PRELIMINARY WATER STUDY
LOMA LINDA UNIVERSITY MEDICAL CENTER
CAMPUS TRANSFORMATION PROJECT

LOMA LINDA, CALIFORNIA

July 15, 2013
July 22, 2013 (Final)

Prepared For:
Loma Linda University Medical Center
P.O. Box 2000
Loma Linda, California 92354

Prepared By:
KETTLER * LEWECk
ENGINEERING
151 W. Market Street
San Diego, California 92101
(619) 269-3449

Steven C. Kettler RCE 48,358
Registration Expires 6-30-2014
TABLE OF CONTENTS

SECTION                       PAGE
I.    INTRODUCTION              1
II.   PROJECT LOCATION          1
III.  PROJECT DESCRIPTION       1
IV.   PRE-DEVELOPED CONDITION   6
V.    DEVELOPED CONDITION       6
VI.   METHODOLOGY               7
VII.  HYDRAULIC ANALYSIS        8
VIII. DISCUSSION AND CONCLUSION 8

LIST OF FIGURES

FIGURE 1   SITE VICINITY MAP  5

EXHIBITS

EXHIBIT A   PRE-DEVELOPED WATER IMPROVEMENT MAP
EXHIBIT B   DEVELOPED WATER IMPROVEMENT MAP
I. **INTRODUCTION**

The purpose of this Preliminary Water Study is to identify the location and size of the existing public (i.e. City of Loma Linda) and private (i.e. Loma Linda University) water mains on and adjacent to the Loma Linda University Adventist Health Sciences Campus (LLUAHSC). The estimate of the approximate domestic water demand and fire flows for the proposed building projects, as well as the demolished and re-designed buildings are included in a separate report titled Loma Linda University Adventist Health Sciences Center Central Plant Utility Services Planning Study by TMAD Taylor and Gaines dated April 2013. Impacts to the LLU system are also addressed in this study. Finally, this study as well as the TTG study does not include all detailed hydraulic calculations of the existing and proposed LLU water facilities. These calculations may be included in future water studies as part of the construction document and associated construction permits.

II. **PROJECT LOCATION**

The Loma Linda University Medical Center Transformation Project is located in the City of Loma Linda, California. The limits of the project are generally Campus Street to the west, Barton Road to the south, Anderson Street, Stewart Street and Orange Grove Street to the east, and Academy Drive to the north. Refer to Figure 1, Site Vicinity Map.

III. **PROJECT DESCRIPTION**

The proposed Campus Transformation Project represents a multi-phased upgrade of LLUMC’s facilities. The Proposed Project includes a Master Plan that provides for modernization of existing facilities including a new central utility plant with utility upgrades (or an upgrade to the existing central utility plant), a new dedicated electrical substation, construction of a new research building, an addition to the dental school, a new parking structure for patients and visitors, and a replacement of the main hospital structure in response to California’s SB 1953 Hospital Seismic Safety Act mandate.

Proposed facilities and improvements associated with the Master Plan include: 1) a six-story, approximately 250,000 square-foot, 760-space patient and visitor parking structure; 2) a twelve-story, approximately 732,000 square-foot hospital with 464 beds to replace seismically-noncompliant existing hospital tower, and 80 parking spaces; 3) an approximate 34,000 square-foot central utility plant; 4) an approximate 14,000 square-foot Southern California Edison (SCE) off-site electrical substation; 5) a two-story, approximately 9,000 square-foot addition to the existing dental school; 6) a four-story approximately 90,000 square-foot research building; and 7) tenant improvements and adaptive reuse of the vacated portions of the existing hospital.

The proposed new hospital would consist of acute care hospital space, some of which will remain as shell space for future build out. The facility will have shared and support services located in the first three levels of a shared podium, with two bed towers above serving separate
pediatric and adult populations. The new hospital would provide for the relocation and decommissioning of the existing acute care services in seismically non-compliant structures. The new building would include approximately 464 patient beds, new Pediatric and Adult Emergency Departments, Perioperative Suites, Imaging Departments, and other support service departments. The total licensed capacity of the Medical Center would decrease from the current license of 719 beds to a total of approximately 650 beds. Upon completion of the new building and surrounding site, all inpatient functions will transfer to the new adjacent location.

