5) circulation, and (6) parking (Figure 1.03, *Proposed Master Plan of Land Uses*). Within the conceptual framework, there are six capital improvements that would most likely be undertaken by LBMMC and MCH to provide expanded capacity for inpatient and outpatient services:

1. TCI
2. MCH Pediatric Inpatient Tower, Utility Trench, and Central Plant Building
3. MCH Pediatric Outpatient Building
4. MCH Link Building
5. Roadway Realignment
6. Parking Program

PHASING

Project phasing is envisioned as a 10-step process to be completed in eight years between years 2005 and 2013, where construction of certain elements is contingent on the availability of funding. Adoption and implementation of the 2005 Master Plan and related capital improvement projects require four actions by the City of Long Beach Planning Commission and require recommendations by the Long Beach City Council:

- Long-Range Development Plan (Master Plan) Approval
- Site Plan Review
- Zoning District Change
- Standard Variances

METHODS

Like the adopted 1999 Master Plan, this 2005 Master Plan provides a land use planning framework for capital improvements that are anticipated to be required to meet the need for health care services within the community. These recommendations for capital improvements incorporate the results of numerous meetings and workshops conducted with the LBMMC and MCH administration, medical staff, users, management, and board members. Extensive research has been undertaken to understand demographic trends that will affect anticipated demand for inpatient and outpatient health care services. In addition, LBMMC and MCH administrators have visited and benchmarked comparable facilities throughout the United States.

FIGURE 1.02 Campus Boundaries

FIGURE 1.03 - Proposed Master Plan of Land Uses

Section 2

MASTER PLANNING GOALS AND OBJECTIVES

The 2005 Long Beach Memorial Medical Center Master Plan of Land Uses (2005 Master Plan) provides the framework for development of the Long Beach Memorial Medical Center campus (Campus). This 2005 Master Plan was prepared by the operating institution, Memorial Heath Services (MHS), to comply with the City of Long Beach Municipal Code, which requires any site in the Institutional District with a lot area exceeding 40,000 square feet to submit a Long-Range Development Plan for the institution.

LBMMC AND MCH MISSION

The Long Beach Memorial Medical Center (LBMMC) and Miller Children's Hospital (MCH) are committed to improving the health and well-being of individuals, families, and their communities through innovation and the pursuit of excellence and to making the Campus into Southern California's preferred, operationally excellent, and fiscally sound provider of comprehensive, high-quality health services (Figure 2.01, *Comprehensive, High-Quality Health Services*; Figure 2.02, *Inpatient Surgery*

FIGURE 2.01 - Comprehensive, High-Quality Health Services

Facilities; Figure 2.03, *Imaging Services*; and Figure 2.04, *Attractive Landscape Entrance to Long Beach Memorial Medical Center Campus*).

PLANNING HORIZON

The ability to fulfill this mission requires the establishment of a Long-Range Development Plan for the Campus. The City of Long Beach Zoning Code, Section 21.34.020, requires the preparation of this 2005 Master Plan. As such, this 2005 Master Plan would normally be prepared to address planning needs through year 2025. However, the City of Long Beach General Plan provides planning and demographic data through the year 2020 planning horizon. Therefore, this 2005 Master Plan incorporates considerations from the previously adopted 1999 Master Plan and provides land use designations, recommended capital improvements, and design guidelines to provide for the orderly and compatible development of the Campus to meet the needs of the community through the year 2020 planning horizon, consistent with the City of Long Beach General Plan.

GOALS

The ability to support the mission of LBMMC and MCH through the year 2020 planning horizon is related to nine primary goals:

1. Maintain state licensing requirements for the LBMMC and MCH.

2. Provide sufficient inpatient and outpatient facilities to accommodate anticipated population growth of 6 to 9 percent by year 2020.

3. Develop a Master Plan and site facility for the Campus that is consistent with the requirements of California Senate Bill 1953 (SB 1953).

4. Ensure that the Master Plan recommendations are cost-effective, feasible, and consistent with the strategic goals and objectives of the LBMMC.

FIGURE 2.02 - Inpatient Surgery Facilities

FIGURE 2.03 - Imaging Services

5. Maximize the effective utilization of the existing 54 acres owned by MHS within the City of Long Beach.

6. Identify specific capital improvements and related infrastructure improvements to be undertaken to accommodate departmental needs, operational efficiency, and future workload, particularly in light of future health and practice changes.

7. Develop solutions that are consistent with goals and priorities established during the master planning process and that are conducive to a user friendly environment for patient, staff, and visitors.

8. Develop and apply unifying design principles that satisfy the LBMMC design guidelines for consistent landscaping, streetscape, pedestrian corridors, outdoor spaces, wayfinding and signage design treatments, and processes that establish a stronger revival of the adjacent community and neighborhood.

9. Establish design guidelines to facilitate a cohesive Campus that is compatible and sentisitve to the surrounding land use and development patterns.

OBJECTIVES

The master planning team, composed of representatives of LBMMC and MCH, health care professionals, architects, engineers, planners, and environmental compliance specialists, defined 13 objectives that would need to be achieved to support the overall master planning goals:

1. Continue the legacy of providing a high-quality environment that supports the health and well-being of patrons through the provision of a comprehensive system of programs and facilities that provide prevention, screening, diagnosis, treatment, and monitoring services to meet existing and anticipated

FIGURE 2.04 - Attractive Landscape Entrance to Long Beach Memorial Medical Center Campus

demand in the community through the year 2020.

2. Expand and reorganize the existing approximately 1,200,000 square feet of combined inpatient, outpatient, and appurtenant facilities by approximately 500,000 square feet to accommodate existing and anticipated demand through the year 2020.

3. Comply with the regulations developed by the Office of Statewide Health Planning and Development (OSHPD) as mandated by SB 1953 (Chapter 740, 1994), an amendment to and furtherance of the Alfred E. Alquist Hospital Seismic Safety Act of 1983.

4. Consolidate and relocate the 24 diverse outpatient treatment modalities of the Todd Cancer Institute (TCI), which are currently dispersed in 11 sites located on and off the Campus, to a single facility in proximity to the inpatient services provided at the LBMMC.

5. Provide a dedicated facility for the outpatient well care, screening, imaging, diagnosis, treatment, and monitoring of cancer and non-cancer patients to accommodate the anticipated need for 375 patients to be served per day by year 2007, and to accommodate approximately 500 patients per day to meet anticipated needs through year 2020.

6. In the immediate proximity of the MCH, provide a pediatric inpatient tower that would increase capacity for pediatric surgical cases that would satisfy a mandate from the California Department of Health Services to provide new, pediatric-dedicated operating rooms by January 2008. An additional three operating rooms may need to be provided between years 2008 and 2015 to meet anticipated demand through year 2020.

7. In the immediate proximity of the MCH, provide a pediatric inpatient tower that would increase capacity for newborn intensive care services and general pediatric patients. The new pediatric inpatient tower will be sized to accommodate the 10-percent increase in the need for pediatric inpatient treatment of children under the age of 15 between years 2000 and 2003, and the projected additional increase of 1 percent per year through year 2020. The increase in capacity would require 72 additional beds by year 2008, and another 92 additional beds between years 2008 and 2015 to meet anticipated demand through year 2020.

8. Consolidate and relocate the diverse pediatric outpatient services, well care, screening, diagnosis, treatment, and monitoring into a single, dedicated building in close proximity to the MCH.

9. Within the Campus, provide a building designated for mixed uses to accommodate retail uses, such as a gift shop, florist, and food and beverage service, to serve MCH employees, patients, and visitors.

10. Provide adequate access and egress to the Campus from Long Beach Boulevard and Atlantic Avenue.

11. Provide adequate infrastructure to support internal and external circulation within the Campus that is consistent with the objectives set forth in the LBMMC design guidelines.

12. Provide sufficient parking capacity to comply with the City of Long Beach parking ordinance. Provide sufficient parking capacity that is differentiated by use (visitor, employee, and physician) to comply with the City of Long Beach parking ordinance.

13. Continue to work with the City of Long Beach to identify appropriate locations for these land uses within the Campus. LBMMC understands the importance of worker and senior housing.

EXISTING CONDITIONS

Section 3

OVERVIEW

Long Beach Memorial Medical Center (LBMMC) is an established, respected institution in the Long Beach community, as well as an asset to the greater Long Beach area. LBMMC is the second largest nonprofit community hospital in the western United States, serving the community since 1914. The LBMMC campus (Campus) includes two licensed hospitals: LBMMC and Miller Children's Hospital (MCH). Related outpatient services are provided in the licensed hospitals and other medical office buildings located on and off the Campus, whereas other services are provided in leased spaces located off the Campus. The majority of patients served are City of Long Beach residents. A variety of inpatient and outpatient services are provided to indigent families at no cost. The Campus is the second largest employer in the City of Long Beach, including 1,200 physicians and more than 3,500 employees.

LOCATION

The 2005 Long Beach Memorial Medical Center Master Plan of Land Uses (2005 Master Plan) addresses the 54-acre Campus located within the City of Long Beach, County of Los Angeles, California (Figure 3.01, *Vicinity of Long Beach Memorial Medical Center Campus*). The Campus is located less than 1 mile south of U.S. Interstate 405 (San Diego Freeway), approximately 1 mile east of U.S. Interstate 710 (Long Beach Freeway), and approximately 1 mile south

FIGURE 3.01 - Vicinity of Long Beach Memorial Medical Center Campus

of State Route 1 (Pacific Coast Highway). The Campus is located approximately 3.5 miles northeast of the Port of Long Beach, approximately 1 mile east of the Los Angeles River, and approximately 1 mile west of the Long Beach Airport. The elevation of the Campus ranges from 19 feet above mean sea level (MSL) to 67 feet above MSL.

The 54-acre Campus is bounded on the north by East Spring Street, on the east by Atlantic Avenue, on the south by Willow Street, and on the west by Long Beach Boulevard. The Campus is comprised of a combination of parcels owned by Memorial Health Services (MHS) and LBMMC (Figure 3.02, *Long Beach Memorial Medical Center Parcels*). The Campus owns additional properties in the adjacent City of Signal Hill, which were not included in this 2005 Master Plan due to their separation from the main Campus by Atlantic Avenue and other known environmental and planning constraints (Figure 3.03, *Property Ownership*). This Master Plan is limited to those properties that are owned by the LBMMC and MCH within the City of Long Beach.

GENERAL PLAN LAND USE DESIGNATION

The Campus is designated as Land Use Designation (LUD) No. 7 Mixed-Use District in the Land Use element of the City of Long Beach General Plan (Figure 3.04, *General Plan Land Use Designation*). This District is intended for use in large, vital activity centers such as medical facilities that, by their nature, involve mixed uses. The Master Plan area is located within and is consistent with the redevelopment goals of the Central Long Beach Redevelopment Area.

FIGURE 3.02 - Long Beach Memorial Medical Center Parcels

FIGURE 3.03 - Property Ownership

FIGURE 3.04 - General Plan Land Use Designation

ZONING

In 2004, there were four zoning designations in place on LBMMC-owned properties within the Campus (Figure 3.05, *2004 Zoning Districts*):

I: Institutional
CCA: Community Automobile-Oriented
CHW: Regional Highway Commercial
PD-29: Long Beach Boulevard Planned Development District

The core of the existing inpatient services within the Campus, bounded by East 29th Street to the north, Atlantic Avenue on the east, East 27th Street on the south, and Long Beach Boulevard on the west, is zoned Institutional (I). The majority of the adjacent parcels to the north and south of the core area of inpatient services are zoned as Regional Highway Commercial (CHW) Districts, which also allow for Institutional land uses. The CHW District is a commercial use district for mixed-scale commercial uses along major arterial streets and regional traffic corridors. There are two areas adjacent to Willow Street that are zoned as Community Automobile-Oriented (CCA) Districts, which permit retail and service uses that serve the entire community, including convenience and shopping goods and associated services. The northwest corner of the Campus is zoned as a Long Beach Boulevard Planned Development (PD-29) District. The PD-29 District was established to allow flexible development plans to be prepared for areas of the City of Long Beach that may benefit from the formal recognition of unique or special land use and the definition of special design policies and standards not otherwise possible under conventional zoning district regulations.

LAND USES

The 54-acre Campus is completely developed and characterized by six general land uses (Figure 3.06, *2004 Campus Land Uses*):

- Inpatient
- Outpatient

FIGURE 3.05 - 2004 Zoning Districts

FIGURE 3.06 - 2004 Campus Land Uses

- Mixed Use
- Utilities
- Circulation
- Parking

As of August 20, 2004, there are approximately 1,213,945 square feet of conditioned space located within the Campus (Table 3.01, *Existing Conditions: Gross Floor Areas*). There are two licensed hospitals within the Campus, LBMMC and MCH, which provide a combined total of 743 licensed beds. These facilities are centrally located on the Campus, north of 27th Street, east of Long Beach Boulevard, south of Columbia Street, and west of Atlantic Avenue. In addition to inpatient services, outpatient services are provided in the eight structures located north and south of the LBMMC and MCH, including a child care center, nutrition programs, and outpatient clinics. The southern portion of the Campus is characterized by mixed use, including residential properties. Approximately 1.93 acres are dedicated to circulation within the Campus, not including public right-of-ways. Parking is provided for physicians, employees, patients, and visitors in parking structures and surface parking lots.

INPATIENT

The two licensed hospitals, LBMMC and MCH, comprise 11 buildings constructed between 1960 and 1994 (Figure 3.07, *2004 Inpatient and Appurtenant Buildings*):

1. Main Tower: This was constructed in 1960 as a six-story building, with two stories added in 1970.

2. Memorial West: This was constructed in 1965. The two-story building was originally designed for two additional stories.

3. Rehabilitation Unit: This is a one-story building at the lower level of the hospital, with doctor parking above. It was constructed in 1965.

4. Miller Children's Hospital: This is a four-story building constructed in 1969.

4a. Old Pathology: This building was constructed within a courtyard created by existing buildings.

5. X-Ray Addition: This is a three-story building.

6. Center for Health Education: This is a one-story building at the lower level of hospital, with a plaza and landscaping above. It was constructed in 1973.

7. Surgery Addition: This was constructed in 1975 as a two-story building, with one story added in 1985 and another in 1994.

8. Doctor's Dining and Administration: This three-story building was constructed in 1985.

TABLE 3.01 - Existing Conditions: Gross Floor Areas

FIGURE 3.07 - 2004 Inpatient and Appurtenant Buildings

8a. Original Coffee Shop: This two-story building was constructed in 1962.

9. Outpatient Surgery: Three stories were originally constructed in 1985, and one story was added in 1994.

10. Cancer Center: This one-story building is located at the lower level of the LBMMC, with a plaza and landscaping above. It was constructed in 1985.

11. Emergency Power Area: This was originally constructed in 1984, with additions in 1994.

OUTPATIENT

Six additional buildings located north and south of two licensed hospitals support outpatient services: Miller House, Ranch House/WIC Center, Memorial Guest Residence Hotel, Research Building, Buffum's Plaza, and Rehab.

MIXED USE

The portion of the Campus located between 27th Street and Willow Street is characterized by mixed use. The Memorial Guest Residence is located southeast of the intersection of 27th Street and Pasadena Avenue. The

Research Building is located southwest of that same intersection. This area includes 15 residential land use parcels (70 residential dwelling units) and 18 vacant lots.

UTILITIES

Utility support for LBMMC and MCH is partially located within the footprint of the buildings. Additional utilities are located north of the West Facility and west of the Administration Building.

CIRCULATION

The Campus is equally accessible from the two major north-south adjacent public roadways: Atlantic Avenue on the east and Long Beach Boulevard on the west. Vehicular and pedestrian circulation within the Campus is supported by a network of public streets and sidewalks, further augmented by landscaped and lighted private driveways and sidewalks maintained by the LBMMC (Figure 3.08, *2004 Hospital-Owned Streets*). There are opportunities to apply this same approach to future development to facilitate safe paths of travel for patients, patrons, visitors, medical staff, and employees.

There are 13 major public/patient entries into the Campus facilities (Figure 3.09, *2004 Hospital Entries*). These entries provide convenient access to inpatient and outpatient services from parking areas, surrounding public sidewalks, and nearby public transit stops.

PARKING

The Campus currently provides 259 parking spaces in excess of the City of Long Beach Code parking requirement (Table 3.02, *City Code Parking Compliance for Existing Development*). There are a total of 3,452 parking spaces located in 11 locations, 2 parking structures, and 9 surface parking lots throughout the Campus (Figure 3.10, *2004 Parking Facilities*; Table 3.03, *2004 Parking Census*).

FIGURE 3.08 - 2004 Hospital-Owned Streets

FIGURE 3.09 - 2004 Hospital Entries

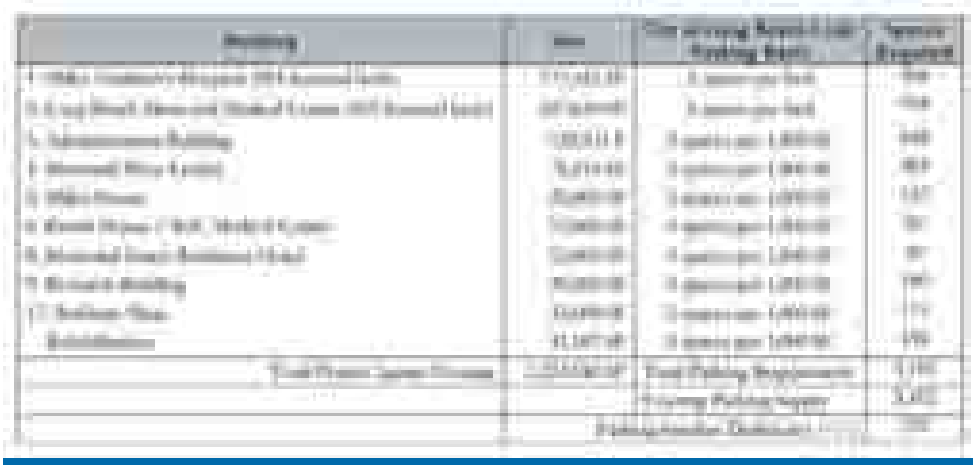

TABLE 3.02 - City Code Parking Compliance for Existing Development

TABLE 3.03 - 2004 Parking Census

FIGURE 3.10 - 2004 Parking Facilities

DESIGN SETTING

BUILDINGS

There are 10 conditioned structures within the Campus that provide a wide variety of inpatient, outpatient, and appurtenant health care services (Figure 3.11, *Conditioned Structures*). The buildings where health care services are provided were constructed between 1956 and 1985; modifications to some buildings were undertaken in the 1990s. The visual character of the Campus is dominated by the eight-story main tower of LBMMC (1960, modified in 1970) and the four-story MCH (1960), which are characteristic of the architecture of public buildings constructed in the Kennedy-Johnson-Nixon-Ford years.[1] The two cruciform buildings are set back from the two nearest primary arterials, Long Beach Boulevard and Atlantic Avenue. This practice was common for the time period and a departure from earlier periods where public buildings were often aligned with, and the primary facade faced, the primary street. The strong geometric lines, glass, and exterior sheathing of the buildings are also characteristic of public buildings constructed during this time period. There are an additional 14 residential structures that were constructed at various times between 1909 and 1959. None of the buildings on the Campus have been afforded any recognition as buildings of architectural noteworthiness in the City of Long Beach.[2, 3, 4, 5, 6]

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[1] Carole Rifkind. 1998. A *Field Guide to Contemporary American Architecture*. New York, NY: Penguin Group.

[2] David Gebhard and Robert Winter. 1994. *Los Angeles: An Architectural Guide*. Salt Lake City, UT: Gibb Smith Publisher.

[3] Reyner Banham. 1971. *Los Angeles: The Architecture of Four Ecologies*. Los Angeles, CA.: University of California Press.

[4] Charles Moore, David Becker, and Regula Cambell. 1998. *Los Angeles: The City Observed*. Santa Monica, CA: Hennessy + Ingalls Art + Architecture Books.

[5] David Gebhard and Harriette Von Bretton. 1990. *Los Angeles in The Thirties: 1931-1941*. Los Angeles, CA: Henessey + Ingalls, Inc.

[6] Gloria Koenig. 2000. *Iconic LA: Stories of LA's Most Memorable Buildings*. Glendale, CA: Balcony Press.

There is a wide variety in massing within the Campus buildings, from the eight-story, 697,630-square-foot LBMMC to the one-story, 122,000-square-foot Ranch House/WIC Medical Center. The massing of the buildings is largely related to three factors: the diversity of services provide, equipment requirements, and medical service capacity. The inpatient facilities vary in height from two to eight stories. Outpatient facilities are typically one to two stories (Figure 3.11). Public building entrances are readily identifiable from parking areas and linkages to adjacent streets.

There are a wide variety of exterior building finishes. However, the primary exterior finishes are poured concrete, stucco, metal, and glass. Most of the exterior facades are painted in light, earth-toned facades with low potential for glare. All health care buildings are equipped with exterior lighting.

LANDSCAPING

The Campus is landscaped with selective plantings of mature trees and shrubs to create a pleasant and secure environment for medical staff, employees, patients, and visitors (Figure 3.12, *Landscaping*). Most recently, in the mid-1990s, LBMMC completed $16.5 million dollars in streetscape and landscape improvements. Typical trees consist of palm, ficus, Brazilian pepper, and eucalyptus. A variety of evergreen shrubs are planted throughout the Campus. Plantings are maintained to provide a level of transparency at eye level that allows viewing from adjacent areas around or on the Campus.

There are five general categories of landscape treatment at the Campus: (1) Campus edge, (2) primary entries, (3) edge treatment of interior sidewalks, (4) edge treatment of surface parking lots, and (5) building edges and courtyards. The Campus edge and streetscape along Long Beach Boulevard and Atlantic Avenue is treated with a white wrought-iron fencing set back with groundcover consisting of low-lying shrubs or grass and trees in the foreground (Figure 3.12). Primary Campus entries on Memorial Center Drive/Patterson Street are treated with alternating pine and ficus trees, flowering shrubs, groundcover, and turf (Figure 3.12). The edges of pedestrian walkways located interior to the Campus are treated turf, occasional trees, hedges, and occasional hardscape such as concrete masonry walls to separate walkways from adjacent buildings (Figure 3.12). Plantings are organized such that security lighting is not impeded. The edges of surface parking lots receive comparable treatment to interior walkways with some combination of turf, shrubs, and trees (Figure 3.12). In addition, lighting is provided within parking lots and structures in accordance with the security plan on file with the City of Long Beach Police Department. Larger buildings typically have some area dedicated to landscaping between the sidewalk edge and the building. These building landscape areas typically consist of turf, groupings of trees such as ficus and palm, and groupings of shrubs (Figure 3.12). The health care buildings and vacant lots located between 27th Street and Willow Street have limited landscape material and are relatively austere, comparable to other commercial properties located in the vicinity of the Campus on Willow Street.

SIGNS

In 2004, LBMMC installed additional signs and improved existing signs throughout the Campus to facilitate site recognition and wayfinding by patients and visitors (Figure 3.13, *Signs and Monuments*). There are generally three types of signs within the Campus: (1) gateway signs, (2) building signs, and (3) directional signs. Large signs identify the primary entrances to the Campus from Long Beach Boulevard and Atlantic Avenue. The entry signs are large, rectangular stone or concrete placards approximately 4 feet in height, with "Long Beach Memorial Medical Center" annotated in raised san serif font lettering. These signs are highlighted with landscape treatment and lighting. The two licensed hospitals have commercial-grade backlit signs near the building cornice identifying the building as "Long Beach Memorial Medical Center" or "Miller Children's Hospital" (Figure 3.13). Directional signs are located along each edge of the Campus directing vehicles to parking areas (Figure 3.13). Additional signs are located within the Campus to direct pedestrians from parking areas to buildings dedicated to inpatient and outpatient treatment centers (Figure 3.13).

FIGURE 3.11 - Conditioned Structures


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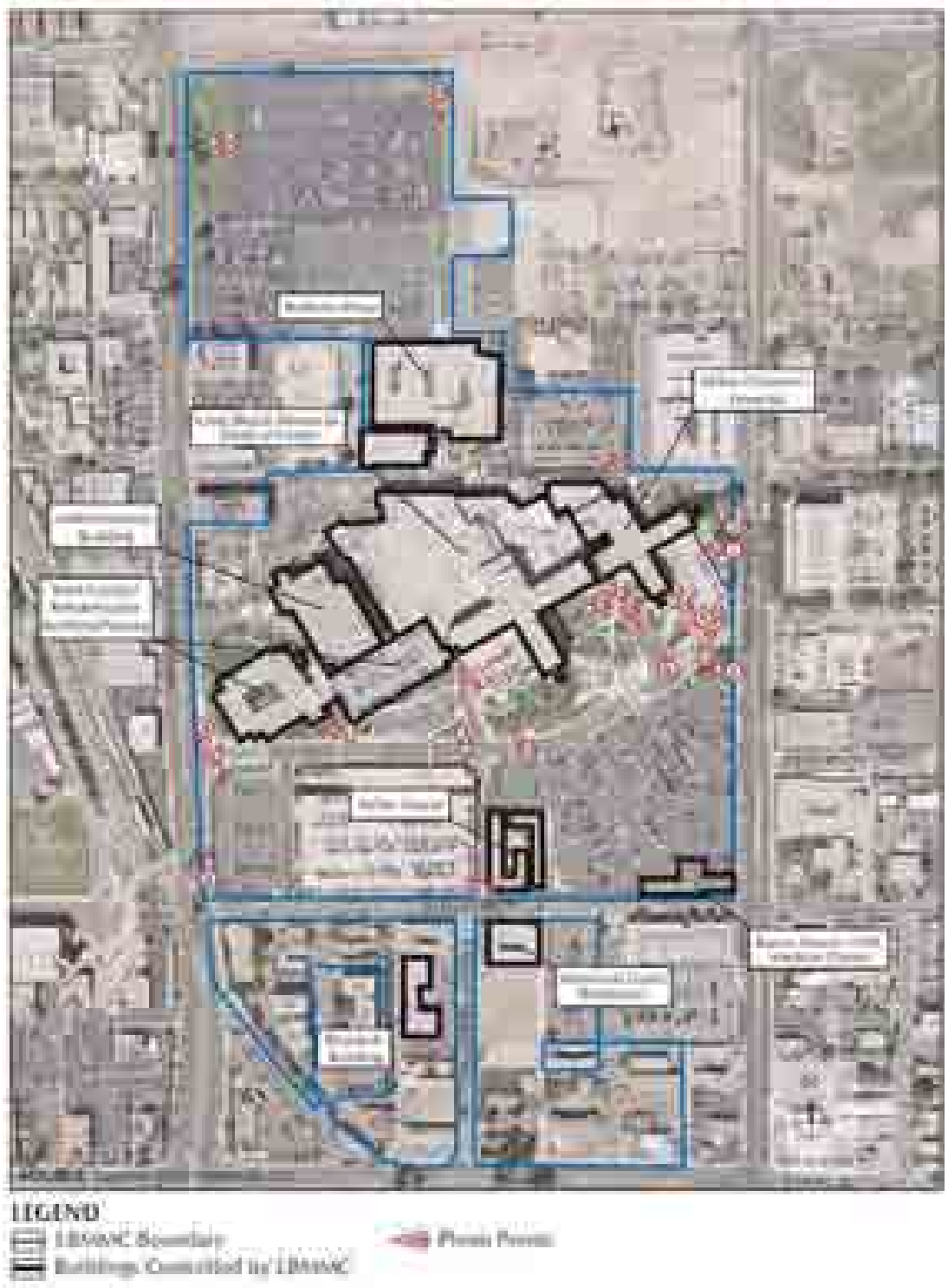

FIGURE 3.12 - Landscaping


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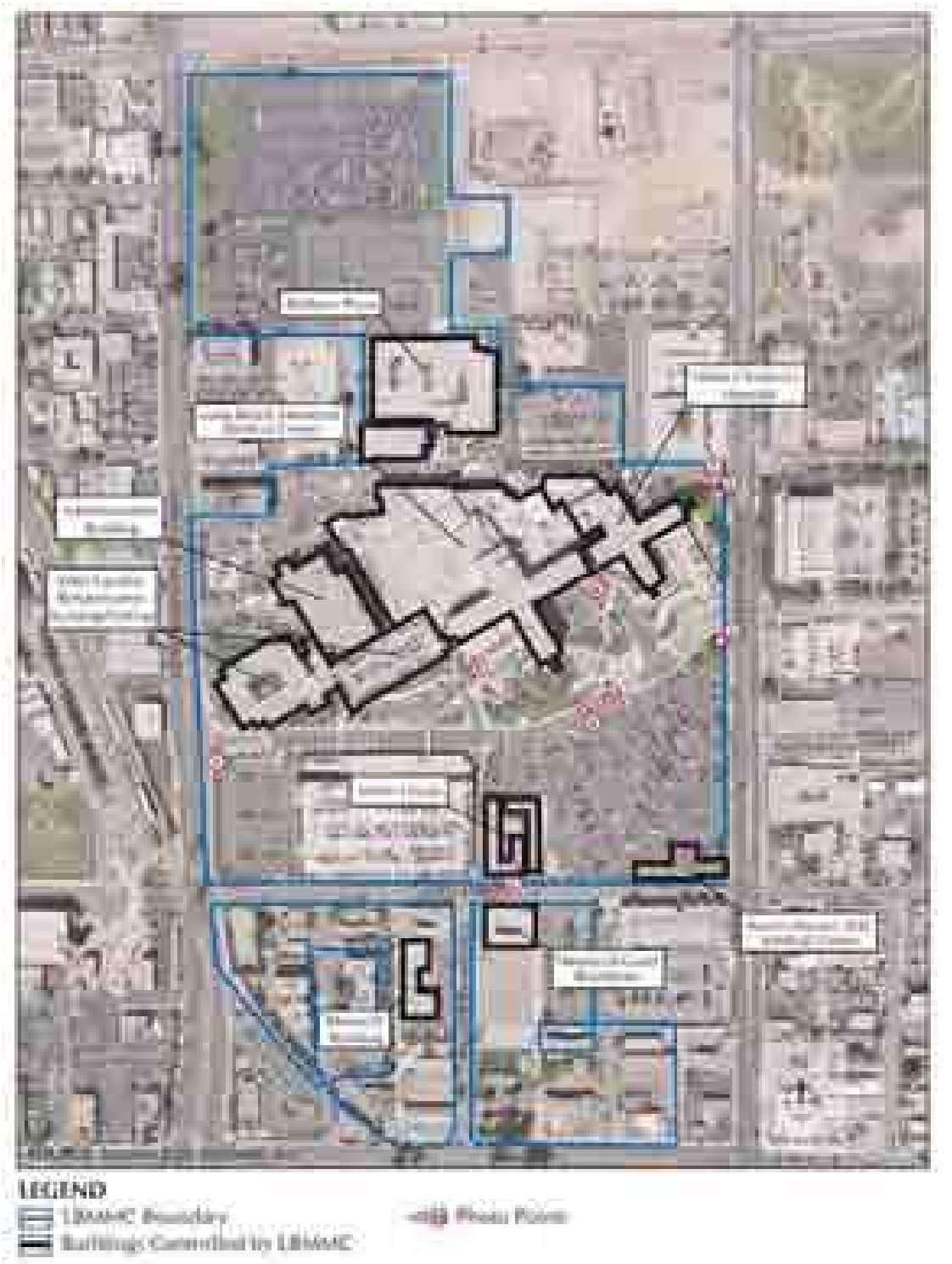

FIGURE 3.13 - Signs and Monuments

GATEWAY SIGNS

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BUILDING SIGNS

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DIRECTIONAL SIGNS

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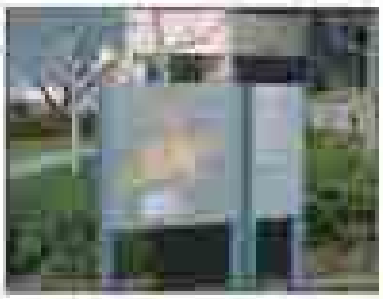


9

MASTER PLAN PROCESS AND ANALYSIS

Section 4

PROCESS

The 2005 Long Beach Memorial Medical Center Master Plan of Land Uses (2005 Master Plan) was prepared through an interactive process involving the project management team for the Long Beach Memorial Medical Center (LBMMC) and the Miller Children's Hospital (MCH), the hospital leadership, and the strategic infrastructure study teams. The 2005 Master Plan builds on both the existing adopted 1999 Master Plan prepared by Bobrow/Thomas and Associates (BTA) and the Kaplan McLaughlin Diaz (KMD) strategic planning process for year 2030 initiated by the LBMMC in 2001 (Figure 4.01, *Conceptual Development Flowchart*).

The LBMMC and MCH retained the services of KMD to develop a year 2030 visioning master plan to meet the requirements of the Office of Statewide Health Planning and Development (OSHPD). As part of the year 2030 visioning process, LBMMC and MCH undertook extensive analysis of existing and anticipated trends for demographics and related health care requirements. This process included an evaluation of existing surrounding properties that would be potentially suitable for expanding the footprint of the existing LBMMC campus (Campus). The decision was made to work within the existing linear framework of the Campus. In addition, LBMMC and MCH evaluated long-term conceptual development options for the Campus and determined that better utilizing the existing 54-acre Campus would be the most cost-effective means of meeting existing and anticipated future demand for health care services.

As a result of the year 2030 visioning process, LBMMC and MCH identified the need for reorganization of land uses within the Campus and additional capital improvements not anticipated by the adopted 1999 Master Plan. As a result, LBMMC and MCH determined to prepare this 2005 Master Plan to distill the relevant information resulting from the year 2030 visioning process, which could guide reorganization of the Campus and funding, design, construction, and operation of capital improvements to be pursued to meet anticipated community needs for the year 2020 planning horizon. This 2005 Master Plan includes a recommended Master Plan of Land Uses developed to accommodate the capital improvements that could reasonably be expected to be funded and undertaken to meet the anticipated needs of the Long Beach community by year 2020. This 2005

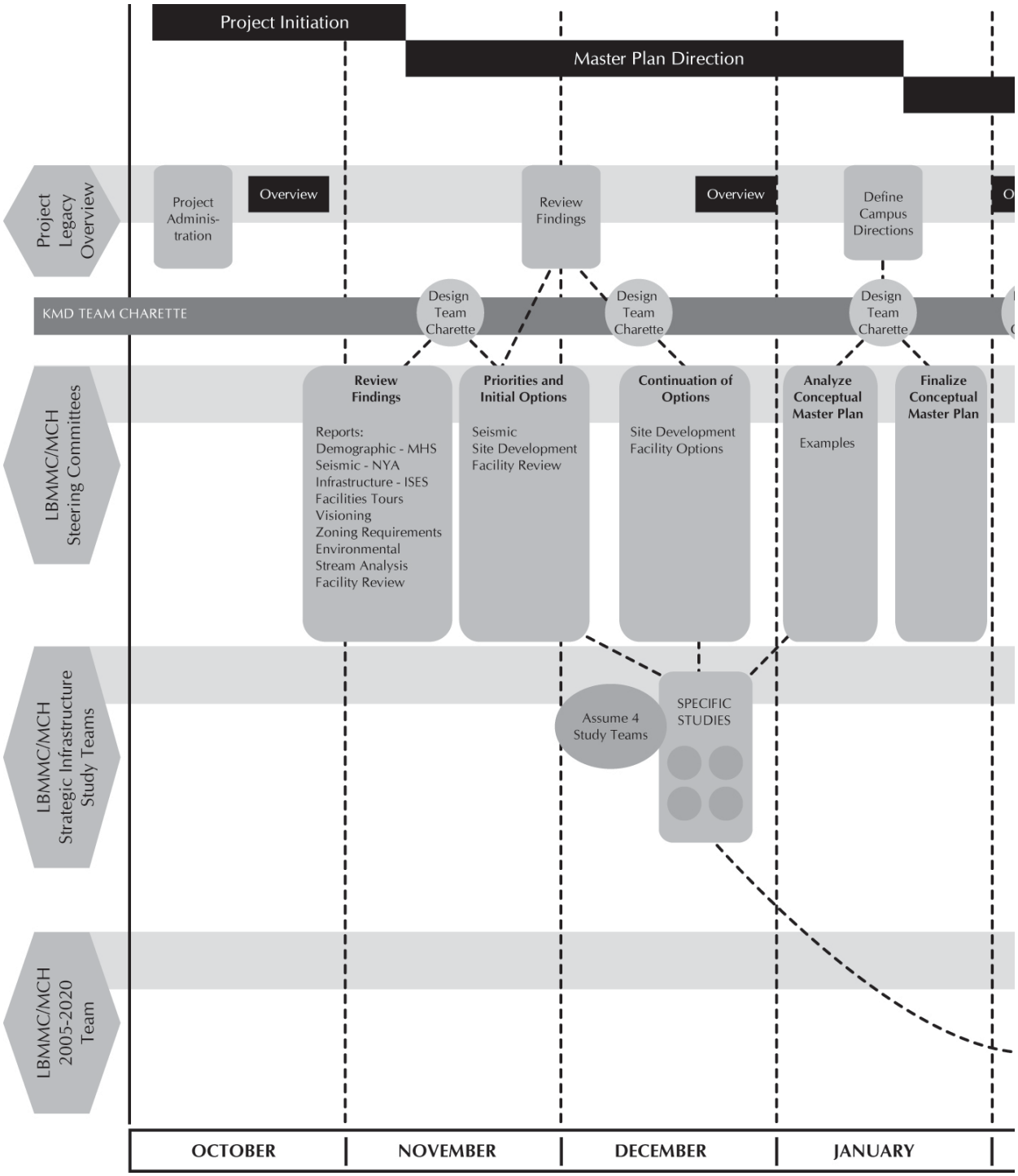
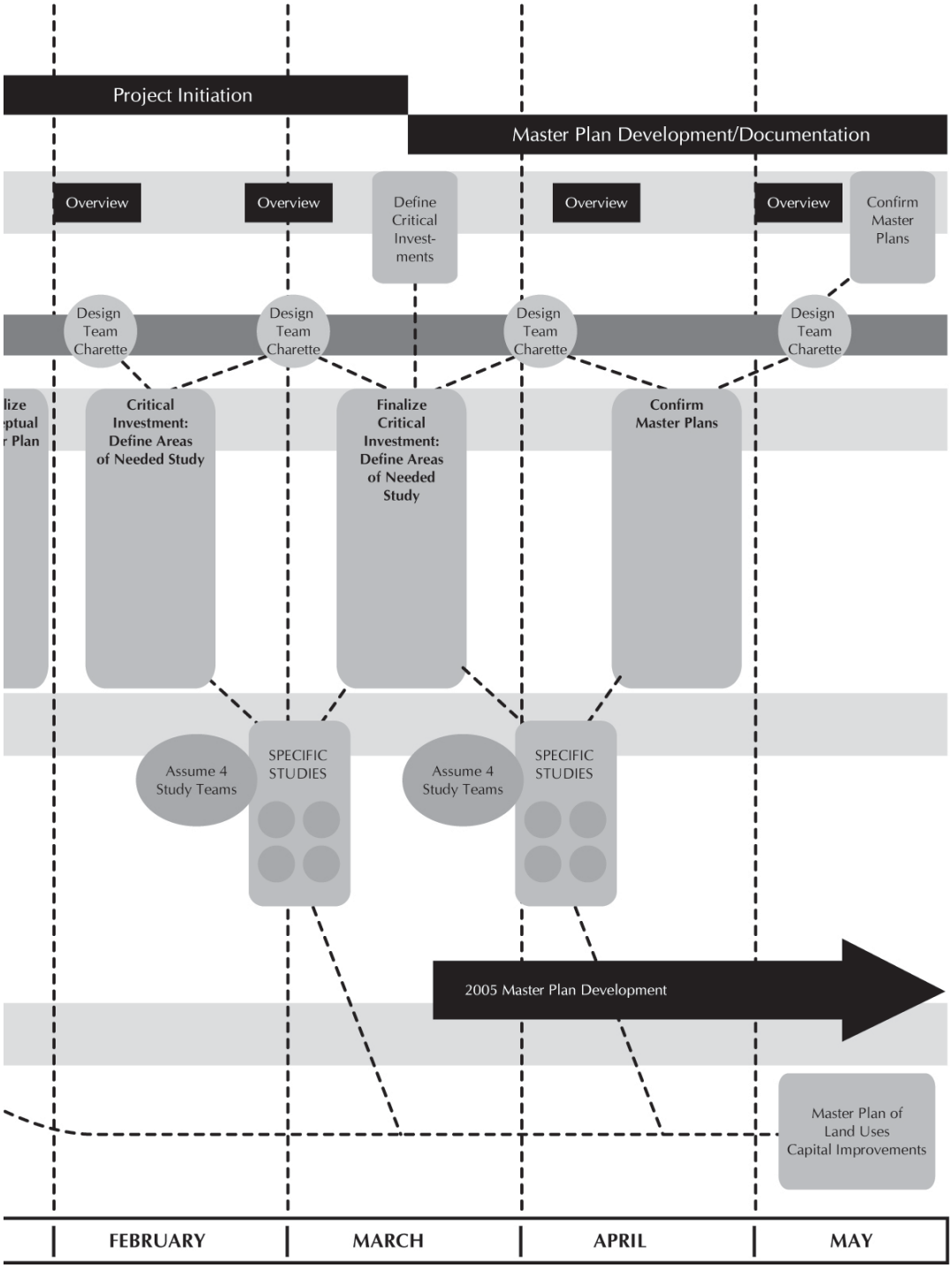


FIGURE 4.01 - Conceptual Development Flowchart


Project Initiation
Master Plan Development/Documentation
Overview
Overview
Define Critical Invest-ments
Overview
Overview
Confirm Master Plans
Design Team Charette
Design Team Charette
Design Team Charette
Design Team Charette
Critical Investment: Define Areas of Needed Study
Finalize Critical Investment: Define Areas of Needed Study
Confirm Master Plans
Assume 4 Study Teams
SPECIFIC STUDIES
Assume 4 Study Teams
SPECIFIC STUDIES
2005 Master Plan Development
Master Plan of Land Uses Capital Improvements
FEBRUARY
MARCH
APRIL
MAY

Master Plan addresses a subset of 9 of the 13 goals, identified in the 1999 Master Plan, that remain to be accomplished.

The recommended 2005 Master Plan keeps all development to meet year 2020 needs on hospital-owned property. It sites the Todd Cancer Institute (TCI) at the northwest corner of the Campus, invigorating this corner of the Campus. MCH is expanded along Atlantic Avenue, allowing joint operation with the existing adjacent facilities. Adequate parking is contemplated in a series of new surface parking lots located within and immediately adjacent to the Campus, with possibly an on-site parking structure to accommodate the later phases of development.

TRENDS AFFECTING DEMAND FOR HEALTH CARE SERVICES

The LBMMC anticipates that the demand for outpatient cancer services provided by the current TCI, a programmatic element of LBMMC, will exceed population growth projections due to several key national and local demographic trends:

- Population of high-risk (over age 65) individuals for cancer in the Los Angeles–Long Beach primary metropolitan statistical area will increase from 12 percent to 16 percent between years 2000 and 2020.
- The overall five-year survival rate for cancer will increase from 63 percent in 1998 to 75 percent in 2010. Cancer patients will not undergo complete remission; instead, they will live longer and require ongoing medical care in the form of outpatient services.
- Between the years 2005 and 2010, 90 percent of all cancer care will be delivered in the outpatient setting.

The MCH experienced a 10-percent increase in the demand for pediatric inpatient and outpatient services between years 2001 and 2004. Several factors are expected to result in a continued increase in demand at a rate of approximately 1 percent per year between 2005 and 2020.

- Anticipated annual population growth of the population under age 15
- Regional trend in closure of hospitals
- Need to absorb pediatric inpatient and outpatient services as a result of the closure of Martin Luther King trauma center

In addition, California Senate Bill 1953 (SB 1953) requires that all buildings used for inpatient care within general acute care hospitals in California meet designated standards within specified deadlines.

CONCEPTUAL DIAGRAMS

In discussing options for Master Plan development for the LBMMC and MCH, several conceptual models for the plan were developed to illustrate the advantages and disadvantages that each potential direction would present. In response to particular site limitations and constraints, two concepts were selected. Even though these were considered to be concepts best suited to the particular site, they were conceived as abstract diagrams that could be implemented under ideal conditions on a "green field" site in order to demonstrate the pure concept (Figure 4.02, *Conceptual Development Options*).

Open Square Development: The advantage to this development type is that it is focused on a central connecting point, minimizing travel distances and providing ease of expansion into an adjacent square. Disadvantages include difficulty in clearing the next square when space is unavailable.

Linear Development: The advantage to the linear development pattern is that it is easily appended and allows for a mall condition under which disparate parts can be connected. Disadvantages include increased travel distances and potential disruption due to building construction and reconstruction.

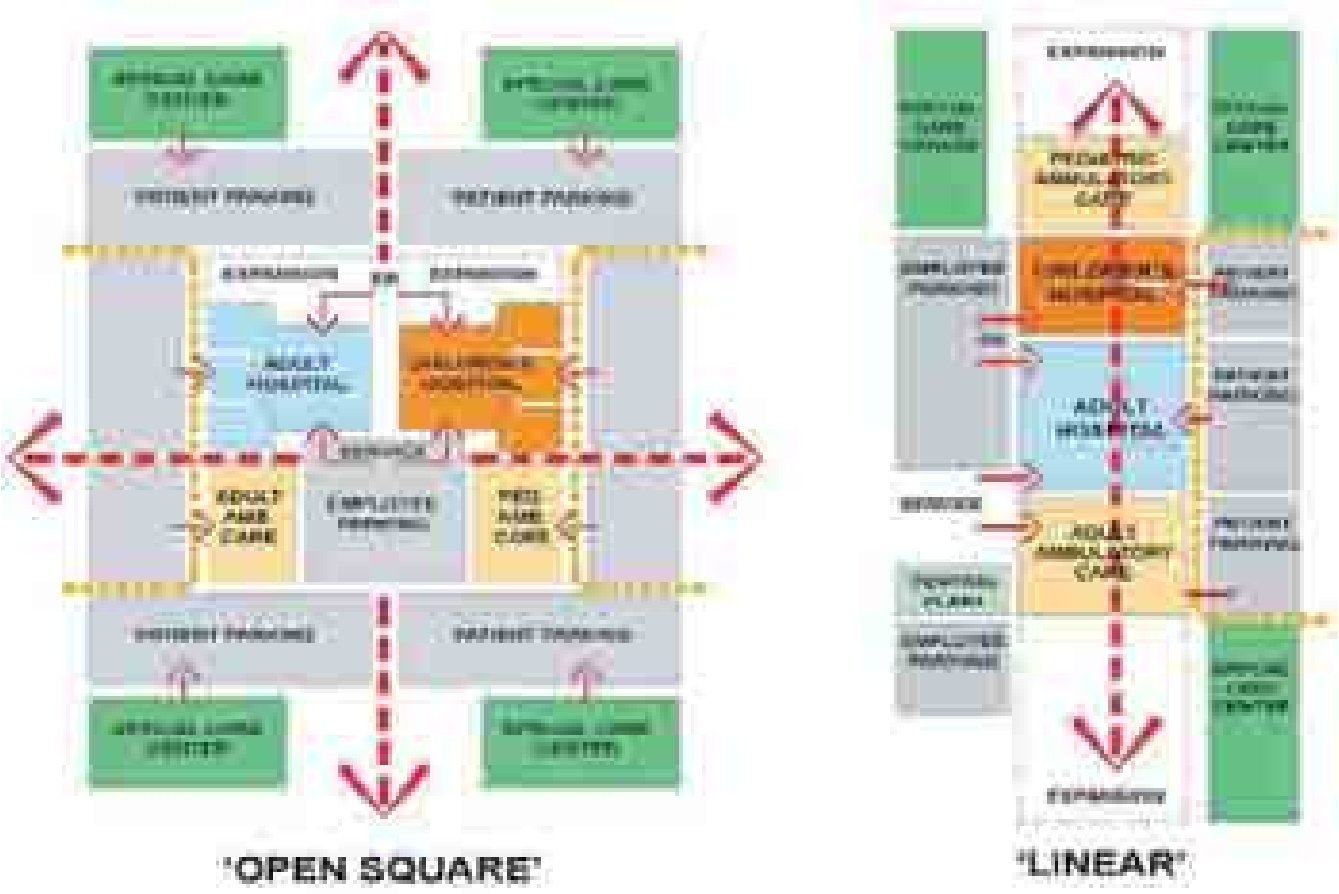


FIGURE 4.02 - Conceptual Development Options

EFFECTIVE PROPERTY UTILIZATION

Several areas are available for development, located both to the north and south of the existing Campus. The potential uses on these sites range from hospital parking, medical office buildings, and hospital housing, to private residential developments.

The lot to the immediate south, currently used for hospital parking, is the site of a former landfill and will require remediation to accommodate development. These properties would be suitable for development of land uses that could be undertaken with the site conditions, such as parking and utility infrastructure, including development of

a central plant building to support the MCH. The southernmost property is, in large part, owned by the hospital and available for development, but it is currently occupied by multiple structures. These buildings would need to be demolished to acommodate future development recommended by this 2005 Master Plan.

The sites to the immediate north are currently occupied by hospital-owned and non-hospital-owned buildings. These buildings and existing adjacent pedestrian and vehicular paths of travel need to be considered in establishing linkages to redevelopment of existing underutilized properties located south of Spring Street.

There are several non-hospital-owned properties located within the general footprint of hospital-owned properties within the City of Long Beach. In addition, there are several non-hospital-owned properties located between the existing Campus and other hospital-owned properties east of Atlantic Avenue in the City of Signal Hill. Although the LBMMC has determined that the development of existing underutilized hospital-owned properties is the most effective means of accommodating the year 2020 anticipated needs of the community for health care services, opportunities for amassing additional key properties will continue to be evaluated on a case-by-case basis.

ZONING

The expansion of the Planned Development (PD-29) District zoning that exists in the northwestern area of the Campus would provide the ideal location to construct a new building or buildings to accomplish multiple objectives of this Master Plan. The height limitations associated with the PD-29 District zoning allow for the development of an outpatient building of sufficient height to accommodate the existing gross floor area occupied by the programmatic functions of the TCI within the existing dispersed locations, as well as providing sufficient space to accommodate anticipated future demands.

CIRCULATION

The development of the Master Plan must be undertaken in a manner that recognizes the existing major circulation patterns and local circulation to and from existing hospital access points (Figure 4.03, *Circulation Patterns*). The 405 Freeway is several blocks to the north of the Campus and provides access to the two main arteries serving the LBMMC and MCH: Long Beach Boulevard and Atlantic Avenue. Columbia, 28th, and 27th Streets all provide secondary access to the Campus. Columbia Street is the main access to the emergency room and the surgery center, 28th Street is the main access to the main hospital and MCH entrances and drop offs, and 27th Street is the main entrance to the employee parking structure. All of these streets are major roads and should have sufficient capacity to accommodate new trips into and from the Campus.

Pedestrian circulation is accommodated by the Pedestrian Plan illustrated and explained in Section 5.0, Figure 5.13, *Pedestrian Plan*. This plan is incorporated into the Landscaping Plan for the Campus. It intends to illustrate sidewalks along all existing streets in the project vicinity and provide unobstructed and direct pathways between arrival areas (i.e., parking areas and mass transit stations) and destinations such as building entrances.

Pedestrians can utilize public transit locations near the proposed project site, which are illustrated in the circulation map (Figure 4.03). This figure illustrates the Long Beach Transit (LBT), the Los Angeles Metropolitan Transit Authority (MTA), and the Metro Blue Line Light Rail Transit System, all of which provide public transit services in the vicinity of the proposed project, as well as probable pedestrian routes from the bus stops. The pedestrian routes were determined assuming the main public transit routes utilized to access the hospital are LBT Route No. 51 and No. 52, which travel north and south on Long Beach Boulevard adjacent to the proposed project site, with a bus stop at the intersection of Long Beach Boulevard and Willow Street, and LBMMC and 28th Street. Route No. 51

FIGURE 4.03 - Circulation Patterns

was previously called Route No. 5. LBT Route Nos. 45, 46, 61, 66, 81, 101, 102, 103, 131, 171, 172, 173, 174, 191, and 192 all provide direct access to LBT Route No. 51 and No. 52.

The pedestrian routes were also determined based on LBT Route No. 61 and No. 62, which travel north and south on Atlantic Avenue east of the proposed project site, with a bus stop at the intersection of Atlantic Avenue and Willow Street. LBT Route Nos. 5, 7, 45, 46, 81, 101, 102, 103, 131, 171, 172, 174, 191, and 192 all provide direct access to LBT Route No. 61 and No. 62.

MTA Route Red No. 60, Route Orange No. 232, and Route Green No. 360 travel north and south on Long Beach Boulevard near the proposed project site. Each of these routes provides further access to all LBT bus routes. The LBT service area extends beyond the City of Long Beach in portions of Signal Hill, Cerritos, Lakewood, San Pedro, Paramount, Compton, Los Angeles, Hawaiian Gardens, and Seal Beach.

All LBT routes connect with the Metro Blue Line Light Rail Rapid Transit System. Given that bus service via LBT is provided between Willow Station and the proposed project site, patrons would be able to utilize the existing Metro Blue Line Light Rail Transit System via Willow Station. In addition, Willow Station is located immediately south of the proposed project site by less than 0.25 mile, allowing patrons to walk to the Campus. Therefore, each of these bus and light rail routes facilitate pedestrian access to the LBMMC through LBT transfer stations.

Service vehicle access improvements should receive special attention to ensure that there will be no conflicts with patient traffic and pedestrians.

PARKING

Although there are 259 excess parking spaces available within the Campus, it is anticipated that an increase of more than 125 licensed beds or addition of more than 51,000 square feet or any comparable combination would require the development of additional parking.

Parking will be lost due to the demolition of the existing 86-car parking structure located immediately adjacent to the MCH, and the realignment of Patterson Street/Memorial Drive to the south would create an area of sufficient size to accommodate the construction of new structures for the projected need for inpatient and outpatient pediatric services. Additional parking will be lost to the footprint of the TCI.

