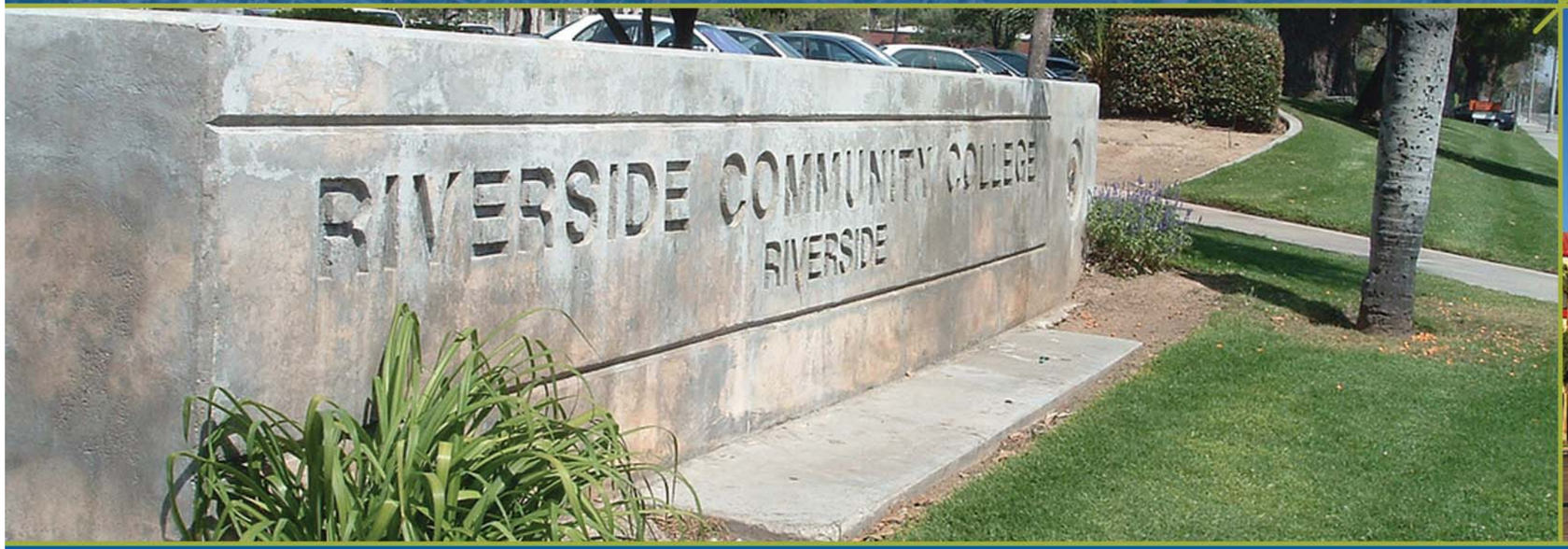
Riverside Community College District
Infrastructure Upgrade Project

Utility Program

Riverside City Campus

June 7, 2010



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EXECUTIVE SUMMARY

0.1 INTRODUCTION

Riverside City College is the most dynamic and diverse college in the Inland Empire. From its opening in 1916 on the site of the former Poly High School, Riverside City College has grown to be one of California's leading community colleges and is a landmark in downtown Riverside. The City campus is approximately 108 acres and while in an urban context it has unique topography.

Serving more than 19,000 students each semester, Riverside City College provides students with a wide range of choices including associate's degree programs, transfer to a four-year college or university, or career certificates that prepare them to enter the workforce. Riverside City College is home to strong programs in liberal arts, science, performing arts, the School of Nursing and athletics

The Riverside City Campus is one of the three Riverside Community College District (RCCD) campuses. To serve the expanding student body, a number of new academic and support buildings have been identified in the Riverside City College Long Range Educational Master Plan (dated March 2008), identified herein as the Master Plan. This report defined that the Campus will need to expand to accommodate the student enrollment which is anticipated to grow to 25,000 students by 2024.

0.2 OBJECTIVE

The objective of this Utility Program is to evaluate the existing utility systems currently servicing the facilities and make general recommendations to upgrade and modify the utility systems to support the future development as proposed by the Proposed Future Building Layout. This programming for master planning will be used in establishing the future construction phasing. The Utility Program is also the next step prior to Master Planning, Schematic Design, and Implementation. The following existing utility systems are considered in this report:

- Sanitary Sewer
- Domestic and Fire Water
- Irrigation Water
- Storm Drain
- Chilled Water
- Hot Water
- Electrical
- Telecommunications
- Central Plant Expansion
- Natural Gas

Supporting Psomas as a subconsultant in this report, P2S Engineering has performed assessments of the chilled water, hot water, electrical, telecommunications, central plant expansion, and natural gas systems.

0.3 REPORT OVERVIEW

The various utility systems discussed within this report are broken into discipline specific sections. Corresponding figures and some supporting data tables are located at the end of each section.

The following information for each utility system is presented in discipline specific sections, Section 1 through 10, of this report.

- Description of the existing utility system, including existing conditions and identified problems. Information on each utility system was obtained through field surveys, existing documents, record data, and discussions with campus facility staff knowledgeable of specific utility systems.
- Description of methodology for analyzing the utility system for present conditions and to accommodate future growth.
- Analysis of the existing and proposed utility systems.
- Recommendations and modifications to accommodate present and future needs of the campus.
- Figures illustrating the existing utility system layout and proposed utility alignments based on future conditions presented.

0.4 PROJECT BACKGROUND AND SCOPE

Psomas' services included review of existing infrastructure study materials along with and Long Range Facilities Master Plans.

Initial workshop meetings were conducted for this campus to determine project scope, objectives, design criteria, project schedule, condition of existing facilities, deficiencies of systems, and future needs based on the Long Range Facilities Master Plans. Determinations were made relative to current and future utility needs for each campus.

Scope of work included research, review of maps, and evaluation of the existing on campus utility infrastructure. The report also provides general recommendations for improvements to each of the utility systems that will serve the future development as shown in the Proposed Future Building Layout.

The utility research was completed via coordination with the on-site facilities manager to collect record documentation regarding the location of recently constructed underground utilities throughout the campus. Psomas received utility records and reviewed as-built mapping as provided by RCCD.

Existing utility information included herein is based upon drawings and information supplied by RCCD, and various architects. Using this information, Psomas modified the provided utility base maps for the following existing utility systems:

- Sanitary Sewer
- Domestic and Fire Water
- Irrigation Water
- Storm Drain
- Chilled Water
- Hot Water
- Electrical
- Telecommunications
- Central Plant Expansion
- Natural Gas

The utility alignments shown in the report figures included herein represent the most practical layout based on all information available. Changes in building layouts, locations, and miscellaneous other conditions may require alignment or utility size revisions.

As a sub consultant to Psomas, P2S Engineering has assisted with the utility mapping by updating the mapping for the existing, chilled water, electrical, telecommunication, central plant expansion, and natural gas utility systems.

0.5 EXISTING AND PROPOSED BUILDING IMPROVEMENTS

The following table identifies the existing buildings on campus and corresponds to the various figures throughout the report. The listed building names and numbers are based upon the campus maps provide by RCCD and illustrated on Figure 0b, Overall Campus Map – Existing Building Layout, included herein. Buildings numbered with the prefix E currently exist but were not listed on the original information provided by RCCD.

The Baseball Field Area portion of the Campus located west of Magnolia Avenue does not include any campus buildings (except for restroom facilities) and is located within the flood plain area. This area was not include in the topographic base provided by RCCD, and was not included in this utility program.

Table ES-1: Existing Buildings

Bldg No.	Building Name
1	Quadrangle
2	Stadium
3	Wheelock Gym
4*	Maintenance & Operations
5*	Maintenance Pit Shop
6	Technology A
7*	Technology B
9	Safety & Security Center
10*	Admissions & Counseling
11*	Student Financial Services
12	Landis Auditorium
13*	Music Building
14*	Art Building
15	Huntley Gym
16*	Main Warehouse
17*	Administration
18*	Cosmetology
19	Cutter Pool / Aquatic Center
20	Life Sciences
21	MLK High Tech Center
22	Physical Sciences
23	Planetarium
24	Student Center
25*	Warehouse Annex B
26*	Ceramics
27	Athletics Center
28	Campus Police/ Safety
29	Portable 3
30*	Automotive Technology
31	Early Childhood Studies
32*	Business Education
33	Greenhouse
34	Assessment Center
35	Music Hall
36	Pilates Studio
37	Digital Library "A" and "B"
39*	Lovekin Complex
42	Outreach Center
46	Student Govt. Center
130	College House
131	North Hall/Apartments
132	Alumni House
E-1	Parking Structure/Tennis Courts
E-2	Field bathrooms (West)
E-3	Field bathrooms (South)
E-4	Field Equipment Shed
E-5*	Faculty Offices
E-6*	Automotive Paint Booth
E-7	Well House - City of Riverside
E-8	Vending Machine Structure
E-9*	Outreach Portable
E-10	Well House - City of Riverside
E-11	Well House - City of Riverside
E-12	Athletic and P.E.
E-13	Financial Services/Counseling/Outreach
E-14	Student Government Supply Room
E-15	Well House - City of Riverside
E-16	Nursing & Science 1
E-17	Nursing & Science 2

Figure 0c, Overall Campus Map – Building Demolition Plan, illustrates existing buildings to be demolished or renovated per discussions with RCCD. Their building names are identified with an asterisk (*) in Table ES-1 above.

Based on the Master Plan and discussions with RCCD, the following proposed buildings have been identified as part of the future development. The building names correspond to the Master Plan and have been numbered as illustrated on Figure 0d, Overall Campus Map – Future Building Layout.