The new parking structure would be located on the northwest corner of Barton Road and Campus Street. The 1.9-acre site is currently developed with 83 surface parking spaces. Improvements would include a new access point on Barton Road and removal of the 83 surface parking spaces. The new hospital would be located on the Project site off of Anderson Street between Barton Road and Prospect Avenue. The area for the new hospital is currently developed with 550 surface parking spaces. Improvements at the site would include two new access points on Barton Road and two new road alignments on Anderson Street at Prospect Avenue and Starr Street. The new central utility plant would be located on the project site adjacent to Anderson Street between Stewart Street and the Union Pacific Railroad. The area proposed for the central utility plant is currently developed with 40 surface parking spaces and a 10,000 square-foot Housekeeping Building (formerly the Radiation Safety Building), which would be demolished to allow for construction of the central utility plant. A new SCE electrical substation would be needed to serve the proposed project and would be located on a 1.3-acre City Park site located on Anderson Street just north of the Union Pacific Railroad.

The 9,000 square foot dental school addition would occur on the north side of the existing School of Dentistry (Prince Hall) located at 11029 University Avenue. Approximately 3,000 square feet of the existing building will need to be remodeled to accommodate the addition. The addition will be designed to complement the existing architecture and fit appropriately up to the cul-de-sac.

A new 90,000-square-foot research facility is proposed on or near the site of Risley Hall, an existing laboratory and classroom building. The new facility will provide expanded laboratory and research office space as well as space for new high-tech research modalities to allow for increased interdisciplinary research. The facility is planned to be a three to four-story structural steel building approximately 50 feet in height.

The proposed project would occur within two phases over an approximate 10-year period. A description of Phases 1 and 2 is provided herein.

**PHASE 1: New Parking Structure, Make Ready, Hospital Tower, and SCE Substation**

**New Patient and Visitor Parking Structure:** In order to maintain operations during the construction of the new hospital, a six-level, 720-space parking structure would be constructed east of Campus Street adjacent to the existing hospital’s South Tower to replace the existing surface lots on the site of the new hospital. Construction of the parking structure would require the demolition of approximately 83 surface parking stalls currently dedicated to hospital
administration. Modifications to site access, circulation and various landscaping improvements are proposed. A new access point from Barton Road is also proposed for the parking structure.

**On-site make ready work:** Site clearing and excavation for the new hospital footprint would include temporary relocation and rerouting of various underground utilities. As these utilities serve the existing acute care buildings, a building permit from Office of Statewide Health Planning and Development (OSHPD) would be required. West of Anderson Street and north of Barton Road the new hospital footprint would result in the demolition of approximately 550 surface parking spaces and require a new site access point to align with Prospect Avenue. Modifications to site access, circulation and various landscaping improvements are also proposed.

**New Hospital:** Proposed construction includes a 732,000 square-foot acute care hospital, with portions to remain as shell space for future build out. The hospital would have support services located in the first three levels of a shared podium, with bed towers above serving separate pediatric and adult populations. The new hospital would provide for the relocation and decommissioning of the existing acute care services that are currently in existing buildings that SB1953 will deem as seismically non-compliant structures starting in the year 2020. The new building will include approximately 464 private patient bedrooms, new pediatric and adult emergency departments, perioperative suites, imaging departments, and other support services. The total licensed capacity of the facility will decrease from the current license of 719 beds to 650 beds.

**New Electrical Substation** - To support the Proposed Project a new connection to the power grid would be required with Southern California Edison (SCE). The hospital would require a redundant connection from the Cardiff and San Bernardino services areas (both support 66kV systems). Easements would be required on several properties to allow for the connection. Upon completion of the new substation, the existing substation, located adjacent to the campus’s existing Central Utilities Plant (CUP), would be decommissioned. LLUM is currently evaluating service options with SCE under a Method of Service (MOS) study; all options would occur at the existing 1.3-acre City Park located north of the Union Pacific Railroad. Due to cost constraints, the SCE substation may be located adjacent to the existing central utility plant.