There is insufficient space to accommodate the additional need for parking solely through the development of surface parking. However, landowners for adjacent properties to the northeast of the Campus have identified their intention to develop these properties as surface parking areas on an interim basis. The ability to enter into a five-year lease for surface parking with adjacent property owners would allow the LBMMC and MCH to prioritize funding for capital improvements to directly address the immediate need for expanded capacity for inpatient and outpatient services. City approvals to construct and operate Campus buildings will be contingent on LBMMC and MCH's ability to demonstrate the availability of long-term parking. It is anticipated that development of a parking structure within the Campus or a nearby property would be required to support the full build-out of the Campus anticipated by this Master Plan.

RECOMMENDATIONS

As part of the 1999 master planning process, the LBMMC management facilitated workshops that included the LBMMC administration, medical staff, users, and board members. The focus of these workshops was to develop lists of pressing LBMMC facility issues and prioritize them into a list of planning goals. Subsequent to that effort, the LBMMC retained KMD in 2003 to develop facilities strategies to meet SB 1953 mandates, as well as to modernize the existing LBMMC and MCH facilities to meet current and projected needs. The following recommendations are derived from these previous planning efforts and the site and building analysis.

Of the 13 issues identified in the 1999 Master Plan, 9 are relevant to the current master planning effort.

1. Customer Service/Patient Flow/Access
   Make LBMMC more patient focused and patient friendly. The intent is to personalize service and make the entire hospital experience convenient to patients and their families.

2. Infrastructure
   Enhance hospital operations, efficiency, and employee satisfaction and meet code requirements, including those mandated by SB 1953. Accomplish hospital improvement in a cost-effective manner.

3. Miller Children's Hospital
   Enhance the operations, flow, and identity of the MCH, including licensing issues, inpatient units, impacted neonatal intensive care unit (NICU) facilities, inpatient overflow, and emergency flow.

4. Outpatient
   Develop outpatient services, including continued reorientation of services to outpatient delivery. Consolidate outpatient functions into easily accessed locations, including outpatient surgery, diagnostic and testing areas, and outpatient clinics.

5. Community Image
   Redefine and enhance the LBMMC's image in the local community. Consider the impact of changing community demographics and the LBMMC's role as a provider of community health education.

6. Amenities
   Enhance the LBMMC's services and patient-focus through the provision and/or development of amenities, including accommodations for family members, wellness/fitness facilities, and a children's playground. Consider a hotel to support visiting family members.

7. Services
   Provide support services that will enhance hospital operations and efficiency. Consider the location of the lab, transcription services, the location and flow of sterile processing, and the provision of 23-hour beds for observation and reduced patient admissions.

8. Master Plan
   Provide the LBMMC with a clear plan that will allow for future growth and expansion, including the identification of opportunities to provide for more efficient and patient friendly use of space.

9. Tertiary Services
   Identify and develop tertiary services to be provided at the LBMMC, in conjunction with its role in the community. Further define the role of oncology services, enhance surgical operating rooms, and create interventional service recovery areas.

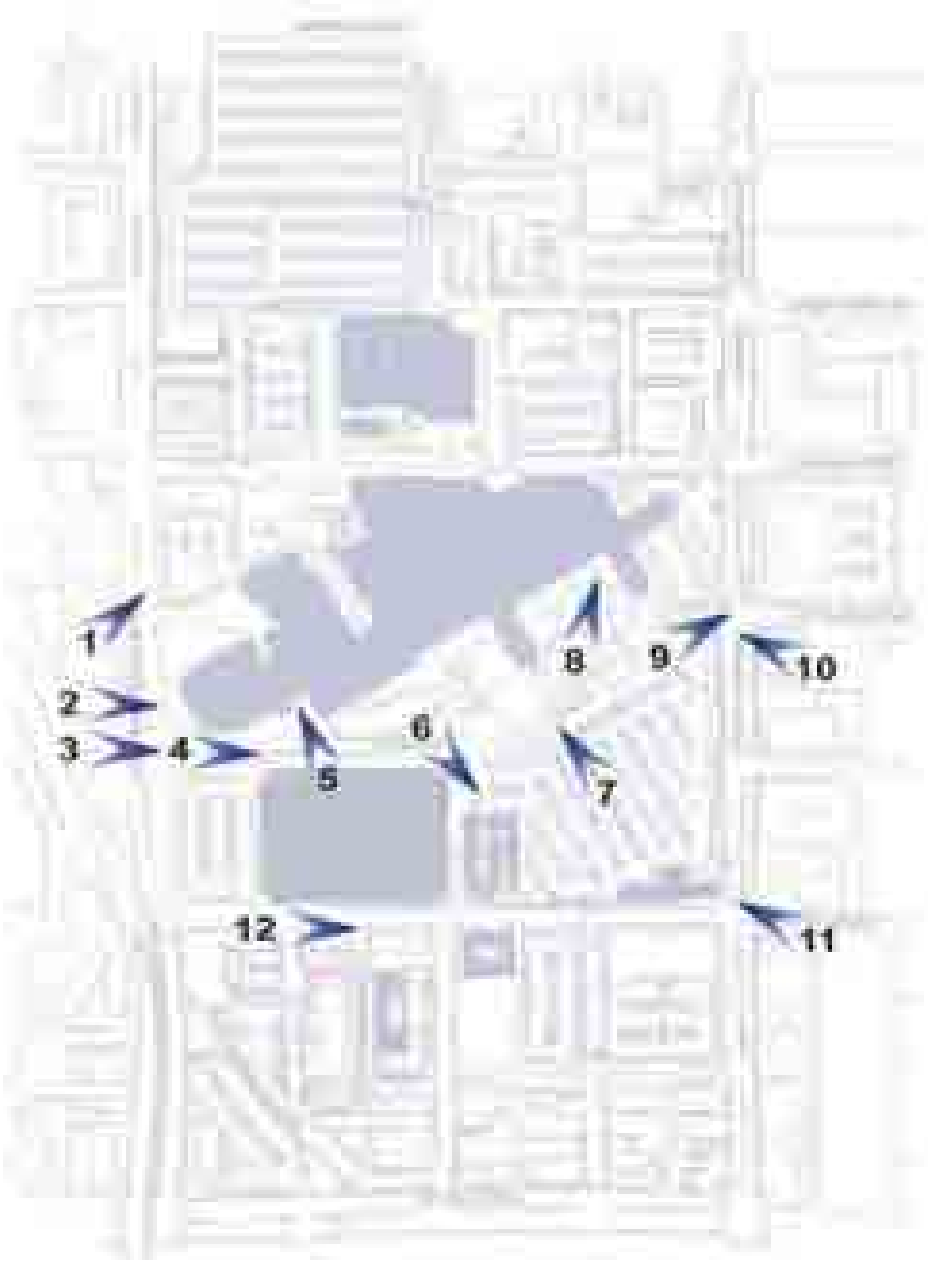
DESIGN GUIDELINES

As part of the development of this Master Plan, photographic documentation of the existing facilities and public areas of the Campus was undertaken (Figure 4.04, *Site Photographs*). The LBMMC and MCH used the existing successful landscape treatments, lighting plans, and sign program as the basis for developing the Campus-wide design guidelines.

LEGEND

1. View northeast across Long Beach Boulevard toward Medical Office
2. View east across Long Beach Boulevard to Administration Building western elevation
3. View east to Medical Memorial Drive intersection with Long Beach Boulevard
4. View west across Medical Memorial Drive planted center divider
5. Administration Building entryway with foreground accent tree
6. Miller House northwest elevation
7. View from south parking lot to LBMMC
8. Entryway to MCH with sycamore accent tree
9. View northeast across Atlantic Avenue and Patterson Street intersection to four-story Atlantic Medical Office Building
10. Memorial Medical Drive entrance at Atlantic Avenue toward MCH
11. View northwest across Atlantic and 27th Street intersection toward WIC Building
12. View east along 27th Street with parking structure on left

FIGURE 4.04 - Site Photographs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LEGEND

1. View northwest across Atlantic Avenue toward oil derricks and roadside shrubs
2. View north across Spring Street
3. View south along palm tree-lined portion of South Spring Street entranceway to Campus
4. View southeast toward 29th Street parking
5. View southwest across 29th Street to landscaped street corner and parking lot
6. View east across Columbia Street toward MCH
7. View south at emergency vehicle access point
8. View northwest toward Buffum Plaza
9. View east toward north LBMMC entrance
10. View east on Columbia Street toward CT and MRI Center
11. View toward northwest corner of Administration Building
12. View northeast across Long Beach Boulevard toward Medical Office Building

FIGURE 4.04 - Site Photographs


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Section 5

2005 MASTER PLAN

The 2005 Long Beach Memorial Medical Center Master Plan of Land Uses (2005 Master Plan) provides for refinements to the existing pattern of land uses that accommodate a new building to house the Todd Cancer Institute (TCI), a component of Long Beach Memorial Medical Center (LBMMC), and the comprehensive expansion of the Miller Children's Hospital (MCH) through construction of new buildings to house inpatient and outpatient services. These improvements would address the existing and anticipated demands of the Long Beach community for health care services through the year 2020. The Southern California Association of Governments (SCAG) and the Housing element of the City of Long Beach General Plan forecast a 6- to 9-percent growth rate to the year 2020, adding approximately 65,000 people to the City of Long Beach. The 2005 Master Plan identifies a series of capital improvements to provide expanded capacity for inpatient and outpatient services in conjunction with ambient population growth, in a manner that conforms to the requirements of California Senate Bill (SB) 1953 and the state's health care licensing requirements. Although compliance with the City of Long Beach Zoning Code would normally require the Long-Range Development Plan for the institution to address a 20-year planning horizon, this 2005 Master Plan was undertaken consistent with the census data provided by SCAG and the General Plan, which provide information through the year 2020 planning horizon. The 2005 Master Plan incorporates the work that was undertaken between years 2000 and 2005, pursuant to the adopted 1999 Master Plan.

GENERAL PLAN

The 2005 Master Plan is consistent with the land use designation (LUD) for the 54-acre LBMMC campus (Campus) as LUD No. 7 Mixed-Use District, as specified in the City of Long Beach General Plan (Figure 3.03, *General Plan Land Use Designation*).

ZONING

The proposed land uses are consistent with the existing Institutional (I) zoning that applies to the portion of the Campus bounded by 29th Street on the north, Atlantic Avenue on the east, 27th Street on the south, and Long Beach Boulevard on the west (Figure 3.05, *2004 Zoning Districts*). The proposed expansion of the MCH and a new parking structure are allowable uses within the I zoning. LBMMC has requested that the City of Long Beach extend the eastern edge of the Planned Development (PD-29) zoning, between Spring Street (on the north) and 29th Street (on the south), from its current location approximately 100 feet east of Long Beach Boulevard to the western edge of Pasadena Avenue in order to accommodate the construction of a new building to house the TCI (Figure 5.01, *Proposed Zoning Districts*). That land is currently zoned as a Regional

FIGURE 5.01 - Proposed Zoning Districts

Highway (CHW) District. The proposed inpatient, outpatient, and mixed-use development within the Campus would require the development of additional surface parking lots. LBMMC proposes to demolish mixed-use properties, including residential units and vacant lots, to create additional surface parking lots south of 27th Street. This use would be consistent with the existing zoning between 27th Street (to the north) and Willow Street (to the south), as a CHW District and as a Community Automobile-Oriented (CCA) District (Figure 3.05).

RECOMMENDATIONS

This 2005 Master Plan addresses the priority improvements identified by LBMMC and MCH to achieve the goals and objectives identified to support the continued mission of improving the health and well-being of individuals, families, and the community through innovation and the pursuit of excellence, and to making LBMMC into Southern California's preferred, operationally excellent, and fiscally sound provider of comprehensive, high-quality health services. The total estimated cost of capital improvements described in this 2005 Master Plan is in excess of $276 million (Table 5.01, *Estimated Capital Improvement Costs*). However, MCH has not yet been funded. Thus, Phase II has not bee constructed and would be subject to site plan review when LBMMC is prepared to move forward with that project element.

EFFECTIVE PROPERTY UTILIZATION

The site evaluation identified existing underutilized property southeast of the intersection of Spring Street and Long Beach Boulevard, east of Long Beach Boulevard and south of the MCH, in the western portion of Parking Lot K, and in the mixed-use properties located south of 27th Street (Figure 5.02, *Effective Property Utilization*). The area located south of the MCH was identified as the most suitable to accommodate the need for additional pediatric inpatient and outpatient facilities. Specifically, the MCH pediatric inpatient tower Phases I and II, the MCH pediatric outpatient building, and the MCH link building would be best placed immediately south of the existing MCH because the pediatric inpatient tower needs to be placed immediately adjacent to and be connected to the existing MCH to maintain operational efficiencies related to patient care, staffing, and equipment (Figure 5.03, *Miller Children's Hospital Expansion*).

The parking lot on the northwest corner of the Campus provides the most suitable location for the development of a dedicated structure for consolidating the TCI

Project Element	Total Cost in Million
Todd Cancer Institute, Phase I	$34.30
Todd Cancer Institute, Phase II	$17.30
Miller Children's Hospital—Pediatric Inpatient Tower, Phase I	$92.00
Miller Children's Hospital—Pediatric Inpatient Tower, Phase II	$61.30
Utility Trench	$1.00
Central Plant Building	$5.00
Miller Children's Hospital—Pediatric Outpatient Building	$19.00
Miller Children's Hospital—Link Building	$14.20
Roadway Realignment	$3.00
Parking Program • On-site parking (N, P, Q, R, S, and T) 515 spaces at $10,000 per car space • 1,700 space structure at $14,000 per car space	 $5.15 $23.80
TOTAL COST	**$276.05**

NOTE:
All costs are at 2004 dollar value.
Above costs include equipment.

TABLE 5.01 - Estimated Capital Improvement Costs

FIGURE 5.02 - Effective Property Utilization

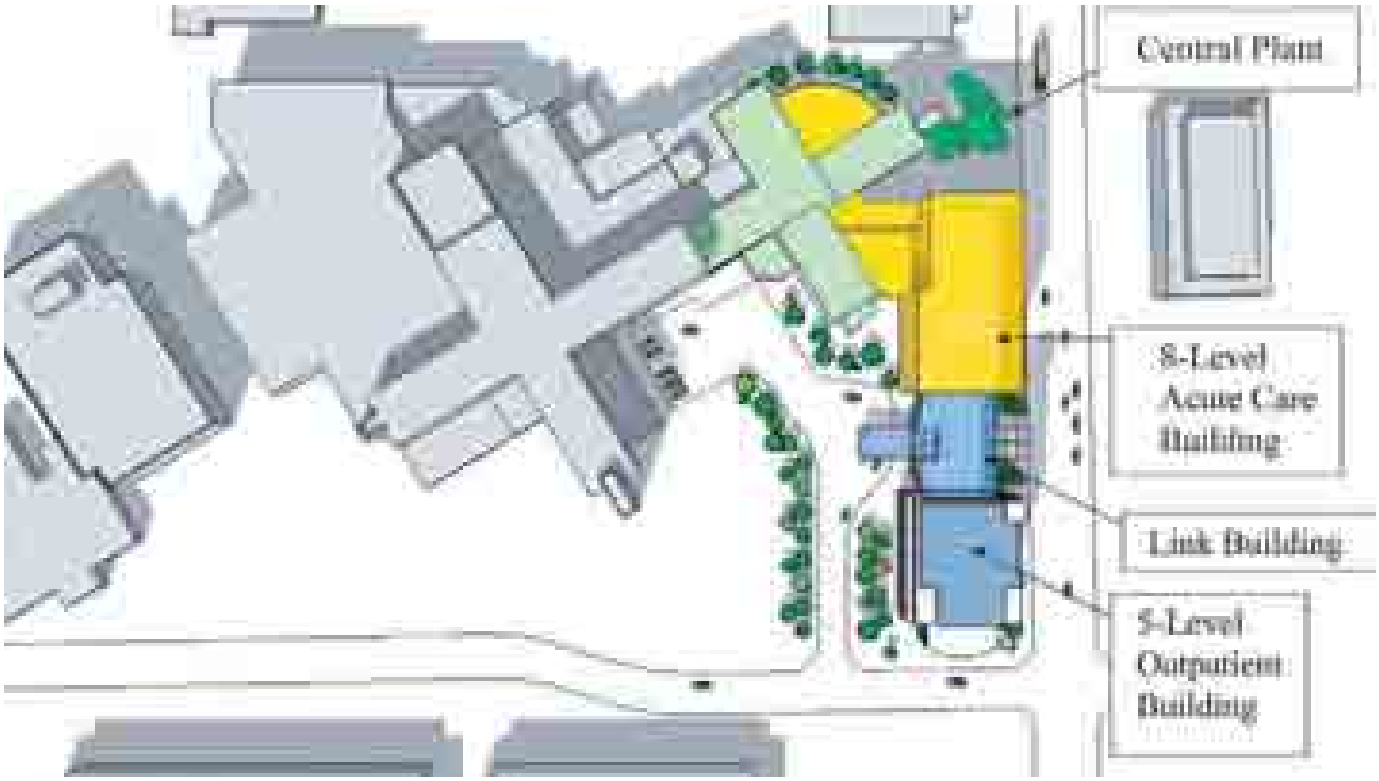


FIGURE 5.03 - Miller Children's Hospital Expansion

programming functions, currently located in 24 diverse locations (Figure 5.02). This location would allow the building to serve as a gateway to the Campus. There is sufficient space at this location to promote sufficient on-site parking and allow for future (Phase II) expansion of the facility to accommodate projected population growth and health care demographic trends.

PRIORITIES

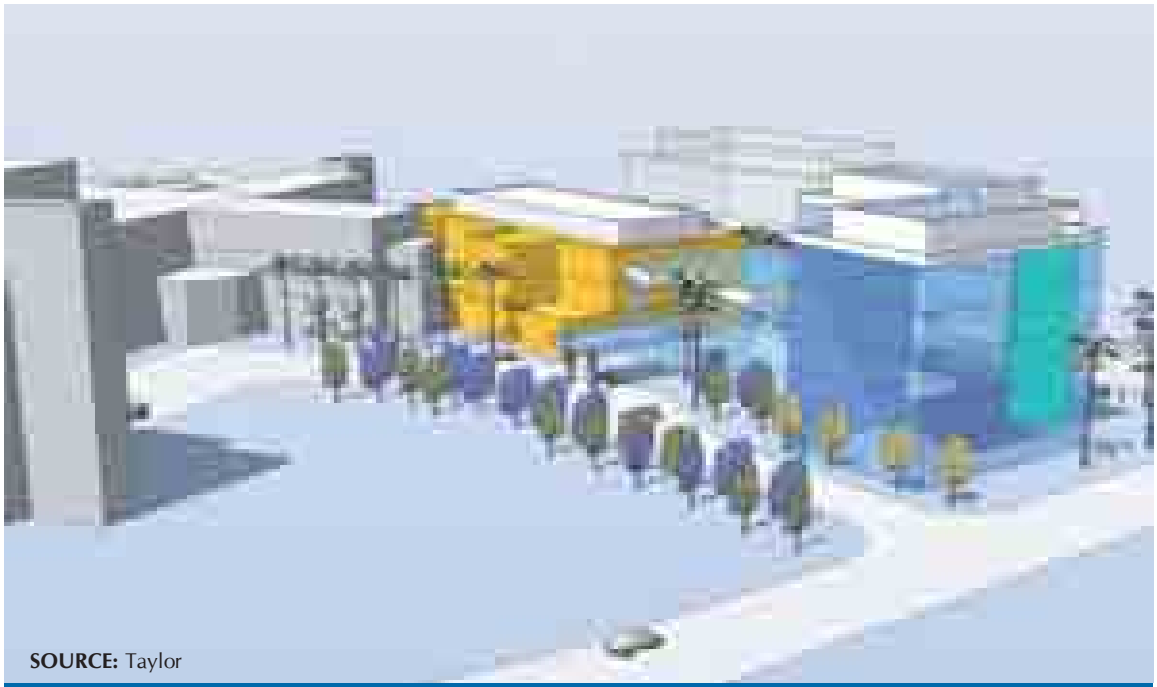
Miller Children's Hospital

MCH proposes to expand its services through the development of a new pediatric inpatient tower, a pediatric outpatient building, and a third building that would link these first two buildings and be suitable for the provision of appurtenant retail services for medical staff, employees, outpatients, and visitors (Figure 5.04A, *Miller Children's Hospital Expansion Phase II, View of South and East Conceptual Massing Study*, and Figure 5.04B, *Miller Children's Hospital Expansion Phase II, View of South and West Conceptual Massing Study*). The need to construct a new building to support pediatric inpatient services (beds and operating rooms) emerged as a priority that must be achieved by December 2007 to conform to State of California licensing requirements for MCH. Pursuant to the SB 1953 regulations of the Office of Statewide Health and Planning Development (OSHPD), a new central plant building would be required to support the pediatric inpatient services facility.

MCH recognized that the quality of pediatric health care services could ultimately be improved through the development of a dedicated facility to house pediatric outpatient services in close proximity to the proposed inpatient services. Given the large medical professional staff, several thousand employees, and nearly a thousand

SOURCE: Taylor

FIGURE 5.04A - Miller Children's Hospital Expansion Phase II, View of South and East Conceptual Massing Study



SOURCE: Taylor

FIGURE 5.04B - Miller Children's Hospital Expansion Phase II, View of South and West Conceptual Massing Study

inpatient beds that will ultimately be present on the Campus, MCH identified the need for space to accommodate appurtenant mixed uses such as food services and a gift shop. The ability to accommodate these facilities in close proximity to the existing and proposed inpatient services requires realignment of the easterly portion of Memorial Drive to the south to align with Patterson Street. The parking required to support these improvements would exceed the existing excess 259 parking spaces within the Campus and would require additional parking to be secured or developed.

Todd Cancer Institute

The ability to consolidate the TCI treatment modalities from the existing 24 locations on and off the Campus into a single dedicated facility emerged as a second immediate priority. Demographic data for cancer treatment clearly demonstrate that there will be an increasing segment of the population that will require treatment for cancer and that a greater number of those treated will be likely to survive; thus, there will be a continually expanding population of patients requiring outpatient services including long-term treatment and monitoring. Therefore, the building constructed for TCI services would need to be placed at a location that could accommodate expansion within the year 2020 planning horizon. It is anticipated that the spaces vacated by TCI services within LBMMC would be backfilled with other inpatient and appurtenant services; thus, the TCI would require additional parking to be secured or developed.

MASTER PLAN OF LAND USES

This 2005 Master Plan provides a conceptual framework for the reorganization of the six existing land uses: (1) inpatient medical facilities, (2) outpatient medical facilities, (3) mixed-use facilities, (4) utilities, (5) circulation, and (6) parking (Figure 5.05, *Master Plan of Land Uses*). Within this conceptual framework, six capital improvements could be constructed between years 2005 and 2013.

MCH Pediatric Inpatient Tower

Operation of the MCH pediatric inpatient tower by January 2008 would allow the hospital to meet the state-mandated licensing requirements for operating rooms and pediatric beds. The pediatric inpatient tower expansion of MCH would be located immediately adjacent to and connected to the existing MCH facility, southwest of the intersection of Atlantic Avenue and Columbia Street (Figures 5.02 and 5.05). The existing land use at this location is an 86-stall, multilevel parking structure. The parking structure would be demolished to accommodate the additional area dedicated to the proposed pediatric inpatient tower. Access to the pediatric inpatient tower would be provided on multiple floors of the existing MCH facility and by a new pedestrian entrance on the west facade of the building. At build-out, the MCH would provide 205,250 gross square feet.

Phase I of the MCH pediatric inpatient tower would provide approximately 129,220 square feet of new space for pediatric surgical services, imaging, lobby, newborn intensive care services, and general pediatric inpatient care services. Phase I would consist of a four-story building with one story below grade and three stories above grade (Figure 5.06A, *Miller Children's Hospital Pediatric Inpatient Building North and East Elevations*, and Figure 5.06B, *Miller Children's Hospital Pediatric Inpatient Building South and West Elevations*). The highest point of the Phase I structure would be 84 feet above grade. The Phase I portion of the building would require 144 parking spaces. Phase I of the new pediatric inpatient tower is proposed to initiate construction in October 2005, with completion in January 2008. Phase II would provide approximately 86,030 square feet in a vertical expansion of the Phase I structure. The highest point of the combined Phase I and Phase II structure would be approximately 148 feet above grade. The Phase II portion of the building would require 192 parking spaces. Construction of Phase II is contingent on the growth of inpatient pediatric cancer services, the needs of the Long Beach community, and philanthropy. The likely dates to initiate and complete construction of Phase II of the MCH pediatric inpatient tower are January 2012 and June 2013, respectively.

The MCH pediatric inpatient tower would be served by the existing service area and loading dock for the LBMMC and MCH.

The MCH pediatric inpatient building design would conform to the design specifications for the Campus

FIGURE 5.05 - Master Plan of Land Uses

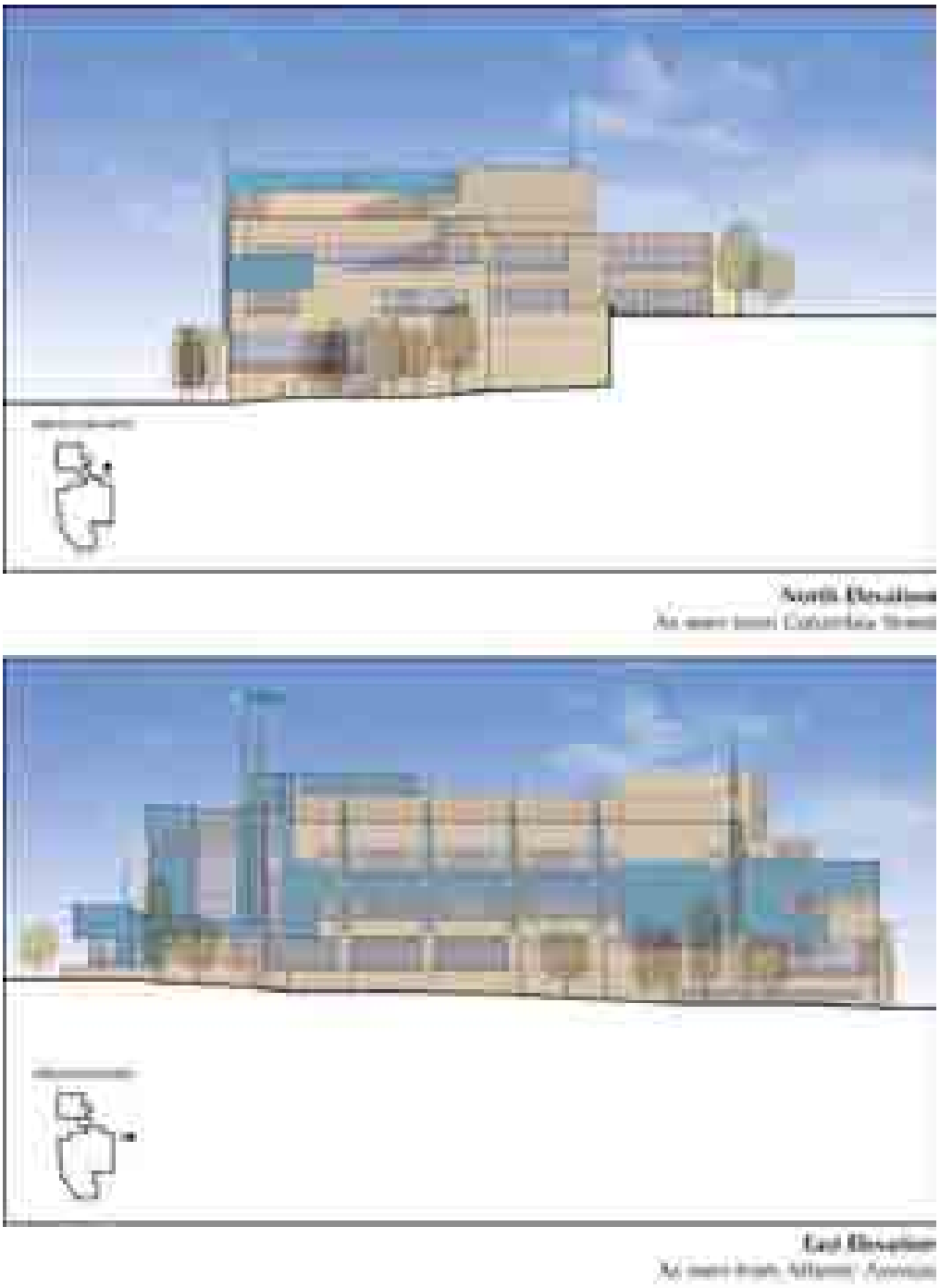


FIGURE 5.06A - Miller Children's Hospital Pediatric Inpatient Building North and East Elevations

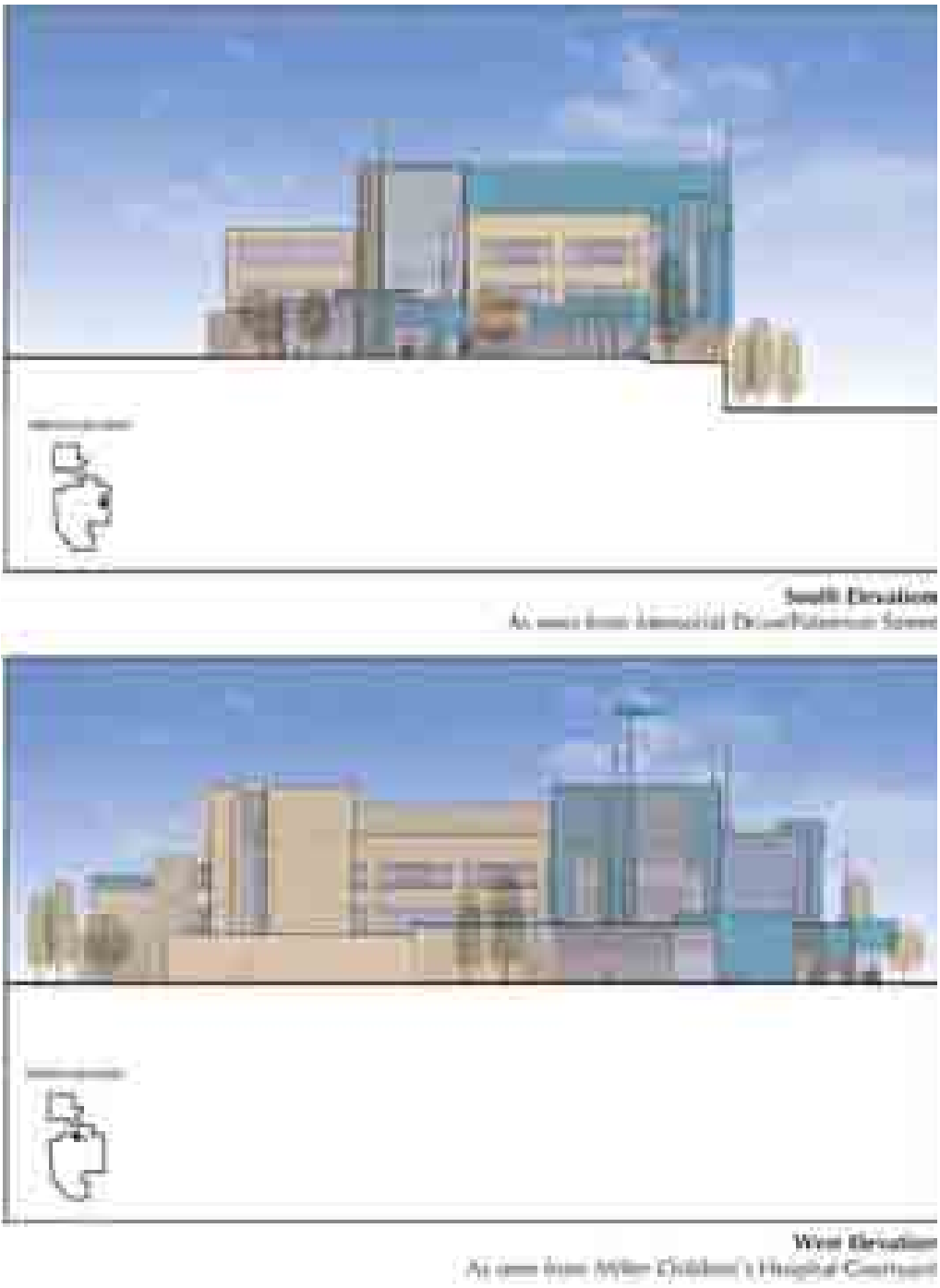


FIGURE 5.06B - Miller Children's Hospital Pediatric Inpatient Building South and West Elevations

provided in this 2005 Master Plan. The building would be identified by three illuminated building signs reading "Miller Children's Hospital" and by ground-level monument signs. All signs would conform to the design guidelines for signs contained in this 2005 Master Plan. Landscaping would be provided along Atlantic Avenue and 27th Street frontages consistent with the design guidelines for landscaping as contained in this 2005 Master Plan.

Outpatient

The ability to address the continued increase in demand for outpatient services through the year 2020 planning horizon would be addressed by designating existing underutilized property in Parking Lots A and K as outpatient (Figure 5.05). These areas would then be designated for development of the TCI and the MCH pediatric outpatient building.

Todd Cancer Institute

LBMMC seeks to create, through the development of a dedicated facility to house the TCI, a center crafted to improve both patient and family experience while going through the long process of cancer treatment. The design of the building would depart from a traditional health care environment, with architecture reflective of a warm, inviting, and comfortable space to create a relaxing, familiar atmosphere for the patients who it would serve. Infusion bays and family spaces would be organized in relation to an outdoor healing garden, embracing nature as part of the therapeutic healing environment.

The TCI would be located on the northwestern corner of the Campus, southeast of the intersection of Long Beach Boulevard and Spring Street (Figure 5.07, *Todd Cancer Institute Conceptual Site Plan*; Figure 5.08, *Todd Cancer Institute Conceptual Elevations*). The existing land use at this location is an 872-stall surface parking lot. The TCI building would provide comprehensive outpatient cancer services in a single facility designed for the unique requirements of cancer patients and their families. These services are

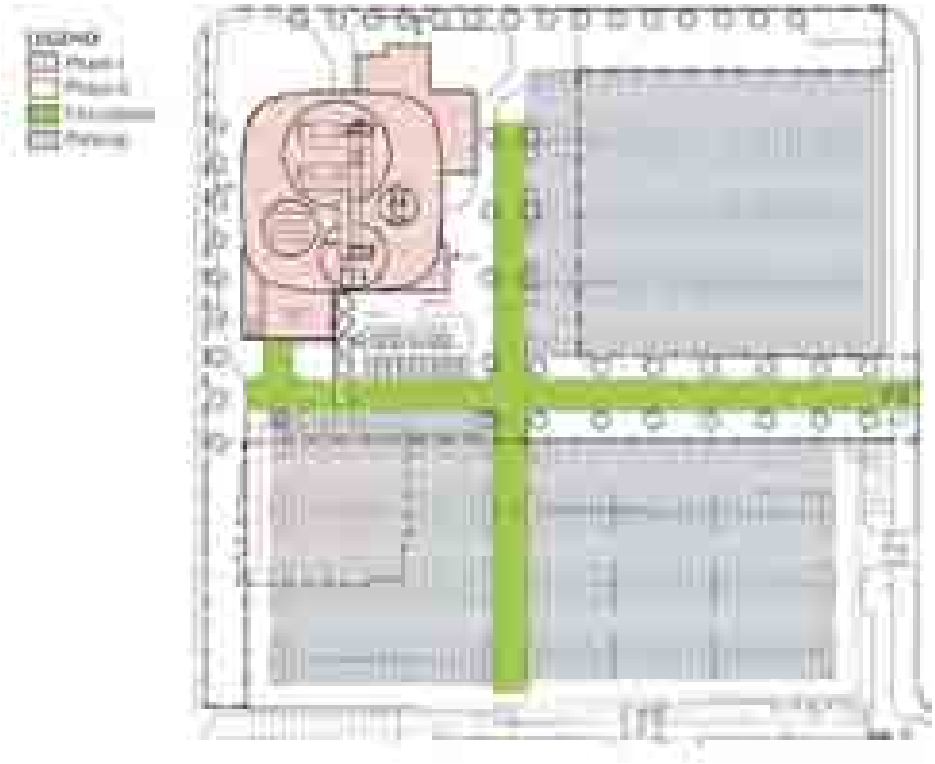


FIGURE 5.07 - Todd Cancer Institute Conceptual Site Plan

FIGURE 5.08 - Todd Cancer Institute Conceptual Elevations

currently provided in approximately 24 distinct locations distributed throughout the Campus and in nearby, leased facilities. The TCI building would also be designed to reinforce a sense of arrival and activate this corner of the Campus. Visitors would access the TCI from entry driveways located on Pasadena Avenue. The entry driveways would also provide staff and service access. Outpatient cancer services would ultimately encompass approximately 125,930 gross square feet of new space constructed in two phases.

Phase I of the TCI would provide 83,630 gross square feet in a 54-foot-high, three-story building. The Phase I portion of the building would require 419 parking spaces. It is anticipated that there would be a maximum of approximately 120 employees working in the building at one time. Phase I of the TCI is proposed to initiate construction in July 2005. Upon completion of Phase I in September 2006, the undeveloped portions of the site would accommodate approximately 700 parking stalls.

Phase II of the TCI would provide an additional 42,300 gross square feet in a new 33-foot-high, two-story horizontal expansion. The Phase II portion of the building would require 212 parking spaces. Upon completion of Phase II, the undeveloped portions of the site would accommodate approximately 642 parking stalls. Construction of Phase II of the TCI is contingent on the growth of outpatient cancer services, the needs of the Long Beach community, and philanthropy. The likely dates to initiate and complete construction are July 2010 through June 2011.

The TCI would be designed to include a service area and loading dock on the south side of the Phase I building. It would be screened from Long Beach Boulevard through the use of a screen wall and landscape material.

The TCI outpatient building design would conform to the design specifications for the Campus provided in this 2005 Master Plan. Landscaping would be provided along Long Beach Boulevard and Spring Street frontages consistent with the design guidelines for landscaping contained in this 2005 Master Plan. A healing garden would be developed adjacent to the TCI on the east side of the building (Figure 5.09, *Healing Garden*). Amenities and plant selections would be sensitive to the needs of cancer patients. Landscaped pedestrian pathways would link the TCI to LBMMC and MCH. The building would be identified by two illuminated building signs reading "Todd Cancer Institute" and by

FIGURE 5.09 - Healing Garden

ground-level monument signs. All signs would conform to the design guidelines for signs contained in this 2005 Master Plan.

MCH Pediatric Outpatient Building

A new pediatric outpatient building would be located south of the existing MCH facility, west of Atlantic Avenue, and approximately midway between the realigned section of Memorial Drive/Patterson Street and 27th Street (Figures 5.03, 5.04A, and 5.04B). The existing land use at this location is a portion of Parking Lot K. Approximately 43 parking spaces would be demolished to accommodate the proposed pediatric outpatient building. Pedestrian access to the pediatric outpatient building would be provided from an entrance on the northwest facade of the building. The MCH pediatric outpatient building would house an array of pediatric care clinics and support services in an approximately 80,000-gross-square-foot, five-story, B-occupancy, medical office building. It is anticipated that there would be a maximum of approximately 140 employees working in the building at one time. The highest point of the building would be approximately 84 feet above grade. The MCH pediatric outpatient building is proposed to initiate construction in June 2006 and finish construction in December 2007. The building would be developed as a shell building, with internal tenant improvements for MCH-operated services and private physician practices. Four types of uses and clinics are under consideration for the pediatric outpatient building: (1) dental clinic, (2) pediatric rehabilitation, (3) children's and specialty care clinic, and (4) support space, including physician's offices. Building design would be consistent with the City of Long Beach–approved design guidelines for the Campus.

The pediatric outpatient building would require approximately 400 parking spaces. Construction of the pediatric outpatient building is contingent on the identification of funding, philanthropy, and lease agreements with private physician groups.

The MCH pediatric outpatient building design would conform to the design specifications for the Campus provided in this 2005 Master Plan. Landscaping would be provided along the Atlantic Avenue frontage consistent with the design guidelines for landscaping contained in this 2005 Master Plan. The building would be identified by two illuminated building signs reading "Miller Children's Hospital" and by ground-level monument signs. All signs would conform to the design guidelines for signs contained in this 2005 Master Plan.

MIXED USE

Approximately 0.5 to 1.0 acre between the proposed location of the MCH pediatric inpatient tower and the MCH pediatric outpatient building would be dedicated for mixed use (Figure 5.05).

The City of Long Beach and the LBMMC recognize the value and importance of senior and worker housing in close proximity to major employment centers and public transit. The LBMMC will continue to work with the City of Long Beach to discuss opportunities for senior and worker housing.

MCH Link Building

A new mixed-use building connecting the pediatric inpatient tower and the pediatric outpatient building would be located southwest of the intersection of Atlantic Avenue and Patterson Street (Figures 5.03, 5.04A, and 5.04B). The existing land use at this location is the main vehicular entrance from Atlantic Avenue. Access to the mixed-use building would be provided on multiple floors from the proposed inpatient hospital addition to the north and the outpatient building to the south. Grade-level pedestrian entrances would also be provided on the east and west facades. The MCH link building would provide approximately 20,000 gross square feet. The link building would consist of a 50-foot-high, three-story building that would contain retail spaces, offices, and retail food service for users of the adjacent pediatric inpatient tower and pediatric outpatient building. The MCH link building is proposed to initiate construction in July 2010 and finish construction in June 2011.

The mixed-use building would require 10 parking spaces. Construction of the link building is contingent on the identification of a funding source.

The MCH link building design would conform to the design specifications for the Campus provided in this 2005 Master Plan. Landscaping would be provided along the Atlantic Avenue frontage consistent with the design guidelines for landscaping contained in this 2005 Master Plan. The building would be identified by a ground-level monument sign conforming to the design guidelines contained in this 2005 Master Plan.

UTILITIES

In accordance with OSHPD requirements, a new central plant building would need to be constructed in conjunction with the MCH pediatric inpatient tower. A central plant building designed to support Phases I and II of the new pediatric inpatient tower would be constructed southwest of the intersection of Atlantic Avenue and Columbia Street (Figure 5.10, *Miller Children's Hospital, Central Plant North and East Elevations*). The existing land use at this location is landscape and hardscape associated with the edge treatment of the existing Miller Children's. Development of the central plant building would not require displacement of any parking spaces. The central plant building would consist of a single-level structure of approximately 3,500 square feet (Figures 5.10). Construction of the central plant building is proposed to begin in June 2006 and finish in August 2007. The central plant building would contain equipment and storage for the provision of emergency power, and chilled water. Provision for the storage of bulk medical oxygen for the inpatient tower would be accommodated in conjunction with the existing parking lot north of Columbia Street and east of Pasadena Avenue. The central plant building would be staffed by existing engineering staff; therefore, no additional parking would be required for the central plant building. Vehicular access to the central plant building would be via a curb cut on Columbia Street (Figure 5.11, *Conceptual Central Plant Service Area*).

The MCH pediatric inpatient tower would be served by the central plant building via a 1,000-linear-foot underground utility trench along the eastern edge of the Campus, parallel to Atlantic Avenue. Utility piping between the central plant building and the pediatric inpatient tower would be direct-buried within a protected, slurry back-filled trench. The utility trench would be a permanent, underground facility that would not generate any additional demand for parking. The central plant building design would conform to the design specifications for the Campus provided in this 2005 Master Plan. Landscaping would be provided along the Atlantic Avenue frontage consistent with the design guidelines for landscaping contained in this 2005 Master Plan. The building would be identified by a ground-level monument sign conforming to the design guidelines contained in this 2005 Master Plan.

CIRCULATION

The Campus is equally accessible from two adjacent public roadways: Atlantic Avenue on the east and Long Beach Boulevard on the west. As with LBMMC and MCH, the TCI and MCH expansion would be served by a network of public streets and sidewalks, further augmented by landscaped and lighted private driveways and sidewalks. Proposed entries provide convenient access to inpatient and outpatient services from parking areas, surrounding public sidewalks, and nearby public transit stops. The proposed expansion of the MCH requires realignment of Memorial Drive/Patterson Street within the Campus. The vehicular entrance at Pasadena Avenue and Spring Street would provide access to the TCI.

Roadway Realignment

Vehicular circulation patterns would be improved through the realignment of selected internal roadways (Figure 5.12, *Roadway Realignment*). Specifically, a 520-linear-foot section of the alignment of Memorial Drive/Patterson Street as it extends through the Campus would be realigned southward by approximately 300 feet from its current intersection, at Atlantic Avenue near 28th Street on the east side of the Campus, to make a connection with the existing alignment of Patterson Street at Atlantic Avenue. As a result, 28th Street westbound would terminate at Atlantic Avenue as a T-intersection. The realigned roadway would consist of two site entry lanes and three site exit lanes with an automated traffic control gate for each lane. The present roadway is approximately 85 feet wide at Atlantic Avenue. The roadway would narrow to 40 feet where it transitions to the existing alignment of Patterson Street near Pasadena Avenue. The road curvature has a radius of approximately 500 feet to

Central Plant North Elevation
As seen from northwest corner of Columbia Street and Atlantic Avenue looking south

Central Plant East Elevation
As seen from southeast corner of Columbia Street and Atlantic Avenue looking west

FIGURE 5.10 - Miller Children's Hospital Central Plant North and East Elevations

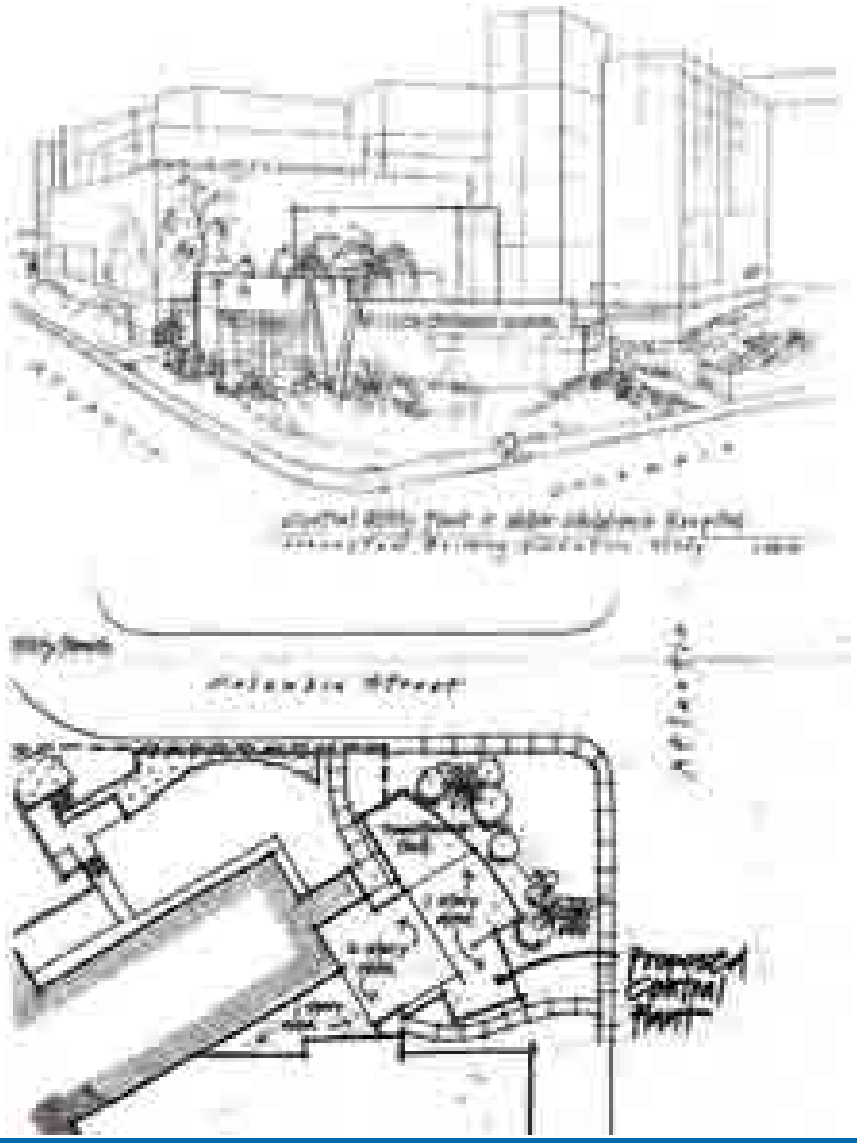


FIGURE 5.11 - Conceptual Central Plant Service Area

transition from Patterson Street to the existing roadway alignment. The roadway realignment would result in the loss of 195 parking spaces from the surface parking lot located north of 27th Street. The existing T-intersection at Atlantic Avenue and Patterson Street would be replaced by a signalized through intersection. The grading and realignment would be undertaken such that the roadway and curbs are adjusted to provide access to adjacent buildings at the first-floor level. The roadway realignment is proposed to initiate construction in July 2005 and finish construction in October 2005.

Pedestrian Plan

Existing pedestrian routes of travel would be improved to provide safe paths of travel between the TCI; designated parking areas; and other inpatient, outpatient, and mixed-use areas within the Campus (Figure 5.13, *Pedestrian Plan*). Clearly identified on-site pedestrian pathways would link the

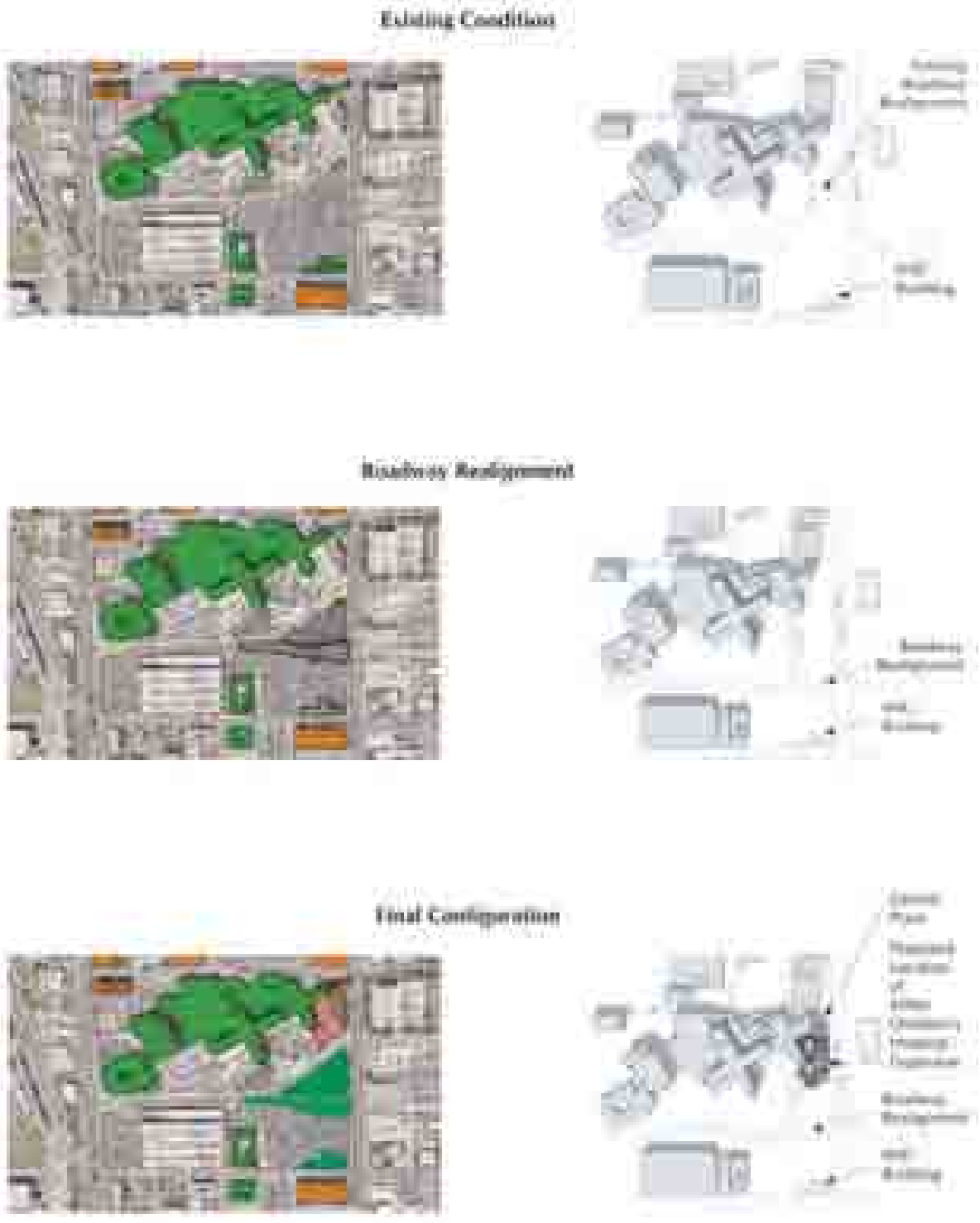


FIGURE 5.12 - Roadway Realignment

FIGURE 5.13 - Pedestrian Plan

Campus medical facilities to neighboring off-campus destinations such as medical office buildings, retail complexes, and public transit facilities.

The pedestrian plan provides unobstructed and direct pathways between arrival areas (e.g., parking areas and mass-transit stations) and destinations such as building entrances. Possible pedestrian corridors are illustrated in Figure 4.03, *Circulation Patterns*. This figure depicts both circulation patterns and Long Beach Transit (LBT) bus stop locations adjacent to the hospital, in addition to possible sidewalk routes pedestrians may take to reach the hospital entrances. Complementary spaces may be developed along the pathways. Each space would have a defined function, and some space would directly relate to a major service or clientele of the Campus. For example, facilities focusing on the treatment of cancer patients may employ exterior "healing gardens" or other outdoor spaces in which patients, family members, and staff can relax. The medicinal value of certain plants might be described by signs or special displays, adding a unique educational element. Other areas may employ seating areas in which patients, visitors, and staff may gather and interact. A "courtyard oasis" may provide an opportunity for staff to conduct a meeting outdoors rather than in a crowded indoor conference room. Some degree of flexibility in the use of such spaces will be preserved. The pedestrian plan provides safe, well-lit connections between parking facilities and hospital buildings.