Table ES-2: Proposed Buildings

Bldg No.	Building Name
P1	Student Services
P2	Band Building
P3	Auto Technology
P4	Maintenance Offices
P5	Maintenance Shipping
P6	Applied Technology
P7	Cosmetology
P8	Parking Structure 1
P9	Music/Landis Addition
P10	Administration

Table R: Revision Block

A Revision Block as been added (below) to document the changes as the report has been re-issued and updated. Detailed discussions and descriptions are identified in the Meeting Minutes in Appendix B.

Revision No.	Date	Description
1	Oct. 23, 2009	Initial DRAFT provided.
2	March 22, 2010	Re-issued DRAFT, w/ new Future Bldg Exhibits
3	April 26, 2010	Re-Issued DRAFT, with Prioritized Summary Table, and graphic updates
4	June 7, 2010	Final Utility Program Study Report with Conceptual Costs included.

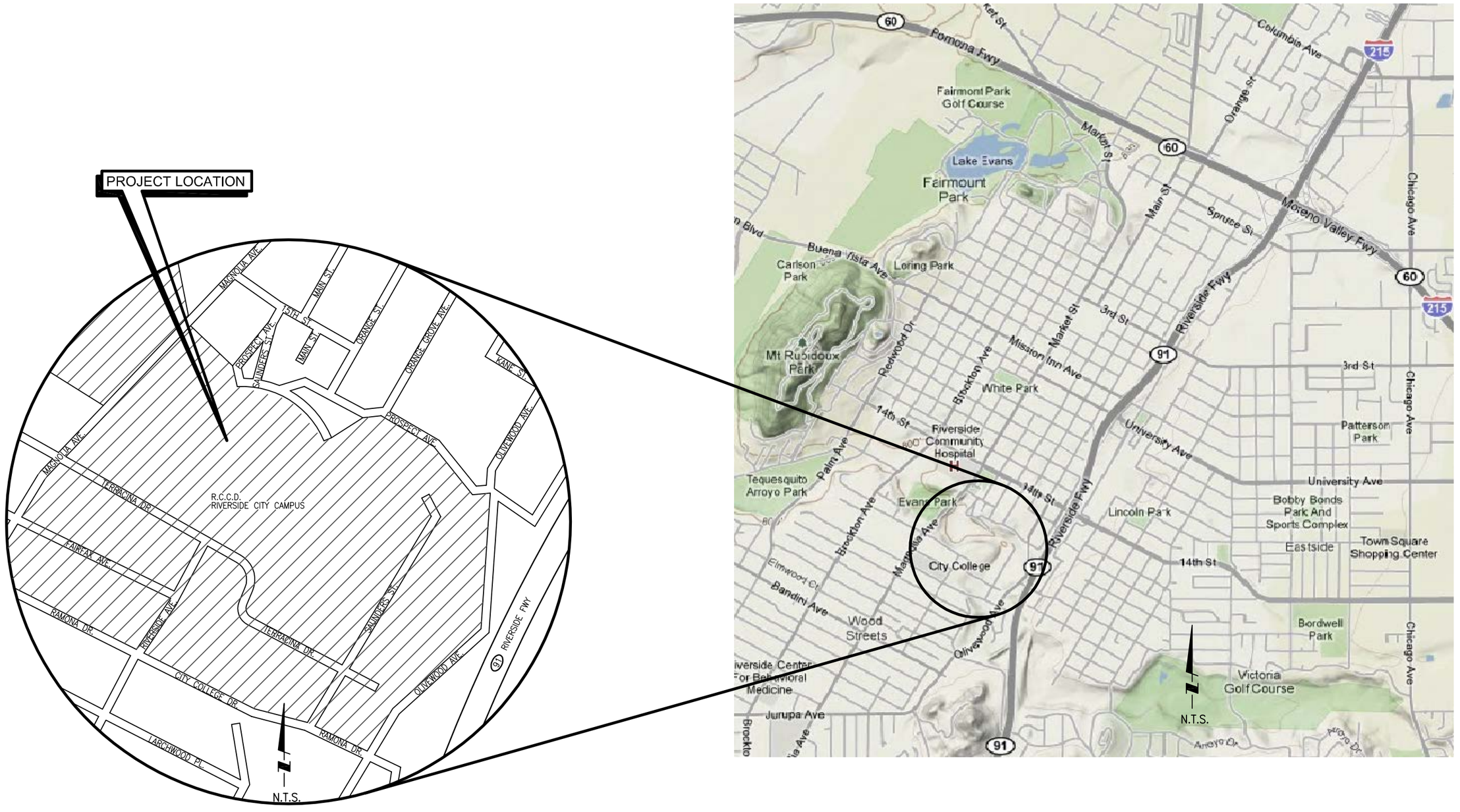


FIGURE 0A
LOCATION MAP

LEGEND:

1 EXISTING BUILDING

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

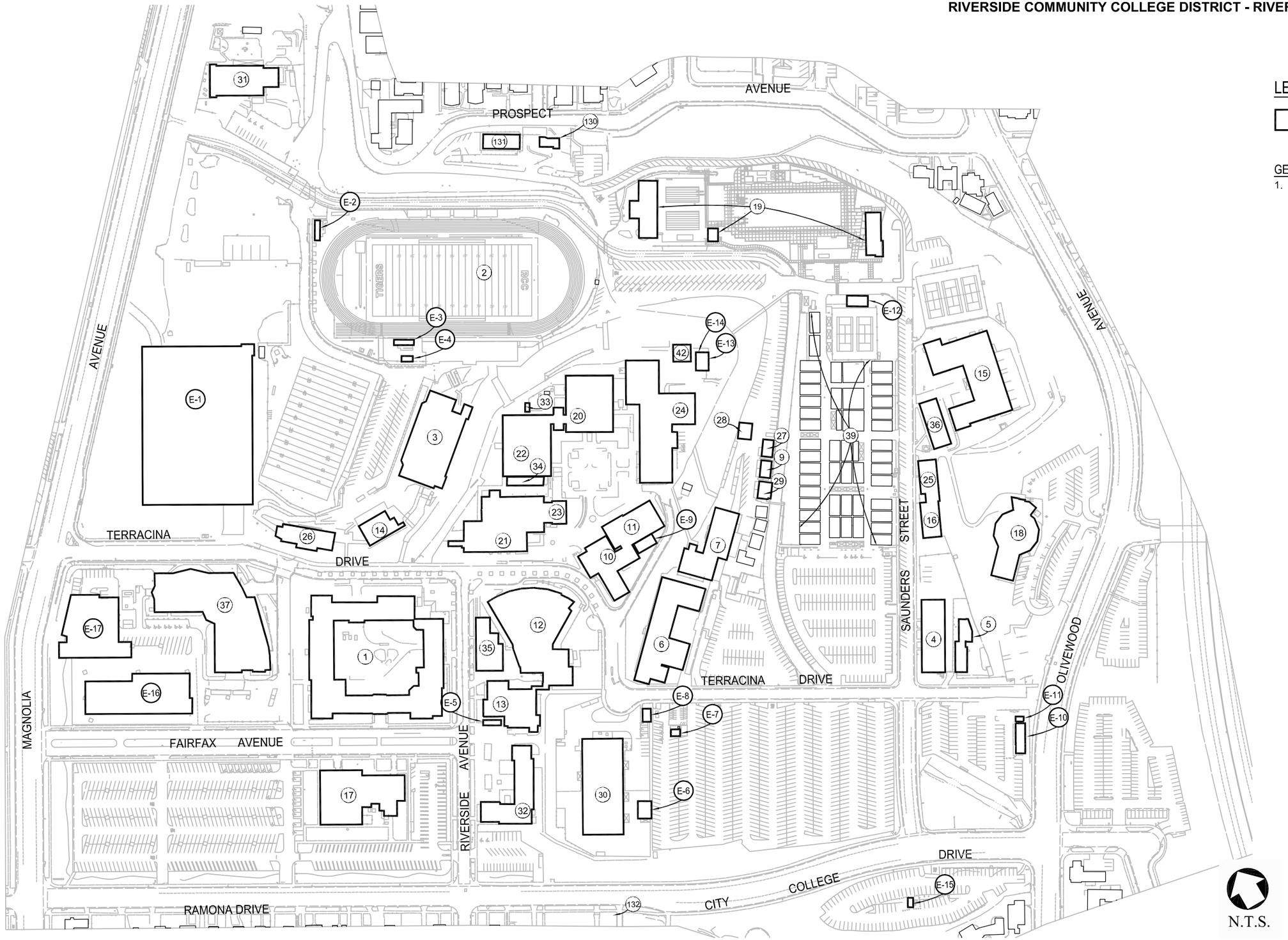


FIGURE 0B
OVERALL CAMPUS MAP - EXISTING BUILDING LAYOUT

LEGEND:

(1) EXISTING BUILDING

EXISTING BUILDING TO BE DEMOLISHED

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

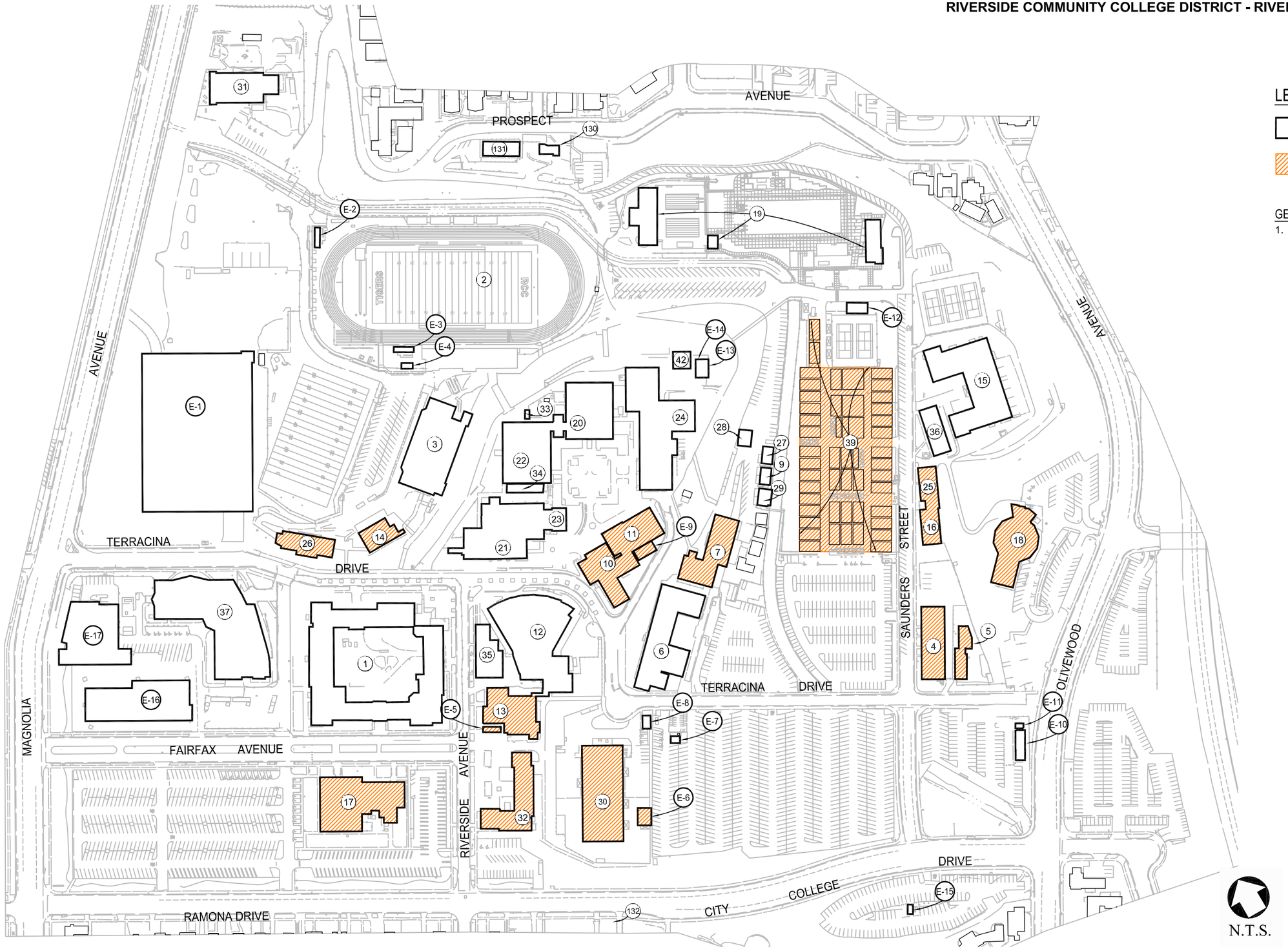
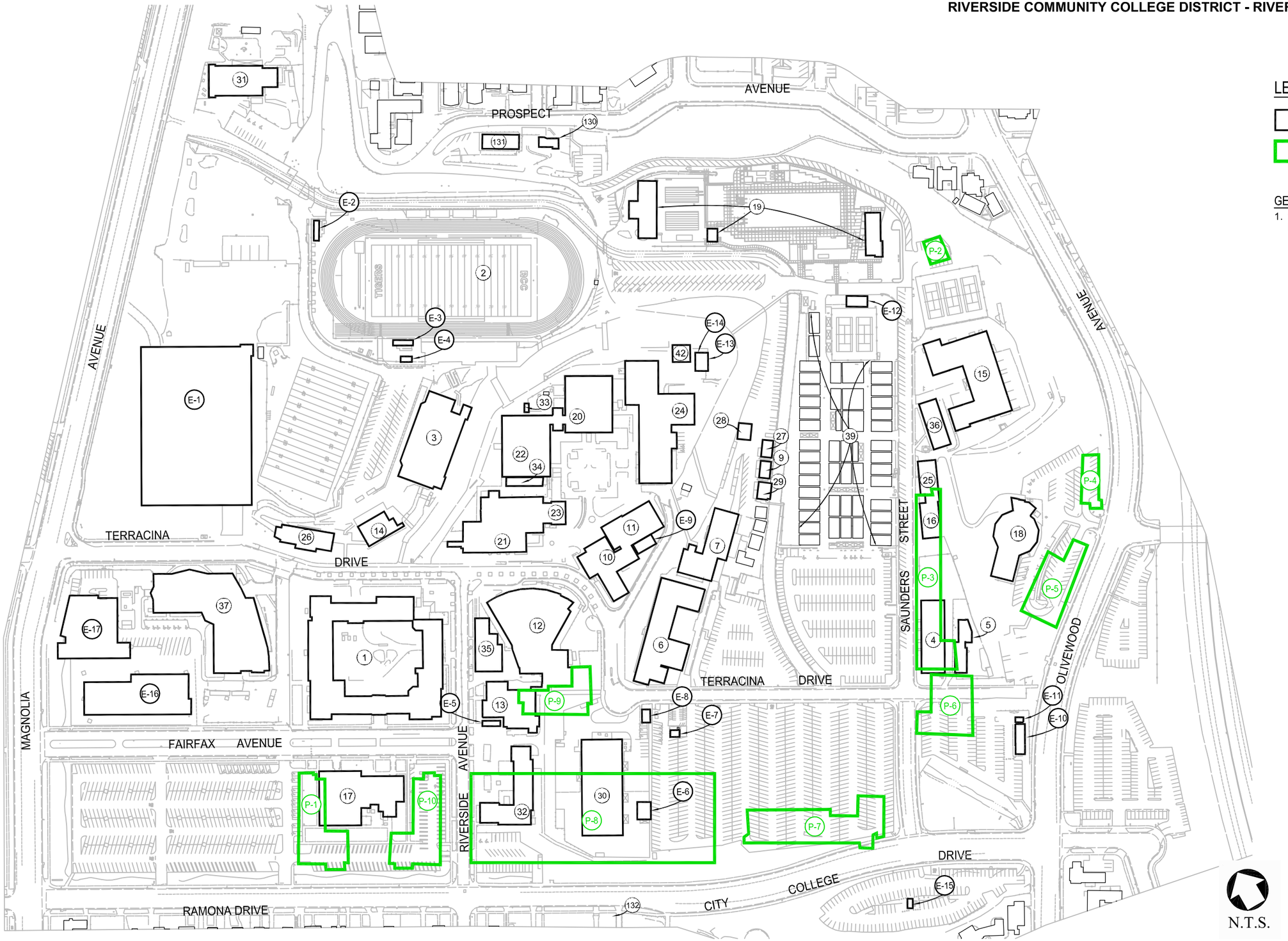


FIGURE 0c
OVERALL CAMPUS MAP - BUILDING DEMOLITION PLAN



LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

FIGURE 0D
OVERALL CAMPUS MAP - FUTURE BUILDING LAYOUT

SECTION 1 – SANITARY SEWER SYSTEM

1.1 SYSTEM DESCRIPTION

The existing campus is served by two separate sanitary sewer systems that join downstream west of Magnolia Avenue.

- The first system is a 27-inch sewer trunk mainline that flows to the north adjacent to the flood control channel and continues under Magnolia Avenue. The City of Riverside Public Works Department trunk sewer main that extends through the campus serves a large area of the City and is being upgraded as part of a City Master Plan upgrade project. Several on-site 6", 8", and 12" mainlines extend from the trunk sewer to serve the campus buildings. The combination of these mainlines through the campus serve approximately 80% of the existing buildings.

- The second 8-inch public main line system flows to the east into Magnolia Avenue. This system serves only the southwest corner of the campus at the corner of Magnolia Avenue and Ramona Drive. This 8-inch main line then provides 6-inch laterals through the campus but only serves approximately 20% of the existing buildings.

The existing on-site sanitary sewer system mainline includes 12, 8, and 6-inch sewer pipe with building laterals ranging between 4-inches and 6-inches in diameter. The (2) on-site sewer systems serve more than just this campus and are part of the overall City sewer master plan that serves offsite upstream flows from many other adjacent developments.

1.2 METHODOLOGY

The average day flow generation rates based upon standard design criteria have been used for evaluating the campus sewer system. Standard Sewer Manual guidelines were used for determining the average daily flow and peak flow for the campus buildings. The total flow was established using sewerage generation factors allocated to each building based upon building area. Sewerage generation factors were adjusted to address academic and non-academic buildings

The standard Engineering criteria for new sewer design limits the flow depth to one-half the pipe diameter (i.e. d/D =< 0.50), and requires a minimum velocity of 3 feet per second (fps) at maximum flow. A minimum velocity of 2 fps is typically used in general practice as it is considered to be self-scouring; that is, it prevents deposition of solids.

Per Sewer Manual standards, a peaking factor of 3.0 was used to determine the peak flow rates.

1.3 ANALYSIS OF EXISTING SYSTEM

We summarized the existing campus buildings' square footage, occupancy type, and flow allocation used to determine the average daily flow generated on campus. The existing system analysis includes the existing campus buildings listed in ES-1 of the Executive Summary.

The input and output data from the existing sanitary sewer system model using Manning's equation, provided a calculated maximum velocity and flow for the existing sanitary sewer system. The maximum flow at d/D = 0.5 reviewed against the minimum velocity was used to determine and discuss the capacity of the existing system. The average daily flow is derived from the existing building allocation.

1.4 ANALYSIS OF FUTURE NEEDS

The sanitary sewer system was evaluated with the addition of the proposed buildings listed in Table ES-2 of the Executive Summary. Based on the future development presented in the Master Plan Update and as discussed in the Executive Summary, recommendations have been made to relocate, demolish and replace various existing sanitary sewer pipe lines in order to accommodate the future development. This is conceptually illustrated in Figure 1b, Future Conditions Sanitary Sewer Map.