**PHASE 2: New Central Utility Plant, Existing Hospital Adaptive Re-use, New Research building, and Dental School addition**

**Central Utility Plant:** The existing central utility plant and co-generation plant/chiller building, located west of Anderson Street and south of University Avenue, serves the campus and the existing hospital with efficient and centralized power and other utilities. A new 34,000-square foot plant is proposed in order to: respond to SB 1953 mandates, modernize obsolete and antiquated utility services, avoid disruption to ongoing patient care activities, and allow for increased future capacity. Construction of the new CUP would occur near the thermal energy storage tank, located east of Anderson Street and just south of the Union Pacific Railroad tracks. Construction activities would require the removal of the existing 10,000-square foot Housekeeping Building (formerly the Radiation Safety Building) and 40 surface parking spaces.
The new single-story central utilities plant and co-generation/chiller building would house six (6) chillers, four (4) co-generation gas turbines, and a mezzanine. A new 4,000-square foot cooling yard is proposed for the containment of eight (8) cooling towers. Upon completion of the new plant, the existing plant would be decommissioned. Due to cost constraints, the existing central utility plant may only be renovated with expanded services provided at the new hospital.

Re-use of the existing Hospital - Towers A & C: The decommissioning and relocation of acute services would allow for the adaptive reuse of approximately 400,000-square feet within the existing hospital’s A and C towers. The new uses are anticipated to be split between existing support spaces, continuing outpatient services and possible future educational services. Construction activities are anticipated to include demolition required for seismic separation. Modifications to site access, circulation and various landscaping improvements are also proposed.

Research Building: In an effort to build on Loma Linda University’s notable history of pioneering medical research, a new research facility is proposed on campus that would transform the University’s ability to provide interdisciplinary and translational research in a single facility. This transformational research is vital to this vision and will ensure a continuation of groundbreaking studies that will save lives and improve the quality of life and provision of healthcare.

The proposed facility would be located on or near the site of Risley Hall, an existing laboratory and classroom building. The new facility would provide expanded laboratory and research office space as well as space for new high-tech research modalities to allow for increased interdisciplinary research.

The proposed 3-4 story (approximately 50 feet in height) 90,000 square-foot facility would complement the architecture of existing buildings located within the northern campus area. Structures within this area include facilities built between the 1930’s and the 1980’s. Utility services would be provided from either the proposed or renovated CUP through the existing utility tunnel.

Dental School Addition: The proposed addition would be constructed on the north side of the School of Dentistry (Prince Hall). The proposed expansion would create an additional 4,500 square feet on each of two floors for a total added floor area of 9,000 square feet.

The first floor of the addition would provide additional reception, administration and consultant space and an expanded and reconfigured waiting area for the Surgery Center for Dentistry. The second floor would add a resident’s lounge, support staff space and offices as well as expanded clinical dentistry space for several specialties.

Approximately 3,000 square feet of the existing building would be remodeled to accommodate the addition. The structural system for the addition would be structural steel with a concrete slab on metal deck. The addition would be designed to complement the existing architecture and fit appropriately up to the cul-de-sac. Like the existing structure, the roof would be flat. Utility services would be provided from the Central Utility Plant through the tunnel.
IV. PRE-DEVELOPED CONDITION

The project area of the campus consists of existing buildings, existing public streets (i.e. Campus Street, Anderson Street, Taylor Street, Taylor Court, Prospect Avenue, University Avenue, and Stewart Street), existing private drives, and existing surface parking areas, hardscape areas, and landscape areas.

There exists both a private Loma Linda University water system (i.e. private water system) and a City of Loma Linda public water system (i.e. public water system) on and around the campus. Both water systems are typically separate from each other during normal operating conditions with the water for the campus facilities being provided by the private water system. However, the two systems are connected to each other by isolation valves at the intersection of Prospect and Anderson, on Campus Street south of University, and at the two existing water storage tanks. Domestic water demands and fire flows for the existing buildings are provided by the private water system.