PARKING

A net increase of 1,159 parking spaces would be required in conjunction with the capital improvements anticipated in conjunction with this 2005 Master Plan, to conform to the City of Long Beach Code parking requirements, beyond the existing 259 excess parking spaces (Table 5.02, *City Code Parking Requirements*). Parking requirements were calculated in accordance with the City of Long Beach standards for inpatient, outpatient, and mixed-use land uses.

A phased parking program would be designed to offset the 577 parking spaces permanently displaced by the proposed project and accommodate the additional demand for 1,153 parking stalls resulting from the expansion project components and the additional 189 parking spaces that would be lost from construction of a parking structure within Lot K.

A total of 510 parking spaces would be permanently lost due to development of five project elements: (1) TCI Phase I; (2) MCH patient inpatient tower Phase I, utility trench, and central plant building; (3) roadway realignment; (4) TCI Phase II, and (5) Parking program on-site parking structure (Table 5.03, *Existing Parking Spaces Converted to Development*). In addition, construction staging and soil remediation impacts on existing parking were also considered, including concurrent staging for TCI Phase I and Phase I of the MCH pediatric inpatient tower, utility trench, and central plant building would be expected to result in temporary loss of parking due to construction staging (Table 5.04, *Additional Parking Spaces Required During Construction*).

Based on the existing available resources, LBMMC defined a parking program to accommodate the parking demand resulting from construction and operation of the elements of the proposed project (Table 5.05, *Parking Opportunities,* Table 5.06, *Construction Parking Program*, and Table 5.07, *Operation Parking Program*). The combined use of existing on-site parking, leasing immediately adjacent parking, and development of additional on-site parking would provide sufficient parking to support construction and operation of three elements of the proposed project: (1) TCI Phase I; (2) MCH pediatric inpatient tower Phase I, utility trench, and central plant building; and (3) roadway realignment. However, the identified parking opportunities would be insufficient by approximately 599 parking spaces to support operation of the last four elements of the proposed project: (1) MCH pediatric outpatient building, (2) TCI Phase II, (3) MCH link building Phase II, and (4) MCH Phase II. If the lease of Lots L and M could not be renewed in year 2015, there would be a need to replace the 534 parking spaces provided at that location, thus suggesting a total possible shortfall of 1,122 parking spaces in year 2015. It would be feasible to address this shortfall through development of a parking structure at the location of the existing surface Lot K. Development of a structure on Lot K would displace 41 parking spaces during construction that would need to be incorporated into the design of the parking structure for a

Project Description	Size (square footage or number of beds)		City of Long Beach Code Parking Ratio	Spaces Required
Existing Development				
LBMMC	462	Beds	2 spaces per bed	924
Miller Children's Hospital	281	Beds	2 spaces per bed	562
LBMMC remaining medical facilities	341,153	SF	5 spaces per 1,000 SF	1,707
Subtotal—Existing Development Code Parking Requirement:				**3,193**
Existing Parking Supply:				**3,452**
Parking Surplus/Deficiency (+/–):				**+259**
Proposed Development				
Todd Cancer Institute	125,930	SF	5 spaces per 1,000 SF	630
Miller Children's Hospital Pediatric Inpatient Tower	164	Beds	2 spaces per bed	328
Miller Children's Hospital Pediatric Outpatient Building	80,000	SF	5 spaces per 1,000 SF	400
Millers Children's Hospital Link Building	20,000	SF	—	50
Central Plant Building	3,500	SF	—	10
Subtotal—Proposed Development Code Parking Requirement:				**1,418**
Total Code Parking Requirement (Existing 3,193 spaces + Proposed 1,418 spaces):				**4,611**
Existing Parking Supply:				**3,452**
Net Parking Surplus/Deficiency (+/–) per Code:				**–1,159**

NOTE:
SF = square feet
SOURCE:
City of Long Beach, Department of Planning and Building. 1988. Title 21, Zoning Regulations, Chapter 21.41: "Off-Street Parking and Loading Requirements." Prepared by: City of Long Beach, Department of Planning and Building, City Hall, 333 West Ocean Boulevard, Long Beach, CA 90802. Available at: http://www.longbeach.gov/apps/cityclerk/lbmc/title-21/frame.htm

TABLE 5.02 - City Code Parking Requirements

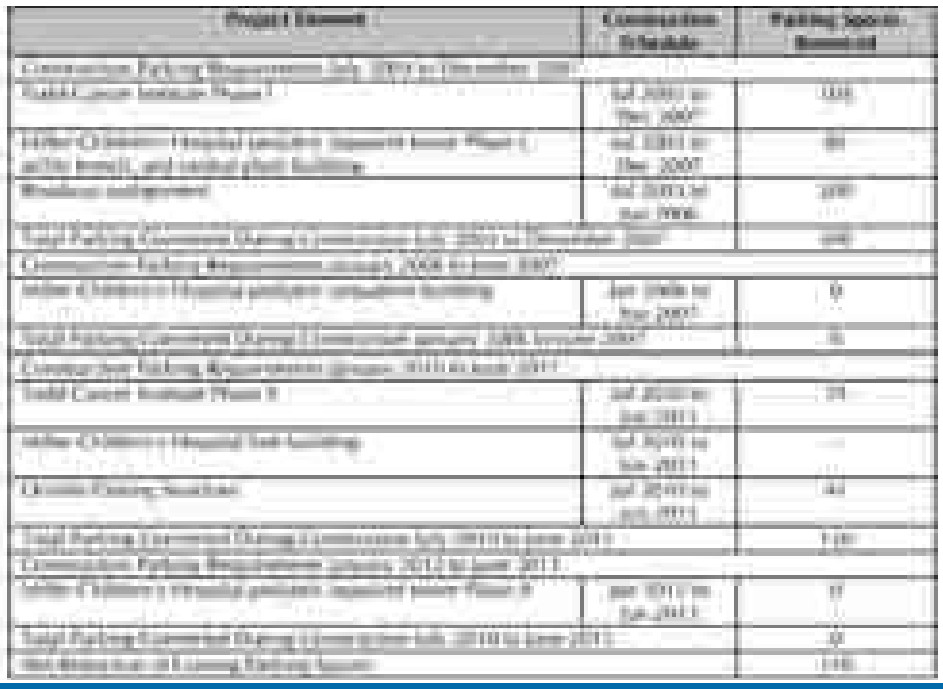


TABLE 5.03 - Existing Parking Spaces Converted to Development

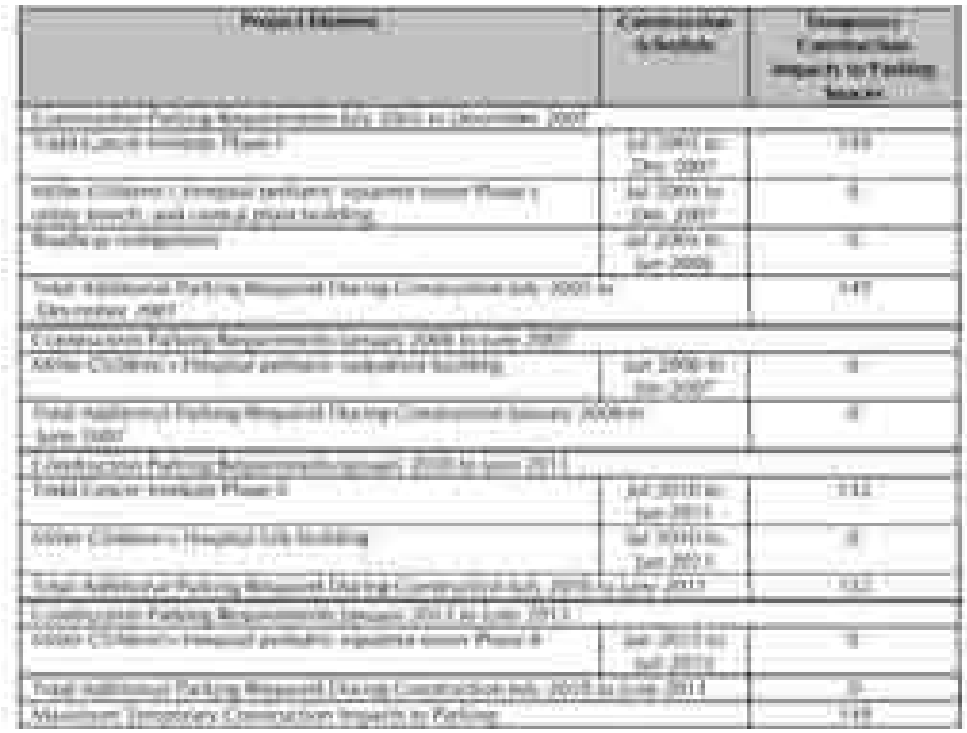


TABLE 5.04 - Additional Parking Spaces Required During Construction

Proposed Parking Site	Potential Surface Parking
Off-Site Lease Opportunities	
Site L	296
Site M	238
Capacity of Off-Site Lease Opportunities	534
On-Site Conversion to Surface Parking	
Site N	121
Site P	68
Site Q	71
Site R	96
Site S	72
Site T	87
Capacity of On-Site Conversion to Surface Parking	515
Total Available Parking Opportunities	1,049

TABLE 5.05 - Parking Opportunities

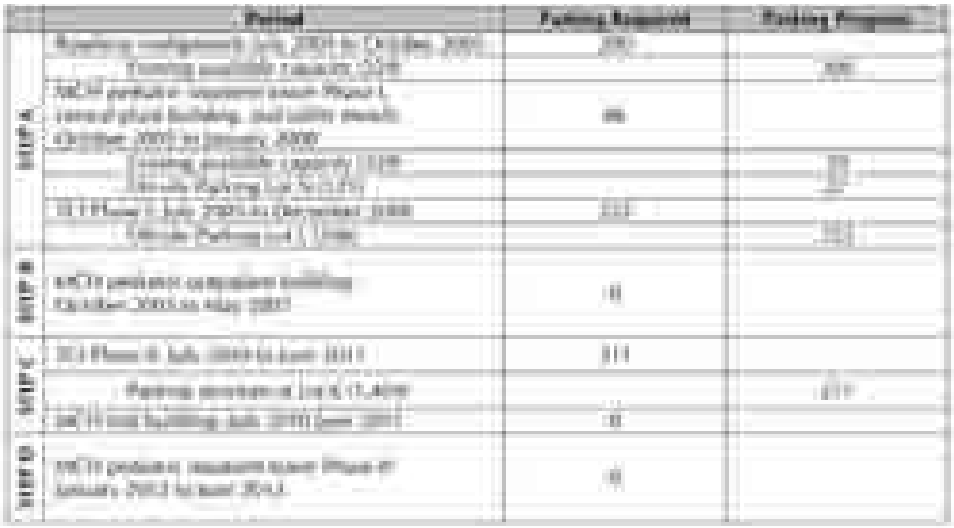


TABLE 5.06 - Construction Parking Program

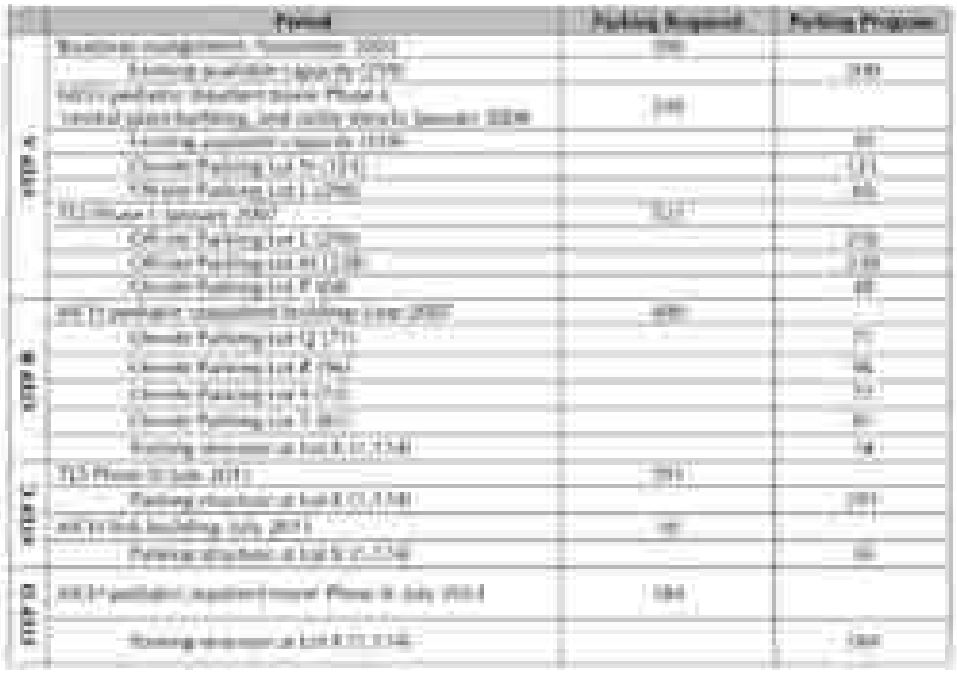


TABLE 5.07 - Operation Parking Program

total capacity of 1,174. Thus, the inclusion of the parking program will provide a sufficient number of parking spaces that will be provided throughout the construction of the proposed project.

It is anticipated that the phased parking program would consider the development of surface parking areas on property owned by the LBMMC (Figure 5.14, *On-Site Parking Opportunities*), nearby off-site surface parking areas (Figure 5.15, *Off-Site Parking Opportunities*) such as Lot L and M that could be leased by the LBMMC for a period of five year or longer. Construction of hospital buildings on the Campus would not take place until adequate parking is secured. Therefore, if additional parking is needed, or spaces in Lots L and M are no longer available, the parking structure with 1,174 total parking capacity will need to be completed at the existing surface Lot K prior to the construction and operation of the last four phases of the proposed project: (1) MCH pediatric outpatient building, (2) TCI Phase II, (3) MCH link building Phase II, and (4) MCH Phase II. The possible future construction of one or more parking structures would be justified by demand. Possible future construction of one or more parking structures when justified by demand. All on-site parking would be developed in areas designated for interim or permanent use of parking in this 2005 Master Plan. If determined necessary, a multilevel parking structure capable of accommodating up to 400 spaces per level would be sited in an area designated for long-term parking.

Construction and operation impacts to parking for each element of the proposed project shall be mitigated through the implementation of a parking program or comparable measure that provides sufficient long-term parking to meet City of Long Beach code requirements. Long Beach Memorial Medical Center shall keep the City of Long Beach informed of any modifications to the parking program for the proposed project. Construction parking plans shall be submitted to the City of Long Beach at least 30 days prior to the anticipated issuance of a grading permit for each element of the proposed project. Operation parking plans shall be submitted to the City of Long Beach at least 30 days prior to the anticipated issuance of occupancy permits or operation of the specified element of the proposed project.

Roadway Realignment

Construction

Miller Children's Hospital shall submit a construction parking plan to address the 200 parking spaces that are expected to be removed from Lot K as a result of the construction of the roadway realignment element of the proposed project. The parking analysis identified the availability of 259 excess parking spaces available within the Campus. It is anticipated that the loss of the 200 parking spaces shall be offset through the use of 200 of the existing available 259 parking spaces. LBMMC will dedicate an increased number of parking spaces in Lot A to visitors to compensate for parking spaces removed from Lot K.

Operation

Miller Children's Hospital shall submit an operation parking plan to address the permanent need for 200 parking spaces to replace parking spaces that are expected to be removed from Lot K as a result of the roadway realignment element of the proposed project. The parking analysis identified the availability of 259 excess parking spaces available within the Campus. During construction, it is anticipated that the permanent loss of the 200 parking spaces shall be offset through the use of 200 of the existing available 259 parking spaces.

MCH Pediatric Inpatient Tower Phase I, Utility Trench, and Central Plant Building

Construction

MCH shall submit a construction parking plan to address the 86 parking spaces that are expected to be removed from demolition of Lot F for the construction of this element of the proposed project. The parking analysis identified the availability of 259 excess parking spaces available within the Campus. It is anticipated that the loss of the 86 parking

FIGURE 5.14 - On-Site Parking Opportunities

FIGURE 5.15 - Off-Site Parking Opportunities

spaces shall be offset through the use of 59 of the existing available 259 parking spaces, and the remaining 27 spaces shall be offset through the use of 27 of the 121 available spaces in Lot N.

Operation

MCH shall submit an operation parking plan to address the permanent need for 240 additional parking spaces (86 from demolition of Lot F, 144 for operation of Phase I of the MCH building, and 10 for operation of the central plant). The parking analysis identified the availability of 259 excess parking spaces available within the Campus. It is anticipated that the permanent loss of the 240 parking spaces shall be offset through the use of 59 existing available parking spaces, Lot N (121 spaces), and lease of off-site parking spaces in Lot L (60 spaces).

Todd Cancer Institute Phase I

Construction

LBMMC shall submit a construction parking plan to address the 253 parking spaces that are expected to be removed from Lot A, including 104 spaces permanently removed by the footprint of the building and additional 149 parking spaces to be temporarily removed as a result of construction staging. It is anticipated that the loss of the 253 parking spaces shall be offset through the use of 253 spaces to be leased off site at Lot L.

Operation

LBMMC shall submit an operation parking plan to address the permanent need for 522 additional parking spaces (replace 104 spaces lost as a result of construction, and provide 418 spaces for operation of TCI Phase I). It is anticipated that the loss of the 522 parking spaces shall be offset through the use of 236 spaces to be leased off site at Lot L, 238 spaces to be leased off site at Lot M, 48 spaces to be provided through development of Lot P on site.

TCI Phase II

Construction

The LBMMC shall submit a construction parking plan to address the 211 parking spaces that would be lost to construction (79 parking spaces) and construction staging (132 parking spaces). It is anticipated that the loss of the 211 parking spaces shall be offset through the provision of 211 parking spaces in a 1,174 space parking structure to be developed within the existing footprint of Lot K.

Operation

The LBMMC shall submit a construction parking plan to address the 291 parking spaces that would be lost to construction (79 parking spaces) and operation of the TCI Phase II (212 parking spaces). It is anticipated that the loss of the 291 parking spaces shall be offset the provision of 291 parking spaces in the 1,174-space parking structure to be developed within the existing footprint of Lot K.

MCI Pediatric Outpatient Building

Construction

Not required.

Operation

MCH shall submit an operation parking plan to address the permanent need for 400 additional parking spaces for operation of the MCH pediatric outpatient building. It is anticipated that the permanent need for 400 parking spaces shall be offset through the use of 71 spaces in Lot Q, 96 spaces in Lot R, 72 spaces in Lot S, 87 spaces in Lot T, and 74 spaces provided by development of a 1,174-space parking structure within the existing footprint of Lot K, which would also accommodate the 41 parking spaces removed as a result of construction of the parking structure itself.

MCH Link Building

Construction

Not required.

Operation

MCH shall submit an operation parking plan to address the 50 parking spaces to support operation of the MCH link building. It is anticipated that the 50 parking spaces required to support operation of the MCH link building shall be provided in the 1,174-space parking structure to be constructed within the existing footprint of Lot K.

MCH Pediatric Inpatient Tower Phase II

Construction

Not required.

Operation

MCH shall submit an operation parking plan to address the 184 parking spaces required to support operation of the MCH pediatric inpatient tower Phase II. It is anticipated that the 184 parking spaces, required to operate the MCH pediatric inpatient tower Phase II, shall be provided in the 1,174-space parking structure to be constructed within the existing footprint of Lot K.

LBMCC is requesting a variance from the City of Long Beach ordinance that requires the planting of one 24-inch box tree per four surface parking spaces (City of Long Beach Zoning Ordinance, Chapter 21.42.040 Landscape Standards R-3, R-4 for Non-Residential Districts, excluding IM, IG, and IP industrial districts).[1] The request would reduce the City's ordinance for the number of trees required per parking space to instead provide a limited number of trees along the perimeter areas of surface parking lots. The ratio for the number of trees required per parking space would not be substantially below the City's tree specification for parking lots in the parking ordinance. The LBMMC's intention for this ordinance is to maximize the number of spaces that can be made available due to future potential parking impacts. This variance would be requested for surface parking Lots P, N, Q, R, S, and T. The exterior design of parking structures would be sensitive to and compatible with adjacent buildings and design guidelines. All parking facilities constructed by the LBMMC would incorporate best management practices consistent with the requirements of the Regional Water Quality Control Board.

PROJECT PHASING

Project phasing is envisioned as a 10-step process to be completed in eight years between 2005 and 2013, where construction of certain elements is contingent on the availability of funding (Figures 5.16A through 5.16J, *Construction Scenarios, Steps 1–10*).

MCH Pediatric Inpatient Tower, Utility Trench, and Central Plant Building

The 198,000-gross-square-foot pediatric inpatient tower would be constructed in two phases. Phase I of the pediatric inpatient tower consists of the construction of 124,500 gross square feet. Construction of Phase I would be anticipated to be initiated in July 2005 and completed by December 2007. Phase II consists of 73,500 gross square feet. Construction of Phase II would be undertaken on an as-needed basis that is anticipated to occur no sooner than year 2012. The estimated duration of construction for Phase II is two years. The pediatric inpatient tower requires construction of a central plant building concurrently with Phase I of the pediatric inpatient tower. The central plant building would be constructed with sufficient capacity to support the anticipated ultimate build-out of Phase II pediatric inpatient services. The central plant building would also provide redundant support to other inpatient

[1] City of Long Beach. 1999. *City of Long Beach Planning Bureau Zoning Ordiances.* Chapter 21.42.040, Landscape Standards R-3, R-4 for Non-residential districts, excluding IM, IG, and IP industrial districts. Contact: City of Long Beach, 333 West Ocean Boulevard, Long Beach, CA 90802.

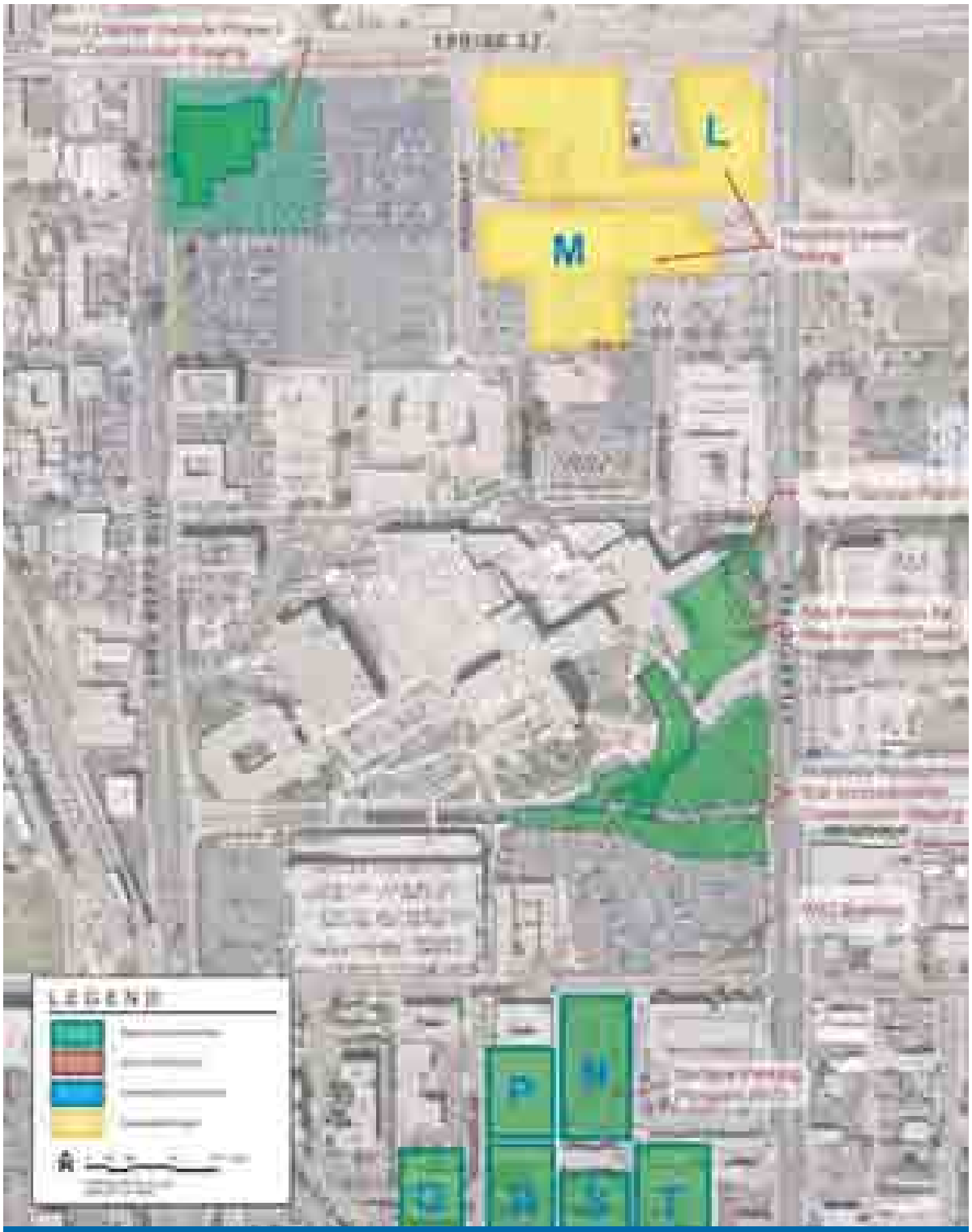


FIGURE 5.16A - Construction Scenario, Step 1, July 2005 to October 2005

FIGURE 5.16B - Construction Scenario, Step 2, November 2005 to May 2006

FIGURE 5.16C - Construction Scenario, Step 3, June 2006 to September 2006

FIGURE 5.16D - Construction Scenario, Step 4, October 2006 to May 2007

FIGURE 5.16E - Construction Scenario, Step 5, June 2007 to January 2008

FIGURE 5.16F - Construction Scenario, Step 6, February 2008 to June 2010

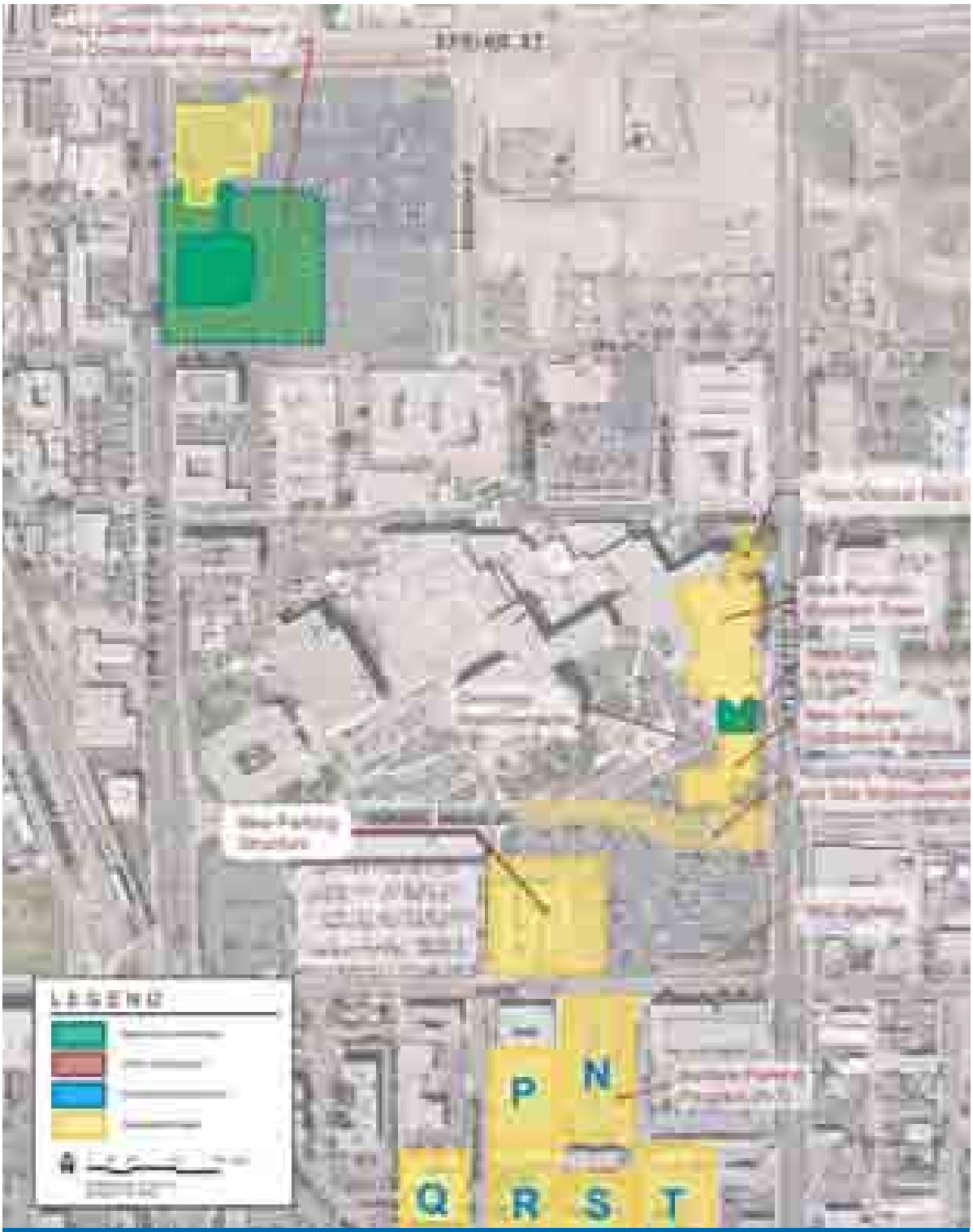


FIGURE 5.16G - Construction Scenario, Step 7, July 2010 to June 2011

FIGURE 5.16H - Construction Scenario, Step 8, Completed by Decemeber 2011

FIGURE 5.16I - Construction Scenario, Step 9, January 2012 to June 2013

FIGURE 5.16J - Construction Scenario, Step 10, Completed by June 2013

services on the Campus. The link building and the pediatric outpatient building would be constructed with their own utility connections and would function independently of the hospital buildings. The central plant building would consist of a single-level structure of approximately 3,000 gross square feet. The pediatric inpatient tower would be served by the central plant building via an underground utility trench along the northeastern edge of the existing MCH, parallel to Atlantic Avenue, which would be constructed concurrently with the pediatric inpatient tower.

Phase I Pediatric Inpatient Tower

Construction of Phase I of the pediatric inpatient tower would be anticipated to be initiated in July 2005 and completed by December 2007. Construction of Phase I of the pediatric inpatient tower would require connection to existing utilities, sewer facilities, and storm water drain facilities; paving; building construction; landscaping; and fencing. Approximately 144 workers would be expected to be on site during peak construction activity periods. Fewer than 140 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished within the parking area of Phase I of the pediatric inpatient tower.

Phase II Pediatric Inpatient Tower

Construction of Phase II of the pediatric inpatient tower would require connection to existing utilities, sewer facilities, and storm water drain facilities; paving; and building construction. Approximately 85 workers would be expected to be on site during peak construction activity periods. Fewer than 85 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished with the staging areas of MCH

Utility Trench

Construction of Phase I would be anticipated to be initiated in August 2006 and completed by March 2007. Construction of the utility trench to support the MCH expansion would require connection to existing utilities, sewer facilities, and storm water drain facilities; paving; and building construction. Approximately 20 workers would be expected to be on site during peak construction activity periods. Fewer than 20 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished within the parking and build-out areas of the MCH.

Central Plant Building

Construction of the central plant building would be anticipated to be initiated in March 2007 and completed by December 2007. Construction of the central plant building to support the MCH expansion would require connection to existing utilities, sewer facilities, and storm water drain facilities; paving; and building construction. Approximately 50 workers would be expected to be on site during peak construction activity periods. Fewer than 50 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished within the parking area of the MCH.

Miller Children's Hospital Pediatric Outpatient Building

The MCH pediatric outpatient building would provide approximately 80,000 gross square feet. The pediatric outpatient building would consist of a five-story, B-occupancy, medical office building housing an array of pediatric care clinics and support services. Construction of the pediatric outpatient building is contingent on the identification of funding, philanthropy, and lease agreements with private physician groups that would be anticipated to be constructed in an 18-month time period initiated for construction no sooner than January 2006. Construction of the pediatric outpatient building would require connection to existing utilities, sewer facilities, and storm water drain facilities; paving; building construction; landscaping; and fencing. Approximately 144 workers would be expected to be on site during peak construction activity periods. Fewer than 140 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished within the parking area of the MCH.

Parking Program

A phased parking program would be designed to accommodate up to 2,986 parking stalls in surface parking areas on property owned by LBMMC, nearby off-site surface parking areas that could be leased by LBMMC, and possible future construction of one or more parking structures when justified by total demand. If it is determined to be necessary, a multilevel parking structure capable of accommodating up to 400 spaces per level would be sited in an area designated for long-term parking. For each element of the proposed project, sufficient parking would be constructed to accommodate any existing parking spaces displaced by construction, and sufficient additional parking would also be constructed to accommodate the parking demand generated by the construction of the proposed project element.

Construction of parking facilities would require connection to existing utilities, sewer facilities, and on-site storm water pollution prevention devices; paving; and possible construction of a parking structure. Approximately 75 workers would be expected to be on site during peak construction activity periods. Fewer than 75 workers would be expected to be on site during nonpeak construction activity periods. Construction staging would be accomplished within the parking area of the MCH.

PROJECT ENTITLEMENTS

The City of Long Beach is the Lead Agency under the California Environmental Quality Act (CEQA). This 2005 Master Plan is subject to review and recommendation by the Planning Commission, subject to final action by the Long Beach City Council, including consideration of related entitlements:

- Long-Range Development Plan (Master Plan) Approval
- Site Plan Review
- Zoning District Change
- Conditional Use Permit (utility relocation)
- Parking Variance

Specific capital improvements may be subject to additional permits (Table 5.08, *Permit Requirements*).

DESIGN GUIDELINES

These design guidelines promote high-quality development within a single overall design concept in the long-range development of the Campus. These design guidelines provide for continued integration of affordable and pragmatic building design and aesthetically pleasing landscape, streetscape, pedestrian corridors, outdoor spaces, and wayfinding and signs that serve the community's needs for health care and well-being. These design guidelines are intended to protect and enhance the Campus's clear identity in a manner that is compatible with the surrounding community it serves, strengthening adjacent neighborhoods and stimulating revival of adjacent areas.

The overall concept is centered on well-designed public buildings, strategically placed within the 54-acre Campus to provide convenient and efficient health care to serve the needs of the community. The overall experience of patients, visitors, medical staff, and employees is further enhanced through the use of landscaping and signs that create an inviting and readily navigable Campus.

As a facility dedicated to the health and well-being of the current Long Beach community, as well as its future generations, the LBMMC Master Plan is committed to the sustainable principles outlined in the City of Long Beach's Green Building Policy for Municipal Buildings. The LBMMC is exempt from the City's specific green building ordinance, which calls for a Leadership in Energy and Environmental Design (LEED) green building rating certification.[2] Thus, the LBMMC is not required to build in compliance with the guidelines. The LBMMC shares with the City a vision of environmentalism that evaluates building performance from a whole-building and life-cycle perspective. The LBMMC will actively look for opportunities to integrate the emerging green building concepts, such as passive and active energy efficiency, low

[2]City of Long Beach. 2004. *Long Beach 2010 Strategic Plan*. Page 26. Contact: City of Long Beach, 333 West Ocean Boulevard, Long Beach, CA 90802

Agency	Permits and Approvals	How to Obtain Permit
U.S. EPA	Asbestos and Lead-Based Paint Abatement	Application
Cal/OSHPD	Plan Approval	Application
Cal/OSHA	Demolition Permit	Application
Cal/OSHA	Asbestos Worker Notification	Application
California EPA, Department of Toxic Substances Control	Asbestos Abatement Notification	Application
California Department of Toxics Substance Control	Health Risk Assessment and Work Plan	Application
State Department of Oil and Gas Resources	Oil Well Abandonment Permits	Application
Regional Water Quality Control Board	NPDES Permit	Application
South Coast Air Quality Management District	Notification	Application
City of Long Beach	Demolition Permit	Application
City of Long Beach	SWPPP Drainage Permit	Application
City of Long Beach	Road Encroachment Permit	Application
City of Long Beach	Truck Haul Permit	Application
City of Long Beach	Grading Permit	Application
City of Long Beach	Building Permit	Application

NOTES:
Cal/OSHA = California Division of Occupational Safety and Health
Cal/OSHPD = California Office of Statewide Health Planning and Development
EPA = Environmental Protection Agency
NPDES = National Pollutant Discharge Elimination System
SWPPP = Storm Water Pollution Prevention Plan

TABLE 5.08 - Permit Requirements

water landscaping, life-cycle costs, and overall mindful consumption of its resources as a part of the site plan development and review process.

BUILDINGS

The two primary buildings where inpatient services are provided, LBMMC and MCH, set the architectural tone for the Campus. As with many public buildings constructed during the Kennedy-Johnson-Nixon-Ford years, LBMMC, MCH, and the other existing buildings of the Campus have a variety of forms that were developed to meet the code and health care delivery needs at that time when they were constructed. Thus, patient and visitor wayfinding is best facilitated by well-designed buildings that are easily distinguishable. The recommended capital improvements have been designed to retain the primary height and massing in the center of the Campus, bounded by Columbia Street to the north, Atlantic Avenue to the east, 27th Street to the south, and Long Beach Boulevard to the west (Figure 5.17, *Massing Diagram*).

Building Setbacks

Building setbacks will conform to applicable specifications of the City of Long Beach Zoning Code.

Building Materials

This 2005 Master Plan envisions construction of structures in four locations within the Campus: (1) expansion of the MCH through the construction of three buildings south of the existing MCH, southwest of the intersection of Columbia Street and Atlantic Avenue; (2) construction of a central plant building to support the pediatric inpatient tower, northwest of the intersection of Atlantic Avenue and 27th Street; (3) construction of a new dedicated outpatient building, southeast of the intersection of Spring Street and Long Beach Boulevard; and (4) construction of a parking structure adjacent to the existing parking structure located on 27th Street. The conceptual design of the expansion of the MCH integrates key design features of the existing LBMMC and MCH, including strong geometric lines, glass, and exterior sheathing (Figure 5.18, *MCH Conceptual Design*). The pediatric inpatient tower will be distinguished from the existing MCH building through the use of architectural details, including distinct patterning of glass and sheathing, flagpoles and banners, exterior artwork featuring children and children's activities, sculpture, and gardens. The MCH link building and pediatric outpatient buildings would use similar architectural details to provide compatible, yet distinguishable, exterior building facades.

FIGURE 5.17 - Massing Diagram

The central plant building would be designed with massing, geometry, and exterior finish comparable to other secondary buildings within the Campus, such as the Buffum's Plaza (Figure 5.10).

Like the MCH pediatric inpatient tower, the design of the TCI would include the use of strong geometric lines, glass, and exterior sheathing (Figure 5.18); however, the massing of the building and relation to the landscaping would be comparable to other existing secondary buildings within the Campus such as the West Facility.

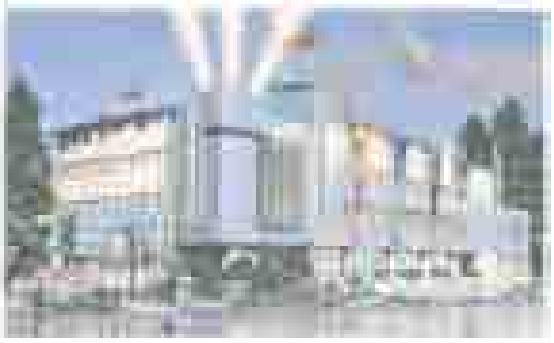
It is anticipated that a parking structure may be constructed east of the existing parking structure, located south of Memorial Drive/Patterson Street (Figure 5.19, *Parking Structure Screened with Landscaping*). It is anticipated that the parking structure will be comparable in design and massing to the existing parking structure. Parking areas shall be differentiated by use (e.g., visitor, employee, and physician). The location for the parking structure was selected to support the primary facilities, LBMMC and MCH, with the greatest number of related trips.

Service Areas

The design of the MCH central plant building and its location has been developed in a manner that is consistent with the concerns of the City of Long Beach. In regard to the location of a utility building in proximity to the major

View of MCH Expansion from Intersection of Columbia Street and Atlantic Avenue

View of MCH Expansion from Atlantic Avenue



View of MCH Expansion from Parking Lot K

View of MCH Expansion from LBMMC

FIGURE 5.18 - MCH Conceptual Design

streets, the building design strives to put its best face toward Atlantic Avenue and 27th Street. The building masses are broken up into several smaller forms with varying heights and finishes, reducing the apparent overall scale and humanizing the elements and form of the building (Figure 5.11). Another benefit of this design approach is that it allows the buildings to be clad in various complementary finishes. Landscaped setbacks soften the building. The combination of landscaped setbacks and proposed monument signage at the corner help to establish this building as an anchoring element of the Campus.

LANDSCAPING

The capital improvements recommended in conjunction with this 2005 Master Plan will be integrated into Campus with landscaping, including selective plantings of mature trees and shrubs to create a pleasant and secure environment for medical staff, employees, patients, and visitors. As with the existing landscaped elements of the Campus, the proposed capital improvements will be designed to define the Campus boundaries, reinforce pedestrian and vehicular entry points, provide pleasant paths of travel for pedestrians, screen parking area, and treat building edges and courtyards to provide attractive vistas from the surrounding community and public right-of-ways (Figure 5.20, *Conceptual Landscaping Plan*).

Five general categories of landscape treatment will be applied to capital improvements, recommended as part of this 2005 Master Plan: (1) Campus edge, (2) primary entries, (3) edge treatment of interior sidewalks, (4) edge treatment of surface parking lots, and (5) building edges and

FIGURE 5.19 - Parking Structure Screened with Landscaping

courtyards. The edge of the MCH expansion building, pediatric inpatient tower, link building, pediatric outpatient building, and central plant building will be treated in a manner that is comparable to the existing Campus edge and streetscape along Long Beach Boulevard and Atlantic Avenue. The Campus edge will be treated with a white, wrought-iron fencing set back with groundcover consisting of low-lying shrubs or grass and trees in the foreground (Figure 5.21, *Campus Edge Landscaping*). The relocated primary Campus entrance on Memorial Center Drive/Patterson Street at Atlantic Avenue will be treated with tubular fending landscaped with alternating pine and ficus trees, flowering shrubs, groundcover, and turf (Figure 5.22, *Primary Entry Landscaping*). The edges of pedestrian walkways linking the TCI and surface parking areas to the interior of the Campus will be treated with turf, occasional trees, hedges, and occasional hardscape such as concrete masonry walls to separate walkways from adjacent buildings (Figure 5.23, *Edge Treatment of Interior Sidewalks*). Planting will be organized such that security lighting is not impeded. The edges of surface parking lots will receive comparable treatment to interior walkways with some combination of turf, shrubs, and trees (Figure 5.24, *Edge Treatment of Surface Parking Lots*). In addition, lighting will be provided within parking lots and structures in accordance with the security plan on file with the City of Long Beach Police Department. New buildings, including the MCH pediatric inpatient tower, link building, MCH outpatient building, central plant building, and TCI will have landscaping between the sidewalk edge and the building, as well as landscaped courtyards (Figure 5.25, *Building Edges and Courtyards*). These building landscape areas will typically consist of turf, clusters of trees such as ficus and palm, and clusters of shrubs.

The plants for the landscaped areas will be selected to blend in with the existing landscaped areas, and to promote positive, healing emotions via the use of color, fragrance, and foliage. A mix of fragrances and colors encourages the healing process. Blue and yellow colors are known for promoting relaxation and happiness, and the use of light silvery green foliage enhances the appearance of sunlight.[3] Where possible, plant species will be selected to promote sustainability, including native species and draught-tolerant plants. The plant species seen in Figures 5.21–5.25 address healing by providing various colors, heights and foliage; and address sustainability by requiring little watering. Additional plant species will include native plants that exude healing qualities, such as the silvery-leaves of the Arctostaphylos species. and the colorful and fragrant blossoms of Ceanothus cultivars. Additional ornamental plants may include lavender and jasmine, known for their pleasant fragrance and flowering displays.

SIGNS

The proposed capital improvements will be integrated into the Campus through the application of the existing three-tiered sign program: (1) gateway signs, (2) building signs, and (3) directional signs. All signs will be compatible with other Campus elements in terms of color, materials, and design. Gateways will be identified through the installation of large, rectangular stone or concrete placards approximately 4 feet in height, with "Long Beach Memorial Medical Center" annotated in raised san serif lettering. It is anticipated that gateway monuments will be installed at three locations in conjunction with this 2005 Master Plan: (1) the realigned intersection of Memorial Drive/Patterson Street and Atlantic Avenue, (2) the intersection of Columbia Street and Atlantic Avenue, and (3) the intersection of Spring Street and Long Beach Boulevard (Figure 5.26, *Conceptual Sign Program*). The monument at the realigned roadway will be completed prior to operation of the roadway. The monument of the intersection of Columbia Street and Atlantic Avenue will be completed prior to operation of the MCH pediatric inpatient building. The monument at the intersection of Spring Street and Long Beach Boulevard will be installed prior to the operation of the TCI (Figure 5.27, *Entry Sign for LBMMC on Atlantic Avenue*). The three additional primary inpatient and outpatient treatment buildings will be treated with commercial-grade backlit signs identifying the respective buildings as part of the "Miller Children's Hospital" or the "Todd Cancer Institute." Identification signs will be mounted near the cornice of the building, at a location

[3] David Squire. 2002. *The Healing Garden: Natural Healing for Mind, Body, and Soul. London, UK: Vega.*

FIGURE 5.20 - Conceptual Landscaping Plan

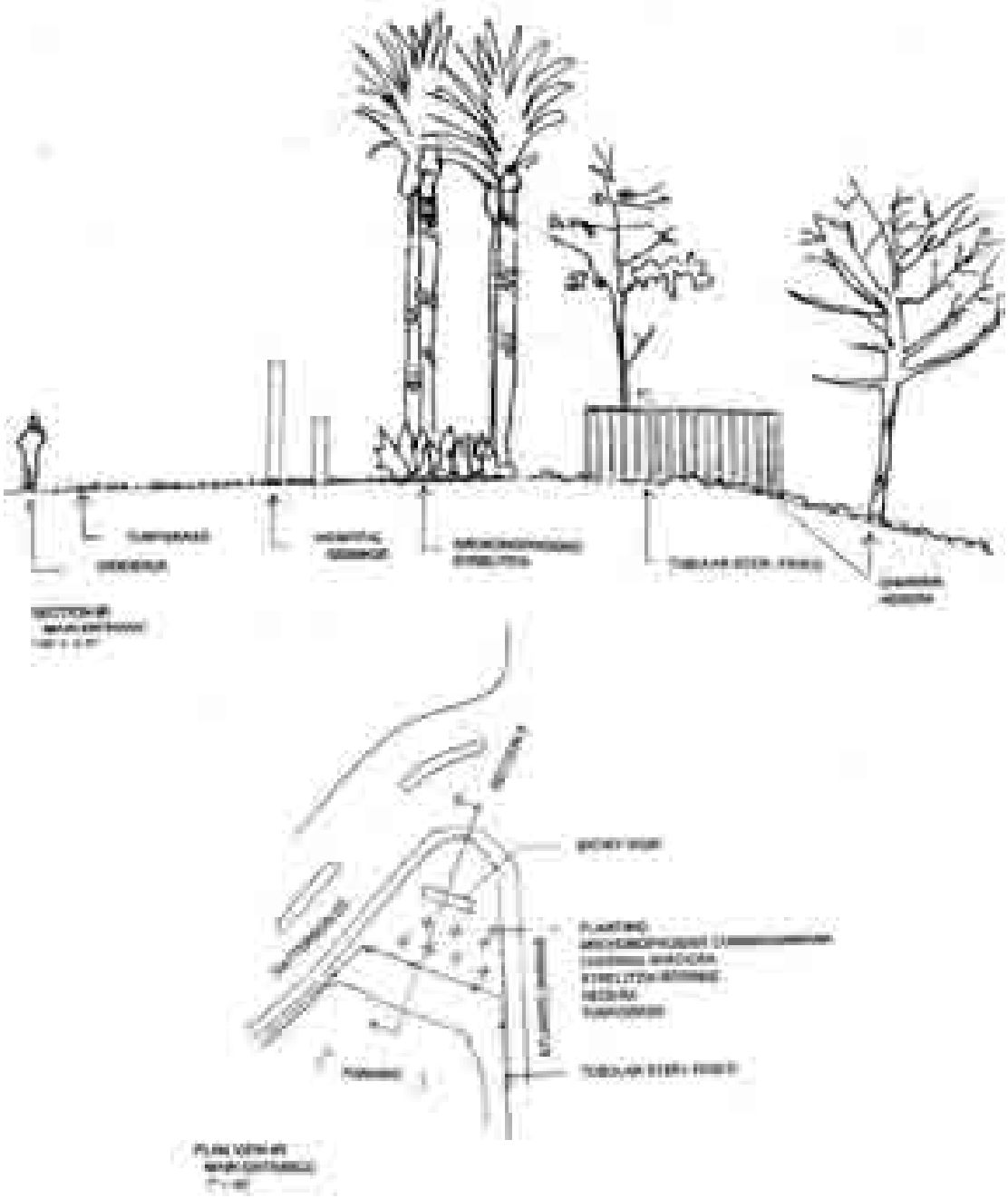


FIGURE 5.21 - Campus Edge Landscaping

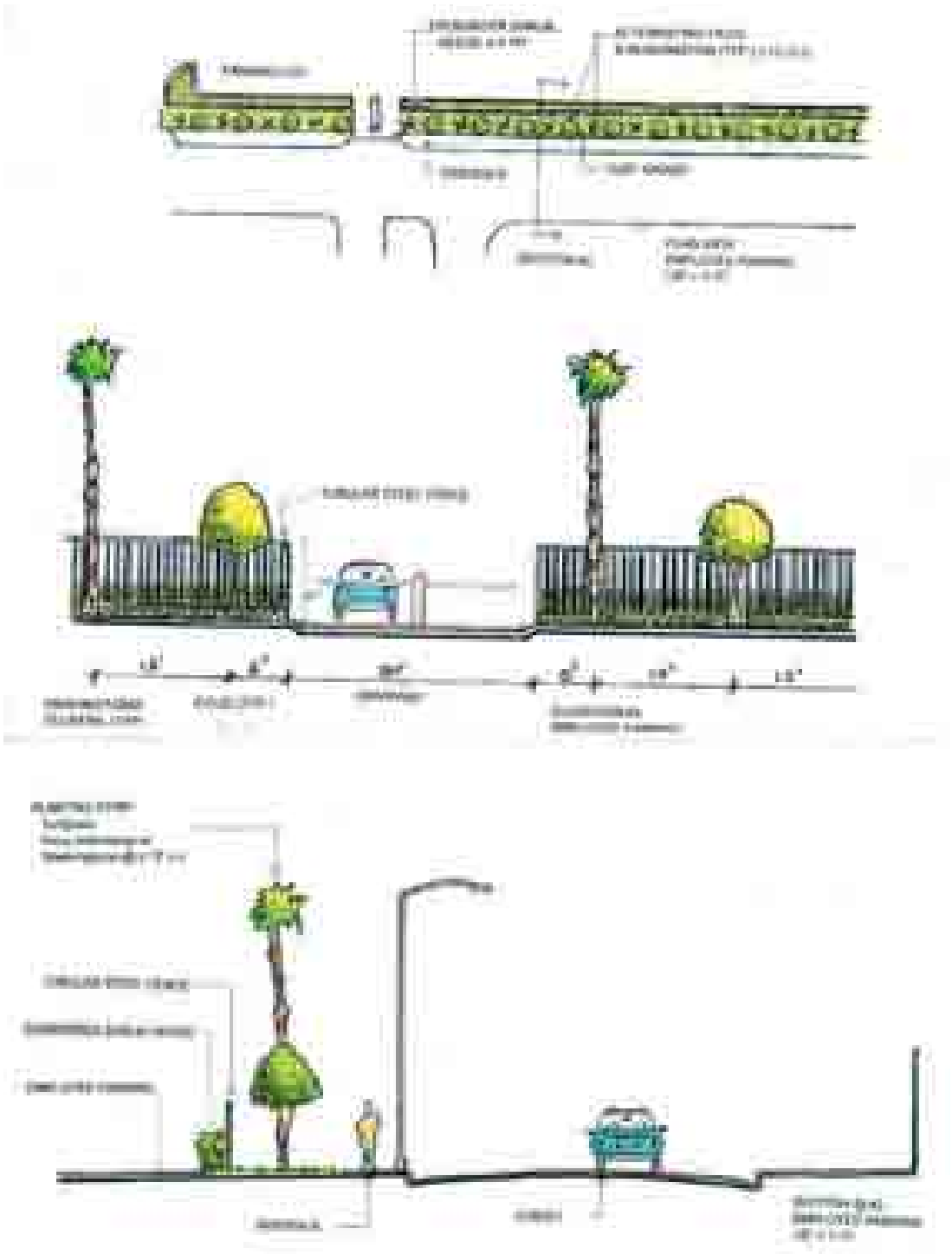


FIGURE 5.22 - Primary Entry Landscaping

FIGURE 5.23 - Edge Treatment of Interior Sidewalks

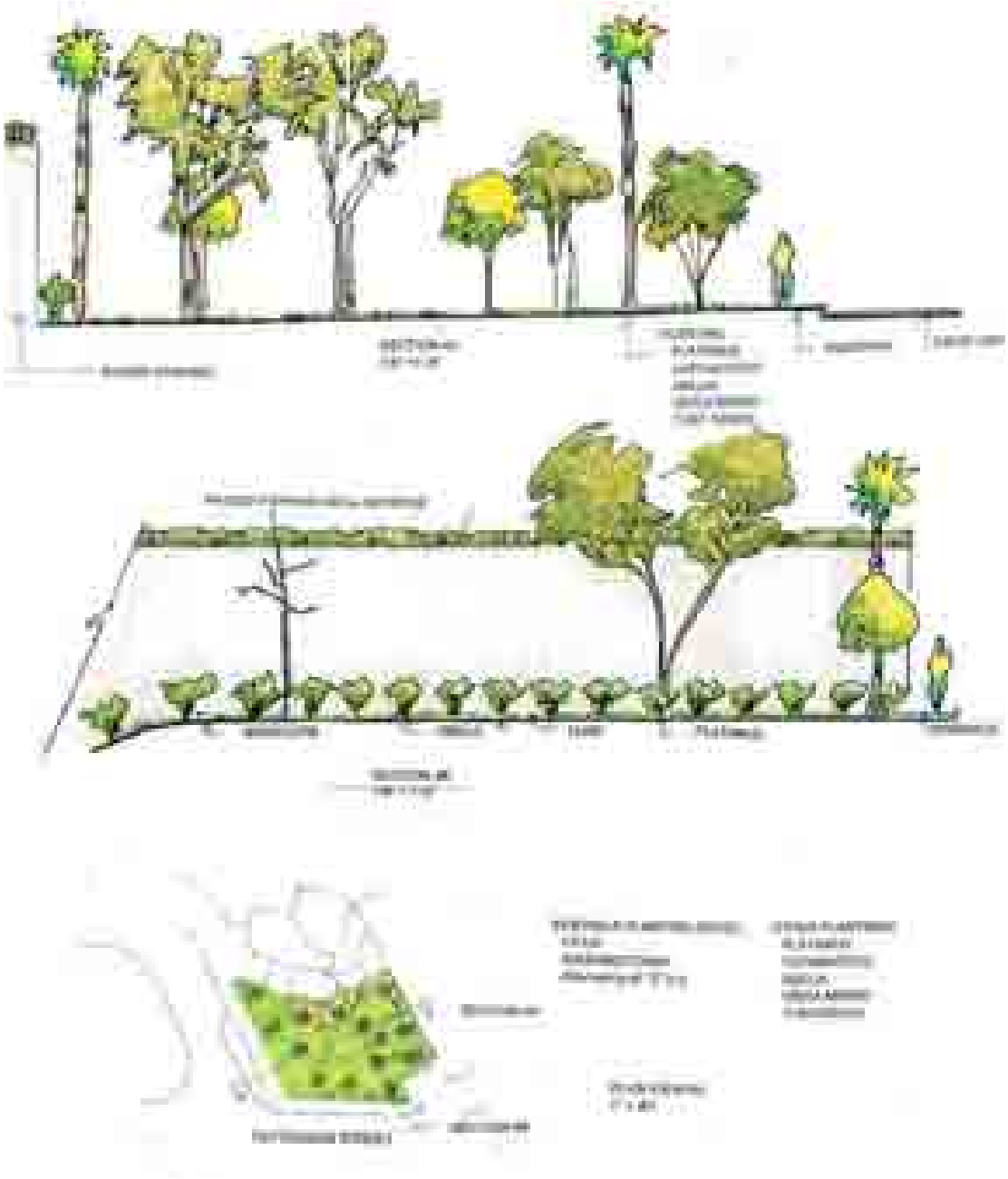


FIGURE 5.24 - Edge Treatment of Surface Parking Lots

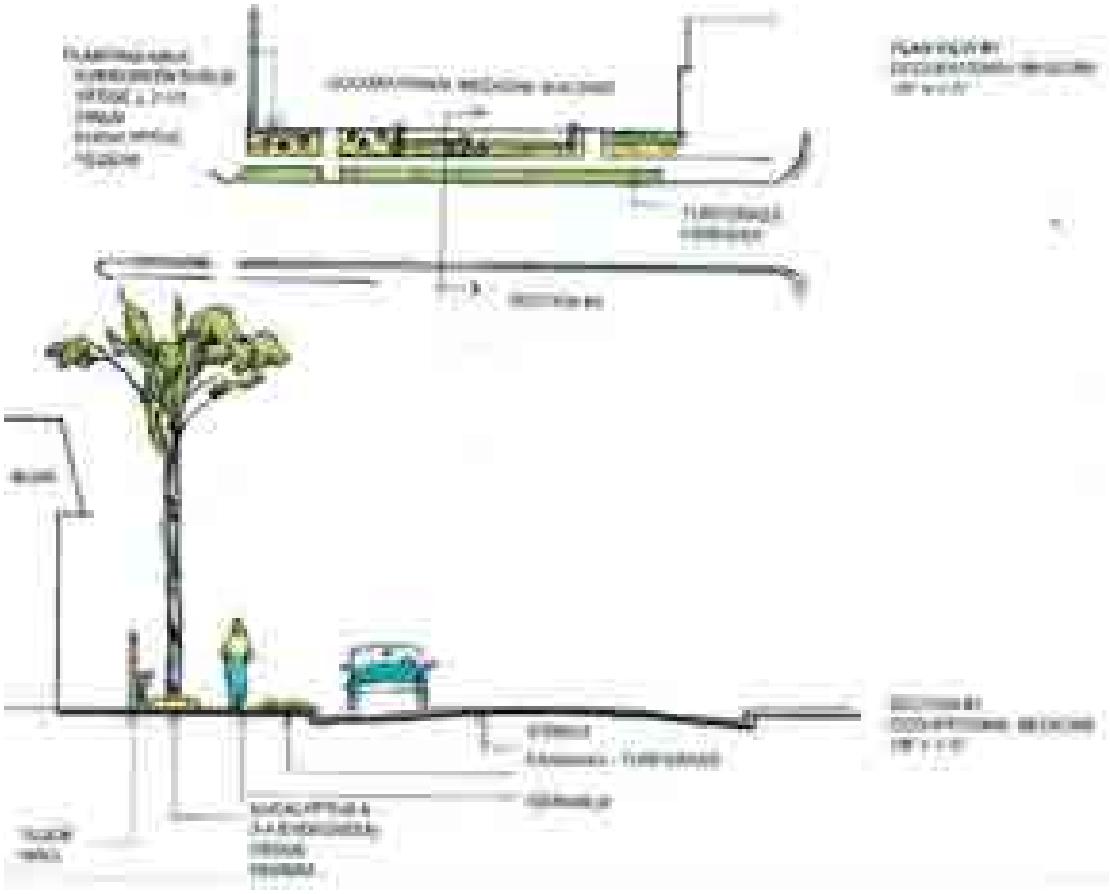


FIGURE 5.25 - Building Edges and Courtyards

FIGURE 5.26 - Conceptual Sign Program

FIGURE 5.27 - Entry Sign for LBMMC on Atlantic Avenue

where the sign will be visible from surrounding public routes of travel. The signs will be finished in san serif lettering. The signs will be uplit or backlit to facilitate nighttime identification of the facilities (Figure 5.28, *Neon Sign for MCH on Top of the Main Building*). Directional signs will be installed to direct drivers to on-site and leased off-site parking areas and to direct pedestrians from parking areas to the TCI and MCH expansion (Figure 5.29, *Directional Signage*). Directional signs will be placed at locations that are readily visible from a distance of 100 feet. The signs will be completed with san serif lettering in a color that creates a distinctive contrast to the background color.