The proposed system analysis includes the proposed buildings illustrated in the Master Plan Update and listed in Table ES-2 of the Executive Summary and summarizes the proposed campus buildings' square footage (based on the Master Plan Update), occupancy type, and flow allocation used to determine impacts to the average day flow expected to be generated on campus.

1.5 FINDINGS AND RECOMMENDATIONS

Findings

The depths of flow in the existing sewers generally conform to the design criteria. Flow velocities for many of the existing sewers are also within the criteria and the various existing pipelines conform to the standards. Due to the existing topographic elevation fall across this campus the minimum flow velocities are reached in most cases.

The total sanitary sewer flow enters the same City sewer system downstream of the campus at both existing and proposed conditions.

The sanitary sewer system maximum flow rate (or capacity), average daily flow rate, and peak flow rate for the existing system appears adequate. Also, we reviewed the conceptual impacts to the existing system from the proposed sanitary sewer systems at each pipe segment. Due to increased sewer demand from the future buildings, the peak flow rate in various pipe segments in maintained below the 50% maximum capacity.

A Pothole Analysis was completed on the sewer line in two areas (see Pothole Exhibit in Appendix A):

- The 6-inch line within the service road north of the Outreach Center Building 42. Based upon this pothole observation, the pipe appeared to be 6-inch steel pipe in good condition and located at an 8-ft depth.

- The 12-inch line located west of the Huntley Gym Building 15. Based upon this pothole observation, the pipe appeared to be 12-inch steel pipe in good condition and located at only a 3.8 ft depth.

A Video Inspection was completed in two areas (See Videography Exhibit in Appendix A)

- The first segment was along the service road north of E-13, and E-14 that is located along the natural hillside area with large trees along the adjacent slopes. This segment begins in the Aguilar Patio (near Cafeteria) and was identified by RCCD staff as an area where sewer leaks had occurred in the past.

- The second segment was along the north-west along Building 22.

Recommendations

The campus staff was concerned with the large on-site tree roots that damage the existing sewer system. Therefore, video inspection was completed in the areas of concern. Our overall analysis was favorable, however, we recommend for continued maintenance and inspection of the sewer system to ensure its service in the future.

The recommendations presented herein include: a) extension of the sanitary sewer system to serve proposed buildings presented in the Master Plan Update, b) removal of existing sanitary sewer service laterals which serve existing buildings planned to be demolished to provide a clear site for future development, c) removal and replacement of existing sanitary sewer pipe segments, and d) further investigation of existing sanitary sewer main lines during the campus expansion to ensure it does not exceed maximum capacity.

The following are recommendations for improvements to the existing sanitary sewer system have been prioritized:

1. Replace damaged sewer lines that were identified in the two 400-ft segments, especially in the sloped areas. Any sewer leaks in these areas could provide potential hillside failures in these graded areas.

2. Tree removal or sewer encasement may be required to eliminate future damage from tree roots.

3. Add a public sewer mainline relocation into Olivewood Avenue, due to the addition of proposed Building P-5.

4. In order to provide a clear site for future development, remove the existing sanitary sewer mains and 4-inch laterals currently serving any existing buildings to be demolished. Existing systems can be cut and capped at the existing manholes.

5. It is recommended that the college continue to further investigate the existing campus wide pipe condition and capacity to provide further recommendations for improvements as the campus expands.

6. Any recommendations should be coordinated with the City of Riverside Water Public Works Department to ensure that they are incorporated into the City Sewer Master plan.

Based upon information provided in the Master Plan Update, the findings and recommendations presented in this report are determined from sanitary sewer design criteria and standard planning guidelines. In the case that the individual proposed building designs yield larger flow rates than presented herein, it is recommended that the college re-evaluate the data analysis and update the findings.

LEGEND:

(1) EXISTING BUILDING

SS EX. SEWER LINE

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

N.T.S.

FIGURE 1A
EXISTING SANITARY SEWER SYSTEM

LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING
- SS EX. SEWER LINE
- SS PROP. SEWER LINE

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

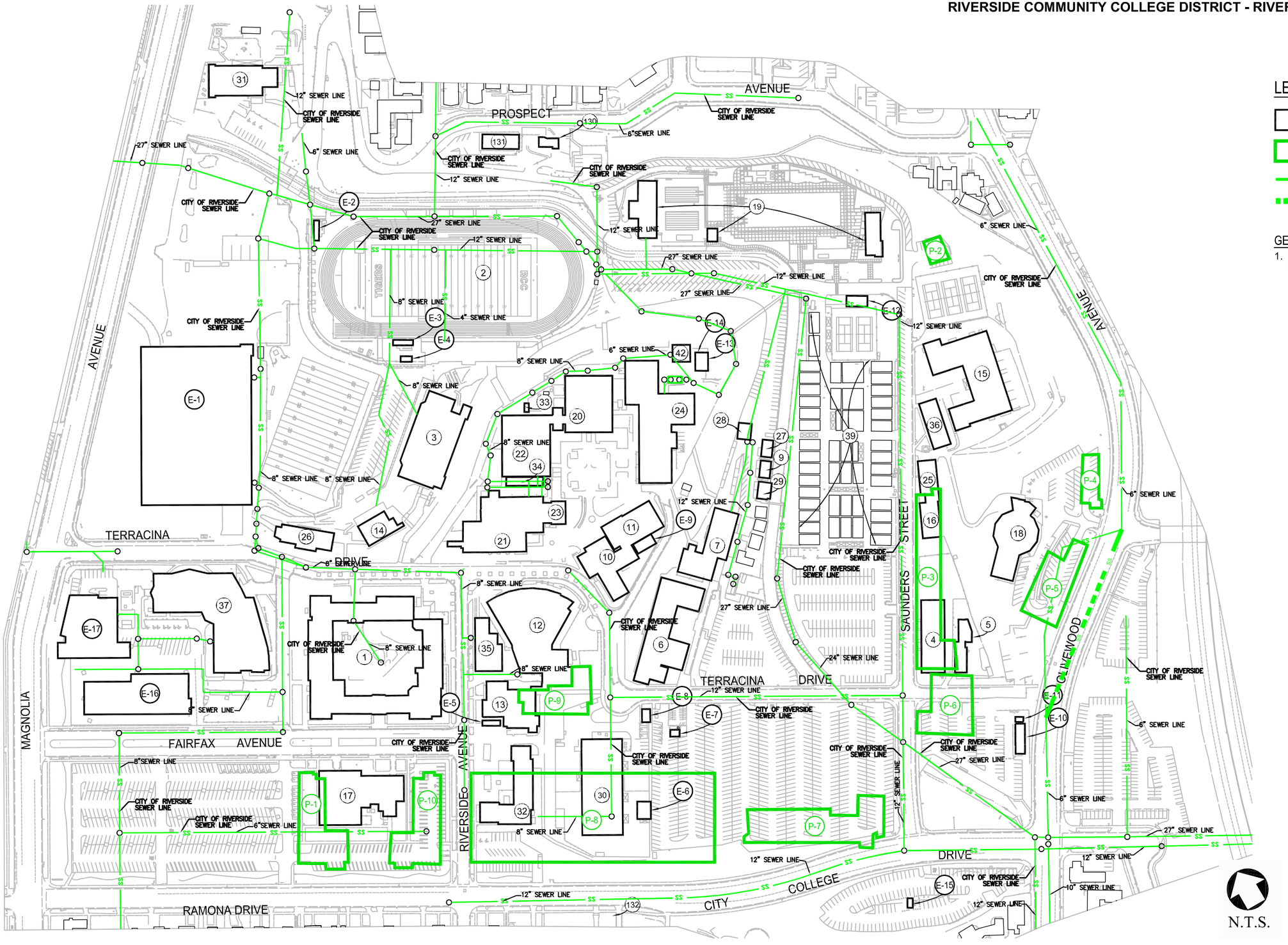


FIGURE 1B
PROPOSED SANITARY SEWER SYSTEM

SECTION 2 – WATER SYSTEM

2.1 SYSTEM DESCRIPTION

The existing water distribution system serving the campus buildings provides both domestic water and fire water from one distribution system. The campus also uses the domestic water system for irrigation and does not have access to a reclaimed water system to supply water for landscape irrigation. This is discussed in Section 3 – Irrigation Water System.

The City of Riverside Public Utilities Department provides water in a single domestic water system to serve both the domestic and fire water distribution systems. The domestic system is served by individual meters for each building and individual fire water services to each building.

1. The existing domestic water system is a series of 4", 6", 8", and 12" lines that enter the campus from Magnolia Avenue on the west, Ramona Drive / City College Drive on the south, and Olivewood Avenue from the east. The water mains follow the alignment of the original residential streets that existed before the campus was established. These existing public mainlines are maintained by the City Public Utilities Department.

2. The existing fire service is provided by individual fire service to each building from the existing domestic water mainlines (described above.) The only exception is a single 8-inch fire line with an 8" backflow preventer on Saunders Street to provide fire service to the (5) Buildings on this street.

Per the recent Fire Flow Data (dated September 24, 2009), the Fire Hydrant located at the corner of Terracina Drive and Riverside Avenue, near the center of Campus, indicated that the 12-inch service has a minimum static pressure of 64 psi.

The campus domestic water distribution network consists of an 8-inch PVC pipe loop. The existing domestic water distribution system and locations of each connection is shown on Figure 2a, Existing Water Map – Water Distribution.

The campus fire water distribution network consists of a 12-inch PVC pipe loop. The existing fire water distribution system and locations of each connection is shown on Figure 2b, Existing Water Map – Water Distribution.

2.2 METHODOLOGY

Psomas defined the fire flow requirements based upon California Building Code requirements for Fire service. These requirements are consistent with industry standards and indicated that the current and proposed fire water systems shall meet the following criteria for new construction:

- Fire hydrants shall be spaced at a maximum of 300 feet along fire lanes. Buildings shall be within 300 feet of a fire hydrant.
- Fire water system shall have a minimum fire flow of 2,000 gpm from fire hydrants flowing simultaneously.
- Fire Water system shall have a minimum residual water pressure of 20 psi with the required 2,000 gpm flowing.