Loma Linda University Private Water Facilities
The private water facilities, as described by Loma Linda University, include 6-inch, 8-inch, 10-inch, and 16 inch diameter water mains within the adjacent public and private streets as well as on the campus. The existing private water mains (16-inch diameter main) essentially provides a connection from the existing water well(s) to the existing reservoir located south of the campus. In addition, there are mains that connect to the 16-inch diameter main that provide loops of water on portions of the campus. There also exist fire hydrants on campus and within the adjacent public streets that are connected to the private system. Most of these hydrants will remain as is but some may need to be relocated as part of the proposed building projects.

City of Loma Linda Public Water Facilities
The public water facilities, as documented on the City’s website, include DIP and CMLC water mains within the adjacent public and private streets as follows: 12-inch DIP in Barton Road, 8-inch CMLC in Campus Street, 12-inch and 16-inch DIP in Anderson Street, and 8-inch DIP in Prospect Avenue, Taylor Street, Taylor Court, and Anderson Street. There also exists an 8-inch public water traversing across the campus (presumably in an existing easement) south of Stewart Street. The existing public water mains essentially provide for a “loop” around the perimeter of the existing campus. There also exist fire hydrants on campus and within the adjacent public streets that are connected to the public system. Most of these hydrants will remain as is but some may need to be relocated as part of the proposed building projects.

Refer to Exhibit “A” for the Pre-Developed Water Improvement Maps.

V. DEVELOPED CONDITION

The proposed Campus Transformation Project represents a multi-phased upgrade of LLUMC’s facilities. Proposed facilities and improvements associated with the Master Plan include: 1) a six-story, approximately 250,000 square-foot, 760-space patient and visitor parking structure;
2) on-site make ready work; 3) a twelve-story, approximately 732,000 square-foot hospital tower with 464 beds to replace seismically-noncompliant existing hospital tower, and 80 parking spaces; 4) an approximate 14,000 square-foot Southern California Edison (SCE) electrical substation; 5) an approximate 34,000 square-foot central utility plant; 6) a two-story, approximately 9,000 square-foot addition to the existing dental school; 7) a four-story approximately 90,000 square-foot research building; and 7) tenant improvements and adaptive reuse of the vacated portions of the existing hospital. In addition to these projects, the proposed work may also include the demolition and/or revisions of miscellaneous onsite public and private roadway improvements within Taylor Street, Taylor Court, and Prospect Avenue (i.e. driveways, street lights, water and sewer services, etc.) and possible offsite road improvements, as may be included in the project’s traffic study. The campus improvements also include the proton re-feed, utility make ready, demolition/removal of a portion of the existing housing/structures located adjacent to Prospect Avenue, west of Anderson Street, and trailer relocation projects. Finally, the proposed projects may include the demolition of the existing Housekeeping Building (formerly the Radiation Safety Building) located north of Stewart Street and east of Anderson Street. This demolition is part of one of two alternatives identified for the Central Utility Plant project. Due to cost constraints, the existing central utility plant may only be renovated in lieu of a new central utility plant with expanded services provided at the new hospital. Due to cost constraints, the SCE substation may be located adjacent to the existing central utility plant.

The proposed projects within the study area will be designed to utilize the existing private water facilities, consistent with the current existing condition. The proposed projects may include revisions to the existing private and public water facilities. However, the public water facilities, as documented on the City’s website and described above, are not anticipated to be changed significantly.

Most of the existing fire hydrants will remain as is but some will need to be relocated as part of the proposed building projects. The number and location of the affected fire hydrants are not known yet. However, the hydrants requiring relocation, as well as additional fire hydrants, will be identified on future construction drawings.