FIGURE 5.28 - Neon Sign for MCH on Top of the Main Building

FIGURE 5.29 - Directional Signage

Section 6

ACKNOWLEDGMENTS

This section of the Master Plan acknowledges the extensive team of health care and consulting professionals that contributed to its development.

Meetings were held with ISES Corporation and ADAMS Project Management Consulting, LLC to review the study and findings of the Facilities Condition Analysis Reports. The ISES Corporation reports were used to establish the scope of work relating to the infrastructure for the facilities. Reports prepared by Nabih Youssef and Associates and Linscott, Law & Greenspan Engineers were provided by the hospital and were used to establish direction for the structural status and parking analysis of the hospital. Existing project information was provided by the architects working on those projects and by the hospital. All relevant information resulting from preparation of the Draft Environmental Impact Report and supporting technical appendices was integrated into this 2005 Master Plan.

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LONG BEACH

Appendix R.C

URBEMIS Air Quality Modeling Data

Please note that this is only a summary of the URBEMIS Air Quality Modeling Data. The remaining 129 pages are available at the following locations by appointment:

City of Long Beach
333 West Ocean Boulevard
Long Beach, California 90802
(562) 570-6193

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105
(626) 683-3547

Appendix C

Air Quality Technical Report

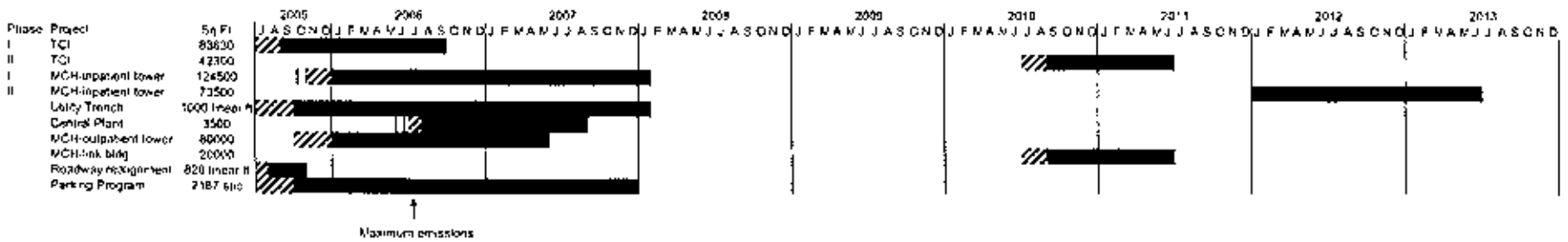
EMISSION CALCULATION SPREADSHEETS

AND

URBEMIS2002 MODELING OUTPUTS

LBMMC/MCH Emission Estimates

Estimated Timeline for Construction



Note: Estimated start and stop dates for each project from Project Description. Estimated construction sub-phase schedule from URBEMIS2002 defaults.

Demolition
Site Grading
Building Construction

LBMMC/MCH Emission Estimates

Estimates Used for Emission Modeling of Demolition, Site Grading, Paving and Remediation for Construction Phase

Project	start date (mo-yr)	end date (mo-yr)	workers	worker trip rate	total sf	stories	estimated footprint (3) (sf)	footprint (acres)	maximum estimated grading (acres)	estimated paving (acres)	estimated demolition (cu ft)	soil hauling for remediation (4) (cu yds)	duration of remediation (4) (days)
TCI Phase I	Jul-05	Sep-06	90	1.1	83630	3	32500	0.75	2	1.25		2769	3
TCI Phase II	Jul-10	Jun-11	55	1 3	42300	2	24500	0.56	2	1.44		2096	2
MCH Inpatient Phase I (1)	Oct-05	Jan-08	144	1.2	124500	4	38000	0.87	2	1.13	1024100	20075	27
MCH Inpatient Phase II	Jan-12	Jun-13	85	1.2	73500	3				0.00			
Utility Trench	Jul-05	Jan-08	20	20.0	1000		500		0.5	0.50		511	1
Central Plant (2)	Jun-06	Aug-07	50	14.3	3500	1	11800	0.27	0.5	0.23	206400	1005	1
MCH Outpatient	Oct-05	May-07	144	1.8	80000	5	19000	0.44	2	1.56		17804	18
MCH Link	Jul-10	Jun-11	55	2.8	20000	3	6500	0.15	1	0.85		5713	6
Roadway Realignment	Jul-05	Oct-05	50	0 7	69700		69700	1.60	4	2.40		9200	18
Parking Program/Structure	Jul-05	Dec-07	75	use default			61000	1.40	2	0 60		38972	39
									16				

(1) Includes demo of 88-stall multi level parking structure

(2) Includes demo of WIC Building

(3) Estimated from Moffat and Nichol grading plan or dimension estimates in project description

(4) Preliminary estimates by SCS Engineers

LBMMC/MCH Emission Estimates

VOC and PM10 Emissions from soil remediation and soil transfer

Building/Area		Exc. Volume (1), cy	Volume for Disposal (1), cy	Est. Volume in Stockpile (1), cy	Est. Time to Perform (1), days	estimated maximum VOC in soil (2) (ppm)	estimated average VOC in soil (3) (ppm)	maximum VOC emitted during excavation (lbs/day) (4)	unmitigated max fugitive PM10 emissions (lbs/day) (5)
	New Acute Care								
	-Area of Overlap w/Parking Structure	7965	3982	2000	8.0	57.8	1.8	78	102.70
	-Area Between Pkg Struc.& Extg. Acute Care	4600	4600	2300	4.6	57.8	1.8	78	102.70
	-Remaining Area	10861	10861	5400	10.9	57.8	1.8	78	102.70
	-Pile Borings	2529	632	300	2.5	57.8	1.8	78	102.70
	Lobby Link	5713	5713	2900	5.7	57.8	1.8	78	102.70
	Outpatient	17804	17804	8900	17.8	57.8	1.8	78	102.70
	Central Plant	1005	1005	500	1.0	57.8	1.8	78	102.70
	Entrance Road/Site Grading	18400	9200	4600	18.4	57.8	1.8	78	102.70
	Utility Trench (assume 4'wide)	511	511	300	0.5	57.8	1.8	78	102.70
	TCI Phase 1	2769	2769	1400	2.8	57.8	1.8	78	102.70
	TCI Phase 2	2096	2096	1000	2.1	57.8	1.8	78	102.70
	New Parking Structure	38972	38972	19500	39.0	57.8	1.8	78	102.70
	Totals		**98000**						

(1) Preliminary estimates by SCS Engineers

(2) Sum of maximum VOC content in soil borings taken from soils near MCH

(3) Average VOC content in soil borings taken from soils near MCH

(4) Assumes 50% of VOC in soil will be emitted during handling and stockpiling

(5) Uses AP-42 emission factor for aggregate handling and storage piles, with average wind speed of 6.2 mph and average soil moisture content of 12%

Conversion: 2700 lbs/cy soil

LBMMC/MCH Emission Estimates
Maximum Construction Emissions for Each Building and Phase

Project	Construction Phase	Year	Maximum Daily Emissions ROG	NOx	CO	SO2	PM10
TCI Phase I	demolition						
	remediation		76				102 7
	trucks		0 51	0 58	6 86	0	0 52
	site grading	2006	35 87	204 75	190 46	0 03	29 35
	building construction	2006	42 57	337 5	305 29	0	15 62
		2008	160 59	324 81	320 81	0 02	14 88
	building construction phase maximum		160 59	337.5	320 81	0 02	15 62
	Maximum All Phases + Trucks		161.1	338.08	327 47	0 03	29.67
TCI Phase I	demolition						
	remediation		78				102 7
	trucks		0 35	0 35	4 22	0	0 52
	site grading	2010	20 71	131 88	173 83	0	24 96
	building construction	2010	26 89	169 44	223 53	0	6 4
		2011	92 2	170 43	226 52	0	6 43
	building construction phase maximum		92 2	170 43	226 52	0	6 43
	Maximum All Phases + Trucks		92.55	170.78	230 61	0	25 48
MCH-inpatient tower Phase I	demolition	2005	0 69	14 87	2 54	0 21	4 14
	remediation	2005	78				102 7
	trucks		0 79	0 69	10 63	0	0 82
	site grading	2005	39 9	321 08	286 51	0 13	34 52
		2006	38 97	307 97	294 66	0 13	33 67
	site grading phase maximum		39 9	321 08	294 66	0 13	34 52
	building construction	2006	73 03	549 44	543 43	0	24 5
		2007	161 26	527 75	569 03	0	22 69
		2008	161 12	526 07	583 37	0	20 74
	building construction phase maximum		161 26	549 44	583 37	0	24 5
	Maximum All Phases + Trucks		162 05	550.33	594	0.13	35.34
MCH-inpatient tower Phase II	demolition						
	remediation						
	trucks		0 38	0 30	4 7	0	0 57
	site grading						
	building construction	2012	48 64	312 81	423 9	0 02	12 02
		2013	116 66	312.78	428 25	0 02	12 12
	building construction phase maximum		116 66	312.78	428 25	0 02	12 12
	Maximum All Phases + Trucks		119.04	313.15	432.95	0.02	12 69
Utility Trench	demolition						
	remediation	2005	78				102 7
	trucks		0 00	0 07	0 71	0	0 05
	site grading	2005	13 35	105 18	98 43	0	9 94
	building construction	2005	7 57	61 18	54 89	0	2 82
		2006	7 57	58 7	56 58	0	2 65
		2007	7 72	56 38	58 36	0	2 42
		2008	7 72	53 88	60 03	0	2 2
	building construction phase maximum		7 72	61 18	60 03	0	2 82
	Maximum All Phases + Trucks		13.44	105.23	99 14	0	9 9
Central Plant	demolition	2006	0 04	12 10	2 38	0 21	4 1
	remediation	2006	78				102 7
	trucks		0 22	0 21	2 53	0	0 21
	site grading	2006	31 4	84 5	88 06	0 01	8 74
	building construction	2006	8 45	63 48	69 26	0	2 82
		2007	8 51	61 04	65 05	0	2 57
	building construction phase maximum		8.51	63 48	65 05	0	2 82
	Maximum All Phases + Trucks		41.67	84.71	90.59	0.01	8.95
MCH-outpatient tower	demolition						
	remediation	2006	76				102 7
	trucks		1 05	1 93	14 46	0.01	1 32
	site grading	2006	41 78	333.48	307 02	0 16	35 03
	building construction	2006	73 87	576 87	534 58	0	29 09
		2007	73 87	554 21	549 74	0	24 66
		2007	149 58	532 7	575 06	0	22 69
	building construction phase maximum		149 58	576 87	575 06	0	29 09
	Maximum All Phases + Trucks		150.63	578.85	589.52	0.17	36.33
MCH-link bldg	demolition						
	remediation	2010	78				102 7
	trucks		0 34	0 35	4 24	0	0 51
	site grading	2010	20 82	133 72	174 27	0 01	10 02
	building construction	2010	26 8	169 44	223 64	0	6 4
		2011	57 93	170 03	226 52	0	6 47
	building construction phase maximum		57 93	170 03	226 52	0	6 47
	Maximum All Phases + Trucks		58.27	170.38	230 76	0.01	10.53
Roadway realignment	demolition						
	remediation	2005	76				102 7
	trucks		0 18	0 19	2 08	0	0 16
	site grading	2005	28 33	224 52	214 76	0 43	40 51
	building construction	2005	19 05	145 23	124 29	0 09	8 52
	Maximum All Phases + Trucks		28.51	224.71	218 84	0.43	49.67
Parking Program	demolition						
	remediation	2005	78				102 7
	trucks		0 18	0 17	2 01	0	0 15
	site grading	2005	48 12	344 04	359 94	0 93	34 68
	building construction	2005	22 83	181 12	156 41	0	8 01
		2006	22 83	182 87	162 57	0	8 45
		2007	27 19	199 41	204 37	0	8 57
	building construction phase maximum		27 19	199.41	204 37	0	8 91
	Maximum All Phases + Trucks		48.3	344.21	361.95	0.23	35 03

LBMMC/MCH Emission Estimates
Worst-Case Construction Emissions

	ROG	NOx	CO	SOx	PM10
Oct-05	137.30	1087 24	988 88	0 47	76 07
Jun-06	341 45	1681 96	1635 51	0 23	78 22
Jul-08	392.21	1756.21	1758.19	0.04	86.94
Aug-08	349 28	1737 19	1703 58	0 00	81 02
Aug-10	42 22	286 1	364 83	0 03	36 01
Sep-10	54 46	335 58	455.75	0	43 83
Maximum	552 21	1756 21	1758 19	0 47	86.94

Note
"Demolition" includes URBEMIS2002 estimates for demolition dust, off-road equipment, and worker commute trips
"Site Grading" includes URBEMIS2002 estimates for grading dust, off-road equipment, soil hauling, and worker commute trips
"Building Construction" includes URBEMIS2002 estimates for off-road equipment usage,architectural coatings, asphalt, and construction worker commute trips
"Trucks" includes materials delivery and pick-up truck trips
"Remediation" includes VOC and fugitive dust emissions from remediation of potentially contaminated soil

LBMMC/MCH Emission Estimates

Emissions from Electricity Consumption

From SCAQMD CEQA Air Quality Handbook, Table A9-11
E = {[(F x G)/365]/1000) x H

E = emissions in lbs/day
F = Gross square foot of land use
G = Electricity usage rate
H = Emission factors in Lbs/MW-hr

Emission Factors (H) for Criteria Air Pollutants

Pollutant	CO	ROC	NOx	SOx	PM10
H	0.2	0.01	1.15	0.12	0.04

Electricity Usage Rate (G)
Hospital Land Use = 21.7 Kilowatt-hour/Square Feet/Year

Gross Square Footage of the Hospital Expansion at 2010 (F): 284930
Gross Square Footage of the Hospital Expansion at Build-out (F): 423930

Potential Regional Emissions from Electricity Consumption at the Hospital expansion

At 2010:

Pollutant	CO	ROC	NOx	SOx	PM10
Lbs/day	3.39	0.17	19.48	2.03	0.68

At Build-out:

Pollutant	CO	ROC	NOx	SOx	PM10
Lbs/day	5.04	0.25	28.98	3.02	1.01

Appendix R.F

Health Risk Assessment and Site Characterization Report

Appendix R.F

Miller Children's Hospital
Health Risk Assessment

Please note that this is only a summary of the draft document. The draft document is being reviewed by the Department of Toxic Substance Control, and will be available at the public outreach meeting on May 5th, 2005.

DRAFT
HUMAN HEALTH RISK ASSESSMENT
LONG BEACH MEMORIAL MEDICAL CENTER
OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90806-1737

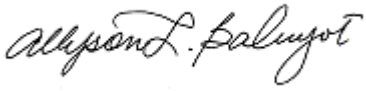
Prepared by:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806-6816
(562) 426-9544

April 2005
File No. 01203219.03, Task 10

This Human Health Risk Assessment report for the Long Beach Memorial Center, Operable Unit 1: Miller Children's Hospital located in the City of Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Prepared by:



Allyson L. Baluyot
Staff Scientist

Paul Damian, PhD, MPH, DABT
Risk Assessment Practice Leader
Board Certified Toxicologist

Reviewed by:

Michael L. Leonard, Sr., PE
Project Manager

SCS ENGINEERS

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GLOSSARY OF ACRONYMS/ABBREVIATIONS

ABS	Dermal Absorption Factor
AEHS	Association of Environmental Health Sciences
AF	Soil-to-Skin Adherence Factor
AT	Averaging Time
bgs	Below Ground Surface
BW	Body Weight
Cal-EPA	California Environmental Protection Agency
CDC	Center for Disease Control
CDI	Chronic Daily Intake
CF	Conversion Factor
cm	Centimeter
COPCs	Chemicals of Potential Concern
CS	Chemical Concentration in Soil
CSF	Cancer Slope Factor
dl	Deciliter
DL	Detection Limit
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
ED	Exposure Duration
EF	Exposure Frequency
EPC	Exposure Point Concentration
ES	Executive Summary
°F	Fahrenheit
FI	Fraction of Ingested Chemicals

FOD	Frequency of Detection
HEAST	Health Effects Assessment Summary Tables
HERD	Human and Ecological Risk Division
HI	Hazard Index
HQ	Hazard Quotient
HRA	Health Risk Assessment
IR	Ingestion Rate
InhR	Inhalation Rate
IRIS	Integrated Risk Information System
J&E	Johnson and Ettinger
kg	Kilogram
km	Kilometer
LBMMC	Long Beach Memorial Medical Center
mg	Milligram
mi	Mile
mph	Miles Per Hour
MCH	Miller Children's Hospital
MSL	Mean Sea Level
NCEA	National Center for Environmental Assessment
NOAA	National Oceanic and Atmospheric Administration
ND	Not Detected
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PAHs	Polynuclear Aromatic Hydrocarbons
PEF	Particulate Emission Factor

PRG	Preliminary Remediation Goal
PQL	Practical Quantification Limit
QA	Quality Assurance
QC	Quality Control
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RWQCB	Regional Water Quality Control Board
SA	Skin Surface Area
sec	Second
SCS	SCS Engineers
SQL	Sample Quantification Limit
SS	Shallow Soil
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TTEMI	Tetra Tech EMI, Inc.
µg	Microgram
USEPA	U. S. Environmental Protection Agency
UCLM	Upper Confidence Limit of the Arithmetic Mean
VOC	Volatile Organic Compound

HUMAN HEALTH RISK ASSESSMENT

LONG BEACH MEMORIAL MEDICAL CENTER

OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL

LONG BEACH, CALIFORNIA

EXECUTIVE SUMMARY

A baseline human health risk assessment (HRA) was prepared for the Long Beach Memorial Medical Center Miller Children's Hospital expansion project. The proposed construction involves the placement of buildings over a former ravine that is classified as a closed solid waste disposal site. The former ravine was historically filled using petroleum impacted soil and debris. Site contaminants have therefore consisted mostly of petroleum-product related chemicals such as benzene, toluene, ethylbenzene, xylene, polynuclear aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons.

An HRA was prepared consistent with state and federal risk assessment guidance to evaluate potential health risks associated with the project site. The general approach was developed in consultation with the California Department of Toxic Substances Control (DTSC) staff. This assessment included evaluation of health risks to the following receptor populations:

- Commercial/hospital worker
- Construction worker
- Hospital inpatient at Miller Children's Hospital (child)
- Hospital inpatient at Long Beach Memorial Medical Center (adult and child)
- Off-site resident

The following exposure pathways were evaluated depending on the receptor population:

- Soil ingestion
- Dermal contact with soil
- Inhalation of soil particulates and volatiles released from soil
- Vapor intrusion

Cancer risks, non-cancer risk, cumulative non-cancer risks and risks due to lead exposure were all evaluated. Cancer risk for the commercial/hospital worker slightly exceeded the threshold of 1E-06

based on state and regulatory agency guidelines. The exceedance is based on potential exposure to polynuclear aromatic hydrocarbons (PAHs) in soil. Cancer risks for all other receptor populations evaluated were below the cancer risk threshold of 1E-06. It is expected that soils containing the main risk drivers (PAHs) are expected to removed as part of the removal action. Cumulative non-cancer risks, as measured by the Hazard Index, were all less than 1, indicating no significant risk of adverse non-cancer health effects. Lead risks indicated that lead risks were also insignificant for all receptor populations.

Appendix R.F

Miller Children's Hospital
Site Characterization Report

Please note that this is only a summary of the Miller Children's Hospital Site Characterization Report. The remaining 684 pages are available at the following locations by appointment:

City of Long Beach
333 West Ocean Boulevard
Long Beach, California 90802
(562) 570-6193

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105
(626) 683-3547

SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL
MEDICAL CENTER EXPANSION
OPERABLE UNIT 1: MILLER CHILDREN'S
HOSPITAL AREA
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90801-1428

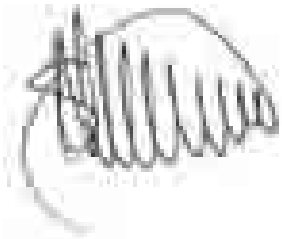
Prepared By:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806
(562) 426-9544

April 2005
File No. 01203219.03 Task 1

This Site Characterization Report for Operable Unit 1: Miller Children's Hospital Expansion at the Long Beach Memorial Medical Center, 2801 Atlantic Avenue, Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Michael L. Leonard, Sr., P.E.
Senior Technical Manager
Professional Engineer No. 31181



Kenneth H. Lister, Ph.D., C.E.G., C.Hg.
Professional Geologist No. 4338
SCS ENGINEERS

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SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION
OPERABLE UNIT 1: MILLER CHILDREN'S HOSPITAL AREA
LONG BEACH, CALIFORNIA

1.0 INTRODUCTION AND BACKGROUND

1.1 General

SCS Engineers was retained by Long Beach Memorial Medical Center (LBMMC) to conduct an environmental review and site investigation of a portion of the LBMMC property immediately west of Atlantic Boulevard between Columbia Avenue and 27th Street (Figure 1). This area of the LBMMC campus has been designated as Operable Unit 1 (OU1) by the Department of Toxic Substances Control (DTSC). Construction of additional facilities for LBMMC has been proposed for OU1, including a new four-story inpatient building, central plant, a relocation of the drive-in entrance from Atlantic Avenue and other realigned on-site roads. OU1 also includes the bulk oxygen storage area located north of Columbia Avenue and west of Lakeview Drive. Figure 2 provides a map showing the location of the study area.

1.2 Previous OU1 Investigation

SCS conducted an investigation of OU1 in March and October 2004, the results of which were described in *Environmental Summary Report* (SCS, November 2004). The 2004 site investigation included a geophysical survey that confirmed the location of two oil wells indicated to be present on the site by review of historical information (see further discussion of oil well records search below in Historical Data Review). The site investigation also included subsurface soil sampling and analysis that encountered detectable concentrations of petroleum hydrocarbons in eight locations to varying degrees. Some of the areas of potential concern encountered are located directly under the proposed buildings, which are discussed, in the subsequent text.

1.3 Scope of Work and Objectives

The proposed construction involves the placement of buildings over a former ravine, which is classified as a closed solid waste disposal site by the California Integrated Waste Management Board (SWIS No. 19-AK-5018). The former ravine was historically filled using petroleum impacted soil and debris. The purpose of the tasks that were conducted, as described below, was to characterize environmental conditions in OU1 generally and to determine how these might impact proposed construction.

Environmental tasks conducted included the following:

- Data review and compilation of historic information. In addition to reports of previous investigations and oil production facility information, historic topographic maps and aerial photographs were reviewed.

- Geophysical investigation. Geophysical techniques were applied to attempt to locate inactive oil production and groundwater monitoring wells.

- Subsurface sampling and analysis. In March 2004, nine soil borings were advanced to total depths ranging from 20 to 50 feet below ground surface (bgs) and soil samples were collected at various depths. In October 2004, two additional soil borings were advanced to total depths of 56 and 61 feet and samples collected at various depths. In March 2005, 19 soil borings were advanced to total depths ranging from 15 to 50 feet bgs and soil samples were collected, generally at 5-foot vertical intervals. Samples were examined physically and boring logs were prepared. Soil samples were transported to a laboratory for chemical analysis that included total petroleum hydrocarbons (TPH) with carbon chain characterization by EPA Method 8015M, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310, semi-volatile organic compounds (SVOCs) by EPA Method 8270C, chlorinated pesticides by EPA Method 8081A, polychlorinated biphenyls (PCBs) by EPA Method 8082, and trace metals by various methods. Three of the borings advanced in March 2004 and 17 of the borings advanced in March 2005 were converted into soil gas probes for later sampling and analysis for VOCs, methane, and hydrogen sulfide.

- Compilation of data resulting from above listed activities and preparation of the Site Characterization Report.

- Input to Health and Risk Assessment (HRA) and Removal Action Workplan (RAW).

Results of these activities are described in the following sections of this report.

1.4 Geology/Hydrogeology

Geologically, the project area is located in the southwestern portion of the Los Angeles basin. The basin formed when basement (older) rocks were structurally downwarped allowing a sequence of Upper Cretaceous through Recent age sedimentary units to form (estimated fill thickness 12,000 feet). The rocks of the basin are cut by numerous faults, most strike-slip faults of generally northwest-southeast orientation. The closest active fault to the site is the Newport-Inglewood fault zone, known as the Cherry Hill segment, located approximately 1,000 feet northeast.

Surface elevation in the expansion area is between approximately 35 and 50 feet above mean sea level. The investigation area is located on the western flank of the Signal Hill uplift, approximately 1 mile east of the Los Angeles River and approximately 3 miles north of the Long Beach shoreline. Surficial geologic materials in the area consist of Pleistocene and Recent non-marine and marine units, predominantly sand, silty sand, sandy silt, silt, and clay. In addition, unclassified fill, including gravel, debris, and waste oil field material, was used to bring a former on-site ravine up to grade. Native and fill soils were encountered in borings drilled during the site investigation described in the present report. Because of the generally heterogeneous nature and thickness of the fill in portions of OU1, no typical soil section can be described that characterizes the area.

The uppermost regional aquifer in this area is anticipated to be the Gage, located at a depth of approximately 200 feet bgs. Uppermost groundwater beneath most of the area occurs at an estimated depth of 50 feet bgs within sands of the Lakewood Formation, however a thin perched zone or zones of groundwater were encountered as shallow as 3 feet bgs.

Appendix R.F

Todd Cancer Institute
Health Risk Assessment

Please note that this is only a summary of the draft document. The draft document is being reviewed by the Department of Toxic Substance Control, and will be available at the public outreach meeting on May 5th, 2005.

DRAFT
HUMAN HEALTH RISK ASSESSMENT
LONG BEACH MEMORIAL MEDICAL CENTER
OPERABLE UNIT 2: TODD CANCER INSTITUTE
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90806-1737

Prepared by:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806-6816
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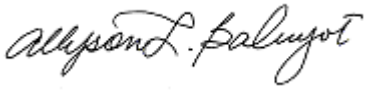
April 2005
File No. 01203219.04, Task 9

This Human Health Risk Assessment report for the Long Beach Memorial Center, Operable Unit 2: Todd Cancer Institute located in the City of Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Prepared by:



Allyson L. Baluyot
Staff Scientist

Paul Damian, PhD, MPH, DABT
Risk Assessment Practice Leader
Board Certified Toxicologist

Reviewed by:

Michael L. Leonard, Sr., PE
Project Manager

SCS ENGINEERS

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AT	Averaging Time
bgs	Below Ground Surface
BW	Body Weight
Cal-EPA	California Environmental Protection Agency
CDC	Center for Disease Control
CDI	Chronic Daily Intake
CF	Conversion Factor
cm	Centimeter
COPCs	Chemicals of Potential Concern
CS	Chemical Concentration in Soil
CSF	Cancer Slope Factor
dl	Deciliter
DL	Detection Limit
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
ED	Exposure Duration
EF	Exposure Frequency
EPC	Exposure Point Concentration
ES	Executive Summary
°F	Fahrenheit
FI	Fraction of Ingested Chemicals

FOD	Frequency of Detection
HEAST	Health Effects Assessment Summary Tables
HERD	Human and Ecological Risk Division
HI	Hazard Index
HQ	Hazard Quotient
HRA	Health Risk Assessment
IR	Ingestion Rate
InhR	Inhalation Rate
IRIS	Integrated Risk Information System
J&E	Johnson and Ettinger
kg	Kilogram
km	Kilometer
LBMMC	Long Beach Memorial Medical Center
mg	Milligram
mi	Mile
mph	Miles Per Hour
MCH	Miller Children's Hospital
MSL	Mean Sea Level
NCEA	National Center for Environmental Assessment
NOAA	National Oceanic and Atmospheric Administration
ND	Not Detected
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PAHs	Polycyclic Aromatic Hydrocarbons
PEF	Particulate Emission Factor

PRG	Preliminary Remediation Goal
PQL	Practical Quantification Limit
QA	Quality Assurance
QC	Quality Control
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RWQCB	Regional Water Quality Control Board
SA	Skin Surface Area
sec	Second
SCS	SCS Engineers
SQL	Sample Quantification Limit
SS	Shallow Soil
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TTEMI	Tetra Tech EMI, Inc.
µg	Microgram
USEPA	U. S. Environmental Protection Agency
UCLM	Upper Confidence Limit of the Arithmetic Mean
VOC	Volatile Organic Compound

HUMAN HEALTH RISK ASSESSMENT

LONG BEACH MEMORIAL MEDICAL CENTER

OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA

LONG BEACH, CALIFORNIA

EXECUTIVE SUMMARY

A baseline human health risk assessment (HRA) was prepared for the Long Beach Memorial Medical Center Todd Cancer Institute expansion project. The project site has some historic chemical contamination associated with past oil production and gasoline service stations. Site contaminants have therefore consisted mostly of petroleum-product related chemicals such as benzene, toluene, ethylbenzene, xylene and total petroleum hydrocarbons.

An HRA was prepared consistent with state and federal risk assessment guidance to evaluate potential health risks associated with the project site. The general approach was developed in consultation with the California Department of Toxic Substances Control (DTSC) staff This assessment included evaluation of health risks to the following receptor populations:

- Commercial/hospital worker
- Construction worker
- Future outpatient at the Todd Cancer Institute (adult and child)
- Hospital inpatient at Long Beach Memorial Medical Center
- Off-site resident

The following exposure pathways were evaluated depending on the receptor population:

- Soil ingestion
- Dermal contact with soil
- Inhalation of soil particulates and volatiles released from soil
- Vapor intrusion

Cancer risks, non-cancer risks, cumulative non-cancer risks and risks due to lead exposure were all evaluated. All cancer risks were below the cancer risk threshold of 1E-06 and are considered negligible by all state and federal regulatory agencies. Cumulative non-cancer risks, as measured by the Hazard Index, were all less than 1, indicating no significant risk of adverse non-cancer health effects. Using the California Department of Toxic Substances Control Leadspread model to evaluate lead risks indicated that lead risks were also insignificant for all receptor populations.

Appendix R.F

Todd Cancer Institute
Site Characterization Report

Please note that this is only a summary of the Todd Cancer Institute Site Characterization Report. The remaining 782 pages are available at the following locations by appointment:

City of Long Beach
333 West Ocean Boulevard
Long Beach, California 90802
(562) 570-6193

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105
(626) 683-3547

SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION
OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA
LONG BEACH, CALIFORNIA

Prepared for:

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, California 90801-1428

Prepared By:

SCS Engineers
3900 Kilroy Airport Way, Suite 100
Long Beach, California 90806
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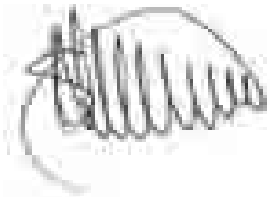
April 2005
File No. 01203219.04 Task 1

This Site Characterization Report for Operable Unit 2: Todd Cancer Institute Area at the Long Beach Memorial Medical Center, 2801 Atlantic Avenue, Long Beach, California, dated April 2005, was prepared and reviewed by the following:

Michael L. Leonard, Sr., P.E.
Professional Engineer No. 31181
Senior Technical Manager



Kenneth H. Lister, Ph.D., C.E.G., C.Hg.
Professional Geologist No. 4338
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SCS ENGINEERS

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SITE CHARACTERIZATION REPORT
LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION
OPERABLE UNIT 2: TODD CANCER INSTITUTE AREA
LONG BEACH, CALIFORNIA

1.0 INTRODUCTION AND BACKGROUND

1.1 General

SCS Engineers was retained by Long Beach Memorial Medical Center (LBMMC) to conduct an environmental review and site investigation, in connection with California Environmental Quality Act (CEQA) activities, for an approximately 7.5 acre portion of the LBMMC property located at the southeast corner of Spring Street and Long Beach Boulevard (Figure 1). Construction of additional facilities for LBMMC has been proposed for this area, including a building for outpatient cancer services. Figure 2 is a map of the study area. This area of the LBMMC campus has been designated as Operable Unit 2 (OU2) by the Department of Toxic Substances Control (DTSC).

1.2 Previous OU2 Investigation

SCS conducted an investigation of OU2 in September and October 2004,the results of which were described in *Environmental Summary Report* (SCS, November 2004). The 2004 site investigation included a geophysical survey that confirmed the location of two of four oil wells indicated to be present on the site by review of historical information. The site investigation also included subsurface soil sampling and analysis that encountered detectable concentrations of petroleum hydrocarbons in one location. In addition, collection and analysis of 31 soil gas samples from 27 subsurface vapor probes detected low concentrations of petroleum related volatile organic compounds (VOCs) in four samples (highest concentrations of toluene, m- and p-xylenes, and benzene in these samples was 2.1, 2.2, and 6.8 ug/l, respectively). None of the areas of potential concern encountered are located directly under the proposed buildings.

1.3 Scope of Work and Objectives

The proposed construction involves the placement of a three story building in the northwestern portion of OU2, to be followed by a two story horizontal building expansion several years later. The construction area is currently used as a surface parking lot. Historical uses of OU2 include oil production and a gas station. The purpose of the tasks that were conducted, as described below, was to evaluate environmental conditions in the area generally and to determine how these might impact proposed construction.

Environmental tasks included the following:

- Data review and compilation of historic information. In addition to reports of previous investigations and oil production facility information, historic topographic maps and aerial photographs were reviewed.

- Geophysical investigation. Geophysical techniques were applied to attempt to locate inactive oil production wells, underground storage tanks, pipelines, and similar subsurface features.

- Subsurface sampling and analysis. In October 2004, twenty-seven temporary soil vapor probes were installed at a depth of five feet bgs and soil vapor samples were collected. Five soil borings were advanced to total depths ranging from 30 to 55 feet bgs for both geotechnical and environmental purposes, and soil samples were collected. One additional soil boring was sampled at 5 feet and 10 feet bgs. In March 2005, 27 soil borings were advanced to total depths ranging from 17 to 30 feet bgs for both geotechnical and environmental purposes, and soil samples were collected. Samples were examined physically and boring logs were prepared. Selected soil samples were transported to a laboratory for chemical analysis that included total petroleum hydrocarbons (TPH) with carbon chain characterization by EPA Method 8015M, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310, semi-volatile organic compounds (SVOCs) by EPA Method 8270C, chlorinated pesticides by EPA Method 8081A, polychlorinated biphenyls (PCBs) by EPA Method 8082, and trace metals by various methods. Twenty-three of the borings advanced in March 2005 were converted into soil vapor probes for later field testing.

- Compilation of data resulting from above listed activities and preparation of the Site Characterization Report.

- Input to Health Risk Assessment (HRA) and Removal Action Workplan (RAW).

Results of these activities are described in the following sections of this report.

1.4 Geology/Hydrogeology

Geologically, the project area is located in the southwestern portion of the Los Angeles basin. The basin formed when basement (older) rocks were structurally downwarped allowing a sequence of Upper Cretaceous through Recent age sedimentary units to form (estimated fill thickness 12,000 feet). The rocks of the basin are cut by numerous faults, most strike-slip faults of generally northwest-southeast orientation. The closest active fault to the site is the Newport-Inglewood fault zone, known as the Cherry Hill segment, located approximately 1,000 feet northeast.

Surface elevation in the expansion area is between approximately 45 and 50 feet above mean sea level. The investigation area is located on the western flank of the Signal Hill uplift, approximately 1 mile east of the Los Angeles River and approximately 3 miles north of the Long Beach shoreline. Surficial geologic materials in the area consist of Pleistocene and Recent non-marine and marine

units, predominantly sand, silty sand, sandy silt, silt, and clay. Native and fill soils were encountered in borings drilled during the site investigation described in the present report.

The uppermost regional aquifer in this area is anticipated to be the Gage, located at a depth of approximately 200 feet below ground surface (bgs). Uppermost groundwater beneath most of the area occurs at an estimated depth of 50 feet bgs within sands of the Lakewood Formation. Groundwater was encountered in the two deepest borings drilled during September 2004, but not encountered in any of the March 2005 borings.

The following field observations are considered particularly relevant to the purpose of the investigation:

- The upper two to three feet bgs is relatively new fill, possibly related to parking lot construction. An additional two to six feet below this may be older fill.

- Between the base of fill and a depth of approximately 20 feet bgs, soil consisting predominantly of sandy silt to silty sand was encountered.

- Below the sandy silt/silty sand, a section of up to approximately 22 to 26 feet bgs of sand was encountered.

- Below the sand, to a depth of 35+ feet, silty sand with some clay was encountered.

- Between approximately 37 to 60 feet bgs, in the two borings that went to this depth, drilling encountered predominantly sandy silt with some clay with a few cleaner sand lenses.

Appendix L

Voluntary Clean-up Agreement

Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

February 16, 2005

Nuna Tersibashian, R.E.A.
Environmental Analyst
Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105

VOLUNTARY CLEANUP AGREEMENT, DOCKET NUMBER HSA-A 04/05-116,
LONG BEACH MEMORIAL MEDICAL CENTER, 2801 ATLANTIC AVENUE,
LONG BEACH CALIFORNIA 90801

Dear Ms. Tersibashian:

Enclosed for your files are two fully executed duplicate originals of the Voluntary Cleanup Agreement for the subject Site. The Agreement will cover the Department of Toxic Substances Control (DTSC) review and comment on the Supplemental Site Investigation Work Plan, and oversight for the completion and implementation of a Removal Action Work Plan (RAW) at the proposed expansion areas. DTSC's oversight of the site characterization and RAW of the existing facility will also be covered by this Agreement.

DTSC has designated Ms. Maryam Tasnif-abbasi as the Project Manager. She will be responsible for the technical interface with you and/or your environmental consultant. Ms. Tasnif-abbasi can be reached by telephone at (714) 484-5489.

As noted in the Agreement, the advance payment is due within 10 days of Agreement execution. It is important that the following information be clearly marked on the face of the check: "Docket Number HSA-A 04/05-116 and CalStars Site Code 401276-11". The advance payment should be sent directly to:

Department of Toxic Substances Control
Accounting/Cashier
400 P Street, 4th Floor
P.O. Box 806
Sacramento, California 95812-0806

A photocopy of the check should be sent to my attention at the letterhead address.

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

In the Matter of: Long Beach Memorial Medical Center Project Proponent Long Beach Memorial Medical Center 2801 Atlantic Avenue Long Beach, CA 90806-1737	)	Docket No. HSA-A 04/05-116 Voluntary Cleanup Agreement Health and Safety Code Section 25355.5(a) (1) (C)

I. INTRODUCTION

1.1 Parties. The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) enters into this Voluntary Cleanup Agreement (Agreement) with Long Beach Memorial Medical Center (LBMMC) (Proponent).

1.2 Site. The property which is the subject of this Agreement (Site) is located at 2801 Atlantic Avenue, California 90806-1737. The Site property consists of 54 acres and is identified by Assessor's Parcel Number 7207-010-041. A diagram of the Site and a location map are attached as Exhibit A and Exhibit B.

1.3 Jurisdiction. This Agreement is entered into by DTSC and Proponent pursuant to Health and Safety Code (H&SC) section 25355.5(a) (1) (C). This section authorizes DTSC to enter into an enforceable agreement with Proponents to oversee the characterization and cleanup of a Site.

1.4 Purpose. The purpose of this Agreement is for the Proponent to develop a work plan for site characterization, implement the work plan, and conduct a removal action, if warranted, under the oversight of DTSC. The purpose of this Agreement is also for DTSC to obtain reimbursement from the Proponent for DTSC's oversight costs.

II. BACKGROUND

2.1 Ownership. The Site is owned by LBMMC.

2.2 Substances Found at the Site. Reports, containing the results of environmental media sampling conducted at the Site, indicate that some of the soil is contaminated with hazardous substances, including petroleum hydrocarbons, volatile organic compounds, and metals.

2.3 Physical Description. The 54 acre Long Beach Memorial Medical Center Campus is completely developed. There are approximately 1,213,945 gross square feet of structures located here. The proposed project is divided into three Operable Units (OUs).

OU1 is the area of construction of the Miller Children's Hospital, which is proposed to be a four story acute care or pediatric inpatient tower building with an anticipated footprint of 37,000 square feet. The proposed construction will overlap the existing parking structure located east of the existing Miller Children's Hospital. Construction will also include a central plant and utility trench, and bulk oxygen tank enclosure, and realignment of the LBMMC entrance. OU2 is currently an empty lot at the corner of Spring Street and Long Beach Boulevard and is site of proposed Todd Cancer Institute. Proposed construction includes two and three story buildings comprising a total of 126,000 square feet. OU1 and OU2 will be managed under a single site code.

OU3 comprises of the remaining portions of the LBMMC facility, i.e., the campus bounded by Spring Street, Long Beach Boulevard, Atlantic Avenue and 27th Street. OU3 will be managed under a unique site code.

2.4 Site History. The existing hospital complex was constructed in 1959. Historically, the site was used for oil production, including oil wells, storage tanks, derricks and associated equipment. A portion of the site is listed as a closed landfill on the California Integrated Waste Management Board's Solid Waste Information System. Past environmental investigations have shown detectable concentrations of hydrocarbon compounds, metals, and volatile organic compounds in the soil.

The expansion of the Miller Children's Hospital will be located immediately adjacent to the existing building, southwest of the intersection of Atlantic Avenue and Columbia Street. The expansion area itself has been a parking structure since approximately 1970. This structure will be demolished to accommodate construction. The proposed project site history indicates that this area was a natural ravine and a former oil field. Over time, the oil wells were abandoned, and the ravine was backfilled with soil and oil field waste.

According to previous site assessments of the Todd Cancer Institute property (OU 2), from approximately 1925 through 1935 a gasoline service station was located in the northwestern corner of this parcel. From 1925 to 1950, a welding shop was located immediately west of the gas station site. An underground storage tank (UST) was installed at the welding shop in 1944. Although no records have been found documenting the removal of USTs from either one of the previously mentioned facilities, geophysical surveys conducted in May 2004 did not indicate the presence of USTs at the site. Oil production facilities were located along the northeast corner of the site from the 1920's through the 1970's. The site has been used as a parking lot since 1985.

III. AGREEMENT

3.0 IT IS HEREBY AGREED THAT DTSC will provide review and oversight of the response activities conducted by the Proponent in accordance with the Scope of Work contained in Exhibit C. The Proponent shall conduct the activities in the manner specified herein and in accordance with the schedule specified in Exhibit E. All work shall be performed consistent with H&SC section 25300 et seq., as amended; the National Contingency Plan (40 Code of Federal Regulations (CFR) Part 300), as

3.6 Communications. All DTSC approvals and decisions made regarding submittals and notifications will be communicated to the Proponent in writing by DTSC's Agreement Manager or his/her designee. No informal advice, guidance, or suggestions or comments by DTSC regarding reports, plans, specifications, schedules or any other writings by the Proponent shall be construed to relieve the Proponent of the obligation to obtain such written approvals.

3.7 Endangerment during Implementation. In the event DTSC determines that any activity (whether or not pursued in compliance with this Agreement) may pose an imminent or substantial endangerment to the health and safety of people on the Site or in the surrounding area or to the environment, DTSC may order the Proponent to stop further implementation of this Agreement for such period of time as may be needed to abate the endangerment.

3.8 Payment. The Proponent agrees to pay (1) all costs incurred by DTSC in association with preparation of this Agreement and for review of documents submitted prior to the effective date of the Agreement, and (2) all costs incurred by DTSC in providing oversight pursuant to this Agreement including review of the documents described in Exhibit C and associated documents, and in providing oversight of field activities. An estimate of DTSC's oversight costs is attached as Exhibit D. It is understood by the parties that Exhibit D is an estimate and cannot be relied upon as the final cost figure. DTSC will bill the Proponent quarterly. Proponent agrees to make payment within sixty (60) days of receipt of DTSC's billing. Such billings will reflect any amounts that have been advanced to DTSC by the Proponent.

3.8.1 In anticipation of services to be rendered, Proponent shall make an advance payment of $20,000 to DTSC. That payment shall be made no later than ten (10) days after this Agreement is fully executed. If the Proponent's advance payment does not cover all costs payable to DTSC under this paragraph, Proponent agrees to pay the additional costs within sixty (60) days of receipt of a bill from DTSC.

3.8.2 If any bill is not paid by the Proponent within sixty (60) days after it is sent by DTSC, the Proponent may be deemed to be in material default of this Agreement.

3.8.3 All payments made by the Proponent pursuant to this Agreement shall be by a Long Beach Memorial Medical Center's check or cashier's or certified check made payable to the "Department of Toxic Substances Control", and bearing on its face the project code for the site (Calstars Site Codes #401276 for OU1 and OU2 and #401277 for OU3) and the docket number (Docket No. Docket No. HSA-A 04/05-116) of this Agreement. Payments shall be sent to:

Department of Toxic Substances Control
Accounting/Cashier
1001 I Street, 21st Floor
P.O. Box 806
Sacramento, California 95812-0806

A photocopy of the check shall be sent concurrently to DTSC's Agreement Manager.

3.8.4 If the advance payment exceeds DTSC's actual oversight costs, DTSC will provide an accounting for expenses and refund the difference within one hundred-twenty (120) days after termination of this Agreement in accordance with Paragraph

3.9 Condition Precedent. It is expressly understood and agreed that DTSC's receipt of the advance payment described in Paragraph 3.8.1. is a condition precedent to DTSC's obligation to provide oversight, review and/or comment on documents.

3.10 Record Retention. DTSC shall retain all cost records associated with the work performed under this Agreement for such time periods as may be required by applicable state law. The Proponent may request to inspect all documents which support DTSC's cost determination in accordance with the Public Records Act, Government Code section 6250 et seq.

3.11 Project Coordinator. The work performed pursuant to this Agreement shall be under the direction and supervision of a qualified project coordinator, with expertise in hazardous substance site cleanup. The Proponent shall submit: a) the name and address of the project coordinator; and b) in order to demonstrate expertise in hazardous substance site cleanup, the resume of the coordinator. The Proponent shall promptly notify DTSC of any change in the identity of the Project Coordinator. All engineering and geological work shall be conducted in conformance with applicable state law including but not limited to Business and Professions Code sections 6735 and 7835.

3.12 Access. Proponent shall provide, and/or obtain access to the Site and offsite areas to which access is necessary to implement this Agreement. Such access shall be provided to DTSC's employees, contractors, and consultants at all reasonable times. Nothing in this paragraph is intended or shall be construed to limit in any way the right of entry or inspection that DTSC or any other agency may otherwise have by operation of any law. DTSC and its authorized representatives shall have the authority to enter and move freely about all property at the Site at all reasonable times for purposes including, but not limited to: inspecting records, operating logs, sampling and analytic data, and contracts relating to this Site; reviewing the progress of the Proponent in carrying out the terms of this Agreement; conducting such tests as DTSC may deem necessary; and verifying the data submitted to DTSC by the Proponent.