Existing domestic water usage for the campus was provided by RCCD.

For the preliminary analysis purposes of this report, and since on this campus the fire flows and domestic flows are provided by the same source, our analysis focused on the maximum fire flows taken at a node located adjacent to the largest building on campus. Based upon this most conservative combined method, if minimum pressures were maintained, then we concluded that both the fire and domestic systems were adequate.

2.3 ANALYSIS OF EXISTING SYSTEM

A computer model of the existing fire water network was created with H20Net Version 8.0 to represent the existing conditions on campus. This model was run to test the existing system's ability to satisfy the fire flow criteria set forth by the Fire Flow requirements using data as measured in the fire flow tests.

The same computer model above incorporated the existing domestic water network by using the critical node locations adjacent to the largest buildings on campus.

2.4 ANALYSIS OF FUTURE NEEDS

The water system was evaluated with the addition of proposed buildings listed in Table ES-2 of the Executive Summary. Based on the future development presented in the Master Plan Update as discussed in the Executive Summary, recommendations have been made to construct new water pipes, relocate and demolish various existing water lines in order to accommodate the future development. This is conceptually illustrated in Figure 2b, Future Conditions - Water Distribution Map.

A second computer model was not required for the proposed condition since the integrity of the existing system was maintained and segments were only relocated around proposed buildings that interfered with the existing system. Also, new loops were added when needed to expand the system and maintain redundancy.

2.5 FINDINGS AND RECOMMENDATIONS

Findings

An evaluation of the existing domestic water system revealed that the existing water system adequately supports the demand for existing buildings with no significant pipe losses due to pipe size or elevation. In addition, the computer model shows that the existing water pressures throughout the campus satisfy a minimum requirement of 20 psi.

Conceptual review of the proposed conditions indicates that the existing domestic water system can also adequately support the demand for proposed buildings.

- The measured static pressure of 64 psi does provide concern. Multi-story buildings proposed at the higher elevations on campus will need to be reviewed in detail to confirm that this water pressure will meet design requirements. Also note that upgrades to the City water system may resolve this issue over time.

An evaluation of the existing fire water system revealed that the existing fire water system adequately supports the demand for existing buildings with no significant pipe losses due to pipe size or elevation and with adequate fire flows at hydrants. In addition, the computer model shows that the existing fire water pressures throughout the campus satisfies the minimum pressure / flow requirements

Conceptual review of the proposed conditions indicates that the existing fire water system can be expanded to adequately support the demand for the proposed future buildings.

A pothole study was done for the 30-inch line east of Cosmetology Building No. 18. The size, depth, and condition of this line could not be confirmed due to the presence of multiple layers of asphalt concrete. A multi-phase coring effort would be required to complete this observation.

Recommendations

Based on the findings above, recommendations include providing new services to proposed buildings, re-routing water lines that are in conflict with proposed buildings, as depicted in the Master Plan Update. As illustrated in Figure 2b, Future Conditions– Water Distribution Map, the following are recommendations for improvements to the existing domestic and fire water system:

1. Relocate 12-inch City of Riverside main domestic water service loop to avoid proposed Building P-6.

2. Relocate 30-inch transmission City of Riverside main into Olivewood Avenue to avoid the proposed Building P-5.

3. Remove and/or relocate existing domestic water or fire water pipes that may be in conflict with new building footprints. Mainline water systems can be cut and capped at the proposed project limits.

4. Install new fire hydrants as needed within 300 feet of proposed buildings per requirements.

5. Review the California Building Code requirements for Fire service with the addition of each proposed building, since the requirements are based upon final building type, size, height, and occupancy use.

6. Provide individual meters at each building as they are constructed or renovated.

LEGEND:

- (1) EXISTING BUILDING
- FW EX. FIRE LINE
- W EX. WATER LINE

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

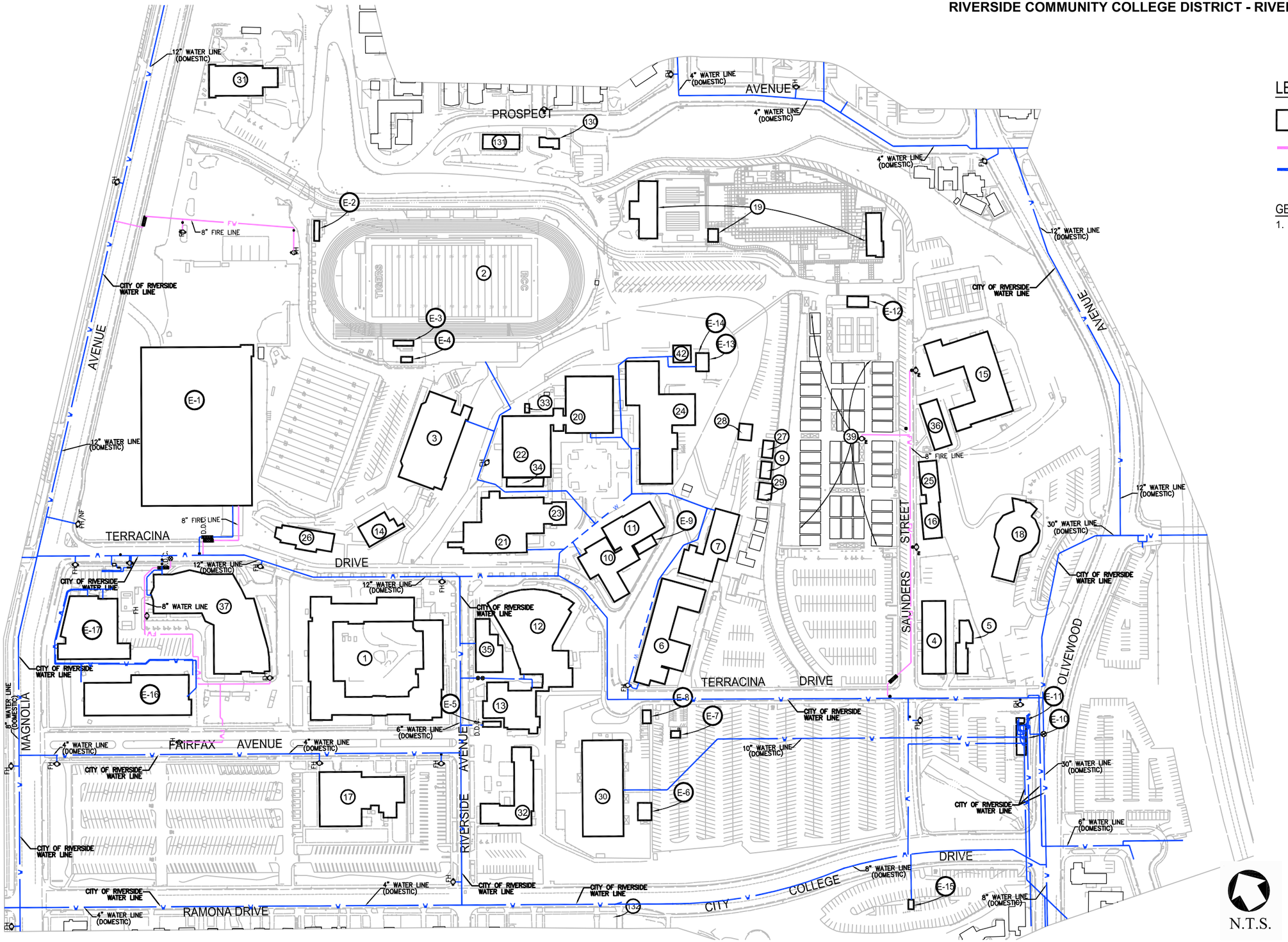


FIGURE 2A
EXISTING WATER DISTRIBUTION

LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING
- FW EX. FIRE LINE
- W EX. WATER LINE
- FW PROP. FIRE LINE
- W PROP. WATER LINE

GENERAL NOTES:

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

N.T.S.

FIGURE 2B
PROPOSEDWATER DISTRIBUTION

SECTION 3 – IRRIGATION WATER SYSTEM

3.1 SYSTEM DESCRIPTION

The campus uses domestic water for landscape irrigation. The irrigation meters and backflow devices are added as needed to the public water system that exists throughout the campus. During the on-site review of the water system, no irrigation concerns were documented related to pressure or availability.

The existing small (2-inch or less) PVC irrigation water distribution system is a campus network of lines that gets relocated, modified, lengthened, and abandoned, as required to accommodate campus expansion projects. Backflow prevention is provided and installed during modification projects.

The City Public Utilities Department has a long range goal to bring reclaimed water to the campus and any new expansion of the irrigation system should include “purple pipe” to allow for the future reclaimed water.

3.2 METHODOLOGY

Existing irrigation water flows for the campus can be estimated based on a percentage of the overall domestic use. The average day usage is the average annual amounts divided by 365 days. The peak month average day considers only the higher meter readings for the dry months between June and November. Irrigation is typically performed between 10pm and 6am, seven days per week, so these peak month amounts were multiplied by 3 (8 hrs./24 hrs.) to get an 8 Hour Irrigation Average Use. The 8 Hour Irrigation Peak Use is twice the previous average to account for the maximum day during those summer months and the fact that the irrigation system cannot be fine-tuned to completely average out the demands over an eight-hour period. The percentage of campus water use dedicated to irrigation use is typically based upon similar campuses of similar sizes located in Southern California.

3.3 ANALYSIS OF EXISTING SYSTEM

An analysis described above provides a conceptual model of the existing irrigation water network and represents the existing condition on campus. The campus currently uses standard water preservation methods to minimize runoff and avoid overwatering through observation and regular maintenance programs.