VI. METHODOLOGY

A preliminary estimate of water demands and fire flows for the master plan building/project and the existing buildings on the campus was provided in a separate report titled Loma Linda University Adventist Health Sciences Center Central Plant Utility Services Planning Study by TMAD Taylor and Gaines dated April 2013. This study also addressed the overall capacity of the private water system. The TTG study does not include all detailed hydraulic calculations of the existing and proposed LLU private water facilities. These calculations may be included in future water studies as part of the construction document and associated construction permits. Recognizing that the domestic and fire water for the pre-developed condition, as well as the developed condition is provided by the private water system, a study of the City of Loma Linda Public Water Study was not completed. However, the City of Loma Linda has stated that their
water system has the capacity to provide water for the campus as well as the future projected growth within the City limits based on the current general plan.

VII. HYDRAULIC ANALYSIS

This study doesn’t include a hydraulic analysis of either the private or public water systems. As mentioned above, an evaluation of the private water system only was addressed in separate report titled Loma Linda University Adventist Health Sciences Center Central Plant Utility Services Planning Study by TMAD Taylor and Gaines dated April 2013. The TTG study does not include all detailed hydraulic calculations of the existing and proposed LLU private water facilities. These calculations may be included in future water studies as part of the construction document and associated construction permits. The analysis of the existing public water facilities was not performed.

VIII. DISCUSSION AND CONCLUSION

This Preliminary Water Study has been prepared in support of the Loma Linda University Medical Center Campus Transformation project and associated Environmental Impact Report (EIR). Proposed facilities and improvements associated with the project include: 1) a six-story, approximately 250,000 square-foot, 760-space patient and visitor parking structure; 2) a twelve-story, approximately 732,000 square-foot hospital with 464 beds to replace seismically-noncompliant existing hospital tower, and 80 parking spaces; 3) an approximate 34,000 square-foot central utility plant or the expansion of the existing central utility plant; 4) an approximate 14,000 square-foot Southern California Edison (SCE) off-site electrical substation; 5) a two-story, approximately 9,000 square-foot addition to the existing dental school; 6) a four-story approximately 90,000 square-foot research building; and 7) tenant improvements and adaptive reuse of the vacated portions of the existing hospital. In addition to these projects, the proposed work may also include the demolition and/or revisions of miscellaneous onsite public and private roadway improvements within Taylor Street, Taylor Court, and Prospect Avenue (i.e. driveways, street lights, water and sewer services, etc.) and possible offsite road improvements, as may be included in the project’s traffic study. The campus improvements also include the proton re-feed, utility make ready, demolition/ removal of a portion of the existing housing/structures located adjacent to Prospect Avenue, west of Anderson Street, and trailer relocation projects. Finally, the proposed projects may include the demolition of the existing Housekeeping Building (formerly the Radiation Safety Building) located north of Stewart Street and east of Anderson Street. This demolition is part of one of two alternatives identified for the Central Utility Plant project. Due to cost constraints, the existing central utility plant may only be renovated in lieu of a new central utility plant with expanded services provided at the new hospital. Due to cost constraints, the SCE substation may be located adjacent to the existing central utility plant.

This water study has identified the location and size of the existing public and the existing private water systems/mains on and adjacent to the Loma Linda University Adventist Health Sciences Campus (LLUAHSC). Both water systems are typically separate from each other during
normal operating conditions with the water for the campus facilities being provided by the private water system. However, the two systems are connected to each other by isolation valves at the intersection of Prospect and Anderson, on Campus Street south of University, and at the two existing water storage tanks. The intent of the project is to continue to have domestic and fire water provided by the private water system.

Although the project is in the conceptual design phase and detailed site plans/designs are not available, it is anticipated that some of the existing private and public water mains will be relocated to accommodate the individual building projects. Refer to Exhibit “B” for the conceptual limits of the anticipated water main relocations. The final determination of the relocations will be identified during the construction document phase of the project.

Finally, the estimate of the approximate domestic water demand and fire flows for the proposed building projects, as well as the demolished and re-designed buildings are included in a separate report titled Loma Linda University Adventist Health Sciences Center Central Plant Utility Services Planning Study by TMAD Taylor and Gaines dated April 2013. The overall capacity of the LLU system is also addressed in this study. This water study, as well as the TTG study, does not include all detailed hydraulic calculations of the existing and proposed LLU water system. These calculations may be included in future water studies as part of the construction document and associated construction permits.