3.13 Sampling, Data and Document Availability. When requested by DTSC, the Proponent shall make available to DTSC, and shall provide copies of, all data and information concerning contamination at the Site, including technical records and contractual documents, sampling and monitoring information and photographs and maps, whether or not such data and information was developed pursuant to this Agreement.

3.14 Notification of Field Activities. The Proponent shall inform DTSC at least seven (7) days in advance of all field activities pursuant to this Agreement and shall allow DTSC and its authorized representatives to take duplicates of any samples collected by the Proponent pursuant to this Agreement.

3.15 Notification of Environmental Condition. The Proponent shall notify DTSC's Agreement Manager immediately upon learning of any condition posing an immediate threat to public health or safety or the environment. Within seven (7) days of the onset of such a condition, the Proponent shall furnish a report to DTSC, signed by the Proponent's Agreement Manager, setting forth the events which occurred and the measures taken in the response thereto.

3.16 Preservation of Documentation. The Proponent shall maintain a central repository of the data, reports, and other documents prepared pursuant to this

Agreement. All such data, reports and other documents shall be preserved by the Proponent for a minimum of six (6) years after the conclusion of all activities carried out under this Agreement. If DTSC requests that some or all of these documents be preserved for a longer period of time, the Proponent shall either comply with that request, deliver the documents to DTSC, or permit DTSC to copy the documents prior to destruction. The Proponent shall notify DTSC in writing at least ninety (90) days prior to the expiration of the six-year minimum retention period before destroying any documents prepared pursuant to this Agreement. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the six year period, the related records shall be retained until the completion and resolution of all issues arising therefrom or until the end of the six-year period, which ever is later.

3.17 Amendments. This Agreement may be amended or modified solely upon written consent of all parties. Such amendments or modifications may be proposed by any party and shall be effective the third business day following the day the last party signing the amendment or modification sends its notification of signing to the other party. The parties may agree to a different effective date.

3.18 Termination for Convenience. Except as otherwise provided in this Paragraph, each party to this Agreement reserves the right unilaterally to terminate this Agreement for any reason. Termination may be accomplished by giving a thirty (30) day advance written notice of the election to terminate this Agreement to the other Party. In the event that this Agreement is terminated under this Paragraph, the Proponent shall be responsible for DTSC costs through the effective date of termination.

3.19 Exhibits. All exhibits attached to this Agreement are incorporated herein by this reference.

3.20 Time Periods. Unless otherwise specified, time periods begin from the date this Agreement is fully executed, and "days" means calendar days. "Business days" means all calendar days that are not weekends or official State holidays.

3.21 Proponent Liabilities. Nothing in this Agreement shall constitute or be considered a satisfaction or release from liability for any condition or claim arising as a result of Proponent's past, current, or future operations. Nothing in this Agreement is intended or shall be construed to limit the rights of any of the parties with respect to claims arising out of or relating to the deposit or disposal at any other location of substances removed from the Site.

3.22 Government Liabilities. The State of California (State) shall not be liable for any injuries or damages to persons or property resulting from acts or omissions by the Proponent or by related parties in carrying out activities pursuant to this Agreement, nor shall the State of California be held as a party to any contract entered into by the Proponent or its agents in carrying out the activities pursuant to this Agreement.

3.23 Third Party Actions. In the event that the Proponent is a party to any suit or claim for damages or contribution relating to the Site to which DTSC is not a party, the Proponent shall notify DTSC in writing within ten (10) days after service of the complaint in the third-party action. Proponent shall pay all costs incurred by DTSC relating to such third-party actions, including but not limited to responding to subpoenas.

3.24 Reservation of Rights. DTSC and the Proponent reserve the following rights.

3.24.1 DTSC reserves its right to pursue cost recovery under the Comprehensive Environmental Response, Compensation and Liability act of 1980 (CERCLA), as amended, the California Health and Safety Code section 25360, and any other applicable section of the law.

3.24.2 Nothing in this Agreement is intended or shall be construed to limit or preclude DTSC from taking any action authorized by law or equity to protect public health and safety or the environment and recovering the costs thereof.

3.24.3 Nothing in this Agreement shall constitute or be construed as a waiver of the Proponent's rights, (including any covenant not to sue or release) with respect to any claim, cause of action, or demand in law or equity that the Proponent may have against any "person", as defined in Section 101(21) of CERCLA, or Health and Safety Code section 25319, that is not a signatory to this Agreement.

3.24.4 By entering into this Agreement, Proponent does not admit to any fact, fault or liability under any statute or regulation.

3.25 Compliance with Applicable Laws. Nothing in this Agreement shall relieve the Proponent from complying with all applicable laws and regulations, and the Proponent shall conform all actions required by this Agreement with all applicable federal, state and local laws and regulations.

3.26 California Law. This Agreement shall be governed, performed and interpreted under the laws of the State of California.

3.27 Severability. If any portion of this Agreement is ultimately determined not to be enforceable, that portion will be severed from the Agreement and the severability shall not affect the enforceability of the remaining terms of the Agreement.

3.28 Parties Bound. This Agreement applies to and is binding, jointly and severally, upon each signatory and its officers, directors, agents, receivers, trustees, heirs, executors, administrators, successors, and assigns, and upon any successor agency of the State of California that may have responsibility for and jurisdiction over the subject matter of this Agreement. No change in the ownership or corporate or business status of any signatory, or of the facility or Site shall alter any signatory's responsibilities under this Agreement.

3.29 Effective Date. The effective date of this Agreement is the date when this Agreement is fully executed.

3.30 Representative Authority. Each undersigned representative of the parties to this Agreement certifies that she or he is fully authorized to enter into the terms and conditions of this Agreement and to execute and legally bind the parties to this Agreement.

3.31 Counterparts. This Agreement may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Date: 2/15/05

Thomas M. Cota,
Southern California Cleanup Operations Branch -
Cypress Office
Department of Toxic Substances Control

Date: 2-15-05

Pat Johner, Vice President, Facilities
Long Beach Memorial Medical Center

EXHIBITS

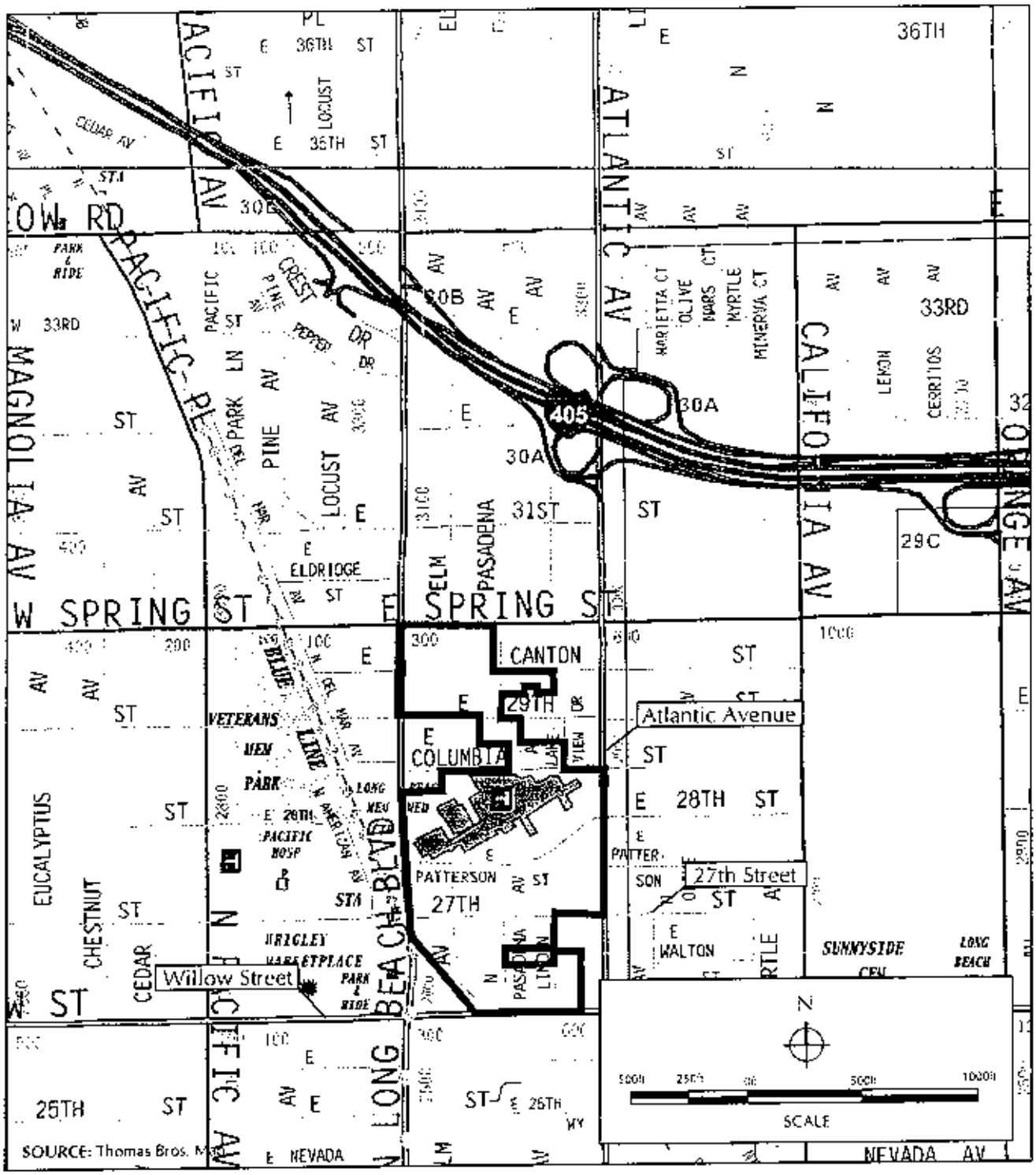
A - SITE DIAGRAM

B - SITE LOCATION MAP

C - SCOPE OF WORK

D - COST ESTIMATE

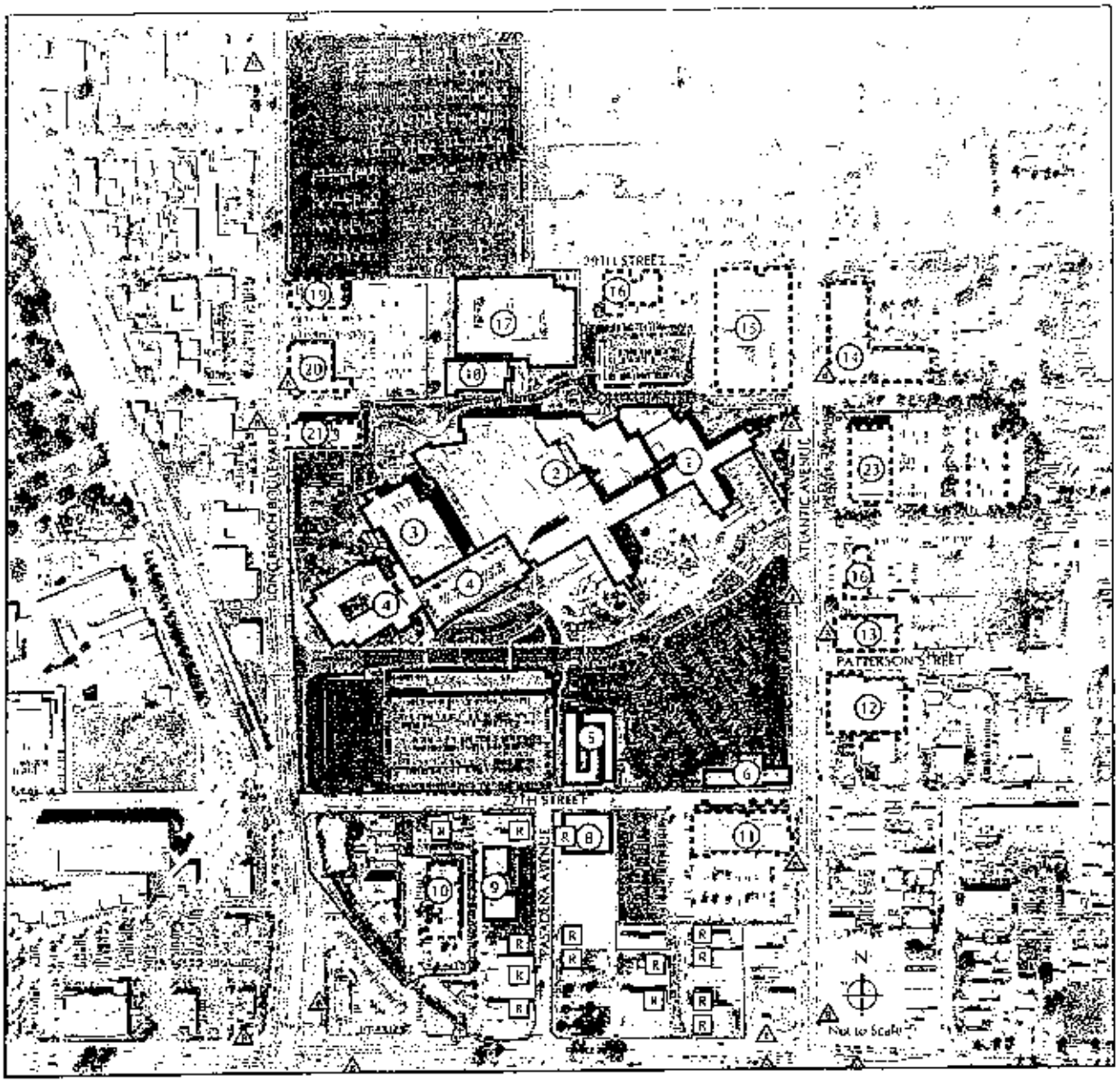
E - SCHEDULE



LEGEND

Long Beach Memorial Medical Center Campus Boundary

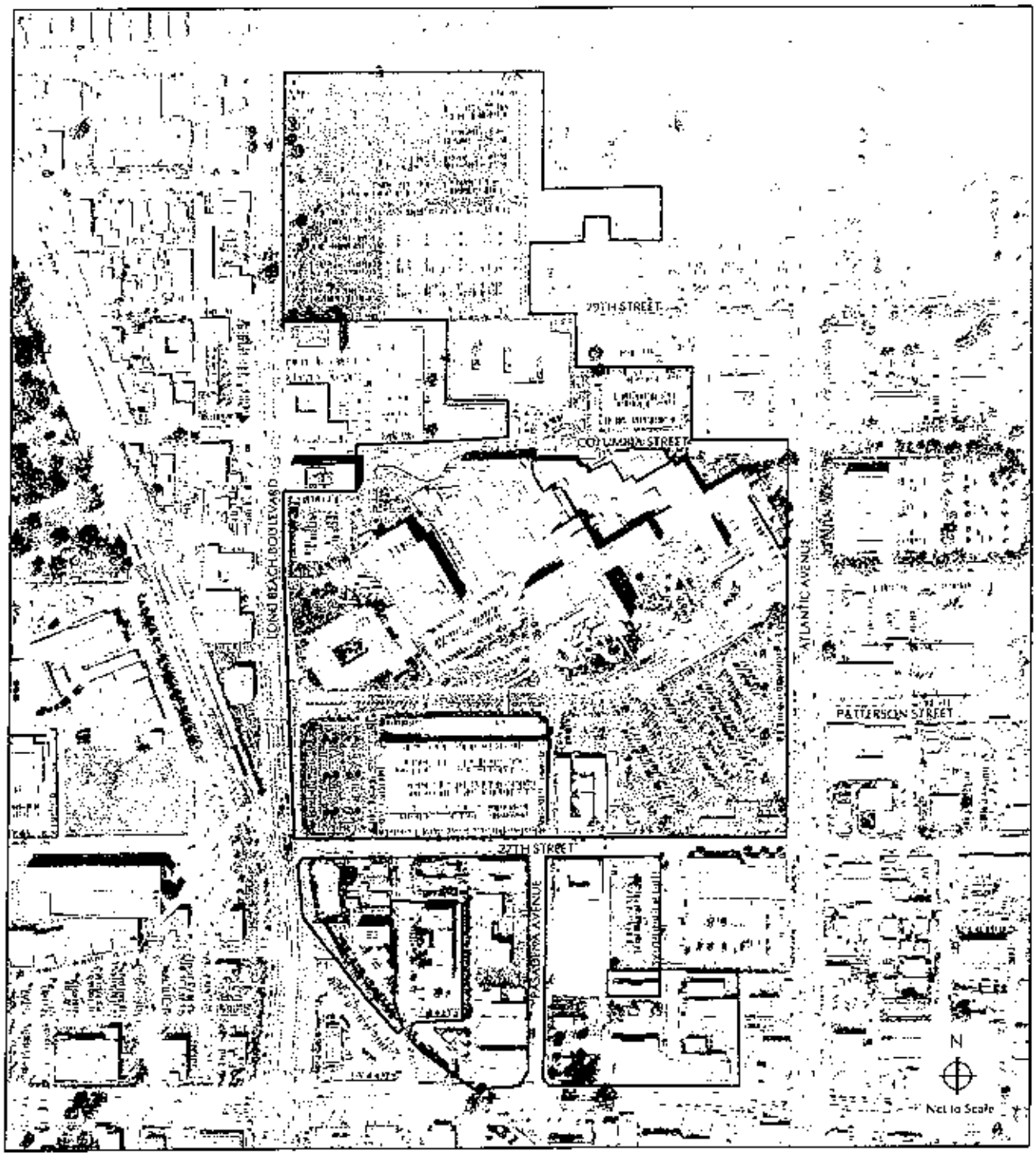
FIGURE 1
Long Beach Memorial Medical Center Location



LEGEND

- Inpatient
- Outpatient
- Mixed Use
- Utilities
- Circulation
- Parking
- LBMMC Boundary
- Buildings Controlled by LBMMC
- Buildings Controlled by Others
- Blue Line (Willow Station)
- Bus Stop (Long Beach Transit)
- (1) Miller Children's Hospital
- (2) Long Beach Memorial Medical Center
- (3) Administration Building
- (4) West Facility/Rehabilitation Building
- Rehabilitation Gym/Parking
- (5) Miller House
- (6) Ranch House / WIC Medical Center
- (8) Memorial Guest Residence
- (9) Research Building
- (10) Elm Medical Plaza
- (11) 3-Story Medical Office Building
- (12) Convalescent Home
- (13) MOB with CT & MRI Orthopedics
- (14) Hillside Medical Plaza
- (15) 2-Story Atlantic MOB
- (16) Medical Office Building - 1 Story
- (17) Buffums Plaza - 1 Story
- (18) CT & MRI Center
- (19) Medical Office Building
- (20) Aloha Motel
- (21) Medical Office Building
- (23) 4-Story Atlantic MOB
- [R] Residential Buildings

FIGURE 2
Existing Conditions



LEGEND

- OU Boundary 1
- OU Boundary 2
- OU Boundary 3
- LBMMC Boundary

FIGURE 3
OU Boundaries

EXHIBIT C

SCOPE OF WORK

The Agreement with the Long Beach Memorial Medical Center addresses three areas. OU1, the Miller Children's Hospital expansion area, OU2, the Todd Cancer Institute, and OU3, the remaining portion of the Long Beach Memorial Medical Center. Activities at OU1 and OU2 are anticipated to run concurrently in order to support proposed construction activities. OU3 activities will be conducted as required by DTSC.

The following Tasks will be completed as part of this Agreement:

TASK 1. Review of Existing Data

The Proponents will ensure that DTSC has all background information, sample analysis, environmental assessment reports, and any other information pertinent to the Site which Proponents have in their possession. DTSC will review the information, identify areas and media of concern, and determine what additional work, if any, is required to complete the Site Characterization, including work required to determine the extent of any off-site contamination.

TASK 2. Site Characterization

The Proponents shall submit a Workplan describing the activities proposed to characterize soil contamination associated with OU1 and 2 including determination of the extent of any off-site contamination.

2.1 Site Characterization Objectives

(a) Characterize the extent of hazardous substance contamination at the OU 1 and 2
(b) Identify existing and potential migration pathways;
(c) Analyze the baseline risks to help determine the need for action at OU1 and 2;
(d) Determine levels of chemicals that can remain onsite and still be adequately protective of human health in residential use.

2.2 Site Characterization Workplan

Proponents shall prepare a Site Characterization Workplan, which will include an implementation schedule which will address determination of the extent of any off-site contamination.

2.3 Site Characterization Report

Proponents shall prepare a Site Characterization report that summarizes the results of Site Characterization activities, including presentation and interpretation of all data and information generated and/or compiled. The Site Characterization report will contain:

(a) Site Background Information, including Physical Characteristics and Site History
(b) Sources of Contamination
(c) Summary of Investigation, discuss all media investigated (i.e., Soil, Geology)
(d) Nature and Extent of Contamination

Task 3. Health-Based Risk Assessment

Proponents will prepare an HRA report. The report will be prepared consistent with U.S. EPA Risk Assessment Guidance for Superfund (EPA/540/1-89/002) and DTSC Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. The HRA report must include the following components:

(a) Contaminant Identification
(b) Exposure Assessment
(c) Toxicity Assessment
(d) Risk Characterization
(e) Environmental Evaluation
(f) Soil Remediation Goals (e.g. NFA or equivalent with no deed restriction)

TASK 4. Removal Action Workplan

If DTSC determines a removal action is appropriate, the Proponents will prepare a Removal Action Workplan (RAW) in accordance with Health and Safety Code sections 25323.1 and 25356.1. The Removal Action Workplan will include:

(a) a description of the onsite contamination;
(b) the goals to be achieved by the removal action;
(c) an analysis of the alternative options considered and rejected and the basis for that rejection. This should include a discussion for each alternative which covers its effectiveness, implementability

and cost;

(d) administrative record list; and

(e) a statement that the RAW serves as an equivalent document to the Engineering Evaluation/Cost Analysis document required by the National Contingency Plan.

If the proposed removal action does not meet the requirements of Health and Safety Code section 25356.1(h), the Proponents will prepare a Remedial Action Plan (RAP) in accordance with Health and Safety Code section 25356.1(c) for DTSC review and approval.

TASK 5. California Environmental Quality Act (CEQA).

DTSC will prepare the necessary CEQA documents. If required, the Proponent shall submit the information necessary for DTSC to prepare these documents.

TASK 6. Implementation of Final Removal Action Workplan.

Upon DTSC approval of the final Removal Action Workplan (RAW), the Proponents shall implement the removal action, as approved. Within thirty (30) days of completion of field activities, Proponents shall submit an Implementation Report documenting the implementation of the final RAW.

TASK 7. Changes During Implementation of the Final RAW.

During implementation of the final RAW, DTSC may specify such additions, modifications and revisions to the RAW as deemed necessary to protect human health and safety or the environment or to implement the RAW.

TASK 8. Public Participation.

8.1 The Proponents shall conduct appropriate public participation activities given the nature of the community surrounding OU1 and 2 and the level of community interest. Proponents shall work cooperatively with DTSC to ensure that the affected and interested public and community are involved in DTSC's decision-making process. Any such public participation activities shall be conducted in accordance with Health and Safety Code sections 25358.7, the DTSC Public Participation Policy and Procedures Manual, and with DTSC's review and approval.

8.2 The Proponents shall prepare a community profile to examine the level of the community's knowledge of the Site; the types of community concerns; the proximity of the Site to homes and/or schools, day care facilities, churches, etc.; the current and proposed use of the Site; media interest; and involvement of community groups and elected officials.

8.3 The Proponents shall develop and submit fact sheets to DTSC for review and approval when specifically requested by DTSC. Proponents shall be responsible for printing and distribution of fact sheets upon DTSC approval using the approved community mailing list.

8.4 The Proponents shall publish, in a major local newspaper(s), a public notice announcing the availability of the RAW for public review and comment. The public comment period shall last a minimum of thirty (30) days.

8.5 DTSC may require that the Proponents hold at least one public meeting to inform the public of the proposed activities and to receive public comments on the RAW.

8.6 Within two (2) weeks of the close of the public comment period, the Proponents shall prepare and submit to DTSC a draft response to the public comments received.

8.7 If appropriate, the Proponents will revise the RAW on the basis of comments received from the public, and submit the revised RAW to DTSC for review and approval. The Proponents will also notify the public of any significant changes from the action proposed in the RAW.

TASK 9. Quality Assurance/Quality Control (QA/QC) Plan.

All sampling and analysis conducted by the Proponents under this Agreement shall be performed in accordance with a QA/QC Plan submitted by the Proponents and approved by DTSC. The QA/QC Plan will describe:

(a) the procedures for the collection, identification, preservation and transport of samples;
(b) the calibration and maintenance of instruments;
(c) the processing, verification, storage and reporting of data, including chain of custody procedures and identification of qualified person(s) conducting the sampling and of a laboratory certified or approved by DTSC pursuant to Health and Safety Code section 25198; and
(d) how the data obtained pursuant to this Agreement will be managed and preserved in accordance with the Preservation of Documentation section of this Agreement.

EXHIBIT D

COST ESTIMATE WORKSHEET

VOLUNTARY CLEANUP AGREEMENT

Project Name: Long Beach Memorial Medical Center Expansion Areas: Miller Children's Hospital (OU1) & Todd Cancer Institute (OU2)

Title	VCP Coord.	Project Manager		Supervisor		Toxicology	Geology	Industrial Hygiene	HQ Engring	Public Particip	HQ CEQA	Legal	Clerical
Classification	Sr. HSS	HSS	HSE	HSSI	HSEI	Staff Toxicologist	Eng Geol.	Assoc IH	HSE	PPS	AEP	Staff Counsel	WPT
TASK: Agreement Prep./Negotiation		8		4									
Scoping Documents: HSP/SAP/QAP													
Review and comment on existing data and Preliminary Endangerment Assessment (PEA) equivalent documents and provide general project oversight[1].		8		4		12	12						2
Site Characterization													
- Workplan[2]		8		4		8	8						2
- Implementation[3]		4		2			8						
- Report[4]		32		8			24						2
Risk Assessment		16				40							
Public Participation		4								24			
CEQA[5]													
Removal Action Workplan[6]		32		12		24	24			16			
Implement Removal Action		12					4						
Design													
Remedial Action Plan (RAP)													
Certification		12		2		8							
Deed Restriction		16		2								16	2
Operation & Maint													
Total No. Hours/Class		144	0	34	0	92	80	0	0	40	0	0	8
Hourly Rate/Class		111	123	128	135	150	123	116	123	104	109	153	52
Cost/Class		15984	0	4352	0	13800	9840	0	0	4160	0	0	416
Grand Total Cost	$48,552												

14-Feb-05

Cost Assumptions:

[1] The Project Manager will conduct a review of the reports provided. The Geologist and the Toxicologist will also perform reviews of the existing data to facilitate discussions with the proponent with regards to the expectations of the Sampling and Analysis Plan Significant historical data exist which need to be evaluated. A site visit will be conducted prior to work plan sumittal in order to facilitate the approval process.

[2] The estimate of job hours are based on the assumption that the Sampling and Analysis Plan for both OUs will be combined in a single deliverable. Estimate includes review time, and allocates time for team communication

[3] In addition to a field visit, this cost estimate assume that the DTSC Geologist and Project Manager may be involved with discussions regarding field data and step out sampling

[4] As with the other subtasks in this category, the assumption is that the report for both OUs will be presented under simultaneously. This category also includes time for meetings, conference calls and other communication that will be needed in order to facilitate the movement of the project

[5] Assumes CEQA compliance addressed via EIR. Estimate not provided at this time

[6] The need for this task is contingent upon the results of the Site Characterization Report, and the job hour estimate is based on the data presented in the VCA application

EXHIBIT D

COST ESTIMATE WORKSHEET

VOLUNTARY CLEANUP AGREEMENT

Project Name: Long Beach Memorial Medical Center: Exisiting Facility (OU3)

Title	VCP Coord.	Project Manager		Supervisor		Toxicology	Geology	Industrial Hygiene	HQ Engring	Public Particip	HQ CEQA	Legal	Clerical
Classification	Sr. HSS	HSS	HSE	HSSI	HSEI	Staff Toxicologist	Eng Geol.	Assoc IH	HSE	PPS	AEP	Staff Counsel	WPT
TASK: Agreement Prep./Negotiation													
Scoping Documents: HSP/SAP/QAP													
Review and comment on existing data and Preliminary Endangerment Assessment (PEA) equivalent documents and provide general project oversight[1].		8		4		8	8						2
Site Characterization													
- Workplan		24		4		8	24						2
- Implementation		4		2			8						
- Report		32		8			24						2
Risk Assessment		16				40							
Public Participation		4								24			
CEQA[2]													
Removal Action Workplan[3]		32		12		16	16			8			
Implement Removal Action		12					4						
Design													
Remedial Action Plan (RAP)													
Certification		12		2									
Deed Restriction		16		2								16	
Operation & Maint[5]													
Total No. Hours/Class		160	0	34	0	72	84	0	0	32	0	0	6
Hourly Rate/Class		111	123	128	135	150	123	116	123	104	109	153	52
Cost/Class		17760	0	4352	0	10800	10332	0	0	3328	0	0	312
Grand Total Cost	$46,884												

14-Feb-05

Cost Assumptions:

1 Much of the background information for this site would have been evaluated in conjuction with activities conducted at OU1 and OU2

2 Assumes CEQA compliance addressed via EIR. Estimate not provided at this time

3 The need for this task is contingent upon the results of the Site Characterization Report.

Exhibit E

TASK	Timeline
Agreement to Execution	February 2005
Proponent to Submit Advance Payment	10 Days After Agreement Execution
Proponent to Submit Site Characterization Work Plan/Quality Assurance Plan for OU 1 and OU 2	14 Days After Agreement
DTSC To Review and Comment on Site Characterization Work Plan/Quality Assurance Plan	Within 30 days of Receipt of Site Characterization Work Plan/Quality Assurance Plan
Proponent to Prepare and Submit Site Characterization Report for OU 1 and OU 2	Within 30 days of Completion of Field Activities
DTSC To Review and Comment on Site Characterization Report	Within 30 days of Receipt of Site Characterization Report
Proponent to Prepare and Submit Draft RAW for OU 1 and OU 2	Concurrently with Site Characterization Report
DTSC to Review and Comment on Draft RAW	Within 30 days of Receipt of RAW
Public Participation Activities for OU 1 and OU 2	Concurrently, as Determined by Project Needs
Proponent to Finalize RAW and incorporate DTSC and Public Comments	Within 15 days of close of comment period
DTSC to Approve Final RAW	Within 15 days of Receipt of Final RAW
Proponent to Implement RAW for OU 1 and OU 2	As outlined in RAW
Proponent to Submit Implementation Report	As outlined in RAW

Appendix M

Traffic Analysis Cover

The City of Long Beach Department of Public Works traffic engineer reviewed Linscott, Law & Greenspan Engineers' Traffic Impact Analysis and determined that it was complete and adequate. The cover for the report has been revised to reflect this determination.

LINSCOTT LAW & GREENSPAN engineers

DRAFT TRAFFIC IMPACT ANALYSIS

LONG BEACH MEMORIAL MEDICAL CENTER EXPANSION

Long Beach, California
December 17, 2004

Prepared for:

Sapphos Environmental, Inc.
133 Martin Alley
Pasadena, California 91105

And

The City of Long Beach
Department of Community Development
333 West Ocean Boulevard
Long Beach, California 90802

LLG Ref. 2.04.2573.1

Prepared by:
Daniel A. Kloos, P.E.
Transportation Engineer II

Under the Supervision of:
Richard E. Barretto, P.E.
Principal

Linscott, Law & Greenspan, Engineers
[illegible]

Appendix N

Résumés

Appendix N

Kleinfelder, Inc.
Résumés

SCOTT DWYER
Senior Toxicologist

Summary of Experience

Dr. Dwyer specializes in the application of toxicology and risk analysis techniques to human health risk assessment, facility siting, and risk of catastrophic events, including chemical releases, pipeline failures, and terrorist attacks. He has served as the project/task manager on many risk assessments performed under CERCLA, RCRA, and state guidelines across the country. Dr. Dwyer has conducted numerous human health screening evaluations in accordance with Department of Toxic Substances Control (DTSC) guidance for proposed new school sites in California. Dr. Dwyer has also provided expert testimony and litigation support on behalf of the U.S. Department of Justice and private clients. He participated in the development of the Interim TPH Policy for the State of Washington and in the development of risk assessment guidelines that are being applied to railroad facilities in Mexico.

Dr. Dwyer has been the senior author or co-author of more than 100 client-funded risk assessment and toxicology reports. This work has encompassed baseline human health risk assessments in several states, including California, Oregon, Washington, Idaho, Montana, Utah, Nevada, Arizona, Alaska, Mississippi, and South Carolina. These risk assessments included evaluations of risk associated with chemicals released to air, soil, and surface and ground water.

Education

BA, History, Washington State University at Pullman, Washington, 1982
BS, General Studies/Biological Sciences, Washington State University at Pullman, Washington, 1983
MS, Pharmacology/Toxicology, Washington State University at Pullman, Washington, 1985
PhD, Pharmacology, University of Alabama System : Birmingham, Alabama, 1989

Registrations

Diplomat of the American Board of Toxicology (D.A.B.T.), NAT, 1997

Professional Affiliations

Society for Risk Analysis

Select Project Experience

The following is a representative selection of Scott Dwyer's project experience.

Health Risk Assessment

Human Health and Ecological Risk Assessments for Six Installation Restoration Program (IRP) Sites, Space and Naval Warfare Systems Center (SPAWAR), Point Loma Naval Complex, San Diego, California. Dr. Dwyer is the task manager and technical lead for the development of six human health and ecological risk assessments being performed at the SPAWAR facility on Point Loma in San Diego, California. The six sites have

supported various naval operations including a plating and sandblasting shop, re-fueling, and sewage disposal. The contaminants of concern include metals (e.g., arsenic, beryllium, cadmium), volatile organic compounds, pesticides, PCBs, and PAHs. The primary exposure pathways of concern include soil ingestion, inhalation of soil particulates, and direct dermal contact for humans and other animals, as well as uptake of contaminants by plants. The project team is also evaluating the potential for leaching of contaminants to groundwater and transport to the Pacific Ocean located within 0.25 miles of each of the sites. The risk assessment reports are now under review at the State of California Department of Toxic Substances Control.

Risk Assessment, Cement Plant (Confidential Client), Trident, Montana. Dr. Dwyer developed a risk assessment of exposure to potential TDF emissions by pathways including inhalation, dermal contact, water ingestion, soil ingestion, ingestion of locally-produced beef, poultry, pork, eggs, milk, and grains, as well as ingestion of mother's milk by nursing infants.

Dr. Dwyer also performed a screening level ecological risk assessment although such a study is not specifically required under Montana environmental law. The risk assessment is the key piece of what MDEQ is calling the "air permit of the decade" because of the breadth of exposure pathways evaluated, the high level of public concern, and the efforts to block permit approval. A draft permit was approved in March 2003. The TDF project is now undergoing an environmental impact statement. Dr. Dwyer has been a key participant in several meetings with MDEQ during the scoping and review of the risk assessment and has made presentations describing this work at public meetings.

Human Health Risk Assessment, Blackman-Uhler Chemical Company, Spartanburg, South Carolina. Blackman-Uhler Chemical Company, Spartanburg, South Carolina. Dr. Dwyer prepared the human health risk assessment for the RCRA Corrective Measures Study (CMS) completed for the Blackman-Uhler Chemical Company plant in Spartanburg, South Carolina. The risk assessment involved the evaluation of nine Solid Waste Management Units (SWMUs) and SWMU groups generated as a result of aniline dye production at the subject plant, as well as on-site groundwater, and nearby surface waters.

The key health risk issues at the plant site included ingestion of and dermal contact with affected soil, and inhalation of dust by plant employees and subsurface utility workers. Groundwater was not a domestic supply and did not migrate to or commingle with a domestic supply; however, leachability of soil contaminants to groundwater was addressed in the risk assessment.

Based on the risk assessment, target soil cleanup goals for the protection of groundwater were developed. The risk assessment was prepared to meet the standards of the South Carolina Department of Health and Environmental Control (DHEC) and Region IV of the U.S. EPA. The RCRA CMS was submitted to DHEC and EPA and formed the basis of

the first Corrective Action Management Unit (CAMU) permit approval in the State of South Carolina.

Human Health Risk Assessment, Tooele Army Depot, U.S. Army Corps of Engineers, Tooele, Utah. Dr. Dwyer performed a baseline human health risk assessment for the Tooele Army Depot (TEAD) to support the optimization of the on-going groundwater treatment system and to support the implementation of an alternative cleanup level for trichloroethene (TCE), which was present in the groundwater at concentrations that exceed the Maximum Contaminant Level (MCL) at some monitoring well locations.

TCE and chloroform were the primary chemicals of concern. For these and a handful of other VOCs, three human health exposure scenarios based on various subsets of monitoring well data were evaluated. Two of the scenarios were focused on residential exposures, including water ingestion, dermal absorption, and inhalation of vapors during bathing. The third scenario was focused on an industrial exposure scenario and included an evaluation of water ingestion and dermal contact.

The results of the risk assessment and the toxicological information available for TCE supported the conclusion that an alternative cleanup level significantly greater than the MCL of 5 ug/L was appropriate and health-protective. The risk assessment also supported recommendations for treatment system modifications that would save the Army Corps of Engineers approximately $20 million in operating costs over the life of the remediation effort.

Human Health Risk Assessment, Nevada Power, Moapa, Nevada. Dr. Dwyer was the task manager for the development of a human health risk assessment of soil and groundwater contamination observed at the Reid Gardner Station (RGS) operated by Nevada Power in Moapa, Nevada. RGS is approximately 45 miles northeast of Las Vegas and is comprised of four coal-fueled electric generating units. The risk assessment was based on several rounds of Phase II investigation data. The primary chemicals of concern included arsenic, chromium, lead, vinyl chloride and other chlorinated hydrocarbons, and PCBs. Exposures to soil and groundwater were evaluated for a worker exposure scenario. The purpose of the risk assessment was to provide a sound technical basis for recommending additional investigation, remediation, or no-further-action. Based on Dr. Dwyer's evaluation, soil at RGS did not require further investigation or remediation; however, additional monitoring was recommended for groundwater.

Human Health Risk Assessment, Former Pepsi Distribution Plant, Ogden, Utah. Dr. Dwyer performed a human health risk assessment for parties responsible for a plume of PCE, TCE, and other chlorinated solvents that originated from a former distribution plant and had migrated under an adjacent residential area. The specific goals of the risk assessment were to support a request to discontinue groundwater monitoring and to demonstrate that the groundwater plume would not reach surface water. Domestic use of groundwater was eliminated as an exposure pathway of concern based on a well survey that showed no existing domestic supply wells in the study area. The Johnson and

Ettinger model for subsurface vapor transport was used to estimate indoor air concentrations of the chemicals of concern and to estimate cancer risk and noncancer hazard. A survey of the design of the homes in the area was performed to identify those constructed with basements and those with slab-on-grade foundations. Because approximately half of the homes had basements, the vapor migration model was set up to evaluate homes with basements.

The results of the risk assessment demonstrated that groundwater concentrations of PCE, TCE, and the other chlorinated solvents had declined over time and that vapor migration to indoor air did not yield a cancer risk exceeding 1 x 10-6 or a noncancer hazard of 1.0. The responsible parties proposed, and the Utah Department of Environmental Quality agreed, that groundwater monitoring could be discontinued, saving the client thousands of dollars in annual groundwater monitoring costs.

Human Health Screening Evaluation, Midland Elementary School, Poway Unified School District, Poway, California. Dr. Dwyer performed a human health screening evaluation of chemicals detected in soil samples collected from the Midland Elementary School campus. The school district plans to demolish the existing school and construct a new elementary school on the same site. The chemicals of potential concern included termiticides (chlordane and dieldrin) injected into the soil around and under the school building possibly as long ago as the 1960s. Due to the persistent nature of these chemicals, significant quantities remain in subsurface soil. After completion of the health screening evaluation, Dr. Dwyer participated in two public meetings to discuss the results and answer questions posed by school faculty, staff, and the parents of children attending the school. Based on the results of the screening evaluation, Dr. Dwyer recommended the excavation and off-site disposal of soils containing chlordane and dieldrin. The human health screening evaluation was performed in accordance with California Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment (PEA) guidance.

Tier II RBCA Health Risk Evaluation, CalTrans Coalinga Maintenance Station, Coalinga, California. Dr. Dwyer performed a Tier 2 Risk Based Corrective Action (RBCA) health risk evaluation for soil affected by petroleum hydrocarbon releases at the Caltrans Coalinga Maintenance Station in Coalinga, California. The purpose of the risk evaluation was to provide information to support a no-further-action designation for the hydrocarbon releases based on the low level of hazard that hydrocarbons pose to human health. Estimates of cancer risk and noncancer hazard were developed based on site-specific information collected during site investigations and on default exposure assumptions provided by EPA and the State of California. The maximum soil and soil gas concentrations of the chemicals of concern were used to represent an upper bound exposure scenario. The chemicals of concern included petroleum hydrocarbons (observed as gasoline, diesel, or motor oil), organochlorine pesticides (DDE and DDT), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Based on the results of the risk assessment, Dr. Dwyer concluded that the site should receive a no-further-action designation for soil affected by the chemicals of concern.

Vapor Migration Modeling and Human Health Risk Assessment, South Shore Shopping Center, Alameda, California. Dr. Dwyer performed a human health risk assessment of indoor air concentrations of chemicals in two retail dry cleaning operations at the South Shore Shopping Center in Alameda, California. The chemicals of concern (primarily tetrachloroethene) may have been present in the indoor air due to the use and storage of dry cleaning materials during normal operations or due to subsurface releases of these chemicals that later migrated as vapors from soil or groundwater to indoor air. Health hazards were evaluated under current and future occupational exposure conditions based on OSHA and NIOSH exposure limits, and based on California Office of Environmental Health Hazards Assessment (OEHHA) "No Significant Risk Levels." Vapor migration modeling was performed using the EPA and DTSC approved Johnson and Ettinger model. The objective of the vapor migration modeling and risk assessment was to support future land use evaluations by the property owner and to evaluate worker safety under current conditions.

Vapor Migration Modeling and Human Health Risk Assessment, Hawthorne Gateway Center, Hawthorne, California. Dr. Dwyer assessed the human health risk that may be associated with organic vapors migrating from subsurface soil to the indoor air of an hypothetical commercial/retail structure located at the proposed Gateway Center development in Hawthorne, California. Four soil gas surveys were conducted on the site and the results of these surveys were used to model the potential organic vapor migration. Specifically, the maximum soil gas concentration of each organic chemical detected was used in an EPA vapor migration model to estimate the indoor air concentration. Then, the estimated indoor air concentration of each chemical was used to estimate the cancer risk or noncancer hazard that may be associated with inhalation of the chemicals of concern under a commercial land use scenario.

Risk Assessment of Proposed School Expansion Site, Anaheim City School District, Anaheim, California Dr. Dwyer was the technical director for the risk assessment of a proposed school expansion site located in Anaheim, California. The school district planned to re-develop a vacant lot near an existing school for additional classroom space and a playfield. The district identified three concerns with the use of this property by students:

· A petroleum product transport pipeline that passed through the site 20 feet below ground surface;
· The presence of a nearby oil company fuel storage and distribution facility; and
· A culvert and outfall through which petroleum products could travel if an accidental release occurred from the oil company facility.

Kleinfelder's risk assessment approach focussed on six key areas:

· Engineering design of the pipeline and above ground storage tanks, including seismic vulnerability;
· Safety and release-prevention measures implemented for the pipeline and tank farm;

· Air emissions from the oil company tank farm;
· The environmental fate and transport and the toxicity of the petroleum products transported through the pipeline or stored at oil company;
· The likelihood that exposure of students will occur at a level that could result in adverse health effects; and
· The ability of facility-based or local hazardous materials emergency response teams (hazmat teams) to mitigate releases, prevent exposures, and restore site conditions.

Kleinfelder's work was executed on a tight schedule given the district's demanding construction schedule: the growth in the local student population required the rapid construction of more classroom space. Kleinfelder's work resulted in a risk assessment report used to support a determination of non-significance and contributed to the timely implementation of the construction schedule. The work was completed on time and under budget.

Water Pipeline Risk Analysis, Moreno Valley, California, Val Verde Unified School District The Val Verde Unified School District retained Kleinfelder to prepare a water pipeline risk analysis for a proposed new school site in Moreno Valley, California. The State of California Department of Water Resources (DWR) operates the Santa Ana water pipeline, a 10-foot diameter prestressed concrete pipeline that passes immediately adjacent to north and east boundaries of the proposed school site. Because the pipeline passes within 1,500 feet of the proposed school site, the California Code of Regulations stipulates that a risk analysis study must be performed. The risk analysis was designed to assess the likelihood that the integrity of the pipeline could be compromised in a location, and to a degree, that poses an unacceptable hazard to the students, faculty, and staff of the proposed school.

This risk analysis was based on the following information:
· pipeline alignment,
· use characteristics (flow rate and frequency of use),
· engineering design and safety features,
· records of past incidents,
· failures in similar systems (frequency, magnitude, consequences), and
· risk management and emergency response plans of the pipeline owner, local emergency response agencies, and the school district.

Kleinfelder concluded that, based on available information, the likelihood that the pipeline would fail at the location of the school site was low. Kleinfelder provided recommendations to the school district designed to limit the consequences of a pipeline failure. Kleinfelder's risk analysis report is under review at the California Board of Education.

Natural Gas Pipeline Risk Analysis, Liberty Unified High School District, Brentwood, California The Liberty Unified High School District retained Kleinfelder to prepare a natural gas pipeline risk analysis for the proposed site of a new high school. The

California Code of Regulations stipulates that a risk analysis study must be performed before a site can be approved for a new school. The purpose of the risk analysis was to assess the likelihood that the integrity of the pipeline could be compromised in a location, and to a degree, that poses an unacceptable hazard to the students, faculty, and staff of the proposed school. Dr. Dwyer prepared the risk analysis according to the California Department of Education (CDE) guidance, which includes a probability and consequence analysis of leak fires, jet fires, and vapor cloud explosions. Two pipelines were located within 1,500 feet of the proposed school site: one operated by CalPine and the other operated by PG&E. On the basis of the risk analysis, Dr. Dwyer made recommendations about the placement of structures on the high school site and landscape modifications that would reduce the impact of a pipeline explosion. The report has been submitted to the CDE for site approval.

Shaver's Farm Landfill, Walker County, Georgia. Dr. Dwyer provided expert testimony regarding the human health and ecological impacts of dioxin and the pesticides dicamba and benzonitrile. In his deposition, Dr. Dwyer reviewed the environmental fate and transport, potential exposure pathways, and toxicology of the chemicals of concern. The deposition also included an assessment of the likelihood that humans, other animals, or plants would be adversely affected by release of the landfill contents to the environment.

WSU Research Station, Long Beach, Washington. Dr. Dwyer provided toxicology and risk assessment support in negotiations with the Washington Department of Ecology regarding the appropriate sampling program for a pesticides released to soil at an agricultural research station. The chemicals of concern included the pesticides dieldrin and DDT. Based on the toxicity and the environmental fate and transport of the chemicals of concern a limited soil sampling program was developed to cost-effectively allocate site investigation resources.

Tuttle Rhododendron Farm, Whidbey Island, Washington. Several pesticides, including DDT, atrazine, dieldrin, and dichlobenil had been used historically at a rhododendron farm. Dr. Dwyer developed soil cleanup levels for the chemicals of concern to protect human health and to provide reasonable goals for remediation at the site. This work included the development of an oral reference dose (RfD) for dichlobenil which was not previously available but which forms the basis of the soil cleanup level. An RfD is the dose of a chemical that is not expected to cause adverse health effects in humans.

Baseline Risk Assessment for Rocker Timber Framing and Treatment Plant Site. Prepared a baseline risk assessment for a small timber treatment site within the Silver Bow Creek/Butte Addition Superfund Site. The site had been impacted by fluvially deposited mine, mill, and smelter wastes, residual contamination from operation of the wood treatment plant, and use of arsenical pesticides on the railroad right-of-way that passed through the site. Dr. Dwyer conducted a sample-specific risk assessment to focus attention on those portions of the site that yielded the most significant human health risk.

Preparation of Human Health Risk Assessment Reports for Three Mississippi Air National Guard Bases, Jackson, Meridian, and Gulfport, MS. As part of the Installation

Restoration Program (IRP), Dr. Dwyer prepared human health risk assessments for three Air National Guard bases in Mississippi. Petroleum hydrocarbons and pesticides were the primary contaminants of concern in soil, groundwater, and surface water. Dr. Dwyer participated in selecting groundwater monitoring sites to optimally investigate the potential for contamination of nearby domestic water supply wells. He also managed all aspects of the preparation of the risk assessments, including data evaluation, identification of contaminants of concern, exposure and toxicity assessment, and risk characterization. The three reports were completed on time and under budget.

Mica Landfill, Mica, Washington. Dr. Dwyer prepared one of the first landfill risk assessments conducted under the Model Toxics Control Act. The municipal landfill in Mica had received household and municipal solid waste and the primary chemicals of concern included metals (such as arsenic, cadmium, chromium, copper, and manganese), chlorinated solvents (including perchloroethylene and trichloroethene), and phthalate esters (including bis-2-ethylhexyl phthalate). The potential public health hazards associated with landfill leachate impacts to area groundwater and surface water (particularly Chester Creek) were the focus of the risk assessment. On the basis of the risk assessment, exposure to groundwater and surface water did not appear to pose an unacceptable public health hazard.

Centralia Landfill, Centralia, Washington. As part of a remedial investigation/ feasibility study at the Centralia Landfill, Dr. Dwyer developed preliminary remediation goals (PRGs) for the chemicals of concern in landfill leachate. A conceptual site model was prepared to evaluate the potential exposure pathways associated with the landfill and the chemical-specific PRGs were developed for each of those pathways. The PRGs were used to determine appropriate quantification limits for the soil and groundwater sampling program and for theevaluation of various remedial technologies.

Seattle Water Department, Mountain Tree Farm Property, North Bend, Washington. Dr. Dwyer and the Kleinfelder project team developed a risk-based approach to the remediation of petroleum-contaminated soil at the Mountain Tree Farm Property. The site was formerly used as a logging operations facility which provided lodging for workers, logging truck and equipment maintenance, fuel storage and dispensing, and a railroad siding for transferring logs from trucks to railroad flatcars. The Water Department plans to redevelop the property as the trailhead for the Iron Horse Trail System. The risk-based approach incorporated the newest methodologies for assessing and managing petroleum-contaminated soils, including the ASTM Risk-Based Corrective Action (RBCA) standard, and Ecology's Interim TPH Policy, which is under development. The Kleinfelder approach involved segregating excavated soil according to risk-based petroleum hydrocarbon concentrations. Segregation of the soil resulted in a more efficient and cost-effective remediation of only the soils that posed an unacceptable level of health hazard. Soil considered clean from a health risk perspective was used to backfill the site excavations.

Petroleum Users Group (PUG), Port of Anchorage, Alaska. Dr. Dwyer prepared the human health risk assessment for the PUG area of the Port of Anchorage (POA). The purpose of the risk assessment was to support the development of alternative cleanup level goals for remediation of the PUG-POA area. Gasoline, diesel, jet fuels, lubricants, and the BTEX compounds are the primary contaminants of concern. This site is one of the major petroleum storage and distribution facilities in the state and is located on a deep water channel, Knik Arm, of Cook Inlet. The PUG is a consortium of bulk fuel refiners and suppliers, including MAPCO Alaska Petroleum, Texaco, Chevron, Tesoro, Defense Fuels, and Signature Fuels. The PUG-POA area covers approximately 600 acres and contains more than 100 above ground petroleum storage tanks and miles of associated pipeline. The port is equipped to load and off-load semi tanker trucks, railroad tank cars, and ocean-going oil tankers.

Truax Harris Energy, Madison Avenue Property, Portland, Oregon. Dr. Dwyer applied the new ASTM RBCA Standard and the Oregon Department of Environmental Quality (DEQ) RBCA methodology to evaluate residual petroleum contamination at a former gas station site in downtown Portland. The site owners planned to redevelop the site with condominiums. The potential exposure pathways that were evaluated included volatilization of hydrocarbons from subsurface soil to ambient outdoor air. Based on architectural drawings for the condominiums, volatilization to indoor air was not evaluated because the first floor of the planned development was to be an open air carport. Soil excavation on the site was directed by soil analysis and comparison of analytical results to Tier 1 RBCA risk-based screening levels (RBSLs), which Dr. Dwyer developed. The cost of remediation was, therefore, limited to management of soil that posed an unacceptable health hazard. The site is currently under consideration by DEQ for closure based on the RBCA evaluation.

Wall Street Properties, South San Francisco and San Mateo, California. Dr. Dwyer prepared risk-based corrective action evaluations according to the ASTM RBCA Standard for three automotive repair and fuel dispensing operations in the Bay Area. Subsurface soil and groundwater at the three sites contained residual petroleum hydrocarbons resulting from normal site operations. Dr. Dwyer evaluated four potential exposure pathways at each site, including volatilization of hydrocarbons from subsurface soil and groundwater to outdoor and indoor air. Based on Dr. Dwyer'sevaluation, the residual hydrocarbon contamination did not pose an unacceptable level of health hazard and additional remedial actions were not considered to be warranted. The sites are now under consideration by the San Mateo County Health Department for closure based on the RBCA evaluation.

Risk Assessment and Development of Alternative Cleanup Levels at a Former Bulk Fuel Storage Facility, Olympia, WA. Served as the project manager for a risk assessment and focused feasibility study for a former bulk fuel storage site contaminated with diesel, gasoline, and heavy oil. The site was located on Budd Inlet next to a City of Olympia park. The city wanted to expand the park onto the contaminated site. The risk assessment was used to support an alternative soil cleanup level of 3,000 ppm for petroleum

hydrocarbons and a "substantial and disproportionate" analysis under MTCA, which limited the cleanup costs to a level reasonable for the site owner.