3.4 ANALYSIS OF FUTURE NEEDS

The irrigation water system can be evaluated with the addition of proposed buildings listed in Table ES-2 of the Executive Summary. Based on the future development presented in the Master Plan Update as discussed in the Executive Summary, recommendations will include relocation and demolition of various existing irrigation water lines in order to accommodate the future development.

A second estimate was not needed to represent the future conditions on campus since additional proposed buildings will reduce the amount of landscape area available for irrigation. Maximum daily flow demands will decrease by the relative percentage of buildable area that replaces the current open landscaped areas.

3.5 FINDINGS AND RECOMMENDATIONS

Findings

An evaluation of the existing irrigation water system revealed that the existing irrigation water system adequately supports the demand of existing buildings and landscape areas with no significant pipe losses due to pipe size or elevation. The existing irrigation system can also adequately support the demand for proposed buildings and landscape areas as depicted in the Master Plan Update.

- No figures and illustrations are provided in this section since the detailed network of small piping is not readable at the scale illustrated on a single sheet overall campus map.

- Prepare for the future reclaimed water system in development by The City Public Utilities Department.

Recommendations

Based on the findings above, recommendations include providing re-routing irrigation lines that are in conflict with proposed buildings, and replacing old irrigation pipes as needed during campus improvement expansion over parking areas and roadway improvements.

It is also recommended that the college pursue its efforts in getting a potential source for future reclaimed water service.

1. Proposed new irrigation piping shall be purple PVC pipe and maintain minimum horizontal and vertical clearances with adjacent potable water lines.

2. Upgrade water sensor technology, as needed, during expansion projects to stay up to date on water saving technological advances.

3. Install and maintain back flow prevention devices as needed to insure water quality safety.

4. Provide individual irrigation meters for each landscape zone.

SECTION 4 – STORM DRAIN SYSTEM

4.1 SYSTEM DESCRIPTION

The existing campus mainline storm drain system consists of a concrete open-top box channel that flows from south to north and extends through the center of the campus. This channel is maintained by Riverside County Flood Control District upstream and downstream of the campus limits.

The following is a summary of the on-site storm water collection system:

- The majority of the on-site storm water surface flows to the mainline channel in a sheet flow manner.
- The southwest corner of the campus (near Magnolia Avenue and Ramona Drive) flows by laterals to the existing 42-inch storm drain in Magnolia Avenue.
- Building roof drains and landscape areas are drained though a system of small (6", 10", 12") pipes and area drains that connect to one of the mainlines - described above.
- No on-site water quality basins are located on campus.
- The existing parking lots sheet flow to catch basins and then into the storm drain mainline or sheet flow directly to the mainline channel.
- No large on-site storm water detention basins are provided

4.2 METHODOLOGY

Due to campus topography the tributary areas flow to the existing channel that collects most (if not all) of the campus flows, a detailed campus hydrology study was not required.

The existing minor storm drain mainlines system was evaluated using concept level hydrology (existing and proposed conditions) by identifying major sub-areas and using County flood control data when needed.

4.3 ANALYSIS OF EXISTING SYSTEM

The existing conditions have been evaluated using concept level hydrology using simplified Riverside County Flood Control Hydrology Methods. Storm flows have been routed to the existing backbone on-site drainage systems using a series of surface flows and pipe flows. This includes:

- Delineate minor drainage sub-areas for on-site tributary areas for minor mainlines.
- Prepared existing condition hydrology model and estimated peak flow runoff rates for 100-year design storms.
- Verified on-site pipe capacity for minor mainlines.

4.4 ANALYSIS OF FUTURE NEEDS

The proposed re-alignments do not require major horizontal re-routing and the tributary areas are constant with the current condition.

Therefore, a conceptual review of the hydrology analysis for the proposed campus conditions were reviewed to determine if the proposed system is in conformance with the existing simplified Riverside County Flood Control Hydrology Methods and if pipe sizes for relocations would match the existing conditions. This is based upon the following review.

- Overlay of the proposed campus master plan onto the existing condition base map.
- Review of the developed condition hydrology analysis for the 100-year storm events.
- Review of potential storm water quality detention facilities to reduce developed peak flows to pre-master plan conditions.
- Review of on-site storm drain mainline system with pipe sizes necessary to convey run-off for the proposed conditions.

4.5 FINDINGS AND RECOMMENDATIONS

The existing storm drain mainline systems are adequately sized to address the current design storm conditions. No immediate concerns were identified.

- A pothole study was done for the district maintained line located west of the football field. This line runs from the southeast to the northwest. A potholing effort to 11-ft depth, failed to locate the pipe and therefore, the pipe size, material, condition, and depth could not be verified. Additional as-built investigation will be required to confirm the existence and/or location of this pipe.

The proposed campus development will impact many of the existing mainline alignments and will require relocations to avoid the planned building footprints.

Additional storm water quality detention basins may be provided at the lower parking areas to address future water quality requirements.

The following is a summary of the modifications related to the proposed on-site storm drain mainline system:

1. Relocation of the east-west mainline that leaves Olivewood Avenue and is in conflict with proposed Building P-2.
2. The ultimate conversion of the existing open topped concrete trapezoidal channel to a closed box culvert will allow the campus increased access opportunities and additional development space.

Sufficient elevation change across the campus site also allows flexibility and opportunities for future storm drain alignments to avoid any significant design elements.

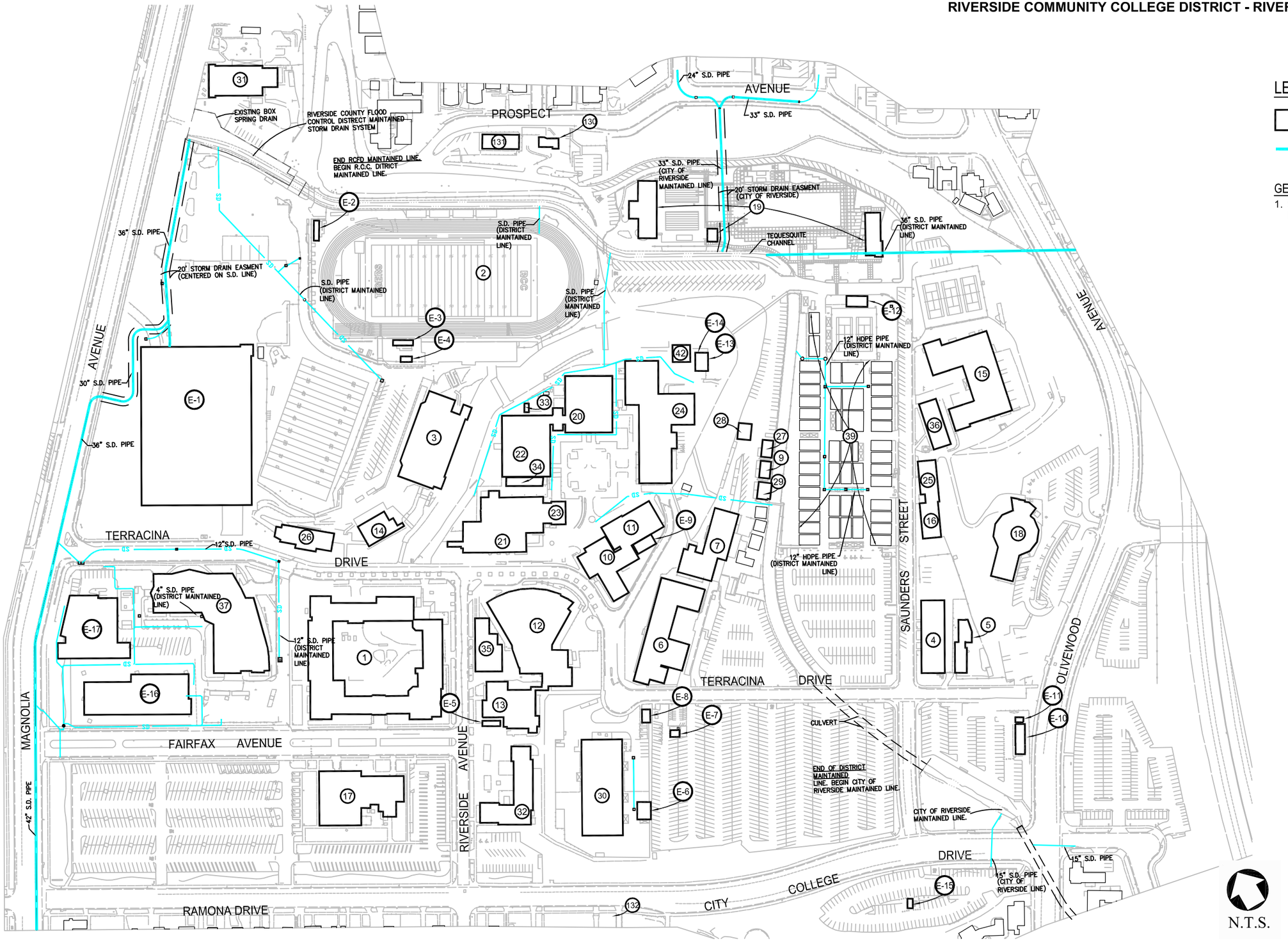


FIGURE 4A
EXISTING STORM DRAIN SYSTEM

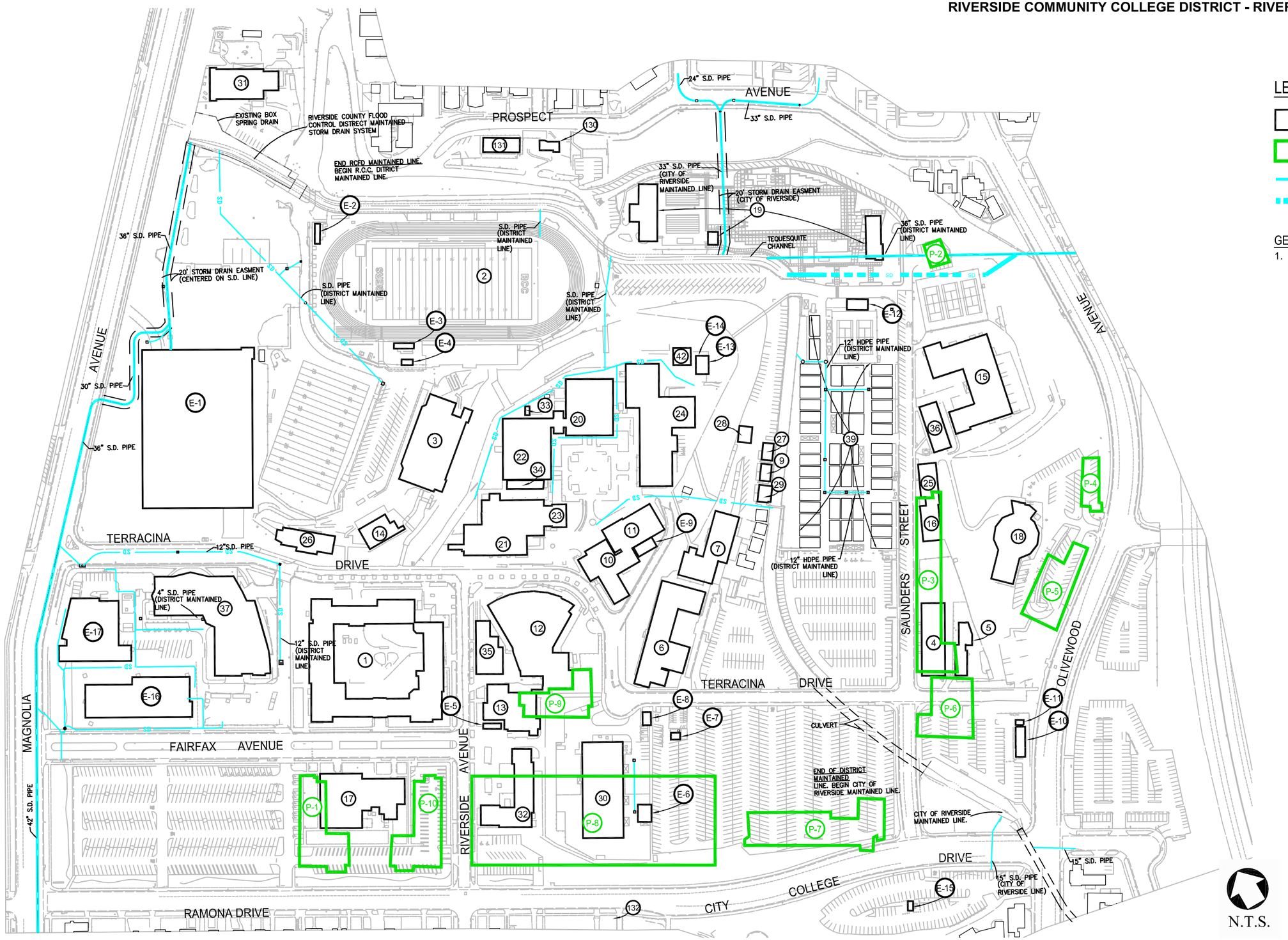


FIGURE 4B
PROPOSED STORM DRAIN SYSTEM

SECTION 5 – CHILLED WATER SYSTEM

5.1 SYSTEM DESCRIPTION

This campus does not have a central chilled water system. It has a mix of some chilled water systems, and some DX cooling systems. The systems are spread out serving individual buildings, or small complexes.

5.2 METHODOLOGY

The objective of this report is to evaluate the existing chilled water systems currently serving the campus and provide recommendations to improve, modify/upgrade existing systems to support new buildings, major renovations, and building retrofits that form part of the proposed campus Facilities Master Plan.

The following methodology was adopted in formulating our mechanical master plan for the campus:

An important aspect in the evaluation of the existing systems serving a facility is a detailed and accurate field investigation of the current systems.

A detailed survey of the existing mechanical systems that currently serve the facilities at the Riverside College campus and existing conditions was undertaken and existing layout, capacity and potential problems were identified. The surveyed information was verified through available record drawings, field investigations and meetings with the campus facilities staff.

Alterations/upgrades/modifications necessary to support new buildings, major renovations and building retrofits that will form the proposed campus facilities were identified.

5.3 ANALYSIS OF EXISTING SYSTEM

The following report provides an analysis of the present chilled water systems currently serving the campus. It identifies potential problems associated with the systems, defines future requirements and outlines recommended solutions to support the proposed facilities master plan. Site plans showing existing and proposed chilled water systems distribution are also provided at the end of the section.

The campus is currently served by several water cooled chiller plants. The chillers and pumps use a high flow rate and low temperature difference distribution systems. These are energy inefficient distribution schemes.

In addition to the chilled water plants, several split systems and packaged systems exist. See the Existing Building Summary Table 9a at the end of Section 9.

Upper Campus

Bldg 37 is the new Library/Learning Resource Center. It does not have any chilled water. It is cooled by three packaged rooftop units and a first floor split system DX airhandler.

Bldg 17 is the administration bldg. It has two split system DX airhandlers..

Bldg 1 is the Quad. It has a water cooled chiller in an outside pit.

Bldg 32 is the Business Education Bldg. Bldg 5 and are the Music Education Bldgs. Bldg 7 is the performing Arts Center. All of these buildings are served by a water cooled chiller system that is in a basement.

Bldg 21 is the MLK High Tech Center. It has a water cooled chiller in the basement.

Bldg 34 is the Assessment Center. It is served by a packaged rooftop unit.

Bldg 23 is the Planetarium. It is served by a packaged rooftop unit.

Bldg 22 is the Physical Sciences and Bldg 20 is the Life Sciences Bldg. They are served by a common water cooled chiller system.

Bldg 24 is the Student Center. It is served by a water cooled chiller system.

Bldg 42 is the Outreach Center. Bldg E-14 is Student Government and E-13 is Financial Services. They are cooled with DX split systems.

Bldg 11 is Financial Services, and Bldg 10 is the Admissions building. They are served by split system DX cooling.

Bldg E-9 is the Outreach Portable. It is cooled by a split system unit.

Lower Campus

Bldg 31 is the early Childhood Studies Bldg. It is served with DX split systems.

Bldg 26 is the Ceramics building. It is served by a packaged rooftop unit.

Bldg 14 is the Art building. It is served by DX split systems.

Bldg 3 is the Gymnasium. It has DX cooling.

Bldg 131 is the North Hall. It has DX cooling.

Bldg 130 is the College House. It has DX cooling.

Bldg 7 is the Technology B building. It has some roof top units and some split systems.

Bldg 6 is Technology A. It has some roof top units and some split systems.

Bldg 30 is the Automotive Technology building. It has some roof top units and some split systems.

All of the Lovekin complex buildings (39) have wall hung DX systems.

Bldg 15 is the Huntley Gym. It has DX cooling.

Bldg 36 is the Pilates Studio. It has DX cooling.

Bldg 4 is the Maintenance and operations building. It has DX cooling.

Bldg 18 is Cosmetology. It has DX cooling

5.4 ANALYSIS OF FUTURE BUILDING COOLING LOADS

Current buildings that will remain, current buildings that will be demolished, and proposed new buildings were identified.

The campus is geographically divided into an upper campus and a lower campus. The projected peak cooling load for the upper campus is about 1,660 tons, depending on which buildings are selected to be connected to the central plant. If we assume a seventy five percent diversity from peak load, the diversified load would be 1,250 tons.

The projected peak cooling load for the lower campus is about 350 tons, again depending on which buildings are selected to be connected to the central plant. The diversified load would be 265 tons.

See Table 9b at the end of section 9 for a list of future buildings and their projected cooling loads.

5.5 FINDINGS AND RECOMMENDATIONS

Findings

The current chilled water systems are set up for constant flow and so they are not as energy efficient as they could be. The chilled water control valves are three way valves. To increase the efficiency of the pumping system, two way valves should be installed. However, the pumps lack VFD's to take full advantage of this retrofit.

The buildings are served by 4 pipe air-handlers and are designed for approximately 10°F differential on the chilled water supply and return temperatures. For a campus environment this is a very low differential and leads to large pipe sizes and large pumping requirements compared to a larger temperature differential design.

Recommendations in Order of Priorities

1. New buildings should be provided with air handlers instead of fan coils to make better use of air side economizers and also greater delta T's through the chilled water coils. This is also essential for maximizing the capacity of the Chilled Water Thermal Energy Storage Tanks.

2. For energy efficiency reasons, water cooled chilled water plants are proposed. A comparison of full load and part load efficiencies is noted below for current state of the art chillers.

3. The campus is geographically divided into an upper campus and a lower campus. It makes sense to divide the central plants in a similar manner. We have shown the proposed central plant for the upper campus to be incorporated with the proposed parking structure P-8. The chillers and pumps would be on the lower floors of the parking structure. The cooling tower would be on the upper level.

4. The use of Thermal Energy Storage (TES) tanks is also recommended. The storage tanks can take advantage of cooler temperatures during off peak hours and possibly favorable electric rates during these hours. They will reduce the overall capacity of the chillers in the plant by taking care of peak loads.

5. The proposed location of the central plant for the lower campus is shown behind the proposed location for the Maintenance office and Maintenance Shipping (P-4 and P-5) near where the current cosmetology building is. Another option would be to locate it down on the flats where the re-locatable units now are (Lovekin Complex).

6. Piping distribution system will need to be installed in roadways or parking areas to allow placement of new buildings without being over the proposed pipe locations. See the site plan (Figure 9b) for the proposed main pipe routing.

7. All new buildings that are fed from the central system should have BTU metering capabilities that tie into a central DDC system with strong energy management capabilities. Similarly, existing buildings should be retrofitted with new BTU monitoring capabilities.