Development of Alternative Soil Cleanup Levels for Petroleum Hydrocarbons, Chevron-Vancouver Bulk Oil Products Plant, Vancouver, WA. Total petroleum hydrocarbon (TPH) concentrations in the soils of a bulk fuel plant, formerly owned by Chevron-U.S.A., exceeded the cleanup levels for gasoline, diesel, and other petroleum products under the Model Toxics Control Act (MTCA) Method A. Remediation of the soil to Method A cleanup levels was not economically practicable particularly since the major contamination was associated with fairly well-defined hot spots. Under the assumption that certain components of the TPH mixtures contributed most of the risk of adverse health effects, Dr. Dwyer used the conservative MTCA exposure factors to develop risk-based alternative soil cleanup levels. The resulting soil cleanup levels, if implemented with capping of portions of the site, will effectively prevent human exposure and protect the groundwater for a fraction of the cost of cleanup to Method A levels.

Risk Assessment to Support Rescinding a Waste Discharge Requirement Order. Prepared a risk assessment of petroleum and solvent contaminated soil and ground water for a Fortune 500 company in Silicon Valley. The innovative approach to the risk assessment was instrumental in supporting the decision of the California Regional Water Quality Control Board to rescind a waste discharge monitoring order which required, in part, quarterly ground water monitoring. The decision to rescind this order was the first of its kind in the State of California and will save the client more than $70,000 per year.

Development of Preliminary Remediation Goals and Toxicological Profiles of Contaminants of Concern, Texaco-Fillmore Plant, Ventura, CA. The soils and surface water of a former site of a Texaco plant were contaminated with petroleum hydrocarbons, polynuclear aromatic hydrocarbons, and metals. Little toxicological information was available for several of the TPH and PAH compounds. Dr. Dwyer prepared toxicological profiles for these chemicals based on similarities in chemical structure to other well-studied compounds. The remedial investigation also required the development of data quality objectives to satisfy the requirementsof a comprehensive baseline risk assessment. Dr. Dwyer prepared risk-based preliminary remediation goals for the contaminants of potential concern to support development of the data quality objectives.

Underground Storage Tank Management Program, Aerospace Manufacturer, Renton, WA. Served as the task manager for the human health risk evaluation portion of an underground storage tank management program for a major aerospace manufacturer. The program incorporated a computer ranking system for evaluating underground petroleum product storage tanks and directing the disposition of those tanks. Remediation of each tank location was based on a computerized ranking system that incorporated human health risks.

Human Health Risk Assessment Project for Eight DEW Line Installations. Under the Installation Restoration Program of the U.S. Air Force, prepared human health risk assessments for eight radar installations on the North Slope of Alaska. These installations

were part of the Distant Early Warning (DEW) line of defense constructed in the 1950s. During operation of the radar installations, contamination of soil, sediments, groundwater, and surface water occurred. The primary contaminants of concern were diesel and gasoline. Other contaminants that were evaluated included chlorinated solvents and PCBs. The risk assessment of the DEW Line installations provided a unique challenge because of the largely subsistence lifestyle of the Inupiat Eskimos inhabiting the North Slope, a primary receptor group of concern. As part of the risk assessment, performed a thorough investigation of subsistence lifestyle patterns drawing from both published and oral resources to develop a reasonable model of exposure for the residents of the North Slope.

Development of a Tier II Analysis for the METRO-West Point Sewage Treatment Plant, Secondary Clarifiers, Seattle, WA. Completion of the $500 million METRO-West Point Sewage Treatment Plant depended in part on procurement of a Notice of Construction for the secondary clarifiers. This required the comparison of chemical emission levels to new standards set in Washington State air toxics legislation. Chloroform emissions from the secondary clarifiers were predicted to exceed the new standard based on air dispersion modeling. In this situation, the air toxics legislation provided the opportunity to develop a risk assessment to support raising the emission standard. Dr. Dwyer prepared a risk assessment (called a Tier II analysis) for the chloroform emissions that indicated exposure to the modeled concentrations posed an acceptable health risk for all segments of the population. After careful review of the risk assessment by the Departments of Ecology and Health, the Notice of Construction was approved. This approval was the first granted by Ecology on the basis of a Tier II analysis.

Class II Permit Modification for RCRA Compliance Monitoring, Envirosafe Services of Idaho, Inc. (ESII), Grandview, ID. Developed alternate concentration limits for groundwater monitoring of chlorinated solvents as part of a Class II permit modification under RCRA. The solvents were leaking from underground storage tanks that were formerly Titan missile silos. After negotiations with the Idaho Department of Health and Welfare, the alternate concentration limits and the rationale applied to their development were determined to be sufficient to support the permit modification. The permit modification will significantly reduce the cost of RCRA compliance for the client.

Development of Appropriate Detection Limits for Ambient Air Monitoring, Hill Air Force Base, Utah. Hill AFB operates a thermal treatment unit (TTU) for the destruction of missile and rocket motors. Hydrogen chloride (HCl) and chlorine (Cl) emissions from the TTU have been implicated in the development of adverse health effects reported by people who live and work in the area. To evaluate the potential for adverse health effects caused by TTU emissions, Hill AFB proposed to monitor ambient air concentrations of HCl and Cl and to perform a risk assessment based on the results of the monitoring program and air dispersion modeling. Selection of the monitoring equipment required knowledge of reasonable detection limits for HCl and Cl. Dr. Dwyer developed risk-based detection limits for these two chemicals based on the toxicology literature

regarding exposure of humans and other animals. These detection limits were the deciding factor in the selection of air monitoring equipment costing thousands of dollars.

Toxicology

Preparation of Toxicological Profiles for the Agency for Toxic Substances and Disease Registry (ATSDR) . Principal author of toxicological profiles for 1,3-dichloropropene and 2-butanone. Development of these profiles required a thorough analysis of the toxicology literature regarding the toxicity and toxicokinetics of these compounds in humans and other animals. Where the toxicity information was sufficient and appropriate, "minimal risk levels" (MRLs) were calculated using a methodology similar to the U.S. EPA reference dose methodology.

Preparation of Health and Environmental Effects Documents (HEEDs) for the U.S. Environmental Protection Agency. Principal author of the HEEDs for formaldehyde, hydrazine, 1,1-dimethylhydrazine, 1,1-biphenyl, and 2,4,6-trinitrophenol. Preparation of the HEEDs involved a comprehensive analysis of the toxicology and toxicokinetics of these compounds. For compounds with sufficient and appropriate information, reportable quantities (RQs), reference doses (RfDs), and slope factors were developed.

Consortium for Environmental Risk Evaluation (CERE) . Member of the health risk evaluation team assigned to the Hanford reservation under the CERE project funded by the Department of Energy (DOE). This project involved reviewing all of the health risk assessment information available for the Hanford site to determine the adequacy of this information for estimating public health risk, to identify risk priorities, and to identify sites that may pose substantial risk but that have not yet been addressed. The project resulted in a site characterization report that will be used for a presentation DOE must make before Congress.

Software and Database Development

Simulated Exposure Assessment Model (SIMEXAS) . Dr. Dwyer was a principal author and task manager for the development of a probabilistic exposure assessment model (SIMEXAS) that incorporated a Monte Carlo module to develop estimates of exposure point concentrations. SIMEXAS was used by an electric power industry group to successfully challenge new soil cleanup levels proposed by a state on the East coast. A publication based on this application of SIMEXAS was a finalist for the Risk Assessment award at the 1993 annual meeting of the Societyof Toxicology.

The Electronic Handbook of Risk Assessment Values (EHRAV) . Dr. Dwyer conceived, developed, and now publishes the EHRAV database electronically. EHRAV is a compendium of risk assessment values (e.g., reference doses, slope factors, health advisories) that are key to preparing human health risk assessments. EHRAV has been updated monthly since 1992.

HyperText-IRIS. Dr. Dwyer has developed a hypertext version of the U.S. EPA Integrated Risk Information System (IRIS) for the PC. HyperText-IRIS (HTI) allows

rapid access to the toxicological information contained in IRIS using natural language (plain English) queries. HTI incorporates a powerful search engine that allows the user to retrieve, for example, "all of the non-cancer reference doses based on 2-year feeding studies in rats but not mice, monkeys, or guinea pigs." In addition, more than 20,000 hypertext links are embedded in this electronic document which allow the user to rapidly "jump" between related pieces of information. HTI was released in January 1995 and is updated monthly.

Publications and Papers

Co-author, *"Probabilistic Health Risk Analysis of Proposed PCB Soil Cleanup Standards"* , The Toxicologist , Dwyer, S, S. Richards, D. Lincoln, and A. Silvers, (Abstract), 13:275, 1993.

Co-author, *"Probabilistic Exposure Assessment Using a Monte Carlo-Based Model"* , The Toxicologist , Dwyer, S, D. Lincoln and A. Silvers, (Abstract), 12:98, 1992.

Co-author, *"Calcium Mobilization by Cadmium or Decreasing Extracellular Na+ or pH in Coronary Endothelial Cells"*, Exp. Cell Res. , Dwyer, S, Y. Zhuang and J.B. Smith, 192:22-31, 1991.

Co-author, *"Toxicological Profile for 1,3-Dichloropropene,"* , Prepared for the Agency for Toxic Substances and Disease Registry, Dwyer, S, E. Michaelenko, U.S. Public Health Service, Atlanta, Georgia, 1990.

Co-author, *"Health and Environmental Effects Document on Formaldehyde"* , Prepared for the Environmental Criteria and Assessment Office, Dwyer, S, W. Meylan and S. Coleman, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1990.

Co-author, *"Health and Environmental Effects Document on Hydrazine"* , Prepared for the Environmental Criteria and Assessment Office, Dwyer, S, D. Basu and S. Coleman, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1990.

Co-author, *"Toxicological Profile for 2-Butanone (Methyl ethyl ketone)"* , Prepared for the Agency for Toxic Substances and Disease Registry, Dwyer, S, J. Tunkel, U.S. Public Health Service, Atlanta, Georgia, 1989.

Co-author, *"Decreasing Extracellular Na+ concentration Triggers Inositol Polyphosphate Production and Ca2+ Mobilization"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:831-837, 1989.

Co-author, *"Cadmium Evokes Inositol Polyphosphate Formation and Calcium Mobilization: Evidence for a Cell Surface Receptor that Cadmium Stimulates and Zinc Antagonizes"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:7115-7118, 1989.

Co-author, *"Lowering Extracellular pH Triggers Inositol Lipid Hydrolysis and Calcium Mobilization"*, J. Biol. Chem. , Dwyer, S, J.B. Smith and L. Smith, 264:8723-8728, 1989.

Co-author, *"Rat Platelet Aggregation: Strain and Stock Variations"*, Thromb. Res., Dwyer, S, K.M. Meyers, 42:49-56, 1986.

Co-author, *"Anesthetics and Anticoagulants Used in the Preparation of Rat Platelet-Rich-Plasma Alter Rat Platelet Aggregation"*, Thromb. Res. , Dwyer, S, K.M. Meyers, 42:139-149, 1986.

Awards

American Society of Pharmacology and Experimental Therapeutics Travel Grant, 1987.

Graduate Research Fellowship, School of Joint Health Sciences, University of Alabama, 1985.

GEORGE E. JOHNSON

Project Environmental Engineer

Summary of Experience

Mr. Johnson has over 14 years of engineering experience in environmental consulting, managing Phase II site assessments, designing, specifying and managing the installation and operation of remediation systems. His experience includes project management and field task implementation. His project management responsibilities have included client relations, project planning, cost control, and select/supervise subcontractors.
Mr. Johnson currently manages the design, installation, and operation of soil and groundwater remediation systems in addition to reporting and project management for environmental site assessments.

From 1978 to 1983, Mr. Johnson worked as a marine electrician at Todd Shipyard in Seattle, Washington. He trained through the apprenticeship program and obtained Journeyman status. He installed a variety of ship component electrical systems on Navy Frigates (FFG Class), including power, diesel power generators, lighting, communications, alarm annunciation systems, and weapons systems.

Education

MS Environmental Engineering, Washington State University, 1991
BS Civil Engineering, Washington State University, 1988

Registrations

Registered Professional Engineer (Civil), No. C 056641), CA, 1997 (exp. 6/30/01)

Professional Affiliations

American Society of Civil Engineers

Select Project Experience

A representative selection of Mr. Johnson's project experience is included below.

Phase II Environmental Site Assessment, Costco Wholesale, Gateway Center, Costco/Mulvanny Architects, Hawthorne, California. Conducted a Phase II environmental site assessment of this 44-acre site that consisted of over 75 historical addresses.

Mobil Marine Oil Terminal Berths 238-239, On-Call Environmental Assessment Contract with the Port of Los Angeles, California (1997 – 1999). Performed an investigation of the soil at the proposed locations of three land-side anchors at the Mobil Terminal. Prepared a site characterization report.

Clarifier Removal and Vapor Extraction of Chlorinated Solvents, Santa Fe Springs, California. Project manager for the removal of an underground industrial wastewater

clarifier. Excavated impacted soil, performed additional site assessment activities for soil and groundwater, conducted a preliminary risk assessment analysis and wrote report for oversight agency review. Also installed a 100-cfm soil vapor extraction system with activated carbon filtration. Agency interaction included Los Angeles County Haz Mat, Department of Toxics Substance Control (DTSC) and the Los Angeles Regional Water Quality Control Board. A no-further-action letter was obtained from DTSC.

Former Underground Storage Tank (UST) Site, Canoga, California. Conducted groundwater pump test and soil vapor extraction testing. Analyzed groundwater pump test using "Aqtesolv". Performed groundwater pump scenario modeling using "Flowpath". Information from these tests was used in a corrective action plan that was submitted and approved by the local oversight agency.

Groundwater Monitoring, Southern California. Conducted quarterly groundwater monitoring at numerous hydrocarbon (NAPL) impacted sites and DNAPL impacted sites. Wrote quarterly groundwater monitoring reports.

Former Wood Preservative Facility, Los Angeles, California. Abandoned four groundwater monitoring wells using a mud rotary system. Wells were installed through a conductor casing into a confined aquifer.

Site Assessment and Remediation, Valdez, Alaska. Performed site assessment and remedial design at an electric utility, including drilling and logging boreholes, collecting soil samples for bioremediation studies, installing recovery and monitoring wells and conducted a slug test for hydraulic conductivity, a soil vapor extraction test, and an infiltration test. Designed and supervised construction of a mound leachfield and soil aeration system.

Fuel/Gas/Oil

Environmental Site Assessment and Remediation, Proposed Power Plant Expansion, Vernon, California. Project Manager for a site assessment program to identify the source of the release of 30,000 gallons of diesel fuel and assess its extent in order to develop a soil and groundwater remediation approach for rapid site clean-up. During plant expansion preparation in July 2001, the City demolished three large fuel above-ground storage tanks (ASTs), leaving one 1,000-barrel (42,000-gallon) tank containing diesel fuel remaining. In early September 2001 the City discovered that approximately 30,000 gallons of diesel fuel had disappeared from this AST during a 1-month period. On September 5, 2001 the City called and asked Kleinfelder to assess and remediate the site under an emergency action to avoid delaying planned plant expansion, for which a $30 million dollar order for gas turbine generators had

been made. Kleinfelder was able to develop and implement a site assessment program in two days.

The Grove at Farmers Market, Los Angeles, California. Provided environmental engineering services as part of a geotechnical and environmental multidisciplinary team involved with redevelopment of a historic 9-acre parcel of land near downtown Los Angeles. The site was proposed to undergo remodeling and construction of new entertainment and retail services. Part of the property was used for oil production activities between 1910 and 1940. Former surface impoundments containing crude oil and partially refined petroleum products have been identified at the site. Performed a Phase II ESA and managed field staff to assess the lateral and vertical extent of petroleum-affected soils at the project site, and prepared the Phase II ESA report. Based on the results of the Phase II ESA, assisted in performing a performed a human health risk assessment to estimate appropriate cleanup levels for the site. Potential site remediation technologies were assessed with respect to cost, feasibility, coordination with the site development plans, and overall effectiveness.

GATX Carson Terminal, Bulk Fuel Storage Facility, Los Angeles, California. Analyzed pump test results from liquid petroleum hydrocarbon (NAPL) recovery wells at a bulk fuel storage facility. Constructed groundwater elevation contour maps, NAPL thickness contour maps, and NAPL elevation maps. Assisted in the preparation of monthly and biannual reports.

Gasoline Station, San Bernardino, California. Conducted Phase II site assessment work at a gas station. Tasks include installation of nine additional groundwater monitoring wells, groundwater sampling, soil vapor extraction test, slug test, and data analysis. This information was then used to develop a remedial action plan. The selected remedial alternative consisted of groundwater pump and treat, air sparging, and soil vapor extraction.

Bulk Fuel Facility, Valdez, Alaska. Field activities included well sampling for petroleum hydrocarbons, measuring water level/free phase liquid hydrocarbons and sampling wells for inorganic chemistry changes associated with groundwater remediation activities. Wrote quarterly groundwater monitoring reports.

Petroleum Facilities, Fairbanks, Alaska. Conducted slug testing at four sites in a region where groundwater movement can be affected by discontinuous permafrost, and determined hydraulic parameters to be used in remedial design.

Petroleum Refinery, Kenai, Alaska. Performed site assessment investigation. Field activities included drilling, soil sampling, and logging of boreholes; installing

monitoring wells, field screening of soil samples; water level/free phase liquid hydrocarbon measurements; and groundwater sampling.

Manufacturing

Site Assessment and Remedial Investigation, Former Battery Casing Manufacturing Facility, Vernon, California. Managed Phase II site assessment for petroleum hydrocarbons and heavy metals. Wrote work plans and data evaluation reports, and evaluated remedial alternatives for lead impacted soil. Alternatives evaluated included on site soil fixation, capping, and off-site fixation.

Limited Environmental Sampling, Hoekstra Property, Mira Loma, Riverside County, California. Performed Limited Environmental Sampling to assess the potential presence of methane gas in vadose zone soils and pesticides/herbicides resulting from historical agricultural uses at the Hoekstra Property in Mira Loma, Riverside County, CA. The site occupies 127 acres and is proposed to be developed for future warehouses. Two holding ponds are present on the site which contain run-off water from an actively operating dairy on the site. Scope of work included health and safety management, methane probe installation and probe sampling.

Military

Site Assessment, Camp Pendleton Marine Corps Base, California. Managed and conducted field assessment activities at a hydrocarbon release located on a sloping site. Drilled 35 soil borings and installed 6 monitoring wells at the upper and lower slopes and within drainage ravines bordering two sides of the site. Evaluated vadose soils and perched groundwater zones for hydrocarbons. Prepared site assessment report (text, tables, and figures) for submittal to the oversight agency. Evaluated site remediation that utilizes multiple technologies: groundwater extraction, soil vapor extraction, bioventing, and soil excavation with off-site thermal desorption.

Madigan Army Hospital Medical Center at Fort Lewis, US Army Corps of Engineers (USACE), Tacoma Washington. Participated as a member of the field team for the USACE Building Survey. Wrote the Quality Assurance Program Plan and performed the building survey for hazardous materials, which included lead-based paint, asbestos, light ballasts potentially containing PCBs, heating oil tanks, and contaminated soils.

Icy Cape and Peard Bay DEW Line Stations, US Army Corps of Engineers (USACE), Alaska. Icy Cape and Peard Bay are Distant Early Warning (DEW) stations constructed during the cold war (late 1950's) on the northern coast of Alaska west of Barrow. Provided services under a multi-million dollar contract by the USACE to dismantle and remediate these stations during the summer of 1997. Served as the

environmental consultant responsible for guiding soil excavations; soil screening using immunoassay test kits for TPH, DDT, and PCBs; made recommendations to USACE on where to collect samples; and collected soil, surface water, sediment and waste characterization samples. At Icy Cape, also sampled unknown drums and characterized their contents using a HAZCAT kit.

Ports/Harbors

GATX Annex, Chemical Storage Facility, San Pedro, California. Project manager for groundwater monitoring program. Developed wells and studied the influence of tidal fluctuations on groundwater table elevations at a former chemical storage facility. Analyzed groundwater chemical data containing volatile and semivolatile organics, constructed groundwater elevation and plume maps, and wrote quarterly groundwater monitoring reports.

Site Assessment, Former Creosote Facility, Port of Los Angeles, California. Under a consulting services agreement with the Port, supervised the abandonment of conductor cased monitoring wells using a mud rotary drilling system. Evaluated cross-contamination between upper and lower aquifers by video logging wells and evaluating conductor casing integrity. Conducted groundwater monitoring and site evaluation activities, as well as creosote extraction tests and a total fluids extraction test. Directed and installed 12 stainless steel monitoring wells to further delineate a creosote plume and gauged wells for creosote thickness. Analyzed groundwater gradients and dissolved plume concentration contours. Wrote reports (text, tables, and figures) documenting the site evaluation activities that were conducted at the former creosote facility. This information is being used to develop a remedial strategy for the site.

Site Assessment and Remediation, Port of Long Beach, California. Under a consulting services agreement with the Port, supervised the removal and site assessment of abandoned concrete sump filled with hydrocarbon waste and debris. Also project engineer for gauging and crude oil bailing of nine groundwater monitoring wells to evaluate site crude oil background conditions and develop site environmental strategy.

Site Assessment, Berths 144 and 147, Port of Los Angeles, California. Under a consulting services agreement with the Port, acted as the project engineer responsible for preparing the Work Plan and drilling six slant soil borings. The Port plans to replace the existing concrete wharf bulkhead and deepen the wharf by dredging to accommodate deep draft vessels. The slant borings were drilled at a 30-degree angle from horizontal in order to collect continuous core samples from beneath the existing concrete bulkhead. Soil samples were transferred to Ogden Environmental for Green

Book testing to determine suitability for ocean disposal. In order to collect the necessary volume of soil with continuous cores, state-of-the-art rotasonic drilling equipment was used, provided by Boart Longyear. This project was first that Boart Longyear used rotasonic drilling equipment at 30-degrees from horizontal. The borings were advanced from 60 to 106 lineal feet.

Site Assessment and Remedial Investigation, Former Battery Casing Manufacturing Facility, Vernon, California. Managed Phase II site assessment for petroleum hydrocarbons and heavy metals. Wrote work plans and data evaluation reports, and evaluated remedial alternatives for lead impacted soil. Alternatives evaluated included on site soil fixation, capping, and off-site fixation.

Residential

Brighton Gardens, Marriott Senior Living Services, Riverside, California. Currently performing environmental services for a proposed senior living facility. A rock quarry formerly occupied the site, and a geotechnical investigation at the site encountered artificial fill consisting of concrete, rubber, metal, wood and organic debris to 40 feet below ground surface (bgs). Services to date have included drilling (for soil sampling and chemical and refuse characterization), and a soil gas survey.

Groundwater Remediation, SheaHomes, Corona. Project engineer managing groundwater remediation and monitoring for extraction of free phase diesel product from the groundwater and remediation of the vadose zone by bioventing. Designed and managed modification of the remediation system to accommodate redevelopment and re-grading of the site into a baseball field as part of a residential home development.

Compass Homes, Yorba Linda. Involved with the design of methane mitigation systems to allow redevelopment of oil field sites for residential home developments. Currently managing of monitoring contractor construction activities for placement of the methane barrier membrane beneath foundations.

(UST Remediation) Soil & Groundwater Assessment from Leaking UST, Tricon, San Pedro. Assessed soil and groundwater for fuel hydrocarbons and methyl tertiary butyl ether (MTBE), resulting from a leaking UST at an off-site service station.

Groundwater Assessment, Target Store, Santa Fe Springs. Prepared work plan for supplemental assessment of groundwater for MTBE released from a former UST.

(UST Remediation) UST Remediation & Removal Activities, Target Store, Van Nuys. Reviewed previous Phase II and remediation documents of USTs, hydraulic

lifts and clarifiers, and prepared a report. Also prepared a soil management plan for upcoming site development activities, and will manage upcoming removal of a 12,000-gallon diesel UST.

(UST Remediation) UST Assessment, Sunrise Assisted Living, Claremont. Assessed two small USTs as part of due diligence. Performed third party oversight of UST removal activities.

UST Remodel/Remediation

City of Seal Beach Corporate Yard, Removal, Replacement and Upgrade of Underground Fuel Storage Tanks, Seal Beach, California. Project Engineer for the removal, replacement and upgrade of the existing UST fuel system through a three-phase design process, followed by field construction activities.

Hasco Oil, California. Managed quarterly groundwater monitoring and reporting.

La Sierra University, California. Managed quarterly groundwater monitoring and reporting.

Long Beach City Yard, Long Beach, California. Currently managing quarterly groundwater monitoring. Currently preparing remedial action plans.

Sunrise, Claremont, California. Assessed two small USTs. Performed Third Party oversight of UST removal activities as part of due diligence.

Shea Homes, California. Managing remediation of free product diesel plume, remediation system,. And quality groundwater monitoring.

Tricon, San Pedro, California. Assessed groundwater and soil affected by an off-site service station. Monitored UST release for fuel hydrocarbons and MTBE.

Tricon, KFE, Central Avenue. Managed removal of 8,500 gal. gasoline UST. Prepared closure report.

Vista Del Mar Hospital, California. Performed and managed supplemental Phase II assessment of a diesel release. Prepared report requesting site closure.

Belmont Village, California. Managed Phase II assessment of existing 5,000 gal. diesel UST. Prepared report of findings.

Target, Santa Fe Springs, California. Prepared workplan for supplemental assessment of groundwater for MTBE released from former UST.

Target, Van Nuys, California. Reviewed previous Phase II and remediation documents of USTs, hydraulic lifts and clarifiers. Prepared report. Prepared soil management plan for upcoming site development activities. Managing upcoming removal of 12,000 gal. diesel UST.

Transportation

Corridor, State of Alaska, Anchorage Alaska. Performed a preliminary site assessment investigation along a State of Alaska right-of way acquisition corridor. Performed soil gas sampling, collected shallow soil samples, drilled borings, installed groundwater monitoring wells, and inventoried and sampled drums on numerous properties.

Alameda Corridor Transportation Authority. Prepared a Work Plan for the Excavation, Transportation and Disposal of Petroleum Contaminated Soil for the Alameda Corridor Transportation Authority (ACTA) Henry Ford Grade Separation Project. The Work Plan discussed the remedial activities that are considered necessary for the removal of impacted soil along a utility corridor. Specifically, the Work Plan described the procedures for excavation, loading, transportation and disposal of petroleum impacted soil at the site. Following the completion of remedial activities, utility company representatives will install overhead and underground utility lines within the utility corridor.

Methane

Compass Homes Tract 15808, Yorba Linda, California. Project Engineer responsible for the construction monitoring of methane mitigation systems being installed for one new home out of 15 being constructed at a former oil field site. Construction monitoring tasks are being performed to comply with Orange County Fire Authority approved design specifications prepared by Kleinfelder. Activities being performed are monitoring of subgrade base material and vent lines, liquid boot installation, ventilation pipe installation, and post construction monitoring of structures for methane.

Compass Homes Tract 15735, Yorba Linda, California. Project Engineer responsible for the construction monitoring of methane mitigation systems being installed for 7 new homes out of 23 being constructed at a former oil field site. Mitigation systems consist of 4 sub slab passive venting systems, 3 methane barrier sub slab passive

venting systems using liquid boot, venting of seven oil wells to flagpole risers, and street venting. Construction monitoring tasks are being performed to comply with Orange County Fire Authority approved design specifications prepared by Kleinfelder. Activities being performed are monitoring of subgrade base material and vent lines, liquid boot installation, ventilation pipe installation, and post construction monitoring of structures for methane.

Reinhold Industries, Santa Fe Springs, California. Project Engineer responsible for preparing scope of work and work plan for installation of 8 multi-depth soil gas probes at the site, and monitoring of the probes for methane, oxygen, and carbon dioxide. Results of the soil gas monitoring was provided in a letter report of findings with recommendations for methane mitigation for a new 50,000 square foot building and remodeling of existing buildings. Work was performed to comply with the City of Santa Fe Springs Ordinance 829.

Prologis Park Mira Loma, Riverside County, California. Project Engineer responsible for preparing scope of work for a soil gas survey of a 127-acre active dairy farm. Proposed development consists of three warehouses ranging in size from 5.1- to 1.64-million square feet. Performed a one-day soil gas survey using a Geoprobe rig and a field lab. Results of the soil gas survey were provided in a report with recommendations for further work and possible mitigation measures for methane detected at the site.

Western Pacific Housing, Riverside County California. Project Engineer responsible for preparing scope of work for a soil gas survey of a 70-acre active dairy farm. Proposed development consists of 250 residential houses and a park. Performed a one-day soil gas survey using a Geoprobe rig and a field lab. Based on the results of the methane levels found at the site, Kleinfelder is currently performing a methane mitigation evaluation of several alternatives.

Phase I ESA and Methane Screening, Tract No. 28821, Shea Homes, Norco, California. Performed a Phase I environmental site assessment to assess the potential impact resulting from the presence of pesticides, herbicides, solid waste, petroleum hydrocarbons and chlorinated hydrocarbons. The subject property, proposed to be developed for residential purposes, encompasses approximately 77 acres currently being used for agricultural purposes. The site had been used for growing crops since 1952; however, no records indicating dairy operations prior to 1952 were found during the preparation of the Phase I ESA report. Aside from crops, the subject property also houses a residential building at the northern end. Adjoining properties to the north and west are dairy farms. Also conducted methane screening survey assessed the potential presence of methane gas in vadose zone soils. The scope of

work included health and safety management, methane probe installation and probe sampling.

Kaiser Harbor City Medical Center, Los Angeles, California. Project Engineer responsible for preparation of methane mitigation plans for four facility expansion projects consisting of a new parking garage, central plant expansion, relocation of a stairway, and the new Maternal Child hospital wing. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consists of a membrane barrier with subslab passive ventilation system.

Constellation Place, Century City, California. Assumed responsibility as engineer of record for methane mitigation for a 35-story office tower and two parking garages in Century City. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consisted of a membrane liner using HDPE, passive subslab ventilation system, and a continuous ventilation system for the ground floor spaces (Tower and Garages).

FDA Building, Irvine, California. Assumed responsibility as engineer of record for methane mitigation for the new FDA building which was constructed adjacent to the San Joaquin Landfill in Irvine. Engineer of record for construction oversight, request for information responses, and project completion letter. Methane mitigation system consisted of a membrane liner using HDPE, passive subslab ventilation system, and a methane gas detection system with activated building ventilation.

EZ-Lube, Los Angeles, California. Project engineer responsible for preparation of methane mitigation plans for the new automotive lubrication facility consisting of service bays with a basement service pit, office, and waiting area. Prepared methane mitigation plans consisting of a membrane barrier. Obtained plan check approval from the City of Los Angeles Building Department. Obtained approval for a request for modification from the Mechanical Department for ventilation. Construction pending.

<u>SPCC Plans</u>

Eagle Roofing, Rialto, California. Responsible engineer for preparation of the SPCC Plan for Eagle Roofing Products, Inc., a roof tile manufacturing facility located at 2352 North Locust Avenue in Rialto, California. The property is approximately 27 acres in size and contains manufacturing and storage facilities for concrete roofing tiles.

Utility Vault, Fontana, California. Responsible engineer for the preparation and update of the SPCC Plan for Utility Vault, which owns and operates a manufacturing

facility at 10650 Hemlock Avenue in Fontana, California. The property is approximately 27 acres in size and contains manufacturing and storage facilities for precast concrete structures. One 2,000-gallon diesel fuel above ground storage tank (AST) is permanently located at the site and is used to fuel forklift trucks and other yard vehicles.

Weatherford Underbalance Services, Bakersfield, California. Responsible engineer for preparation of the SPCC Plan for Weatherford Drilling and Intervention Services, which provides mobile maintenance service for oil well drilling rigs in Bakersfield, California. The facility has the capacity to store 4,000 gallons of diesel fuel in an above ground, double walled, steel tank for their mobile maintenance truck rigs.

Vopak Terminal Los Angeles, Inc., Wilmington, California. Responsible engineer of preparation of SPCC Plan for Vopak Terminal Los Angeles Inc. Marine Terminal, located at 401 Canal Avenue, Wilmington, California. The Marine Terminal is a liquid bulk storage facility, which has 62 ASTs at the Marine Terminal, of which 40 contain petroleum product. The 40 ASTs containing petroleum product are used for the temporary storage of these products (e.g. Bunker fuel, diesel, fuel oil, cutter stock, and lube oil). The Marine Terminal has a maximum storage capacity of approximately 29 million gallons of liquid bulk petroleum and chemical product, more than 22 million gallons of which are petroleum products.

Pilot Chemical Company, Santa Fe Springs, California. Responsible engineer for the preparation of SPCC Plan for Pilot Chemical Company facility located at 11756 Burke Street, Santa Fe Springs, California. The approximately 3.5-acre facility has 45 above ground storage tanks/reactors/vessels. The petroleum product on site includes vegetable oils (e.g. coconut and safflower) and dilutent/dilute oil, gear/lube oil, and fuel.

Appendix N

Linscott, Law, & Greenspan Engineers
Résumés

RICHARD E. BARRETTO, P.E.
Principal

Professional Registration

Traffic Engineer, State of California (TR2006)

Professional Experience

Principal: Linscott, Law & Greenspan, Engineers
Associate Principal: Linscott, Law & Greenspan, Engineers
Transportation Engineer: Linscott, Law & Greenspan, Engineers
Transportation Engineering Intern: City of Costa Mesa, Transportation Services Division

Areas of Professional Competence

Traffic Forecasting and Impact Analysis Reports
Transportation Planning and Site Design Consultation
Mixed-Use Parking Demand Studies
Conceptual Improvement Plan Preparation
Traffic and Parking Field Studies
Detailed Capacity Evaluation
Signal Progression Analysis

Representative Experience

Traffic Impact Study and Parking Study Report for Kaiser Permanente Primary Care Center, Fontana, California. Traffic study evaluated the traffic and parking impacts of a 330,000 SF outpatient treatment facility on the existing Medical Center Campus. Site access design, internal circulation and conceptual off-site street improvements were prepared as part of this project's processing.

Site planning design consultation and study of internal circulation for the Arrowhead Regional Medical Center Colton, California. Traffic Impact Analysis Report for the 880,000 SF replacement medical center proposed by the County of San Bernardino. Conceptual street improvement plans and cost estimates for the proposed off-site street improvement, to include the Pepper/I-10 interchange, were prepared.

Traffic Impact Analysis Report for the Sunshine Canyon Landfill Extension project in the County of Los Angeles. The study focused on evaluating the potential truck traffic impact at 13 study locations in the Sylmar community of Los Angeles.

Traffic Impact Analysis and Parking Study Report for One Golden Shore, Long Beach, California. The traffic study focused on evaluating the potential traffic impacts of two office towers totaling over 725,000 GSF in office space and a 350 room hotel on the circulation system of downtown Long Beach.

Traffic Impact Study for the El Embarcadero-Windham Grade Separation, Port of Long Beach, California. The traffic study evaluated the probable traffic

impacts of three design alternatives for an elevated grade crossing for El Embarcadero-Windham Avenue at railroad tracks in the Port of Long Beach.

Traffic Analysis and Site Planning Evaluation for Universal City. The study analyzed future traffic conditions and needs with respect to the internal circulation system at the "top of the hill" with the development of several planned MCA projects to include tour and attraction expansions, hotel additions, and additions to City Walk.

Traffic Impact Study for Empire Center, Fontana, California. The project consisted of over 1.5 million square-feet of retail/commercial uses and included a regional mall, an entertainment center, a neighborhood community center, and a promotional center.

Traffic Impact Study for Prado De Las Posas, Camarillo, California. Traffic study focused on evaluating the potential traffic impacts of a mixed use development that included a 285,600 SF village commercial center, 151,316 SF of R&D uses, and an 18.8 acre, nine-hole executive golf-course with a 15,000 SF clubhouse.

Traffic Impact Study for Park Place, Irvine, California. The traffic study focused on evaluating the potential traffic and circulation impacts with the development of 360 residential units of the Park Place Development Plan. The Park Place Development Plan consists of over 1.7 million SF of new office space, a day care facility, a health club, a 200 room hotel, 71,500 SF of restaurant floor area, 90,000 SF of retail uses, a 2,000 seat theatre, a potential 10,000 SF night club and 1,442 apartments/ condominiums. The traffic study required an evaluation of traffic modeled data provided by the City of Irvine.

Traffic impact evaluation and conceptual intersection improvement design plans for Country Club Falls Shopping Center (304,422 SF) and Desert Crossing Center (479,400 SF), Palm Desert, California.

Education

University of California, Irvine, B.S. in Civil Engineering
University of California ITS Extension laboratory, Richmond, (3.5 ceu).
Transportation Planning Models and Software Applications
And Transportation Planning Model (TRANPLAN)

Professional Memberships

Institute of Transportation Engineers, Associate Member
American Society of Civil Engineers, Associate Member

DANIEL A. KLOOS, P.E.
Transportation Engineer III

Professional Registration

Traffic Engineer, State of California (TR 2200)

Professional Experience

Transportation Engineer: Linscott, Law & Greenspan, Engineers
Assistant Project Engineer, DeSilva Gates Construction

Areas of Professional Competence

Traffic Impact Analysis Reports
Transportation Planning
Traffic Control Design
Pavement Delineation Design
Roadside Sign Design
Sight Distance Analysis
Traffic Signal Warrant Analysis
Parking Demand Analysis
Trip Generation Studies

Representative Experience

East Chino Tentative Tract 16248 Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Chino, California. This study addressed the potential near-term and long-term traffic impacts associated with the development of a single-family residential subdivision. A signal warrant analysis was performed to determine whether or not the proposed development would warrant the installation of traffic signals at key intersections within the project's vicinity.

Home Depot Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of San Juan Capistrano, California. This study addressed City of San Juan Capistrano staff concerns, as well as the potential near-term traffic impacts and "summer" traffic impacts associated with the development of a home improvement store.

North Long Beach Police Station Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Long Beach, California. This study addressed the potential near-term traffic impacts associated with the development of a police station. Two project alternatives were proposed to maintain acceptable levels of service at all key intersections.

Harbor Boulevard Storm Drain Installation – Traffic Engineer for the design of traffic control and detour plans. The design focused to provide for the safe and orderly movement of vehicular traffic during which roadway

improvements were being implemented. The roadway construction involved three stages of development.

Del Obispo Street Median Modification – Traffic Engineer for the Traffic Circulation Study in the City of Dana Point, California. This study addressed the potential traffic/circulation impacts of the proposed raised median island on Del Obispo Street, the associated impact of diverted (re-routed) traffic to key signalized and key unsignalized intersections, and evaluated the access/egress needs of existing development along the Del Obispo Street study area.

Manhattan Country Club – Traffic Engineer for the Parking Demand Analysis for the Manhattan Country Club (MCC) Tennis Courts Expansion project, located in the City of Manhattan Beach, California. The parking analysis focused on determining the existing and future parking needs of the MCC, and the availability of parking with the addition of two, "clay" tennis courts on a portion of the City "leased" parking lot.

Alton Corporate Center Project – Traffic Engineer for the Traffic Impact Analysis Report in the City of Santa Ana, California. This study addressed the potential traffic impacts associated with the development of two office buildings for existing, future near-term and future long-term peak hour traffic conditions, as well as access/egress into the proposed site.

Freight Forwarding – Traffic Engineer for the Traffic Analysis Report in the City of Hawthorne, California. This study addressed the potential traffic impacts associated with the development of freight forwarding land uses on three separate planning areas. Trip generation studies were conducted at four sites to develop daily, AM peak hour, and PM peak hour trip rates. A midblock link analysis was performed to determine the levels of service at sixteen key street segments located within the immediate vicinity of the three separate planning areas.

Norwalk Transportation and Public Services Facility Master Plan – Traffic Engineer for the Traffic Impact Analysis Report in the City of Norwalk, California. This study addressed the potential traffic impacts and circulation needs associated with the redevelopment and expansion of the existing Norwalk Transportation and Public Services Facility.

Education

University of California, Irvine, B.S. in Civil Engineering
(specialization in Transportation Engineering and Structural Engineering)

Appendix N

Moffat & Nichol Engineers
Résumés

JAMES DAVID FAUL, P.E.
Chief Civil Engineer

REGISTRATION

Registered Professional Engineer, California Registration No. C52258

EDUCATION

Civil Engineering, San Diego State University
Engineering/Architecture, Ventura College
Environmental Management Certificate, West Coast University

REPRESENTATIVE PROJECTS:

Mr. Faul has twenty (20) years of experience covering all aspects of civil engineering design as it relates to urban development. Prior to joining M&N, Mr. Faul served for more than three years in the City of Temecula's Department of Public Works where he was involved in all phases of development projects and effectively managed and coordinated numerous consultants. His project experience includes capital improvement projects, waterfront and residential developments, and commercial centers.

As Chief Civil Engineer and a project manager, he directs the activities of his project team. In this role, he is responsible for each project's technical quality, scope, schedule and budget as well as communication with the client to ensure satisfaction with the work performed.

REPRESENTATIVE PROJECTS

Long Beach Memorial Medical Center Expansion, Long Beach, California

San Pedro Waterfront Promenade, Port of Los Angeles, California
Project Manager for the public input, concept development and final design for a public promenade along Berths 87-90 in the Port of Los Angeles. The work includes landscape and hardscape improvements to Harbor Boulevard, street alignment, signalization, and public plazas. Specific areas of responsibility include civil design of streets, sites, and utilities, grading plans, utility investigations and coordination, public meeting presentations, and permit processing.

San Pedro Waterfront Transportation Study, San Pedro, California
Project Manager for the preliminary analysis of transportation issues related to proposed development of traffic generators in port areas along the San Pedro Waterfront.

North Embarcadero Waterfront Redevelopment & County Administration Center Waterfront Park, San Diego, California
Project Manager/Chief Civil Engineer responsible for construction documents, estimates, exhibits, utility relocations and street improvements for the redevelopment of the San Diego waterfront from the San Diego Airport south to the Seaport Village commercial center. The historic County Administration Center property is also being redeveloped to accommodate a public park area and construct an underground parking structure beneath the proposed park.

Seabridge in Mandalay Bay, Oxnard, California
Project Manager/Chief Civil Engineer responsible for coordinating coastal engineering related issues and permit acquisition during the Tentative Map portion of a 135-acre mixed-use residential, commercial, waterfront and marina-related facilities that is to be part of the Channel Islands Harbor of Oxnard.

Laguna Del Mar, Mexico
Chief Civil Engineer responsible preparation of construction documents to dredge and excavate for a salt-water lagoon and multiple salt-water lakes in support of a golf course and residential development. Unique design issues included the existing land was a sand desert and the lakes are to be tidal due to the proximity to the ocean.

Bay-to-Bay Project, San Diego, California
Chief Civil Engineer responsible to analyze the impacts of existing transportation, utility, and property related to alternatives to connect the San Diego Bay with Mission Bay that does not currently exist. Alternatives include creating a tidal water canal that would enable boaters to traverse from San Diego Bay to and from Mission Bay while creating a significant amount of urban waterfront. Unique design concerns have included the impacts of tides and water circulation along with the estimated costs to raise roadways over the proposed canal and mitigate existing utility crossings.

Laguna Beach Sewer Pump Station, Laguna Beach, California
Chief Civil Engineer responsible for alternative designs, profiles and estimates for relocating an existing sewer main in the business district of downtown Laguna Beach. Alternative designs included wet wells, gravity flow, force main flow and pumps while maintaining access to local shops and roadways including the busy Pacific Coast Highway while under construction.

Diamond Valley Lake Marina; Hemet, California
Chief Civil Engineer responsible for preparing construction documents, estimates, construction quantities, typical cross sections, and profiles for an access roadway, parking area and launch ramp facility at the newly created Diamond Valley Lake.

Cabrillo Marina –Phase II; San Pedro, California – Port of Los Angeles
Chief Civil Engineer responsible for infrastructure design for the development of an approximately 700 slip marina and 50 acres of waterfront property to include a promenade, marine retail center, restaurants, dry stack storage and boat launch facilities, and a yacht club.

Multiple 3-D Visualization Projects
Project Manager/Chief Civil Engineer responsible for creating 3-D visualization exhibits and videos for numerous projects. The 3-D products are used in public presentations, project interviews, client and design team meetings, agency reviews and agency approvals. Typical 3-D modeling projects have included underground utilities, structural tiebacks, developments, freeway interchanges, bridges and urban waterfronts.

Playa Vista Development, Los Angeles, California
Project Manager responsible for site and utility designs as well as street improvements for multiple projects including the Visitor & Information Pavilion, a Community Center and two Apartment Complexes within the first phase development of Playa Vista, a 1,087-acre, mixed-use Master-Planned community at the western edge of Los Angeles. These projects included high-rise residential buildings and subterranean parking structures as well as landscape/hardscape improvements.

California State University, Northridge, California
Civil Engineer responsible for site design supporting the reconstruction of Oviatt Library to repair damage resulting from the 1994 Northridge earthquake. Reconstruction of the site required a new stairway as well as civil redesign of Stonepine and the Sierra Quad. Civil engineering services included grading, utilities and hydrology.

Fountain Park Apartments (Playa Vista), Los Angeles, California
Project Manager responsible for site and utility designs as well as street improvements for an apartment project within the first phase development of Playa Vista, a 1,087-acre, mixed-use Master-Planned community at the western edge of Los Angeles. The project included a 4-story, 401,832-square foot residential building and subterranean parking structure on 10 acres.

Loyola Marymount University/Burns Recreation Center, Los Angeles, California
Responsible for grading and utility plans, drainage, horizontal control, and construction administration for the new Burns Recreation Center. This project required that an existing gym be demolished to make way for a new 70,000 square foot facility that will include a gym, outdoor swimming pool and pool house.

Loyola Marymount University/Miyawaki Library, Los Angeles, California
Responsible for site design supporting new construction of the 80,000 square foot Miyawaki Library. The project included construction of the three-story structure and basement, a pedestrian bridge connection to the existing library, and a courtyard/amphitheater. Services provided included grading, utilities, hydrology, and permit and construction consultation.

Plaza at the Arboretum, Santa Monica, California
Responsible for the site design supporting a new six-story, 350 unit (307,000-square foot) residential building incorporating 10,000 square feet of retail space. Engineering services have included grading, utilities, street widening, new 14-inch public water line, hydrology, and permit and construction consultation.

Sherman Oaks Galleria, Sherman Oaks, California
Project Manager responsible for site design and street mitigation for the former shopping mall which was reopened in November 2000 as an office complex. The new Galleria includes office space as well as a collection of upscale shops and restaurants, with an outdoor plaza and fountain at the entrance. Civil engineering services included site grading, site utilities, fire hydrant relocations, street improvements and streetscape enhancements, and permit and construction consultation. The sidewalk and landscaping improvements to several City blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new tree well grates had to be coordinated with existing utilities (below grade and above grade structures).

Sunset Millennium, West Hollywood, California
Responsible for research and reports to investigate the utility demands of the proposed Sunset Millenium project, a 662,820-square foot commercial development spanning portions of three city blocks in West Hollywood.

Target Store, Santa Monica, California
Target's first three-level store located in the downtown area of Santa Monica. Responsible for site design including grading, utilities and permit consultation for the project, which included a four-level subterranean parking structure.

The Legacy at Wilshire, Los Angeles (Westwood), California
Legacy Partners developed a 213,358-square foot, 187 unit luxury residential building and subterranean parking structure on 2.66 acres of vacant land at 10833 Wilshire Boulevard. Responsible for providing engineering consultation services during the design development phase to assist the design team on issues including building height, shoring and haul route permits, and vertical slopes of garage access.

Las Flores Creek Realignment & Park, Malibu, Los Angeles County, California
Project Manager for civil engineering services related to the improvement of this park located in Los Angeles County. Responsibilities included the preparation of a grading exhibit, modification to the hydrologic study of the site to accommodate changes in the creek bed and allow for flood control and protection of the creek and surface features.

Infomart at Terminal Annex, Los Angeles, California
Project Manager responsible for civil engineering services for the interim-parking phase for the Infomart Los Angeles at Terminal Annex located adjacent to Union Station. Project included preparing an interim parking exhibit, providing field verification of existing on-site fencing, and coordinating client meetings with the Client, public agencies and other consultants to obtain plan approvals.

First San Diego River Improvement Project, San Diego, California
Senior Design Engineer for channel improvements utilities, street crossings, and pedestrian/bike path along both sides of the San Diego River between Highway 163 and I-805 in Mission Valley. Other design included grading, ADA access, parking and cross-slope.

Santa Monica College, Santa Monica, California
Project Manager responsible for the demolition of existing swimming pool and construction of a new addition to the existing parking structure. The pedestrian access and construction phasing for this project was critical as the work was done during classes in session. Existing pedestrian flows had to be maintained to enable access to existing classrooms.

Sherman Oaks Galleria Streetscape Improvements, Sherman Oaks, California
Project Manager responsible for sidewalk and landscaping improvements to several City blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new tree well grates had to be coordinated with existing utilities (below grade and above grade structures).

Santa Monica Business Park, Santa Monica, California
Project Manager responsible for the reconfiguration and enhancement of existing surface parking lot.

Citrus Valley Hospital, Citrus Valley, California
Project Manager responsible for the reconfiguration and enhancement of existing surface parking lot.

Civil and Street Design

Liefer Road Bridge (PW93-02), Department of Public Works Projects, City of Temecula, California
As a City of Temecula employee, responsible for project management, consultant selection and management, plan check and review, public relations, preparation of City Staff Reports and bid docuements, contract negotiation and resolution, Construction Administration, and preparation of the Notice of Completion for the construction of a pre-fabricated concrete structure bridge extension of Liefer Road and channel improvements to the Santa Gertrudis Creek as a result of the 1993 floods. Received a Letter of Commendation form the Director of Public Works for efforts on this City of Temecula public works project.

Harry Bridges Boulevard Realignment, Wilmington California
Project Manager responsible for civil engineering services involved in the 1.2-mile long realignment of an existing roadway as a result of the Port of Los Angeles' expansion of one of their major terminals at the harbor in San Pedro. Secured conceptual approvals and managed the preparation of construction

drawings and permit acquisition for the Port's major arterial located within the City of Los Angeles. Substantial coordination with utility providers and emergency response agencies was performed. In addition, also responsible for coordinating and administering the contracts with consultants for landscaping, soils, traffic and structural engineering as well as public relations.

Wilmington Parkway, Wilmington, California
Project Manager responsible for civil engineering services for this linear park and elevated promenade that traverses approximately 0.6 miles along the southerly side of an existing City street. Responsible for providing exhibits/graphics/reports needed in order to amend or supplement the existing EIR of the project including, drainage/hydrology studies, utility studies, street closures, and ancillary engineering studies. Street closures, a Tract Map, and easement documents were also involved as well substantial coordination with utility providers and emergency response agencies.

Alta Loma Road & Sunset Boulevard, West Hollywood, California
Project Manager responsible for conceptual approvals, preparation of construction drawings and permit acquisition of the back-to-back cul-de-sacs of the existing 12% grade of Alta Loma Road and the widening of Sunset Boulevard in the densely populated area of the Sunset Strip of West Hollywood as part of the proposed Sunset Millenium project, a 662,820 square foot commercial development spanning portions of three city blocks in West Hollywood. Construction phasing, traffic circulation, existing utility relocations, retractable bollards, and fire truck access were key issues in the design and construction. Substantial coordination with utility providers and emergency response agencies was performed.

Colorado Boulevard, Santa Monica, California
Project Manager responsible for preparation of construction drawings and permit approvals for the widening of this busy section of Colorado Boulevard supporting a new six-story, 350 unit (307,000-square foot) residential building incorporating 10,000 square foot of retail space. Engineering services have included utilities, street widening, new 14-inch public water line, hydrology, and permit and construction consultation.

Wilshire Boulevard, Los Angeles (Westwood), California
Project Manager responsible for preparation of construction drawings and permit approvals for the widening of Wilshire Boulevard in the heart of Westwood, CA. Construction phasing, traffic circulation, existing utility relocations, and building moratoriums for this extremely busy business corridor of Los Angeles were key issues in the design and construction.

Ventura Boulevard and Sepulveda Boulevard, Sherman Oaks, California
Project Manager responsible for preparation of construction drawings and permit acquisition for street and landscaping improvements to several City of Los Angeles blocks of existing public streets that included unique vertical grade challenges that had to meet ADA standards. Placement of new improvements had to be coordinated with existing utilities (below grade and above grade structures) and expeditious approvals of these improvements within existing City & Caltrans Rights-of-Way were needed. Project was showcased in the January 2002 edition of California.

PROFESSIONAL AFFILIATIONS

Member, American Society of Civil Engineers

EDWIN P. REYES, P.E.
Civil Engineer

REGISTRATION

1995, Civil Engineer, California, C53584, Exp. Date 6/30/07
1994, Certificate, Construction Project Management, UCLA

EDUCATION

BS, 1987, Civil Engineering, Mapua Institute of Technology, 1987

EXPERIENCE

Mr. Reyes has over 15 years of experience in providing geometric and vertical grade designs, utility and consultant coordination and right-of-way determination. He is skilled in conceptual designs, cost estimates, and economic analysis inclusive of streets, storm drain and site development. Excellent in computer-aided design and drafting with knowledge of AutoCAD 2003, Land Development Desktop, COGO, Storm Plus, HEC2 and Excel.

REPRESENTATIVE PROJECTS

Long Beach Memorial Medical Center Expansion, Long Beach, CA

Sewer Improvement Design Review Study, City of Laguna Beach, CA
Senior Civil Engineer responsible for the evaluation of five (5) sewer collection and distribution alternatives that were proposed to accommodate the installation of a reinforced concrete box culvert in downtown Laguna Beach. Civil design and analysis included peak station flow analysis, sewer line sizing, and constructability risk assessment.

Multiple Public Works Projects in Various Cities
Project Manager and Engineer responsible for numerous public works projects for the City. Projects included parking lot grading, bike path realignment, utility relocation and permit processing. Specific projects included:

North Embarcadero Visionary Plan, San Diego, CA
Performed preliminary utility conflict analysis.

County Administration Center Waterfront Park, San Diego, CA
Performed utility relocation, site grading and site demolition.

Greenville-Banning Low Flow Diversion, Huntington, Beach, CA
Designed low flow diversion conduit from the channel pump station to the OCSD trunk sewer line. Completed traffic control plans and bike path detour plans in accordance with the City of Huntington Beach requirements.

Laguna Beach Pump Station, Laguna Beach, CA
Coordinated with the utility companies, analyzed and calculated conceptual design estimates for the relocation of main sewer line along a commercial district per the requirements of the City of Laguna Beach.

Carnival Cruise Terminal Parking Structure, Long Beach, CA
Performed utility relocation, site grading and permit processing for the entire site. Coordinated with the City of Long Beach and the private developer for a smooth construction schedule.

Tustin Ranch Road Extension, Tustin, CA
Designed preliminary roadway alignment, utility impact analysis and right of way determination in the overhead crossing project with the SCRRA, OCPFRD and Edinger Avenue.

EDWIN P. REYES, P.E.
Civil Engineer
Page 2

Sand Canyon Avenue Undercrossing, Irvine, CA
Designed roadway alignment, utility relocation and right of way determination in the grade separation project with the SCRRA. Assisted the City of Irvine in creating a project report for project funding submittal to the State.

Cherry Avenue Widening, Signal Hill, CA
Analyzed right of way acquisition, traffic patterns and generated roadway alternatives for the preparation of a project study report. Assisted the City of Signal Hill to gather approval for public funding from the County of Los Angeles MTA.

Brighton Street Resurfacing, La Habra, CA
Designed water and sewer line relocation, street resurfacing, and coordinated with the utility companies regarding the proposed project. Coordinated with the City representative to satisfy the City of La Habra requirements.

Multiple Ports / Backland Projects
Project Manager and Engineer responsible for numerous port projects all around the country. Projects included terminal and backland grading and utility relocations, permit processing, pavement failure analysis and master plan cost estimating. Specific projects included:

- Berth 171-181, Port of Los Angeles / Pasha Terminal
- Radiation Portal Monitor, Port of Los Angeles / Port of Long Beach / Homeland Security
- Pierce County Terminal, Port of Tacoma
- Terminal 46 Redevelopment, Port of Seattle
- Berth 215-219, Port of Los Angeles / YTI Terminal
- Norfolk International Terminal North and South, Virginia Port Authority
- Barbours Cut Terminal, Port of Houston
- Pier G & J Terminal, Port of Long Beach

Multiple Public Works Projects in the City of Industry, CA
Project Manager and Engineer responsible for numerous public works projects for the City. Projects included street reconstruction, sidewalk construction, and traffic control determination. He completed plans, specifications and cost estimates for projects using computer aided design and drafting. Coordinated with utility companies and property owners affected by the city's capital improvement projects. Handled pre-bid inquires by contractors bidding on the city's projects and offered construction support for projects undergoing construction. Specific projects included:

- Industry Hills Equestrian Center Rodeo Arena Structural Cover
- Crossroads Parkway Street Resurfacing
- Business Parkway Reconstruction and Resurfacing
- Nelson Avenue Sidewalk Improvements
- Arenth Avenue Street Reconstruction
- Proctor Avenue Street Resurfacing

Multiple Public Works Projects, Los Angeles County Metropolitan Transportation Authority (LACMTA), CA
As Civil Engineer prepared project plans for the development of a portion of the County's Metrorail program. Specific projects included:

- Hollywood Boulevard & Western Avenue Station – Metro Redline
- North Hollywood Station – Metro Redline
- Metro Pasadena Project Yard & Shop Facilities

Design Engineer, Miscellaneous Transportation Projects, Southern California
Calculated and designed public works projects for a variety of State, County and City clients. Submitted plans ahead of schedule and achieved objectives within the allotted budget. Specific projects included:

- I-215 Preliminary Engineering – Riverside, California
- Hollywood Boulevard/Vine Avenue Station – Metro Redline
- Metro Greenline Extension Preliminary Study
- Route 74 Feasibility Study – Riverside, California
- Route 126 Feasibility Study – Ventura County, California
- Valley Circle Boulevard/Route 101 Interchange Improvements – Ventura County, California
- Haven Avenue/I-10 Interchange Improvement – San Bernardino, California

Appendix N

Sapphos Environmental, Inc.
Résumés

Andre Anderson, REA, CES

MS, Environmental Engineering, University of Southern California, 1979

Environmental Analyst III

Years of Experience: 24

Relevant Experience

- *Conduct Phase I, II, and III Environmental Site Assessments*
- *Collect data through interviews with regulatory and permitting agencies*
- *Collect data related to past land use*
- *Conduct searches of databases related to known contaminated sites*
- *Conduct asbestos surveys*
- *Conduct subsurface investigations including soil and groundwater sampling and remediation*
- *Conduct air quality studies*
- *Conduct radon gas surveys*
- *Conduct lead-based paint surveys*
- *Supervise disposal of hazardous materials*
- *Perform regulatory compliance evaluations*

Mr. Andre Anderson provides environmental consulting services to various clients including property management companies, governmental agencies, financial institutions, and engineering firms. Services provided include Phase I, II, and III environmental site assessments, underground storage tank system installation and removal, soil and groundwater sampling and remediation, indoor air quality studies, radon gas surveys, lead-based paint surveys, hazardous materials management, and regulatory compliance.

Mr. Anderson has managed an environmental project department and coordinated environmental projects in accordance with established schedules, budgets, and regulatory requirements. He has produced in-house procedures for conducting all phases of environmental assessments, prepared and reviewed work plans and final reports, supervised subsurface investigations, and was responsible for regulatory compliance of all projects.

Mr. Anderson has been responsible for projects related to hazardous materials management including supervision and performance of environmental assessments, subsurface investigations, and asbestos surveys. He has managed production of environmental impact reports, prepared industrial waste discharge permits, conducted noise and traffic analyses, and generated air-quality computer models.

Mr. Anderson has managed site assessment activities, developed and implemented soil plans, designed remedial action plans, and supervised packaging, transportation, and disposal of hazardous materials. He has conducted asbestos surveys, prepared air quality permits, prepared environmental impact statements, performed regulatory compliance evaluations for fossil, nuclear, and alternative energy power plants, conducted engineering cost analyses for hazardous waste management, storage and disposal systems, and designed mechanical systems for gaseous, liquid, and solid hazardous waste processing.

Mr. Anderson has generated environmental qualification calculations, prepared and administered bid evaluations and specifications for radioactive waste systems equipment, revised and maintained system descriptions and design manuals, and conducted field verification of mechanical systems design for nuclear power generating stations.

Mr. Anderson has designed sewers, storm drains, and wastewater treatment systems, and he has conducted infiltration/inflow analyses and septic tank–leach field evaluations.

Edward Belden, MESM

MA, Environmental Science and Management, Conservation Planning, Donald Bren School of Environmental Science, University of California, Santa Barbara

Habitat Restoration Specialist

- *Construction and Maintenance Monitoring*
- *Riparian Restoration Monitoring*
- *Streambed Alteration Agreement Coordination*
- *Environmental Impact Analysis*
- *Watershed Analysis*
- *Water Quality Analysis*
- *Identification of California Plant Communities*
- *GIS Analysis*
- *Directed Surveys*
- *Statistical Analysis*

Years of Experience: 2

Relevant Experience:

- *Restoration of Riparian and Coastal Scrub Habitat*
- *Preparation of CEQA/NEPA Documents and peer review of biological sections*
- *Numerous directed surveys and data analysis*
- *Managed data collection for Federal Projects with Louisiana Department of Wildlife and Fisheries*
- *Published in Peer Reviewed Journal*

Mr. Edward Belden holds a MESM with broad experience in the environmental field with an emphasis on green building and habitat planning. His knowledge and experience covers opportunity and constraint analyses, field surveys, mapping of habitat and sensitive species, identification of native/invasive plants, development of restoration plans and CEQA/NEPA compliance documentation.

While at Sapphos Environmental, Inc., Mr. Belden has conducted numerous construction and maintenance monitoring efforts, performed quantitative analysis of riparian restoration sites, completed biological technical reports, coordinated streambed alteration agreement work efforts, and conducted numerous biological surveys in developed and undeveloped regions from desert (Kern County) to riparian (Orange County) plant communities. Mr. Belden is knowledgeable of environmental impact assessment legislation, having completed biological sections and peer reviews of CEQA and NEPA documents.

Before joining Sapphos Environmental, Inc., Mr. Belden served as a biologist with the Louisiana Department of Wildlife and Fisheries to collect samples and manage data for three federal projects. His field experience includes habitat construction monitoring, estimates of plant cover, mark-recapture, tree surveying, destructive root sampling, development of a data logger system, and integrated pest management within various communities including Oak Woodlands, Coastal Sage Scrub, Eastern Hardwoods and Wetlands. Mr. Belden took an active role in the restoration of the Arroyo Hondo Preserve riparian corridor along the Gaviota Coast of Santa Barbara County to protect and enhance the habitat of endangered steelhead trout through replanting of natives and removal of invasive species.

Mr. Belden's master's thesis evaluated the environmental impacts of rice production on the water resources within Tanzania for the United Nations Environment Program. The interdisciplinary graduate education Mr. Belden received allowed for an interest in green building and alternative energy systems to be explored through courses in energy economics, land use planning and law, landscape, community, population, and restoration ecology in addition to classes addressing planning and environmental rules and regulations such as the ESA, Clean Air Act and CEQA/NEPA. While studying in Denmark, Mr. Belden also studied Marine Science and Environmental Policy.

Member of the Association of Environmental Professionals and the California Native Plant Society.

Marie Campbell, MA

MA, Geography, Geomorphology /Biogeography, University of California, Los Angeles, 1988

Project Manager/Environmental Compliance Specialist

- *Ensure technical and procedural adequacy pursuant to NEPA, CEQA, and other federal, state, and local statutes and regulations*
- *Provide strategy for regulatory permit compliance*
- *Agency coordination*
- *Coordination with Special Interests*
- *Identify opportunities for issue resolution*
- *Public Outreach*
- *Quality assurance/quality control*
- *Milestone compliance*

Years of Experience: 20

Relevant Experience:

- *Managed 12 open-end contracts for environmental services*
- *Project Manger, Plaza de Cultura y Arte EIR*
- *Environmental Compliance Specialist to the EIR for the Specific Plan for the Development of Stat*
- *Technical expert to successfully support client in 5 CEQA lawsuits:*
- *Longden Reservoir, Van Nuys Reservoir EIR,*
- *Bonelli Regional Park EIR, Friendship Community Regional Park EIR,*
- *Hollywood Bowl EIR,*
- *Owens Dry Lake State Implementation Plan EIR*

Ms. Campbell, principal of Sapphos Environmental, Inc. is an environmental compliance specialist with over 20 years experience in project management of all aspects of environmental documentation, mitigation monitoring, and resource management planning. Having served as project manager for several hundred NEPA and CEQA environmental compliance documents, she has an extensive knowledge of federal, state, and local environmental statutes and guidelines. In addition, her training in negotiating, bargaining, and conflict resolution makes her uniquely qualified to work with the public and agency representatives on complex projects.

In the past 11 years, she has successfully coordinated over 12 open-end contracts for environmental services for Caltrans, Metropolitan Water District of Southern California, County of Los Angeles Department of Recreation, County of Los Angeles Department of Public Works, the City of Los Angeles Bureau of Engineering, Great Basin Unified Air Pollution Control District, and Southgate Recreation and Park District. These contracts have involved coordination of multidisciplinary teams including architecture and design firms, structural engineering, civil engineering, marketing and image consultants, geotechnical firms, hazards and hazardous materials, and traffic, transportation, and parking.

In particular, Ms. Campbell has extensive experience with capital improvement projects undertaken by the County of Los Angeles. Ms. Campbell worked directly with County Counsel in the successful defense of two EIR prepared for the County of Los Angeles Board of Supervisors. She served as project manager or senior technical advisor for numerous challenging and high-profile projects: Plaza de Cultura y Arte EIR, Grand Avenue and Environs project EIR, the Hollywood Bowl Shell Rehabilitation and Acoustical Improvements project EIR, Addendum No. 2 to the First Street Properties (Walt Disney Concert Hall) EIR, Bonelli Regional County Park Master Plan EIR, and Deane Dana Friendship Community Regional County Park EIR. These projects have routinely involved interface with project engineering and architctural design teams to ensure that the EIR fully addresses feasibility in light of the technical engineering, economical, and environmental characteristics of the project, thus fully informing the public and the County of Los Angeles Board of Supervisors in their decision-making process. Ms. Campbell has strong working relationships with numerous County Department including, the County of Los Angeles Chief Administrative Office, the Department of Public Works, the Department of Parks and Recreation, and the Department of Regional Planning.

Ms. Campbell's career began with the Corps as an environmental protection specialist with the U.S. Army Corps of Engineers giving her broad breadth related to all federal, state, and local statutes and regulations.

Ms. Campbell serves on the State Board of the Association of Environmental Professionals. In addition, she teaches a graduate seminar on Landscape Planning at California Polytechnic University at Pomona.

Eric Charlton

BA, Geography, University of California, Riverside, 1985

Certificate in GIS, University of California Riverside, Riverside, California, 1998

GIS Analyst

- *GIS project development and management*
- *GIS analysis and problem solving.*
- *GIS data acquisition conversion, maintenance, and documentation*
- *Cartographic production and design*
- *Application and script development in Avenue, AML, and VB for specialized tasks, to customize the user interface, and automate repetitive processing and map production tasks*
- *Database design and Maintenance*

Years of Experience: GIS, 6 years, Urban Planning, 8 years

Relevant Experience:
- *Biological Monitoring, Cottonwood Wind Energy*
- *Owens Valley PM10 Planning Area Demonstration of Attainment SIP Project EIR*
- *Ahmanson Ranch Specific Plan*
- *Los Angeles County Parks Needs Assessment*

Technical Experience:

Software:
- *Arc GIS 8.x,*
- *Spatial Analyst,*
- *ArcInfo,*
- *AutoCAD*

Programming Languages:
- *Avenue, AML, VBA*

Database:
- *MS Access*

Mr. Charlton is a geographic information system (GIS) Analyst with over 14 years of experience in GIS and urban planning. Mr. Charlton's role at Sapphos Environmental, Inc. is to provide GIS support for the entire company in the form of GIS project development and management; GIS problem solving and spatial analysis with both vector and raster data; GIS data acquisition, conversion, maintenance, and documentation; cartographic production and design; application development; and database design and maintenance.

Projects Mr. Charlton has worked on at Sapphos Environmental, Inc. include the Southern California Association of Governments (SCAG) Land Use and Data Modeling Updates for the Malibu/Las Virgenes Sub-Region, the Los Angeles County Parks Needs Assessment and Facility Inventory, the 2003 Owens Valley PM10 Planning Area Demonstration of Attainment SIP Project EIR, Biological Monitoring and GIS analysis for the Cottonwood Wind Energy Project, and the Ahmanson Ranch Specific Plan.

Prior to joining Sapphos Environmental, Inc., Mr. Charlton worked for the Thurston Conservation District (District) located in Olympia, Washington, as a GIS specialist/system administrator. He was responsible for developing a robust and fully functional GIS for the District from the ground up. The GIS that Mr. Charlton developed is used for numerous conservation projects, for documenting the varied activities of the District, for special district tax assessment purposes, and for public outreach efforts. Additionally, Mr. Charlton developed a custom application for ArcView used for tax assessment purposes, and he created applications in ArcInfo for streamlining geoprocessing and data conversion tasks.

Prior to working at the Thurston Conservation District, Mr. Charlton worked for the City of Tumwater (City) in Tumwater, Washington, as an urban planner. While at the City, Mr. Charlton gained considerable experience in comprehensive planning. He was responsible for the revision of the City's comprehensive plan and zoning code.

Mr. Charlton has also worked for Riverside County in Riverside, California, as an urban planner. He developed skills in Specific Plans, the environmental review process, LAFCO annexation procedures, site plans, demographic analysis, and database development.

Prior to working at Riverside County, Mr. Charlton worked for the Earth Technology Corporation in San Bernardino, California, where he helped develop a spatial database of the United States railroad network. Mr. Charlton developed skills in research, inventory, and cataloging of multiple data sources, data development and attribution, and verification of data accuracy using aerial image interpretation.

Mr. Charlton began his GIS career at Aerial Information Systems in Redlands, California, after graduating from UC Riverside. While he was at Aerial Information Systems, he participated in field data collection for a Land Use and General Plan zoning consistency study for the City of Los Angeles. Data collected was used to create a spatial database in conjunction with Environmental Systems Research Institute (ESRI) in Redlands, California.

Caprice D. (Kip) Harper

MA, Anthropology (Archaeology emphasis), California State University, Los Angeles, 1997

Cultural Resource Analyst

- *Archaeological Survey and Excavation*
- *Section 106 Compliance*
- *Telecommunications Compliance*
- *NAHC and OHP Consultation*
- *Artifact Curation*

Years of Experience: 8

Relevant Experience:

- *Phase II Research Design for the Bartlett Point and Ash Point Air Quality Monitoring Stations, Owens Valley*
- *Phase I Archaeological Survey of the Bartlett Point and Ash Point Air Quality Monitoring Stations, Owens Valley*
- *Final Historic Resources Technical Report: Rettig Development Project, Sierra Madre, Califonia*
- *Assistant project manager for cultural resource assessments of more than 200 telecommunications facilities throughout Southern California and Clark County, Nevada*
- *Field director for San Nicolas Island GPS Mapping Project*
- *Directed cultural resource surveys of deteriorating power poles for Southern California Edison*
- *Compliance review of environmental documents for the California Energy Commission*
- *Curatorial Assistant for the Natural History Museum of Los Angeles County*
- *Archaeologist for the Stanislaus National Forest*

Ms. Caprice D. (Kip) Harper, cultural resource analyst, has over eight years of experience in California archaeology. During this period, Ms. Harper has acted as an assistant project manager, field director, crew chief, and curatorial assistant for environmental consulting firms, federal and state agencies, and museums.

Ms. Harper's experience spans the field of archaeology from archival research and field investigations to technical report preparation. This work typically involves consultation with various governmental agencies, including the Native American Heritage Commission (NAHC) and the State of California Office of Historic Preservation (OHP). During the past two years, Ms. Harper completed more than 200 Cultural Resource Assessments for various telecommunications carriers; this work was completed to fulfill the requirements of Section 106 of the National Historic Preservation Act (NHPA). Ms. Harper also work as an environmental planner (archeologist) reviewing functional equivalent environmental documents for the California Energy Commission.

Ms. Harper began her career conducting field investigations on San Nicolas Island, California, where she surveyed and recorded more than 360 archaeological sites using global positioning systems and participated on the excavation of several prehistoric archaeological sites; this work was funded by the U.S. Naval Air Weapons Station, Point Mugu. In addition, Ms. Harper has worked for the Natural History Museum of Los Angeles County as a curatorial assistant in the Anthropology Section and as a collections manager in the History Section, and as an archaeologist for the Stanislaus National Forest.

Ms. Harper is currently taking graduate course work in Historic Preservation at the University of California, Riverside. Ms. Harper is a Registered Professional Archaeologist and is a member of the Society for California Archaeology, the National Trust for Historic Preservation, the Archaeological Institute of America, and the Society of Architectural Historians. She is also an occasional volunteer for Pasadena Heritage.

Juliana Prosperi, MA

MA, Environmental Science and Energy Analysis, Boston University, Boston, Massachusetts

BA, Environmental Science and English, University of Colorado, Boulder, Colorado

Environmental Analyst IV

- *Participate in all aspects of the preparation of NEPA/CEQA documents*
- *Assist in conducting field surveys of sensitive animal and plant community resources*
- *Conduct and report on environmental research*
- *Serve as an active interdisciplinary group member*
- *GIS Analysis and Remote Sensing*
- *Statistical/Econometric Analysis using S-PLUS, SAS, and RATS*

Years of Experience: 4

Relevant Experience:

- *Assist in the preparation of several environmental documents.*

Ms. Juliana Prosperi, environmental analyst IV, joined Sapphos Environmental, Inc. after graduating from Boston University with a MA in Environmental and Energy Analysis through the department of Geography and the School of Public Health. She is currently participating in various projects at Sapphos Environmental, Inc. requiring technical and analytical skills, as well as field management. Ms. Prosperi's role at Sapphos Environmental, Inc. is balanced between preparation and coordination of environmental compliance documents such as Environmental Impact Reports, Mitigated Negative Declarations, Environmental Assessments, and Initial Studies, preparation of regulatory permits, as well as assisting in field monitoring and data collection.

Since joining Sapphos Environmental, Inc., Ms. Prosperi has had the opportunity to assist in the preparation of environmental documents which include the Long Beach Memorial Center Expansion Environmental Impact Report, the County of Los Angeles Fire Station 108 Environmental Impact Report, the Ranchos Los Amigos National Rehabilitation Center (RLANRC) North Campus Program Consolidation Project Draft Subsequent Environmental Impact Report, the Final EIR for South Coast County Golf Course, County of Kern Cottonwood Area Wind Energy Project, and several projects with Southgate Recreation and Park District.

Prior to working at Sapphos Environmental, Inc., Ms. Prosperi attended graduate school at Boston University located in Boston, Massachusetts where she received her Masters of Arts Degree in Environmental and Energy Analysis. During her studies, she worked part-time at the United States Environmental Protection Agency (USEPA) in the New England regional offices as a GIS Analyst with General Dynamics, assisting on numerous GIS and environmental health and policy related projects involving cases and remediation projects under the Clean Air Act (CAA), Clean Water Act (CWA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Before working at the EPA New England offices, she worked as an Environmental Associate at the EPA Region 5 offices in Chicago, Illinois. Here, she worked in the Superfund Division in several field GIS teams involving site remediation, human health risk assessment, and clean-up monitoring, using GIS and statistical programs.

Her studies included extensive coursework in environmental and natural resources economics and policy, multivariate statistics, GIS and spatial analysis, econometrics and energy modeling, human health and ecological risk and exposure assessment, toxicology, and environmental epidemiology. Her research projects included evaluating the effectiveness of state and federal pollution prevention programs (P2) and the benefits from reducing toxic use and byproduct at top polluting firms regulated under the Massachusetts Toxic Use Reduction Act (TURA), as well as measuring urban development along the Appalachian Trail using remote sensing and GIS analysis. She has had extensive experience in the environmental health sciences from both her specialized coursework taken Boston University's School of Public Health and projects she worked on at the EPA.

Laurie Solis, MA

MA, Anthropology/Archaeology
California State University
Northridge, 2004

MA, History
Canterbury University
Cheshire, U.K., 2003

Paleontology
Southern California
Pleistocene Marine
Pleistocene Terrestrial- Mammals
Miocene Marine

Cultural Resource Specialist

Years of Experience: 6

- *County of Los Angeles, Hollywood Bowl National Register of Historic Places Nomination Package*
- *Great Basin Unified Air Pollution Control District, Phase I & Phase II Archaeological Evaluation*
- *County of Los Angeles, Plaza de Cultura y Arte EIR – Cultural Resource Evaluation*
- *City of Sierra Madre – Historic Resource Evaluation*
- *Vasquez Rocks County Park - Phase I Archaeological Survey*
- *EnXco - Phase I Archaeological Survey*
- *County of Los Angeles Fire Station, Cultural Resource Evaluation*
- *City of LA, Bureau of Engineering – Archaeological Resource Evaluation*
- *Hyundai Corp. - Cultural Resource Evaluation*
- *LAUSD Central High School No. 9 – Cultural Resources Evaluation*
- *LAUSD Central High School No. 10 – Cultural Resources Evaluation*
- *SCAG 2000 RTP – Cultural Resources Evaluation*
- *Edwards Air Force Base – Archaeological Recognizance Survey and Excavation*
- *Vista Pacifica Project, in Culver City, CA-archaeological and paleontological monitoring*
- *City of Diamond Bar – archaeological/ paleontological monitoring*

Ms. Laurie Solis joined the Sapphos Environmental, Inc. team as a Cultural Resource Specialist in April 2003. She brings to Sapphos Environmental, Inc. five years of experience in management of cultural resources impact assessment projects throughout California. During her career, Ms. Solis has successfully completed numerous environmental studies pursuant to the California Environmental Quality Act (CEQA), the California Public Resources Code, the National Environmental Policy Act (NEPA), National Historic Preservation Act, Section 106. In addition, her experience includes preparation of complex technical studies and completion of environmental compliance documents for projects requiring incorporation of numerous technical studies and other input, occurring in various environments and habitat types, and facing multiple regulatory constraints.

Ms. Solis has managed and directed historic resource surveys, initial studies and investigations for the City of Sierra Madre, County of Los Angeles, Los Angeles Unified School District, and the City of Los Angeles, Bureau of Engineering for a number of projects, including Plaza de Cultura y Arte, 1 Carter Avenue, Fire Station No. 65, and Fire Station No. 63. She is currently completing the Hollywood Bowl National Register of Historic Places Nomination Package for the County of Los Angeles.

Her wide range of experience in archaeological and paleontological resource management includes directing archaeological and paleontological resource assessments, developing archaeological and paleontological mitigation treatment plans; performing field reconnaissance and surveys; conducting archaeological and paleontological monitoring and salvages; laboratory analysis and database management, literature review and research; and academic and technical report writing.

Ms. Solis' extensive experience in managing and directing Phase I archaeological resource surveys, as well as monitoring, were gained through her work for the City of Los Angeles, National Park Service, Edwards Air Force Base, and many private sector clients. Some of these projects include the Vasquez Rocks County Park, New Valley Bomb Squad Facility, and West Los Angeles Animal Shelter.

In addition, Ms. Solis has experience in the treatment of paleontological resources, which was gained through graduate coursework, and her internship at the George C. Page Museum in Los Angeles, where she was a laboratory assistant. Ms. Solis has collected fossil specimens as part of mitigation monitoring for projects at Edwards Air Force Base, City of Culver City, and the City of Diamond Bar. Her fossil recovery efforts for the City of Diamond Bar yielded the discovery of at least two new species of marine organisms never before discovered in California. These finds and others are currently being evaluated at the Natural History Museum of Los Angeles County and University of California at Berkeley.

Academically, Ms. Solis was awarded the 2001 Graduate Equity Fellowship Award in Archaeology and is an active member of the Society for California Archaeology, and Society for American Archaeology. She is a published author in academic journals on the topic of cultural resource law and practice in California.

Nuna Tersibashian, MS, REA

MS, Environmental Geology, California State University, Northridge

BS, Engineering Geology, State University of Yerevan, Armenia

Environmental Analyst III, Project Geologist, and Water Quality Specialist

Years of Experience: 7

Relevant Experience:

- *Conducted several groundwater investigations, assisting in the development of large hydrologic databases. Participated in updating Bulletin 118, Investigation of Southern California Groundwater Basins*
- *Conducted a hydrologic investigation of the Simi Valley, California to characterize runoff quality and quantity for the purpose of developing the watershed as a drinking water source*
- *Conducted landfill site investigations, surveys, and analyzed alternative environmental management policies for achieving environmental standards in a cost effective manner*
- *Interfaced with local regulatory agencies, gained approval for all investigation phases, and designed regulatory permits*
- *Produced geologic and hydrogeologic surveys of the sites and analyzed data. Prepared Quality Insurance Project Plans (QAPPs) and RI Reports*

Ms. Nuna Tersibashian, environmental analyst III, is currently participating in various projects at Sapphos Environmental, Inc. Ms. Tersibashian's role at Sapphos Environmental, Inc. is balanced between preparation and coordination of environmental compliance documents such as Environmental Impact Reports, Mitigated Negative Declarations, Environmental Assessments, and Initial Studies, preparation of regulatory permits, as well as assisting in field monitoring and data collection.

Since joining Sapphos Environmental, Inc., Ms. Tersibashian has had the opportunity to assist in the preparation of environmental documents, including the Brownfields Policy.

Prior to working at Sapphos Environmental, Inc., Ms. Tersibashian received her Masters of Science in Environmental Geology attended graduate school at the California State University located in Northridge, California where she. Her studies included surface water and groundwater impact analysis for Simi Valley, Ventura County, CA.

Ms. Tersibashian provided technical and management support to Edwards Air Force Base (EAFB) Environmental Restoration Program (ERP), Sites Remedial Investigations and Long Term Monitoring. She managed and performed extensive soil and groundwater sampling at the 50-acre area surrounding a former burn dump. A major component of the site work was the removal of debris ensuring no impact to the desert plant and wildlife species.

Ms. Tersibashian performed operation, maintenance and monitoring services for soil vapor extraction and treatment system, removing JP-8 from the soil around Hydrant 3 at EAFB.

Ms. Tersibashian conducted correspondence, presented data, and worked collaboratively with the Air Force, U.S. Environmental Protection Agency (EPA), Cal EPA, Regional Water Quality Control Board (RWQCB), and county agencies to gain approval of project plans, investigation alternatives, and schedules.

At EAFB, she also performed monitoring and reporting of key water quality indicators, and performed field and laboratory analysis of Simi Valley surface water. The water was analyzed for dissolved oxygen, pH, E. Coli and total coliforms, chlorophyll, alkalinity, metals, and nutrients. Analytical results were used by the Los Angeles RWQCB to develop a history of data for the classification of streams, ponds, and lakes.

Associations/Certifications/Achievements:

2002 Completed Toxic Chemical Training for Edwards Air Force Base, 8 hrs. 5-2002

2002 Current OSHA 8-hour Refresher Health & Safety Training

2001 OSHA 40-hour Health & Safety Training for Hazardous Materials Workers

1997 Member of American Society of Geologists

Appendix N

SCS Engineers
Résumés

ALLYSON L. BALUYOT

Education

B.A. - University of California, Irvine, 1999
Sociology (Additional coursework in Environmental Analysis and Design)

M.S. - University of San Francisco, 2004
Environmental Management

Additional Training

40-Hour Hazardous Waste Operations Training
8-Hour Annual Refresher Training for Hazardous Waste Site Activities
First-Aid and CPR Training

Affiliations

Society of Environmental Toxicology and Chemistry (SETAC), Southern California Chapter

Professional Experience

Ms. Baluyot has 3 years of experience in environmental consulting and preparation of human health risk assessments. She has performed and assisted in routine aspects of human health risk assessment, site characterization, and other environmental science projects, including baseline risk assessments, exposure modeling to predict exposure point chemical concentrations, development of action or cleanup levels, multi-pathway exposure assessments, development of site-specific, risk-based cleanup levels for soil and groundwater, and toxicological assessments. Her duties have included performing risk assessment calculations using spreadsheet tools and other modeling software, analyzing and interpreting environmental chemistry data, database management, and report writing. She has assisted in evaluating the nature and extent of contamination at hazardous waste sites; evaluating the fate and transport of chemicals in the environment; and preparing reports to document the site investigation process. In addition to completing health risk assessments at SCS, Ms. Baluyot has gained valuable experience in preparing air quality compliance reports, and performing field work activities such as indoor air methane monitoring and landfill gas probe monitoring. She joined SCS in September 2003.

Selected project experience includes the following:

- Active Commercial/Industrial Facility, San Diego, California (2001): Assisted in the preparation of a baseline risk assessment in support of a Resource Conservation and Recovery Act (RCRA) facility investigation for 26-acre site, including a technical memorandum and analysis of soil, groundwater, and soil gas data to determine chemicals of potential concern and evaluate the potential health risks to current and future on-site industrial workers and construction workers.

ALLYSON L. BALUYOT (continued)

- Former Industrial Facility, Los Angeles, California (2002): Prepared a human health risk assessment at a 3.75-acre site used by several different industries to evaluate the potential effects of constituents detected at the sites such as lead, residues from gasoline and diesel fuel, and other chemicals to a hypothetical commercial/industrial worker. A data usability study of historical data was conducted to address issues such as adequacy of samples and sampling methods with respect to potential sources.

- Former Agricultural Facility, Los Angeles, California (2003): Assisted in the preparation of human health risk assessment for former agricultural facility to determine risk to human health to potential future residents from chemicals formerly used at the site, including VOCs and pesticides.

- Former Chrome Plating Facility, Hayward, California (2003): Performed an environmental screening evaluation in support of investigations of trivalent and hexavalent chromium contamination in soil and groundwater beneath the facility. Representative soil and groundwater sample data were directly compared to environmental screening levels set forth by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) in their guidance document *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (2004).*

- Former Precision Metal Stamping Facility, El Segundo, California (2003): Prepared a focused health risk assessment to evaluate potential human health risks to future site workers attributable to volatile organic compounds (VOCs) present in soil beneath the site.

- Landfill Located in San Diego County, California (2004): Assisted in the preparation of an air toxics human health risk assessment to determine risks from landfill gas to potential future residents adjacent to a landfill site.

- Commercial Fueling Facility, Petaluma, California (2004): Prepared focused health risk assessment to estimate potential future health risks to future construction and commercial/industrial workers at site from total petroleum hydrocarbons and "indicator chemicals" for petroleum mixtures such as VOCs and polycyclic aromatic hydrocarbons (PAHs). A "tiered" approach was used using SFBRWQCB's *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (2004).* Cleanup levels were also determined based on the evaluation of risk.

- Former Commercial/Industrial Facility, Menlo Park, California (2004): Prepared health risk assessment in support of a RCRA facility investigation to evaluate potential health risks to current/future on-site and off-site receptors at a former facility involved in the aerospace, automotive, construction, electronics, electrical power, process and telecommunications industries.

PAUL DAMIAN, Ph.D., MPH, DABT

Education

B.S. - University of Michigan, 1981
Natural Resources

MPH (Master of Public Health) - University of Michigan, 1984
Environmental Health

Ph.D. - University of California, Davis, 1995
Toxicology and Pharmacology

Certifications

Diplomate, American Board of Toxicology (DABT), 1997 (Recertified 2003)

Affiliations

Society of Toxicology
American College of Toxicology
Society of Environmental Toxicology and Chemistry
International Society of Regulatory Toxicology and Pharmacology
Roundtable of Toxicology Consultants
Society for Risk Analysis
Health Physics Society
American Bar Association (Environment, Energy and Resources Section)
(Associate Member)
Groundwater Resources Association of California

Professional Experience

Dr. Damian is a Board Certified Toxicologist with 20 years of experience assessing the human health and ecological risks associated with chemical contamination of the environment and workplace. He is the California Risk Assessment Practice Leader and National Partner for Risk Assessment at SCS.

Dr. Damian's project experience has included directing and preparing risk assessments and risk assessment work plans for hazardous waste sites, military bases, mine and smelter sites, radiation sites, landfills, and brownfields. His experience also includes Proposition 65 compliance, chemical and drug product safety assessment, contaminated building risk assessments, and expert witness testimony. Dr. Damian brings advanced risk assessment expertise to our clients, including Monte Carlo (probabilistic) risk assessment and toxicokinetic modeling. Dr. Damian has been trained at Argonne National Laboratory in the use of RESRAD, the leading computer model for assessing risks associated with radioactively contaminated sites.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Prior to joining SCS, Dr. Damian was involved in the following projects:

- As Principal of Chemical Risk Sciences International, he conducted advanced risk assessment and environmental toxicology projects for private and public sector clients.

- As Principal Toxicologist/Risk Assessment Scientist for Tetra Tech EM, Inc., he was project manager on risk assessment and toxicology projects. He provided senior-level toxicology and health risk assessment support to other project managers throughout the company and contributed advanced risk assessment methods such as pharmacokinetic/toxicokinetic analysis and probabilistic (Monte Carlo simulation) risk assessment capabilities.

- As Principal Toxicologist/Risk Assessment Scientist at Earth Tech, Inc. (formerly Rust Environment & Infrastructure), Dr. Damian was project manager on risk assessment and toxicology projects. He provided senior-level toxicology and health risk assessment support to other project managers throughout the company and contributed advanced risk assessment methods such as pharmacokinetic/toxicokinetic analysis and probabilistic (Monte Carlo simulation) risk assessment capabilities.

- As Regional Program Coordinator for the Food Animal Residue Avoidance Databank, Department of Environmental Toxicology, University of California, Davis, he supervised staff in the conduct of pharmacokinetic analyses, responded to information requests from veterinarians, and managed day-to-day operations. He advised public officials on the public health implications of food animal poisonings, and advised veterinarians on the extra-label use of drugs in order to prevent the occurrence of drug residues in meat and milk. He also performed pharmacokinetic analyses of drugs and chemicals in food animals.

- As Senior Toxicologist for Delta Environmental Consultants, Inc., in Rancho Cordova, California, he provided senior-level toxicology and health risk assessment support for the investigation and remediation of underground petroleum storage tank sites, pre-purchase site assessments, and hazardous waste site cleanups.

- As Lead Toxicologist for Hazardous Waste/Toxicology Group at Envirosphere in Sacramento, California, he was responsible for all technical activities associated with health risk assessment/toxicology work. He was Lead Risk Assessor for a multipathway health risk assessment for a Superfund site in San Jose, California, and assessed health impacts associated with catastrophic and routine releases of toxic air contaminants.

- As a toxicologist in the Risk Assessment and Toxicology Group at Radian Corporation in Sacramento, California, he prepared air toxics health risk assessments for waste-to-energy incineration facilities and hospital incinerators. He also assisted in the development and/or selection of appropriate health risk assessment methods, and

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

developed acceptable levels of exposure to toxic chemicals based on critical reviews and interpretation of the toxicological literature.

- As a toxicologist for the Toxics Group, Standards and Toxics Section, Ohio Environmental Protection Agency, he prepared statewide technical guidelines for use in developing surface water quality standards for toxic chemicals. The guidelines provided detailed procedures for the consistent interpretation of mammalian toxicology data and were approved by U.S. EPA. Dr. Damian assisted in setting up a technical advisory group to review the guidelines, and provided general toxicology support on agency projects.

- As a toxicologist for the Hazard Assessment Unit, Toxic Chemical Evaluation Section, Michigan Department of Natural Resources (Lansing, Michigan), he reviewed, evaluated, and compiled data from the primary scientific literature dealing with the toxicological properties of chemicals. He conducted reviews of the aquatic and mammalian toxicology literature to evaluate potential impacts of toxic substances, and to provide justification and rationale for water quality standards.

Dr. Damian's specific project experience includes:

- Prepared baseline human health and ecological risk assessments for a landfill site in southern California. The assessments evaluated potential risks associated with metals, explosives, dioxins and furans, polynuclear aromatic hydrocarbons (PAHs), VOCs, and pesticides. The risk assessments were approved by the California Department of Toxic Substances Control (DTSC).

- Wrote the draft basewide human health risk assessment protocol document for the U.S. Navy for the former Alameda Point Naval Air Station, Alameda, California. Arranged meetings with the U.S. Navy, California DTSC and U.S. EPA Region 9, and led negotiations regarding development of the basewide human health risk assessment protocol document.

- Wrote a health and ecological risk assessment work plan for a 1,000-acre brownfields site in southern California. The work plan was approved by the California DTSC.

- Project manager for a Removal Action Work Plan (RAW) and Site Remediation Completion Report (SRCR) for a 100-acre explosives site in northern California. The California DTSC approved the RAW and SRCR, and the site was certified closed.

- Prepared a health risk assessment for a former scrap metal recycling site in Tempi, Arizona consistent with Arizona Department of Health Services (DHS) risk assessment guidelines. The assessment included both deterministic and probabilistic (Monte Carlo) assessment of health risks associated with residual arsenic, lead, and PCBs in soil. The

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Monte Carlo assessment resulted in an estimated savings of about $1.5 million in cleanup costs for the client.

- Prepared a Monte Carlo (probabilistic) risk assessment for a chemical widely used in the semiconductor industry. The assessment resulted in an estimated savings of $15 million in retooling costs for a major semiconductor manufacturer.

- Project manager for a human health risk assessment for a 100-acre brownfields site in northern California. An explosives-manufacturing company formerly owned the site and the site was contaminated with explosives and metals.

- Prepared a groundwater vapor intrusion risk assessment for a UST site owned by a national manufacturer of luggage. The risk assessment resulted in closure of the site within 3 months.

- Prepared a data usability memorandum to support baseline human health and ecological risk assessments for a landfill site in southern California. The data usability memorandum was approved by the DTSC.

- Prepared a radiological hazard assessment for a former uranium mine in Stanislaus County, California. The assessment evaluated the immediate health hazards associated with gamma radiation, radon exposure, consumption of radionuclide-contaminated drinking water and soil, and potential contamination of beef cattle with radionuclides. The project involved the use of RESRAD and direct measurement of gamma emissions, radon concentrations in ambient air, and airborne particulate concentrations of radionuclides to assess radiation dosages for recreational users of the site. Also developed human health and ecological screening benchmarks for acceptable levels of radionuclides in soils, surface water and sediments.

- Prepared a health risk assessment for a former mine facility site near Morenci, Arizona, consistent with Arizona DHS risk assessment guidelines. The assessment evaluated health risks associated with residual soil levels of arsenic. The following exposure pathways were evaluated: soil ingestion, inhalation of soil particulates, and dermal contact with soil. The assessment concluded that health risks to a hypothetical occupational population would be negligible.

- Prepared a health risk assessment for a former mine tailings disposal site near Clifton, Arizona, consistent with Arizona DHS risk assessment guidelines. The assessment evaluated health risks associated with residual soil levels of arsenic and copper following site remediation. The following exposure pathways were evaluated: soil ingestion, inhalation of soil particulates, and dermal contact with soil. The assessment concluded that health risks to hypothetical residential, occupational, and student population receptors would be negligible.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

- Project Manager for several baseline multi-pathway human health and ecological risk assessments for a 1,000-acre former propellant-manufacturing site in southern California.

- Prepared a human health and ecological endangerment assessment for two mine sites in Uinta National Forest, Utah County, Utah (Dutchman Flats and Pacific Mine). The endangerment assessment included evaluating human health and ecological risks and developing arsenic and lead cleanup levels to protect a hypothetical recreational user of the site.

- Prepared a product safety health risk assessment for a mine-derived national lawn care product. The assessment included management of a contract toxicology laboratory, geochemical characterization of the chemical forms of mine-derived lead and arsenic, and *in vitro* bioavailability studies of lead and arsenic.

- Assisted in the evaluation of the potential health risks associated with toxic emissions from a proposed 800-ton/day solid waste combustion facility to be located in Stanislaus County. Toxic contaminants evaluated in this assessment included heavy metals, PCBs, PAHs, polychlorinated dibenzodioxins, and dibenzofurans. All potentially significant exposure pathways were evaluated, including inhalation, drinking water, fish consumption, inadvertent ingestion of soil, dermal contact with soil, and consumption of contaminated food (produce, dairy products and meat). The assessment included quantitative estimation of cancer and noncancer risks to impacted receptor populations, including sensitive receptor populations located at schools and hospitals. The risk assessment was reviewed and approved by both the California Air Resources Board and the California Department of Health Services.

- Assisted in the preparation of a multi-pathway health risk assessment for the Milliken waste-to-energy facility, a 1,600-ton/day solid waste combustion facility proposed for construction in San Bernardino County, California. The assessment included estimation of human contaminant exposures and risks for the following exposure pathways: inhalation, dermal contact with soil, drinking water, fish consumption, soil ingestion, and maternal milk consumption.

- Prepared a screening-level analysis of the projected maximum health impacts associated with inhalation exposure to plutonium-239 (Pu-239) released during truck transport of low-level transuranic radiologic waste. Plutonium present in a hypothetical waste payload was assumed to be released via a fire resulting from a truck accident. Maximum downwind air concentrations of the released plutonium were modeled using the EPA- and California Air Resources Board-approved air dispersion models PTPLU and PTFUM. The dispersion modeling approach used included consideration of the effect of combustion gas production on the plutonium release rate. Lifetime cancer risk and the potential for noncancer-related acute toxic effects were determined based on inhalation

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

exposure. Inhalation exposure included contributions from direct inhalation of ambient air and inhalation of resuspended particulates.

- Assessed the health impacts associated with air emissions from a hotel incinerator. Population exposures to metal and organic contaminants were estimated for the following exposure pathways: inhalation, dermal contact with soil, inadvertent soil ingestion, drinking water, home garden produce consumption, and maternal milk. Lifetime cancer risks and the potential for noncancer adverse health effects were evaluated. The risk assessment was submitted to the County of Santa Barbara Air Pollution Control District.

- Technical lead responsible for the evaluation of public and worker health impacts associated with production and testing of a newly designed rocket motor for the Space Shuttle. The evaluation included the assessment of impacts related to hazardous material spills, rocket motor explosions and fires, and inhalation exposure to rocket exhaust during testing. A detailed discussion of general worker health and safety practices and control technologies associated with rocket motor production was also prepared as part of the evaluation.

- Risk assessment lead for a comprehensive Superfund site public health evaluation for a hazardous waste drum recycling facility located in San Jose, California. Numerous exposure pathways were evaluated including: inhalation, soil ingestion, dermal contact with soil, fish consumption, dermal contact with sediment, sediment ingestion, drinking water, indoor air exposure through domestic use of groundwater, and home garden produce consumption.

- Assessed the health effects associated with chemicals released from a proposed University of California research laboratory. The assessment included evaluating toxicology data to develop estimates of safe exposure levels for approximately 50 chemicals used at the research laboratory.

- Prepared a health risk assessment of a fertilizer product to support compliance with California's Proposition 65. The assessment was prepared consistent with the requirements of Proposition 65, and included evaluation of exposure occurring through incidental soil ingestion, inhalation of airborne particulates, dermal contact and consumption of homegrown garden produce.

- Evaluated the health risks associated with potential human exposure to DDT in soil as part of a real estate site audit. Total daily exposure to low levels of DDT in soil was estimated for the following pathways: inhalation, inadvertent soil ingestion, and dermal contact with soil. The risk assessment was conducted according to California Proposition 65 risk assessment guidelines to determine whether the site was in compliance with the Proposition 65 "no significant risk" level for DDT.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

- Provided third-party critical review of a comprehensive hazardous waste disposal facility risk assessment for the County of Santa Barbara.

- Prepared and/or reviewed and approved health and safety plans for the investigation and remediation of leaking underground storage tank sites.

- Evaluated the potential health impacts associated with catastrophic release of propane from a propane tank rupture. The evaluation included modeling of the air dispersion of the released propane.

- Evaluated the potential health risks for a building contaminated with lead.

- Prepared a literature review of the toxicity of lead and arsenic to horses.

- Prepared and presented expert witness testimony with regard to the potential public health impacts associated with placement of a large cogeneration facility in Crockett, California. Testimony addressed the health significance of routine air emissions, as well as possible catastrophic release of ammonia in the event of an accidental ammonia tank spill or rupture (deposition and testimony at administrative trial). Provided expert witness testimony regarding the human health risks associated with possible toxic contamination of a herd of beef cattle (deposition and testimony at juried trial).

- Prepared and presented expert witness testimony with regard to the potential public health impacts associated with the diversion of water from the Sacramento Delta upstream into the Camanche Reservoir. Testimony addressed the possible contamination of Camanche reservoir fish with contaminants from lower quality delta water and resulting human exposure through fish consumption (deposition and testimony at administrative trial).

In addition, Dr. Damian serves on the Editorial Board, TOMES (Toxicology, Occupational Medicine, and Environmental Series) Information System, Micromedex, Inc., Englewood, Colorado, and developed and taught a graduate course (Toxicokinetics and Pharmacokinetics) as an Adjunct Assistant Professor in the Department of Pharmaceutical Sciences, School of Pharmacy, University of Colorado Health Sciences Center.

Continuing Education/Special Training

Investigation and Remediation of Dry Cleaner Release Sites. Groundwater Resources Association of California Symposium. Newport Beach, California. November 10, 2004.

Investigation and Remediation of Dry Cleaner Release Sites. Groundwater Resources Association of California Symposium. Sacramento, California. April 7, 2004.

33rd Annual Conference on Environmental Law. American Bar Association. Keystone, Colorado. March 11-14, 2004.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

1,4-Dioxane & Other Solvent Stabilizer Compounds in the Environment. Groundwater Resources Association of California Symposium. San Jose, California. December 10, 2003.

Emergent Chemicals: Who, What, When, Where and How to Clean Up. Groundwater Resources Association of California Symposium. Irvine, California. October 9, 2003.

Subsurface Vapor Intrusion to Indoor Air: When is Soil and Groundwater Contamination an Indoor Air Issue? Groundwater Resources Association of California Symposium. San Jose, California. September 30, 2003.

Environmental Risk Insurance. Pacific Business and Industrial Association. Palo Alto, California. September 18, 2003.

Perchlorate in Groundwater: Occurrence, Analysis and Treatment. Groundwater Resources Association of California Symposium. Sacramento, California. July 31, 2003.

Fundamentals of Risk Assessment and Applications of Recent Methodologies to Difficult Problems, Society of Toxicology Continuing Education Course, Society of Toxicology 42nd Annual Meeting, Salt Lake City, Utah, March 9, 2003.

Risk Assessment for Metals, Society of Toxicology Continuing Education Course, Society of Toxicology 40th Annual Meeting, San Francisco, California, March 25, 2001.

RESRAD Training Workshop, Argonne National Laboratory, Argonne, Illinois, January 29-30, 2001.

Practical Issues in the Use of Probabilistic Risk Assessment and Its Application to Hazardous Waste Sites, Superfund Basic Research Program and the University of Florida, Sarasota, Florida, March 29-31, 1998.

Effective Risk Communication: Avoiding the Pitfalls, Society of Toxicology Continuing Education Course, Society of Toxicology 37th Annual Meeting, Seattle, Washington, March 1, 1998.

Bioavailability: Quantifying the Real Toxicity of Common Soil Contaminants, International Business Communications, Scottsdale, Arizona, December 11-12, 1997.

Quantitative Uncertainty Analysis in Risk Assessment: Monte Carlo Techniques, Society of Toxicology Continuing Education Course, Society of Toxicology 35th Annual Meeting, Anaheim, California, March 10, 1996.

International Workshop on Physiologically-Based Pharmacokinetic Modeling and Risk Assessment, Colorado State University, Ft. Collins, Colorado, August 3-21, 1992.

PAUL DAMIAN, Ph.D., MPH, DABT (continued)

Publications

Damian, P., and Pontius, F. From Rockets to Remediation: The Problem of Perchlorate in Drinking Water. Environmental Protection June 1999.

Damian, P., Craigmill, A., and Riviere, J. 1997. Farad Digest: Breaking new ground. Journal of the American Veterinary Medical Association 210(5).

Craigmill A.L., Rangel-Lugo M., Damian P., and Riviere J. E. 1997. Extralabel use of tranquilizers and general anesthetics. Journal of the American Veterinary Medical Association 211:302-304.

Damian P., Craigmill A.L., and Riviere J.E. 1997. Extralabel use of nonsteroidal anti-inflammatory drugs. Journal of the American Veterinary Medical Association 211:860-861.

Damian, P., and Raabe, O.G. 1996. Toxicokinetic modeling of dose-dependent formate elimination in the rat: in vivo-in vitro correlations using the perfused rat liver. Toxicology and Applied Pharmacology 139:22-32.

Presentations

"Using Risk Assessment to Streamline Contaminated Site Closure," Presented at the February 13, 2001, Meeting of the Colorado Hazardous Waste Management Society, Denver, Colorado.

"Using Risk Assessment to Facilitate Contaminated Site Closure," Presented at the January 13, 2000, Meeting of the Rocky Mountain Association of Environmental Professionals, Denver, Colorado.

"Using Risk Assessment to Facilitate Contaminated Site Closure," Presented at the March 16, 2000, Meeting of the American Society of Civil Engineers, Denver, Colorado.

RAYMOND H. HUFF, R.E.A.

Education

B.A. - Whittier College, 1991
Philosophy (Minor in Geology)

M.B.A. - Keller Graduate School of Management, 1999
Information Systems Emphasis

Licenses, Certifications, and Affiliations

Registered Environmental Assessor - California, 1997 (No. 06857)
OSHA 40-Hour Health and Safety Training for Hazardous Waste Workers
OSHA 8-Hour Hazardous Waste Supervisor Training

Professional Experience

Mr. Huff has over 13 years of experience in the field of environmental consulting, information systems management, and in the areas of environmental site assessment and remediation, chemical fate and transport modeling, and risk assessment. He is currently a Project Manager in SCS's California office. Mr. Huff has been the task manager and lead staff personnel on a variety of projects relating to site investigation, risk assessment, environmental modeling, and risk management of sites with both soil and groundwater contamination.

Selected projects and studies Mr. Huff has participated in include the following:

- Environmental Investigations and Risk Assessment at a former landfill in Los Angeles County. This landfill is a closed site that may have received both hazardous and non-hazardous wastes; it is currently occupied by two golf courses and other commercial and residential developments and is being considered for additional redevelopment. Project work at this facility has included completion of soil vapor surveys, installation and monitoring of LFG migration probes, LFG sampling/analysis, oversight of cover and subsurface soil and groundwater sampling, completion of a human health risk assessment, CEQA assistance, and negotiations with regulatory agencies. The site is currently being considered for listing on the National Priorities List (NPL) as a potential Superfund site. Oversight of the landfill is provided by EPA Region IX, DTSC, and the Los Angeles County landfill LEA.

- Creation of Baseline Human Health and Ecological Risk Assessment for a former rocket manufacturing facility in Van Nuys, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, hydrazine, and VOCs. The ecological risk assessment included terrestrial ecosystems.

- Key field geologist in the investigation of a former oil refinery located in central California. In addition to conducting remedial excavations of lead impacted soils, Mr.

RAYMOND H. HUFF, R.E.A. (continued)

Huff planned, scheduled, and coordinated quarterly sampling of 73 multi-aquifer groundwater monitoring wells located in and around the site, as well as designed and installed 16 groundwater monitoring wells located in three different aquifers for contaminant plume tracking and remediation; and compiled data and prepared reports for submittal to regulatory agency.

- Creation of Baseline Human Health and Ecological Risk Assessment for a former electronics manufacturing facility in Los Angeles, California. Contaminants at the site included chlorinated solvents. The ecological risk assessment included terrestrial ecosystems.

- Human Health Risk Evaluation and Impact Assessment for proposed commercial developments, on and adjacent to a former hazardous waste landfill in southern California. The site contains two landfills; one municipal solid waste landfill and one hazardous waste site, which are under the oversight of DTSC. Mr. Huff completed various investigations and data reviews/analyses of soil, surface water, groundwater, LFG, and air quality. The data were used for the completion of a human health risk assessment in support of the CEQA process for a proposed golf course and business park development on the Class III landfill.

- Key field geologist in remedial oversight for cleanup of a former petroleum refinery and state Superfund site located in Southern California. More than 1,000,000 cubic yards of contaminated soils were excavated for on-site treatment using bioremediation and vapor extraction.

- Investigation, Risk Assessment, and Remediation Feasibility Study for a former landfill in San Diego County, California. For this site, Mr. Huff developed the LFG sampling portion of the site assessment workplan of the former landfill site, which is located next to a river, bay, and amusement park and is used heavily for recreational purposes. The field investigations will be followed by a risk assessment, and given the highly visible and public nature of the landfill project; focus on risk communication will be of primary importance. Ultimately, several candidate risk-based remediation methods applicable to the site will be identified with typical costs associated with each method. This is an ongoing project that includes interface with multiple regulatory agencies. Site investigative activities, including preparation of work plans, conducting soil gas surveys, installation of soil borings and subsequent sampling, and evaluation of applicable remedial alternatives, assessment of hydrocarbon contaminant plumes from a variety of sources, including leaking underground storage tanks, aerospace facilities, and former petroleum refineries.

- In-field design and installation of vapor extraction systems for the remediation of volatile contaminants in subsurface soils.

RAYMOND H. HUFF, R.E.A. (continued)

- Planning and direction of field investigations of numerous hazardous waste sites to identify and characterize contaminants in soil and groundwater.

- Preparation of health and safety plans submitted for regulatory approval. This includes hazardous waste characterizations, emergency response planning, establishing site operating procedures, and field implementation of health and safety plans.

- Preconveyance environmental assessments of properties prior to real estate transfer. These projects consist of evaluating past on-site operations, identifying potentially contaminated sites, record searches of files maintained by regulatory agencies, and collection and analysis of groundwater quality information, where applicable.

Additionally, Mr. Huff is skilled in information systems management, database design, programming, and computer modeling. He is responsible for the collection, conversion, manipulation, and management of data used in risk assessments, groundwater and vadose zone migration, water fate and transport modeling, and in designing and developing maps, cross-sections, and 3-D visualizations of surface and subsurface environments.

Mr. Huff is also experienced in database design, development, programming, and management. Project experience includes adaptation of soil contaminant attenuation models, and creation/management of GIS database used for tracking and administration of internal SCS projects. Mr. Huff's expertise includes the use of the EPA-approved SESOIL and VLEACH (vadose zone), AT123D and MODFLOW (groundwater), Visual MODFLOW, Visual Groundwater, MS Project, AutoCAD, GIS (ArcInfo/ARCView), Surfer, Visual Basic, FileMaker Pro, MS Access, Dbase, and MS Windows 3.1/NT/95/98, Unix, and Apple Macintosh operating systems and applications.

Mr. Huff also performs project and financial management for internal and external projects using business practices and project management skills acquired during completion of his Master's degree in Business Administration.

Mr. Huff has participated in a certified health and safety program in compliance with OSHA Standard 29 CFR 1910.120. He is knowledgeable in incident response operations, team functions, personnel safety, and field equipment. Mr. Huff has also participated in an OSHA-approved Hazardous Waste Supervisor Training course.

Prior to joining SCS, Mr. Huff was affiliated with Green & Associates, an environmental consulting firm that provided services such as Phase I assessments, asbestos assessments, and evaluation of core samples for paleontological purposes for major oil companies.

Publications and Presentations

Huff, Raymond; Leonard, Michelle; and Sullivan, Patrick S., Composting Emissions Update and New Southern California Regulations, Presentation at the Annual Solid Waste

RAYMOND H. HUFF, R.E.A. (continued)

Association of North America (SWANA) WASTECON Conference in St. Louis, Missouri, October 2003.

Huff, Raymond, and Sullivan, Patrick S., Unique Landfill Gas Issues on Urban Inactive Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004.

Huff, Raymond, and Sullivan, Patrick S., Air Quality and Odor Impacts from Landfill-Related Emissions, Conference Proceedings, Water Environment (WEF) and Air and Waste Management Association (AWMA) Odor and Air Emissions 2004, Bellevue, Washington, April 2004.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G.

Education

B.S. - University of California, Los Angeles, 1967
Geology

M.S. - University of California, Los Angeles, 1970
Geology

Ph.D. - University of Kansas, Lawrence, 1974
Geology

Professional Licenses

Professional Geologist - California, 1987 (No. 4338)
Certified Engineering Geologist - California, 1991 (No. 1581)
Certified Hydrogeologist - California, 1995 (No. 79)
Registered Geologist - Arizona, 1989 (No. 23684)
Certified Petroleum Geologist - AAPG, 1986 (No. 2977)

Affiliations

American Association of Petroleum Geologists (Environmental Issues Committee)
Geological Society of America (Hydrogeology and Engineering Geology Divisions)
National Water Well Association
American Society of Testing and Materials (Committee on Environmental Assessment)

Professional Experience

Dr. Lister has 30 years of professional experience in geology and hydrogeology. His experience includes remedial investigations at active and inactive industrial facilities; active, inactive, and planned solid waste disposal sites; and state and federal Superfund sites. Dr. Lister has participated in numerous types of projects, including the following:

- Investigation of vadose and saturated zone contamination at industrial and commercial sites throughout Southern California, including Remedial Investigations (RI) and Feasibility Studies (FS).

- Investigations of surface and groundwater quality at landfills, including design of groundwater monitoring systems, direction of well drilling and installation, sampling and analysis, interpretation of data, and preparation of reports.

- Design of groundwater and vadose zone treatment systems, including determination of subsurface properties by means of aquifer pump tests, vapor extraction tests, and laboratory tests; determination of well location and spacing by means of capture zone analysis; preparation of remedial action plans, including specifications for extraction and air sparging wells; and determination of operations, maintenance, and test programs.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G. (continued)

- Studies of proposed sites for new landfills and other waste management facilities, including hydrogeological assessments of sites for protection of water quality. Work included installation of monitoring wells, groundwater sampling on a local and regional basis, conducting aquifer tests, and descriptions of groundwater regimes for environmental evaluation and permitting.

- Research into field investigation and remediation, resulting in journal articles, reports, and guidance documents on the practical application of these techniques.

- Investigation of groundwater flow patterns in relation to migration of hydrocarbons, including regional subsurface studies of variations in permeability and porosity, potential migration pathways, and geochemical and geophysical indications of migration.

- Litigation support, including research and report preparation, advising legal counsel, and expert testimony.

Selected projects in which Dr. Lister has been involved at SCS include the following:

- Project Manager for site investigation and remediation for a dry cleaning facility located in a regional shopping center in Goleta. Tetrachloroethene and its breakdown products have been found in soil, soil vapor, and groundwater samples. Investigative effort has concentrated on determining extent of impacts to multiple groundwater zones and feasible remediation approaches. Vadose zone remediation testing has involved injection of chemicals designed to promote reduction dechlorination within the aquifer.

- Project Manager for multiple former underground storage tank sites in the Los Angeles area for a large dairy. Vadose zone soils and groundwater have been impacted. Groundwater monitoring wells have been installed and monitored. Vadose zone wells have been installed and soil vapor extraction tested. Design and remediation efforts will involve installation and operation of vapor extraction systems and free product recovery.

- Project Manager for site investigation on four parcels (total of approximately 67 acres) of a large industrial site in Downey. This 160-acre former aerospace manufacturing facility was active from the late 1920s to the present. Investigation involved review of extensive files, design of a soil vapor and bulk soil sampling and analysis program, conducting the field work, and preparation of reports. Expedited implementation of the investigation allowed on-schedule redevelopment of the parcels in question by the City of Downey. Substances tested included solvents, fuel hydrocarbons, and trace metals.

- Project Manager for investigation and remedial action planning for an approximately 15-acre area in Santa Barbara, involving three dry cleaning facilities, a former vehicle maintenance area, and several thousand feet of sewer main. The project has included soil and groundwater sampling and analysis, aquifer testing, fault studies, and document preparation.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G. (continued)

- Project Manager for remedial investigation, design, and construction for a pesticide-impacted site located on a portion of the Thermal Airport, Riverside County, California. Soil sampling and analysis and health risk assessment were used to delineate the areas requiring remedial action. Design and construction, conducted under Regional Water Quality Control Board (RWQCB) oversight, involved a composite soil/synthetic membrane cap and other facilities to isolate affected soil from potential receptors. Construction was carried out on a rapid turnaround basis, with SCS acting as the general contractor.

- Project Manager for remedial action for Kaiser Ventures facilities. For the former Kaiser Steel plant in Fontana, a two-phase remedial investigation has been carried out and the final report accepted by the California State Environmental Protection Agency, Department of Toxic Substances Control (DTSC). Portions of the site were found to contain soils impacted by coal tar components and heavy metals. Residual materials from coke making and iron and steel manufacturing also exist on site. Feasibility studies and remedial action plans were completed and approved for two of three major portions of this 1,100-acre facility. Remedial action on the largest operable (approximately 500 acres) was completed on a rapid turn-around basis in 1995, and was approved by the DTSC. This portion of the site was redeveloped into an automobile race track. Dr. Lister was also responsible for a number of individual soil, ground-water, and waste investigations, including treatability studies, risk assessments, remedial action plans, preliminary endangerment assessments, and hydrogeological studies. Investigations and remedial action at other Kaiser facilities, including an iron mine, have been conducted.

- Project Manager for RCRA closure at a former aerospace manufacturing facility in Van Nuys, California. Closure plan implementation consisted of investigation of nine waste treatment or storage facilities on a 54-acre site. Site-wide investigation was also conducted including soil vapor survey, soil sampling to 130 feet, groundwater monitoring, and remedial action planning. Remedial activities have included design and implementation of soil vapor extraction, lead removal from a former shooting range, and asbestos removal.

- Project Manager for an RCRA facility assessment (RFA) at a former pesticide storage and disposal site in Pico Rivera, California. County-owned site was used for rodent and other bait formulation for over 60 years, including use of strychnine, thallium compounds, warfarin, and other poisons. The site was also used for collection, storage of dry materials, and tank disposal of waste liquid pesticides received from the public. Based on review of historical sources, a list of over 200 pesticides received on site was compiled. RFA activities have included soil sampling, groundwater well construction and sampling, sample analysis, removal actions, and closure of a septic system used for disposal of pesticide container rinsings.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G. (continued)

- Project Manager for remedial action and hydrogeological studies in support of closure for a former oil production facility in Los Angeles. This site, located on a public beach, was subject to excavation of impacted soil, installation and monitoring of groundwater and vapor wells, and a natural attenuation study.

- Project Manager for investigation of impacts to groundwater from degreasing operations at a 7-acre industrial site in Gardena. Several chlorinated hydrocarbon species have been detected, some of which have their source in off-site areas.

- Project Manager for remedial investigation and feasibility study at the operating Angeles Chemical facility in Santa Fe Springs, including RI/FS and removal actions carried out under DTSC oversight. Project included test, permitting, and installation of a vapor extraction system designed to remove a mixture of as many as 12 volatile solvents from the vadose zone, and simultaneously treat vapor from industrial activities at the site.

- Project Manager for the hydrogeological assessment of the former Armco Steel site in Torrance, California. Project consisted of ground water monitoring well installation, sampling, and analysis and interpretation in terms of local and regional hydrogeology. There are 23 on-site wells, and 12 off-site wells are planned.

- Project Manager for remedial investigation and remediation for a site located in the Puente Valley Well Investigation Program (part of the San Gabriel Valley Superfund site). Multiple phases of soil, soil vapor, and groundwater sampling have occurred, due to impacts by chlorinated hydrocarbons. A soil vapor extraction system was designed, installed, and was operated until site closure was received.

- Project Manager for groundwater monitoring system design and permit compliance for a drinking water treatment sludge monofill for the Peck Road Gravel Pit/San Marino Landfill in Monrovia and Irwindale, California.

- Project Manager for closure, including design of groundwater monitoring systems at several waste management units in California, including the North Chollas Landfill in San Diego, Maxson Street Landfill in Oceanside, the Kaiser Tailings Ponds in Riverside County, and Duck Pond Landfill in National City.

- Project Manager for Water Quality Solid Waste Assessment Test (SWAT) investigations in California, including a Ford Motor Company truck storage site in Carson, the Kaiser East Slag Pile Landfill in Fontana, Peck Road Gravel Pit in Monrovia, Berkeley City Landfill, and others.

- Task Manager for groundwater monitoring and vapor extraction system operation at a former electronics manufacturing facility in Los Angeles, impacted by chlorinated hydrocarbons. Project involved leading a major post-remediation environmental

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G. (continued)

evaluation involving soil and soil vapor sampling and analysis. Dr. Lister has been designated an expert witness for several ongoing litigation efforts involving this site.

- Task Manager for geological and hydrogeological aspects of landfill permitting and California Environmental Quality Act (CEQA) compliance for the Eagle Mountain project, a proposed 100-year-life, rail-haul landfill in central Riverside County.

- Author of groundwater monitoring section of Procedural Guidance Manual for Sanitary Landfills prepared by SCS for the California Waste Management Board.

Prior to joining SCS, Dr. Lister was District Geologist for Pennzoil Exploration and Production Company. He was in charge of petroleum exploration in eastern Texas, northern Louisiana, Arkansas, Mississippi, Alabama, Florida, and Georgia. Dr. Lister managed a drilling budget that averaged $2 million per year, and directed a staff of eight geologists. Dr. Lister has also had experience in various aspects of stratigraphy, geochemistry, structural geology, basin analysis, clastic and carbonate sedimentology, reservoir engineering, and tectonics. In addition to his work throughout California and the Gulf Coast, Dr. Lister has been involved in projects in Arizona, Utah, Nevada, Kansas, New York, South Korea, British Columbia, Bermuda, the Bahamas, and Mexico.

Publications

Clements, S., and K. H. Lister. Closure of a Site Used for Collection of Waste Pesticides and Mixing of Rodenticide Baits. West Coast Conference on Contaminated Soils and Groundwater. Abstracts. 1998.

Devinny, J. S., J. April, D. F. Buss, C. Johnson, K. Khan, K. H. Lister, J. A. Nuno, P. S. Sullivan, M. Tagoe, and D. P. Williams. The ASCE Draft Environmental Site Remediation Manual. Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management. Vol. 1. 1997.

Lister, K. H. Planning Ground Water Monitoring Field Projects. Ground Water Monitoring Review, Vol. 9, No. 3. 1989.

Lister, K. H., and B. Garbaccio. A Resource for Solid Waste Disposal, S. California. Geological Society of America, Abstracts with Program, Annual Meeting. 1990. p. A376.

Lister, K. H., and T. A. Shuput. Post Closure Maintenance and Monitoring for the City of Berkeley Landfill, an Integrated Approach. Presented at Meetings of the Solid Waste Association of North America. 1992.

Lister, K. H., and A. S. Childress. Negotiating the Preliminary Endangerment Assessment Process. Fourth Annual West Coast Conference on Hydrocarbon Contaminated Soils and Ground Water Conference, Association for the Environmental Health of Soils. To Be Published in Hydrocarbon Contaminated Soils, Vol. 4. 1993.

KENNETH H. LISTER, Ph.D., C.E.G., C.H.G. (continued)

Lister, K. H., and B. Garbaccio. Contingency Planning for Utility Construction Through an Area Containing a Preexisting Gasoline Plume, San Diego, California. Annual West Coast Conference on Contaminated Soils and Ground Water Conference, Association for the Environmental Health of Soils. Hydrocarbon Contaminated Soils, Vol. 5. 1994.

Lister, K. H. Fast-Track Remediation for Redevelopment of a Former Integrated Steel Mill Site, Fontana, California. Remediation. Vol. 6, No. 4, p. 31.

Lister, K. H. Evaluation of Remediation Alternatives, Chapter 3 in American Society of Civil Engineers, Environmental Site Characterization and Remediation Design Guidance. ASCE Manuals and Reports on Engineering Practice, No. 99. 1999.

Lister, K. H. Evaluation of Remediation Alternatives. Presented at Convergence 2000, American Society of Civil Engineers. 2000.

Nuno, J. A., P. S. Sullivan, and K. H. Lister. Project Plan Development, Site Characterization, Risk Assessment, and Development and Evaluation of Remedial Action Alternatives, American Society of Civil Engineers/Canadian Society of Civil Engineers Environmental Engineering Conference.

Reis, R. H., K. H. Lister, and D. E. Roberson. Investigation and Remediation of the Former Expo '86. Hazardous Materials Control Research Institute. Proceedings of Research and Development Conference. 1991.

PATRICK S. SULLIVAN, R.E.A., C.P.P.

Education

B.A. - Harvard University, 1989
Biology/Ecology

Licenses and Certifications

State of California, Registered Environmental Assessor (No. 05952)
South Coast Air Quality Management District, Certified Permitting Professional (No. A-1716)
OSHA 40-Hour Health and Safety Training for Hazardous Waste Workers
Air and Waste Management Association Course on Risk Assessment and Air Dispersion Modeling; Trinity Consultants Course on Air Dispersion Modeling and General Sciences; Corporation Course on Exposure Modeling and Risk Assessment (Air, Vadose Zone, and Groundwater Modeling Using EPA Models)

Affiliations

Air and Waste Management Association (AWMA)
Water Environment Federation (WEF)
South Bay Business Environmental Coalition
Solid Waste Association of North America (SWANA)
Waste Industry Air Coalition (WIAC)
National Solid Wastes Management Association (NSWMA)
California Biomass Collaboration

Professional Experience

Mr. Sullivan has 15 years of experience in the field of environmental consulting and in the areas of human health and ecological risk assessment, chemical fate and transport modeling, and air toxics evaluation. He is currently SCS's National Partner and lead technical expert for Risk Assessment projects. Mr. Sullivan is also SCS's National Partner and lead technical expert for air quality permitting and compliance for landfills and solid waste facilities.

Mr. Sullivan is a Vice President and Project Director within SCS's California office, and is the Group Leader for the Landfill Gas/Landfill Engineering and Technical Services Group (which includes risk assessment and air quality). He is responsible for the management and oversight of the majority of the risk assessment projects conducted by the corporation. Mr. Sullivan has been the Project Manager and lead technical expert for over 25 projects relating to risk assessment, environmental modeling, and risk management for contaminated industrial properties and landfill. These projects accounted for over $1,000,000 in consulting fees associated with risk assessment work and over $5,000,000 in total fees.

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Mr. Sullivan is the Vice Chairman of the Rules and Regulations Committee for the Landfill Gas Division of SWANA and a member of the Bioreactor Committee of the Landfill Management Division of SWANA. He is one of the founding members of the WIAC and Board of Director Member for the Mother Lode Chapter of the AWMA. Mr. Sullivan is also Executive Board Member for the California Biomass Collaboration.

Selected risk assessment projects and studies Mr. Sullivan has managed or otherwise participated in include the following:

- Environmental Investigations and Risk Assessment at the Former BKK Main Street Landfill in Los Angeles County. This landfill is an old, closed site that may have received both hazardous and non-hazardous wastes. It is current occupied by two golf courses and other commercial and residential developments. Project work at this facility has included completion of soil vapor surveys, installation and monitoring of landfill gas migration probes, landfill gas sampling/analysis, oversight of soil and groundwater sampling, completion of a human health risk assessment, and negotiations with regulatory agencies. The site is currently being considered for listing on the National Priorities List (NPL) as a potential Superfund site.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Developments, Adjacent to the Otay Landfill, Chula Vista, California. Contaminants at the site included a variety of organic and inorganic chemicals associated with a former hazardous waste and municipal solid waste landfill operations. Other activities at the site have includes evaluation of landfill gas migration, LFG design, air quality permitting, and other landfill engineering services.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Development, Adjacent to a Landfill Site, Union City, California. Contaminants at the site included PAHs, heavy metals, and landfill gas emissions containing various organic constituents.

- Human Health Risk Evaluation and Impact Assessment, Proposed Commercial Developments, On and Adjacent to the BKK Landfill Site, West Covina, California. Contaminants at the site included a variety of organic and inorganic chemicals associated with a former hazardous waste and municipal solid waste landfill. The BKK site includes two landfills: one municipal solid waste landfill and one hazardous waste site.

- Investigation, Risk Assessment, and Remediation Kaiser Ventures Inc. Facilities, Fontana, California. For the former Kaiser Steel plant in Fontana, RI/FSs, RAPs, and Remedial Designs were prepared for three on-site operable units. Mr. Sullivan was responsible for a number of individual soil, groundwater, surface water, and waste investigations at the Kaiser site, including treatability studies, risk assessments, remedial

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

action plans, and hydrogeological studies, storm water pollution prevention plans, and spill prevention, control, and countermeasure (SPCC) plans. These projects included investigations of two landfill sites, with both hazardous and non-hazardous wastes, including soil, waste materials, hazardous waste, groundwater, and surface water issues.

- Human Health Risk Evaluation and Impact Assessment, Proposed Residential Development, 38th Street Burn Dump, San Diego, California. Contaminants at the site included organics, heavy metals, and other landfill-related contaminants.

- Environmental Investigations at the Ostrom Road Landfill in Wheatland, California. Project work at this site included sampling/analysis of landfill gas, assessment of landfill gas migration using soil-vapor techniques, sampling and monitoring of LFG migration probes, installation of additional migration probe for landfill gas, design and installation of a LFG collection and control system to mitigate groundwater impacts, as well as other engineering and permitting assignments.

- Ecological Risk Assessment for a Seasonal Wetland located along the San Francisco Bay in Hayward, California. The wetlands property was impacted by petroleum hydrocarbons originating from an active automobile recycling facility. The ecological risk assessment included both terrestrial and aquatic ecosystems.

- Burn Dump Investigation in San Joaquin County, California. As part of this project, Mr. Sullivan provided technical oversight for investigations of a possible burn dump site, which included soil investigations, trenching investigations to determine extent of refuse, LFG migration assessment, waste sampling/analysis, hazardous waste determination, and other project tasks. The project site was slated for residential development; therefore, all project elements we completed in consideration for this type of development.

- Human Health and Ecological Risk Assessment under ASTM's Risk-based Corrective Action (RBCA) guidance for a former diesel engine repair facility, Commerce, California. Contaminants at the site included fuel-related VOCs. The ecological risk assessment included terrestrial ecosystems.

- Human Health Risk Assessment for a proposed residential development at a former crude oil tank farm in Norwalk, California. Contaminants at the site included petroleum hydrocarbons and several heavy metals under ASTM's RCBA requirements. The assessment also included an evaluation of the potential human health impacts associated with neighboring crude oil storage facility, such as fire and explosion hazards.

- Human Health and Ecological Risk Assessment, Long Beach Naval Shipyard, Long Beach, California, which was undergoing corrective action under RCRA. Contaminants at the site included pesticides and PCBs. The ecological risk assessment included both terrestrial and aquatic ecosystems.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

- Baseline Human Health and Ecological Risk Assessment for an active chemical manufacturing facility in Santa Fe Springs, California, which is undergoing site mitigation under CERCLA. Contaminants at the site included chlorinated, aromatic, and oxygenated solvents. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health and Ecological Risk Assessment for a former rocket manufacturing facility in Van Nuys, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, hydrazine, and VOCs. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health and Ecological Risk Assessment for a former electronics manufacturing facility in Los Angeles, California. This project has also included expert testimony in support of risk assessment and other work completed on the project. Contaminants at the site included chlorinated solvents. The ecological risk assessment included terrestrial ecosystems.

- Baseline Human Health Risk Assessment for a former metals recycling facility in San Pedro, California. Contaminants at the site included heavy metals and PCBs.

- Human Health and Ecological Risk Assessment at a former pesticide manufacturing facility in Pico Rivera, California, which is undergoing site mitigation under RCRA. Contaminants at the site include heavy metals, pesticides, PCBs, and VOCs. The ecological risk assessment evaluated terrestrial ecosystems.

- Screening-level human health risk assessments for a former air strip impacted by pesticides, an electronics manufacturing facility impacted by chlorinated solvents, a storm water channel impacted by petroleum hydrocarbons and solvents, and numerous landfill sites.

- Human Health and Ecological Risk Assessment for a former chemical plant in Menlo Park, California, which is undergoing closure under RCRA. Contaminants included PCBs, dioxins/dibenzofurans, VOCs, and several heavy metals. The ecological risk assessment included aquatic and terrestrial ecosystems.

- Air toxics emissions inventory plans, reports, and risk assessments for various industrial facilities and landfills in California under AB 2588.

- Risk Management and Prevention Program (RMPP), Southern California Edison facility in Long Beach, California.

- Technical Review of Tier 1 Ecological Risk Assessment, Former Chlorate and Clor-Alkali Plants, Squamish, B.C., Canada, including review of Problem Formulation and Analysis Plans.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Selected litigation support projects include the following:

- Litigation support and preparation of an expert report in defense of a landfill company in Pittsburgh, Pennsylvania, which was sued under the third-party provisions of the federal Clean Air Act. Project tasks including emissions estimation, regulatory applicability review, and preparation of an expert report. The case was settled in favor of our client.

- Litigation support in defense of a landfill company in Houston, Texas. Project tasks including emissions estimation, regulatory applicability review, and air quality compliance assessment.

- Litigation support and expert testimony in defense of a nuisance claim and a CERCLA cost recovery action filed against an electronic relay manufacturing facility in Los Angeles, California. Project tasks included a remedial investigation, feasibility study, remedial design, remedial action, risk assessment, and expert testimony. The first case was settled; the second case is ongoing.

- Litigation support and expert testimony as part of a toxic tort litigation filed by a plaintiff group against a large aerospace company in Burbank, California. Project tasks included emissions estimation, air dispersion modeling, air toxics risk assessment, and expert testimony before an arbitration judge. The case was settled in favor of our clients.

- Litigation support and preparation of an expert report as part of a toxic tort litigation in defense of a metal heat-treating facility in Phoenix, Arizona. Project tasks included emissions estimation, air dispersion modeling, and air toxics risk assessment. The case was settled in favor of our client.

- Litigation support as part of a CERCLA cost recovery action filed by a group of PRPs against various municipalities and public agencies, which disposed refuse at a mixed hazardous and municipal solid waste landfill in California. Project tasks included review of depositions, evaluation of industrial and hazardous waste disposed in the landfill, and development of a draft report on the contribution of the various PRPs to contamination in the landfill. Our clients were successful in the litigation.

- Litigation support as part of a nuisance lawsuit filed by the current owner of a screw manufacturing facility against the former owner in Santa Fe Springs, California. Project tasks included a site investigation, compliance audit, evaluation of on-site disposal of waste oil, and expert testimony before an arbitration judge.

- Litigation support as part of a insurance claim filed by an aerospace facility against its insurance carrier in Natick, Massachusetts. Project tasks included review of soil vapor data, vadose zone modeling, determination of the vapor-phase plume, and preparation of exhibits to be used in court. Our client was successful in the litigation.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

- Litigation support in defense of a nuisance claim and a CERCLA cost recovery action filed against a steel mill in Fontana, California. Project tasks included a remedial investigation, feasibility study, remedial design, remedial action, risk assessment, and assistance in the cross-examination of opposing experts. The case was settled in favor of our client.

- Litigation support in two lawsuits where contractors were unwittingly exposed to asbestos during building demolition after the property owners claimed that the buildings did not have asbestos-containing materials. The cases are ongoing.

Mr. Sullivan's litigation experience includes the following Proposition 65 cases in California. These cases include preparation of exposures and risk analyses and participation in settlement conferences:

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to methylene chloride in a silk flower cleaner.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to dichlorobenzene and toluene in a bicycle tire repair kit.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to lead in PVC grips and handles for various tools and equipment.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to lead in cosmetics.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning exposure to chromated copper arsenate in treated wood used for children's playground equipment.

- Litigation support for a defendant in a Proposition 65 lawsuit concerning the exposure to various pollutants emitted from landfills and other solid waste facilities in California.

- Risk assessment under Proposition 65 at two municipal solid waste landfills in Southern California. The chemicals of concern included various toxic organic compounds present in landfill gas.

- Risk assessment under Proposition 65 for commercial building in Los Angeles, California, with large quantities of asbestos-containing building materials.

- Risk assessment under Proposition 65 for a jewelry manufacturing facility in Los Angeles, California. Chemicals of concern included various chlorinated solvents and heavy metals.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Publications and Presentations

Sullivan, Patrick S., and Zbozinek, Jasenka V., Exposure Assessment and Toxic Distribution Modeling In Toxic Tort Litigation: Air and Soil Pathways. Seminar Proceedings, Phoenix Chapter of the State of Arizona Bar Association, One-Day Technical Meeting, November 1996.

Sullivan, Patrick S., and Lister, Kenneth H., Use of Screening Level Risk Assessment for Risk-Based Corrective Action. Conference Proceedings, Association for the Environmental Health of Soils, 7th Annual West Coast Conference on Contaminated Soil and Groundwater, Oxnard, California, February 1997.

Sullivan, Patrick S., Nuno, Julio A., and Lister, Kenneth H., The Use of Risk-Based Corrective Action in Site Mitigation Projects. Conference Proceedings, Environmental Engineering Conference, Canadian Society of Civil Engineers/American Society of Civil Engineers (CSCE/ASCE), Edmonton, Alberta, July 1997.

Albert, Lon, Kubis, Elizabeth L., and Sullivan, Patrick S., Ongoing Challenges of Emission Inventories at Municipal Solid Waste Landfills, Conference Proceedings, Emission Inventory Conference, Air and Waste Management Association (AWMA), Raleigh-Durham, North Carolina, October 1997.

Kubis, Elizabeth L., Rankin, Sue, and Sullivan, Patrick S., Strategic Planning for Landfill Gas and Air Quality Compliance at Municipal Solid Waste Landfills, Conference Proceedings, 28th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, April 1999.

Pierce, Jeffrey L., and Sullivan, Patrick S., NSPS, NESHAPs, NSR, and Title V: The Impact of Federal Air Quality Regulations on Landfill Construction and Operation, Conference Proceedings, 28th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, April 1999.

Sullivan, Patrick S., A Practical Approach to Clean Air Act Compliance for Landfills, Presentation at the Annual Solid Waste Association of North America (SWANA), WASTECON Conference, Reno, Nevada, October 1999.

Sullivan, Patrick S., The Use of Methane Gas from Landfills as an Alternative Fuel Source, Presentation at the U.S. Conference of Mayors/Municipal Solid Waste Management Association Fall Summit, San Jose, California, November 1999.

Sullivan, Patrick S. (lead author: Risk Assessment section), Environmental Site Characterization and Remediation Design Guidance, American Society of Civil Engineers (ASCE) Manuals and Reports on Engineering Practice No. 99, ASCE, Reston, Virginia, 1999.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Michels, Mike, and Sullivan, Patrick S., Actual LFG Emissions Lower than EPA Estimates, Conference Proceedings, National Solid Waste Management Association (NSWMA)/ Environmental Industries Association (EIA) Waste Tech 2000 Conference, Orlando, Florida, March 2000.

Sullivan, Patrick S., and Michels, Mike, The Time Is Now for Changes to the AP-42 Section on Landfills, Conference Proceedings, 23th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in La Jolla, California, March 2000.

Sullivan, Patrick S., U.S. EPA's Urban Air Toxics Strategy, Conference Proceedings, Conference Proceedings, 10th Annual Technical Conference, Air and Waste Management Association (AWMA) Golden Empire Chapter, Golden West Section, Bakersfield, California, March 2000.

Mezzacappa, David, and Sullivan, Patrick S., Air Quality Pre-Construction Permits for Municipal Solid Waste Landfills, Conference Proceedings, 9th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in Austin, Texas, June 2000.

Sullivan, Patrick S., Risk Characterization in Site Characterization and Remediation Design, Conference Proceedings, Convergence 2000 Environmental Engineering and Pipeline Engineering Conference, American Society of Civil Engineers (ASCE), Kansas City, Missouri, July 2000.

Nuno, Julio A., and Sullivan, Patrick S., Site Characterization, Presentation at Convergence 2000 Environmental Engineering and Pipeline Engineering Conference, American Society of Civil Engineers (ASCE), Kansas City, Missouri, July 2000.

Sullivan, Patrick S., Getting Down to Cases: Just What Is a Bioreactor Landfill, MSW Management, July/August 2000.

Sullivan, Patrick S., and Stege, G. Alexander, An Evaluation of Air and Greenhouse Gas Emissions and Methane Recovery from Bioreactor Landfills, MSW Management, September/October 2000.

Green, Roger B., Vogt, W. Gregory, and Sullivan, Patrick S., Comparison of Emissions from Bioreactor and Conventional Landfills, Conference Proceedings, Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Cincinnati, Ohio, October 2000.

Vogt, W. Gregory, and Sullivan, Patrick S., Literature Review and Research Needs for Bioreactor Landfills, Conference Proceedings, National Solid Waste Management Association (NSWMA)/Environmental Industries Association (EIA) Waste Tech 2001 Conference in San Diego, California, February 2001.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Sullivan, Patrick S., and Caponi, Frank R., The Potential Impacts of the MACT Standard and Urban Air Toxics Strategy on MSW Landfills, Conference Proceedings, 24th Annual Solid Waste Association of North America (SWANA), 24th Annual Landfill Gas Symposium in Dallas, Texas, March 2001.

Sullivan, Patrick S., Bioreactor Landfill Energy Recovery, Proceedings of the U.S. EPA's and Water Environment Federation's Innovative Processes to Produce Useful Materials from Biosolids and Animal Manures--A Symposium, Chicago, Illinois, June 2001.

McCready, Ambrose A., Nordell, David, and Sullivan, Patrick S., Bioreactor Operation Feasibility Study for Fink Road Landfill, Conference Proceedings, 10th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in San Diego, California, June 2001.

Sullivan, Patrick S., Landfill Gas Modeling and Emission Estimates for a Large Bioreactor Landfill in California, Presentation at the 10th Annual Solid Waste Association of North America (SWANA), Landfill Symposium in San Diego, California, June 2001.

Sullivan, Patrick S., and Green, Roger, Air Emissions, Methane Generation and Recovery, and Energy Potential for Bioreactor Landfills: Comparing the Theoretical to the Actual, Proceedings of the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Baltimore, Maryland, October 2001.

Pierce, Jeffrey L., and Sullivan, Patrick S., Economic and Financial Aspects of LFGTE Project Development in California, California Energy Commission/U.S. EPA Landfill Methane Outreach Program (LMOP), California Landfill Gas to Energy Workshop, California Landfill Gas Primer, Sacramento, California, October 2001.

Sullivan, Patrick S., Enhancing Energy Recovery from Landfills Using the Bioreactor Technology, Presentation at the 5th Annual U.S. EPA Landfill Methane Outreach Program (LMOP) Conference and Project Expo, Washington, D.C., December 2001.

Sullivan, Patrick S., and Caponi, Frank R., Air Quality Compliance for Landfill Gas to Energy Projects, Conference Proceedings, 25th Annual Solid Waste Association of North America (SWANA), 25th Annual Landfill Gas Symposium in Monterey, California, March 2002.

Sullivan, Patrick S., Huff, Raymond, and Tinker, Amy, Human Health Risk Assessment Issues for Landfills, Conference Proceedings, 25th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in Monterrey, California, March 2002.

Sullivan, Patrick S., Update on Air Quality Permitting and Compliance Issues for MSW Landfills, Presentation at the 31th Annual Solid Waste Association of North America (SWANA), Western Regional Symposium, South Lake Tahoe, Nevada, May 2002.

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Walsh, James, and Sullivan, Patrick S., NSPS and Other Clean Air Act Issues--Recent Development and Workarounds, Proceedings of the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in Long Beach, California, October 2002.

Sullivan, Patrick S., and Bins, John, Measurement of Toxic Emissions from Landfills: History and Current Developments, Conference Proceedings, Symposium on Air Quality Measurement Methods and Technology--2002, Air and Waste Management Association (AWMA), San Francisco, California, November 2002.

Sullivan, Patrick S., and Bins, John, Toxic Emissions from Landfills: History and Current Developments, Conference Proceedings, National Solid Waste Management Association (NSWMA) Waste Tech 2003 Conference in New Orleans, Louisiana, February 2003.

Morris, Jeremy, Sullivan, Patrick S., et al., Performance-Based System for Post-Closure Care at MSW Landfill--A New Approach to the Current 30-Year Time-Based System of Subtitle D, Conference Proceedings, National Solid Waste Management Association (NSWMA) Waste Tech 2003 Conference in New Orleans, Louisiana, February 2003.

Sullivan, Patrick S., et al., Landfill Gas Module, Performance-Based System for Post-Closure Care at MSW Landfill, Conference Proceedings, Conference Proceedings, 26th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in Tampa, Florida, March 2003.

Sullivan, Patrick S., Landfill Gas Aspects of Bioreactor Landfills, Presentation at Association of State and Territorial Solid Waste Management Officials (ASTSWMO) Annual State Solid Waste Managers' Conference, Salt Lake City, Utah, July 2003.

Huff, Raymond H., Leonard, Michelle P., and Sullivan, Patrick S., Composting Emissions Update and New Southern California Regulations, Presentation at the Annual Solid Waste Association of North America (SWANA) WASTECON Conference in St. Louis, Missouri, October 2003.

Huff, Raymond H., and Sullivan, Patrick S., Unique Landfill Gas Issues on Urban Inactive Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004 (accepted for publication).

Clarke, Steve, and Sullivan, Patrick S., Estimating the Trend in NMOC Generation and Emissions After Closure of MSW Landfills, Conference Proceedings, 27th Annual Solid Waste Association of North America (SWANA), Landfill Gas Symposium in San Antonio, Texas, March 2004 (accepted for publication).

PATRICK S. SULLIVAN, R.E.A., C.P.P. (continued)

Huff, Raymond H., and Sullivan, Patrick S., Air Quality and Odor Impacts from Landfill-Related Emissions, Conference Proceedings, Water Environment (WEF) and Air and Waste Management Association (AWMA) Odor and Air Emissions 2004, Bellevue, Washington, April 2003 (accepted for publication).

HEATHER TOMLEY

Education

B.S. - California Polytechnic State University, San Luis Obispo, 1994
Chemistry, with a minor in Psychology

M.S. - University of North Carolina, Chapel Hill, 1999
Environmental Science

Professional Experience

Ms. Tomley has a background in environmental science with emphasis in air quality, environmental health, environmental compliance, and Geographic Information Systems (GIS). Her experience with project management, environmental analysis, program development, and report writing, combined with her broad knowledge of computer technology and applications, enhances her ability to work effectively on teams or independently.

Ms. Tomley's recent project experience includes:

- Project Scientist, SCS Engineers: Ms. Tomley developed compliance reports for a metal plating facility under a Consent Agreement with DTSC; and developed New Source Performance Standards and Startup, Shutdown and Malfunction reports for landfills. She also wrote air quality and hazards sections for Initial Studies under CEQA; used GIS to distribute workload into territories to streamline staff efforts; and assisted with data analysis for environmental assessments.

- Air Quality Specialist, San Luis Obispo County Air Pollution Control District: Ms. Tomley reviewed new residential and commercial development projects under CEQA to assess and mitigate air quality impacts. She developed and managed multiple grant programs allocating over $1.2 million in funding; established a GIS program; and worked with a multiple-agency coalition to promote alternative transportation. She also assisted with the development of long-range air quality management goals and programs; assisted with development of a 5-year strategic plan to prioritize agency-wide workload on projects aimed at achieving the agency mission. She assisted with rule development and implementation, including working with a community group to develop local solutions. She also assisted with development of public outreach goals and strategies, and created public communication tools such as brochures, flyers, and websites.

- Environmental Contractor, Research Triangle Institute, Water Quality Program: Ms. Tomley reviewed Unified Watershed Assessment Reports for the EPA; indexed water bodies for U.S. states using GIS to indicate waters regulated under the Clean Water Act; and produced final maps for submittal to state and regional EPA offices.

HEATHER TOMLEY (continued)

- Environmental Researcher, University of North Carolina, Chapel Hill: Ms. Tomley developed and designed a research project to assess potential ecological risk from metals contamination at a recreational firing range; created a map of the site and contamination distribution using GPS and GIS; collected soil samples; analyzed soil chemistry and contamination (pH, CAC, TOC, total metals, SPLP); performed earthworm and lettuce seed bioassays; used the data to determine bioavailability of metals in the soil and characterized the potential ecological exposures for the area.

- Environmental Contractor, Diablo Canyon Power Plant: Ms. Tomley wrote the 1994 Toxic Emission Inventory Plan (TEIP) and corresponding report (TEIR); calculated air emissions of all toxic and criteria air pollutants released during 1993 and 1994 from the site; collected and organized Material Safety Data Sheets for all hazardous materials located on site; and developed and maintained a hazardous materials inventory database.

- Air Quality Intern, San Luis Obispo County Air Pollution Control District: Ms. Tomley was involved in research and development of air quality regulations to reduce air emissions from wood burning. She also reviewed Toxic Emission Inventory Reports for auto body shops.

- Laboratory Technician, Central Coast Analytical Services: Ms. Tomley prepared soil and water samples for metals analysis and maintained data records.

Appendix N

VSA n Associates
Résumés

VSA
n
Associates
Acoustics
Noise
Vibration
Consultants

Resume of Key Staff
Mahabir S. Atwal, Ph.D.

Education

1978	B.S. (Honors)	Physics	Leeds University
1980	M. Phil.	Physics/Acoustics	Leicester University
1982	Ph.D.	Physics/Acoustics	Leicester University
1991	M.B.A.	Business Mgmt.	Pepperdine University

General Experience

1982-83	Postdoctoral Research Associate	Purdue University
1983-84	Visiting Assistant Professor	Purdue University
1984- 92	Acoustical Consultant	Veneklasen and Associates
1992-present	Acoustical Consultant	VSA n Associates

General Noise and Vibration Control Experience

- Dr. Atwal has provided consulting on over 500 noise/vibration control projects for over 20 years. He has published over 25 technical papers on various aspects of acoustics and noise and vibration control.
- Participation in major architectural projects including apartments, airports, CEQA, condominiums, courthouses, child care centers, detention centers, environmental, gymnasiums, hospitals, industrial facilities, hotels, office buildings, laboratories, railway stations, shopping centers, university buildings. Consultation included room acoustics, sound isolation, community noise impact, impact on project of freeway or aircraft noise, and HVAC, plumbing, electrical and elevator system noise and vibration control.
- Participation in major environmental projects including noise part of environmental impact reports. Projects have included airports, residential, medical, industrial, office buildings, government facilities, transportation noise, and Participation in major construction projects including determining demolition and construction noise. Monitoring of demolition and construction noise levels and Preperation of noise part of CEQA and EIR reports.
- Freeway, aircraft, railway and industrial facility noise measurements to determine impact on existing or proposed developments. Preparation of environmental impacts reports.
- Acoustical design of large volume spaces including airports, gymnasiums, railway stations, swimming pools, malls, etc.
- Industrial noise surveys, including procedures for defining noise producing characteristics of major noise sources, establishing noise level criteria related to hearing conservation, community annoyance and speech interference, design and application of noise control.
- Community noise surveys, noise level prediction and control techniques. Noise ordinances and codes, impact studies.
- Participation in community to meetings to discuss and answer questions regarding acoustical issues and design.
- Design of noise/vibration monitoring systems to measure construction levels and sounds alarm if criteria levels are exceeded.
- Identification of noise and vibration sources/paths in existing buildings. Control of noise and vibration by means of conventional noise and vibration control elements, custom designed elements and equipment modification.

- Analysis of structural vibrations and their impact on sensitive equipment including electron and eye surgery microscopes. Assessment of structural vibrations due to steady and transient vibration inputs.
- Dynamic and static analysis of structures using finite element analysis.
- Precision calibration of acoustic transducers, measurement of the transmission loss of partitions and the absorption coefficient of acoustical materials.
- Measurement of field STC and IIC ratings.
- Speech privacy determination in open plan offices.
- Acceleration, velocity and displacement measurements.
- Sound transmission over long distances over varying terrain.
- Damping measurements. Identification of vibratory sources within an equipment and isolation and damping of the vibratory sources to reduce vibration levels and sound radiation.
- Vibration isolation of a Pulsion Laser used in refractive surgery. This type of laser has a higher degree of safety in vision correction surgery with reduced complications. The project included the identification of the signature of various components and isolation of the components from the chassis. Additional work included the design of body isolation from the exterior environment.

Research and Development

- Research in the area of light propeller driven aircraft noise reduction.
- Validation of the two-microphone sound intensity technique for source and/or noise path identification in-situ.
- The feasibility of the intensity technique to measure the transmission loss and absorption of aircraft structures.
- Development of a simple experimental/theoretical model for predicting the sound pressure level in an aircraft cabin.
- Theoretical and experimental work on sound transmission characteristics of porous materials. Development and validation of the inter-relationship between sound transmission and properties of the porous transmitting media. Properties of the porous media investigated included permeability, porosity, density, etc.

Teaching

- Teaching of senior level undergraduate course in Noise and Vibration Control and supervision of undergraduate projects in Acoustics. Purdue University.

Publications

- Atwal, M.S., David, J., Heitman, K. and Crocker, M., “Light Aircraft Sound Transmission Study,” NASA CR 174540, 1983.
- Atwal, M.S. and Bernhard, R., “Prediction of Light Aircraft Interior Sound Pressure Level Using the Room Equation,” NASA CR N84/10910.
- Atwal, M.S. and Crocker, M., “Noise Path Identification Using Face-to-Face and Side-by-Side Microphone Arrangements,” Proceedings INTER-NOISE 1984, pp 1047-1050.
- Atwal, M.S. and Bernhard, R., “Study of Double Wall Panels for Use in Light Propeller Driven Aircraft,” NASA CR 84.
- Atwal, M.S. and Bernhard, R., “Measurement of the Absorption Coefficient Using the Sound Intensity Technique,” NASA CR 84.

- Atwal, M.S. and Crocker M., “The Effect on the Transmission Loss of a Double Panel of Using Helium Gas in the Gap,” Proceedings NOISE-CON 85, pp 187-192.
- Atwal M.S. and Crocker, M., “Measurement of the Normal Incidence Absorption Coefficient Using the Sound Intensity Technique, Proceedings NOISE-CON 85, pp 424-428.
- Atwal, M.S., Crocker M., and Heitman, K., “Investigation of the Level Difference Between Sound Pressure and Sound Intensity in an Aircraft Cabin Under Different Fuselage Conditions,” Proceedings 2nd International Congress on Acoustic Intensity, Paris, 1985.
- Atwal, M.S. and Crocker, M. “Measurement of the Absorption Coefficient of Acoustical Materials Using the Sound Intensity Method,” Proceedings 2nd International Congress on Acoustic Intensity, Paris, 1985, pp 485-490.
- Atwal, M.S. and Crocker, M., “Effect on the Transmission Loss of a Double Panel of Perforating the Send Panel,” Proceedings INTER-NOISE 85, Munich, pp 389-392.
- Heitman, K., Atwal, M.S. and Crocker, M., “Light Aircraft Sound Transmission Studies: The Use of the Two-Microphone Sound Intensity Technique,” Noise Control Engineering J., 31, 145-153 (1988).
- Atwal, M.S., Heitman, K. and Crocker, M., “Light Aircraft Sound Transmission Studies: Noise Reduction,” J. Acous. Soc. Am. 82, 1342-1348 (1978).
- Atwal, M.S., Heitman, K. and Crocker, M., “Prediction of Light Aircraft Sound Pressure Level From the Measured Sound Power Flowing into the Cabin,” Proceedings INTER-NOISE 86, pp 1045-1048.
- Atwal, M.S., “Factors Affecting the Air Flow Resistance of Needle Felted Fabrics,” Textile Research J. 57, 574-579 (1978).
- Atwal, M.S. and Crocker, M. “Measurement of the Absorption Coefficient of Acoustical Materials Using the Sound Intensity Method,” La Revue Francaise d’Acoustique, 1987.
- Atwal, M.S., “Transmission Loss of Double Panels with Different Gases in the Gap,” Presented at the 112th meeting of the Acous. Soc. Of Am., Anaheim, California, 1986.
- Atwal, M.S., “Control of Low Frequency Noise in Air Distribution Systems,” Proceedings INTER-NOISE 87, Beijing, pp 111-114.
- Atwal, M.S., “Random Incidence Transmission Loss of Double Wall Panels with Different Gases in the Cavity”, Proceedings INTER-NOISE 1988.
- Atwal, M.S., Ortega, J.C., and Khosrovani, H., “Community Response to Co-Generation Plant Noise”, Proceedings INTER-NOISE 89.
- Atwal, M.S., “Duct Breakout Rumble problems in Air Distribution Systems”, Proceedings INTER-NOISE 90.
- Atwal, M.S., “Factors Affecting the Air Resistance of Porous Fibrous Acoustical Material”, Submitted to INTER-NOISE 91.
- Veneklasen, P.S. and Atwal, M.S., “The Control of Reverberation”, Presented at the 125th meeting of the Acous. Soc. of Am., Ottawa, Canada.

Appendix O

Affordable Housing
Memorandum for the Record

Sapphos Environmental Inc
planning
resource management
environmental compliance

April 19, 2005
Job Number: 1416-002
Long Beach Memorial Medical Center Expansion

MEMORANDUM FOR THE RECORD

2.6 1416-002.M13

TO: City of Long Beach Redevelopment Agency/Community Development
(Ms Barbara Kaiser)

Long Beach Memorial Medical Center
(Mr. Richard DeCarlo and Ms. Susan Crockett)

FROM: Sapphos Environmental, Inc.
(Ms. Marie Campbell and Ms. Juliana R. Prosperi)

SUBJECT: Summary of the April 18, 2005, Meeting Regarding Affordable Housing Opportunities in the City of Long Beach Redevelopment Area

This Memorandum for the Record (MFR) summarizes the April 18, 2005, meeting session at the City of Long Beach for the Long Beach Memorial Medical Center Expansion (proposed project) in Long Beach, California. The meeting was held from 9:00 a.m. to 10:30 a.m. at the City of Long Beach Community Development Conference Room, 333 West Ocean Boulevard, Long Beach, California 90802. The meeting was attended by the City of Long Beach Redevelopment Agency/Community Development (Ms. Barbara Kaiser), Long Beach Memorial Medical Center (Mr. Richard DeCarlo and Ms. Susan Crockett), and Sapphos Environmental, Inc. (Ms. Juliana R. Prosperi).

The purpose of the study session was to address the need for potential affordable housing in the City of Long Beach Redevelopment Area for hospital staff, student nurses, medical staff, and hospital trainees.

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- **Santa Monica Regional Office:**
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- **Billing Address:**
P.O. Box 50241
Pasadena, CA 91115
- **Email:**
sapphos@pacbell.net

This meeting was held to discuss the following five issues:

(1) Education Partnerships with California State University Long Beach (CSULB) and the Long Beach Community College (LBCC)

(2) Education and Research Locations

(3) Housing for Students

(4) Mitigation Plans for Demolished Housing

(5) The Joint Powers Authority meeting with the City of Signal Hill

LBMMC (Mr. Richard DeCarlo and Ms. Susan Crockett) opened the meeting session and introduced the five issues to be discussed. Both Mr. Richard DeCarlo and Ms. Barbara Kaiser referred to project area maps to illustrate potential parcels and buildings to use for future research locations and student housing. Ms. Barbara Kaiser will send project area maps to all meeting participants to include in the administrative record.

LBMMC currently has two partnerships with CSULB and LBCC. Student capacity has doubled in the past year and is expected to increase by approximately 150 percent in the upcoming years. Since most of the students now spend the majority of their time on the LBMMC campus and all clinical work is completed at the hospital, the need for affordable housing needs to be addressed. The LBMMC expects affordable housing that will aid both recruitment of qualified student applicants and employees and retention of current students and employees. LBMMC (Mr. Richard DeCarlo) inquired about information on housing grant opportunities, relocation assistance programs, and other means of support for housing in the City of Long Beach Redevelopment Area.

LBMMC is also seeking additional buildings to acquire for research locations in the area. Therefore, a list of available spaces will be provided, including areas near a 63-unit for senior housing located between the Vernon and Willow Avenue alleyways. Based on discussions with Ms. Barbara Kaiser, several of these small parcels could be acquired by the City of Long Beach, cleaned-up, and leased for classrooms and housing.

Mitigation plans for demolished housing were also discussed in regards to relocation procedures and assistance. Mr. Larry Triesch should be contacted at the Housing Bureau for further information on Housing Vouchers.

Based on an e-mail received from Dr. Melvin Marks, MD, on April 18, 2005, relocation fees are potentially expected to be $3,489 per household, equaling $177,939 for the proposed project, depending on how many households are determined to be low income.

The process is as follows:

1. LBMMC provides notice of demolition to households 18 months prior to demolition. Note that the tenant can waive notice, so this is subject to negotiation.

2. LBMMC provides tenant with City of Long Beach application and explanation forms.

3. LBMMC collects forms and sends to City of Long Beach Housing Services.

4. City of Long Beach evaluates whether household qualifies for relocation assistance and notifies household and LBMMC.

5. Owner deposits fees with City of Long Beach.

6. Once the tenant is verified by City of the Long Beach, the City disperses relocation assistance to the tenant.

This process is based on City of Long Beach Ordinance, Municipal Code, Chapter 21.60: "Relocation Assistance for, and Meeting Housing Needs of, Persons of Very Low and Low Income Households." This ordinance is available at: http://www.longbeach.gov/apps/cityclerk/lbmc/title-21/frame.htm

Ms. Barbara Kaiser added that a meeting with the Joint Powers Authority (JPA) will be held with the City of Signal Hill on June 30, 2005, to address housing opportunities west of Atlantic Avenue.

Should there be any questions regarding the information contained in this MFR, please contact Ms. Marie Campbell or Ms. Juliana R. Prosperi at (310) 260-1520.