8. The lower campus system could be combined with the upper campus system, but the pipe would have to cross the canal. The cost of the extra piping from the upper campus system would have to be balanced against the cost of another central plant for the lower campus. The lower campus could be kept independent since the buildings are more spread out compared to the upper campus.

SECTION 6 – HEATING WATER SYSTEM

6.1 SYSTEM DESCRIPTION

This campus does not have a centralized heating system. It has a mix of some local heating water systems, some gas-fired heating equipment, and some electric heating equipment.

6.2 METHODOLOGY

The objective of this report is to evaluate the existing heating systems currently serving the campus and provide recommendations to improve, modify/upgrade existing systems to support new buildings, major renovations, and building retrofits that form the proposed campus Facilities Master Plan.

The following methodology was adopted in formulating our mechanical, master plan for the campus:

An important aspect in the evaluation of the existing systems serving a facility is a detailed and accurate field investigation of the current systems.

A detailed survey of the existing mechanical systems that currently serve the facilities at the Riverside College campus and existing conditions was undertaken and existing layout, capacity and potential problems were identified. The surveyed information was verified through available record drawings, field investigations and meetings with the campus facilities staff.

6.3 ANALYSIS OF EXISTING SYSTEMS

The following section provides an analysis of the present heating systems currently serving the campus. It identifies potential problems associated with the systems, defines future requirements and outlines recommended solutions to support the existing and proposed facilities master plan.

The campus is currently served by several heating water plants. The boilers and pumps use a high flow rate and low temperature difference distribution systems. These are energy inefficient distribution schemes.

In addition to the several heating water systems, there are several gas fired systems and some electrical heating systems on smaller units.

See the Existing Building Heating Load Summary (Table 9a) for existing buildings at the end of the chilled water section.

Upper Campus

Bldg 37 is the new Library/Learning Resource Center. It is heated by three packaged rooftop units and a first floor DX airhandler with gas heat.

Bldg 17 is the administration bldg. It has two split system airhandlers with gas heating.

Bldg 1 is the Quad. It has a boiler in an outside pit.

Bldg 21 is the MLK High Tech Center. It has heating water boilers in the basement.

Bldg 32 is the Business Education Bldg. Bldg 13 is the Music Education Bldgs. Bldg 12 is the performing Arts Center. All of these buildings are served by a common boiler system that is in the basement of Bldg 13.

Bldg 34 is the Assessment Center. It is served by a gas-fired packaged rooftop unit.

Bldg 23 is the Planetarium. It is served by a gas-fired packaged rooftop unit.

Bldg 22 is the Physical Sciences and Bldg 20 is the Life Sciences Bldg. They are served by a common heating water boiler system.

Bldg 42 is the Outreach Center, E-13 is Financial Services building, and E-14 is Student Government. They are heated with split systems with electric heat.

Bldg 10 is the Admissions Office, and Bldg 11 is the Financial Services building. They are served by split system units with electric heat.

Bldg E-9 is the Outreach Portable. It is served by an electric split system.

Lower Campus

Bldg 31 is the early Childhood Studies Bldg. It is served by split systems with electric heating.

Bldg 26 is the Ceramics building. It is served by a gas-fired packaged rooftop unit.

Bldg 14 is the Art building. It is served by split systems with electric heating.

Bldg 3 is the Gymnasium. It has gas fired heating.

Bldg 131 is the North Hall. It has gas-fired heating.

Bldg 130 is the College House. It has gas-fired heating.

Bldg 7 is the Technology B building. It has some roof top units with gas heating and some split systems with electric heating.

Bldg 6 is the Technology A building. It has some roof top units with gas heating and some split systems with electric heating.

Bldg 30 is the Automotive Technology building. It has some roof top units with gas heating and some split systems with electric heating.

All of the Lovekin complex buildings shown as item 39 have individual wall hung DX units with electric heating.

Bldg 15 is the Huntley Gym. It has gas heating.

Bldg 36 is the Pilates Studio. It has gas heating.

Bldg 16 and 25 are warehouses. They have no heat.

Bldg 4 is the Maintenance and Operations building. It has some gas fired heating and some electric heating.

Bldg 18 is Cosmetology. It has gas heating

6.4 ANALYSIS OF FUTURE BUILDING LOADS

Current buildings that will remain, current buildings that will be demolished, and proposed new buildings were identified. Refer to the summary of future heating and cooling loads, Table 9b at the end of Section 9.

Future heating loads should be handled locally rather than centrally, on a building by building basis. Heat provided by gas furnaces are just as efficient as gas –fired boilers, unless condensing boilers are used. The lower the return water temperature to a boiler, the better the efficiency. However, most non-condensing boilers have a minimum entering water temperature of 140 degrees. It should be noted that heating water has better control over supply air temperature and space temperature and therefore is the preferred method of heating.

6.5 FINDINGS AND RECOMMENDATIONS

1. For those smaller buildings that have electric heat, we would recommend changing out strip heat to heat pumps. Heat pumps are three to four times more efficient than straight electric heat.

2. It is more economical to heat smaller buildings with packaged gas furnaces than to provide a boiler system. This will need to be studied on a case by case basis. It is probably not economical to change existing buildings from gas heat to hot water, unless it is a larger building. Again, this would need to be evaluated by building.

3. It is recommended to localize the generation of heating hot water rather than having all heat generation in one location. There is no improvement in overall system efficiency by a centralized heating water system. Current SCAQMD regulations limit economical boiler sizing to less than 2.0 million BTU per boiler.

4. For heating water systems, pumping and piping systems should take advantage of higher temperature difference coils to allow for lower flows. This provides more efficient pumping systems.

5. Heating water pumps should have VFD's and all control valves should be two way so that reduced flow at part load conditions can further save pumping energy. However, VFD's below 3 hp are not as economically beneficial and therefore are not recommended.

SECTION 7 – ELECTRICAL SYSTEM

7.1 SYSTEM DESCRIPTION

Background and Scope

Riverside City College, one of three colleges within the Riverside Community College District, is a two-year public community college situated in the community of Riverside California. The campus is located on former Poly High School site and opened in 1916. The City Campus has become one of California's leading community colleges and is a landmark in downtown Riverside.

Each semester more than 19,000 students pursue associate's degrees, transfer to a four-year college or university or receive career certificates that qualify them to enter their chosen field.

The campus derives its power from the City of Riverside Public Utility Company. The power is provided both from a 12kV new primary distribution system and a much older 4160 volt primary service.

The 12kV portion of the primary distribution system is extended throughout the campus where it is transformed by the Riverside Public Utility down to low voltage (120/240,120/208,277/480V), metered and distributed to individual buildings. The 12kV distribution system is owned and maintained by the utility company.

The 4160 volt power is provided from a single service point where it is extended to a 5kV main switch and then metered at 4160 volts. The 4160V system then extends to campus owned transformers where it is transformed to low voltages to serve various buildings throughout the campus.

See Exhibits 7a for reference to the existing site electrical distribution system and Exhibits 7c and 7d for the existing campus single-line diagram.

Objective

The objective of this report is to evaluate the existing power distribution system and its adequacy to support new buildings, major renovations, and building retrofits that form part of the proposed campus Facilities Master Plan.

7.2 METHODOLOGY

The following methodology was adopted in formulating our power distribution master plan:

The normal methodology in formulation of the power distribution master plan would be to verify the existing conditions based upon available record drawings. Unfortunately, available record drawings did not exist or in the case of buildings where they did exist, they were not updated and did not match the current conditions.

Therefore it was necessary to perform a detailed survey of existing conditions and verify the existing site distribution and individual systems at the building. The survey identified the existing conditions and the revisions made to the system in the last fifty-four years since the system was installed.

Several meetings were held with the Riverside Utility Company service and Engineering Department to verify their existing installation details.

The compilation of this report thus allows accurate assessment for the alterations/upgrades/modifications necessary to support new buildings, major renovations and building retrofits that will form part of the proposed campus facilities master plan.

7.3 ANALYSIS OF EXISTING SYSTEM

Our following report provides an analysis of the present electrical our following report provides an analysis of the present electrical distribution currently serving the campus. It identifies potential problems associated with the system, defines future requirements and outlines recommended solutions.

The following are included as part of our report:

- High voltage system description of the existing equipment for both 12 kV and 4160 volt system.
- Low voltage system description of the existing equipment for each individual building.
- Review of the current power consumption including current electric rate structure, peak KW demand per meter, and total electric consumption.
- Available spare electrical capacity including requirement for future buildings.
- PDF's of drawings of the existing and proposed electrical site distribution system as well as single line drawings for both the 4160 volt and 12kV systems. The list of drawings is as follows:

  Figure 7a Existing Utility Map-Electrical

  Figure 7b Future Conditions Utility Map-Electrical

  Figure 7c Existing Electrical System 4160 Volts Single-Line Diagram

  Figure 7d Existing Electrical System 12KV Single-Line Diagram

  Figure 7e Proposed Electrical System 12KV Lower Loop SLD

  Figure 7f Proposed Electrical System 12KV Upper Loop SLD

Description of Existing Conditions

Electrical Power Distribution Findings

High Voltage 12 kV System

Riverside Utility Company has a fairly new 12kV underground system that extends around the campus. The 12kV distribution system forms a loop system around the campus.

The 12kV underground distribution system extends down Olivewood Avenue across City College Drive and Ramona Drive then up Magnolia Avenue. Placed strategically throughout the distribution system are a series of vaults, manholes and various types of switches.

In addition to the 12kV underground loop system, there is a 12kV residential pole line that extends along Prospect Avenue and into the campus. This pole line feeds the North Hall and College House as well as Cutter Pool. There is another drop from this pole line that extends underground around the Stadium Playing Field to (2)-12kV transformers, one of which serves the New Stadium Sports lighting poles and the other serves a Utility Transformer substation in the Stadium Building itself.

The 12kV underground system extends along Olivewood Avenue to an underground vault and switch which serves a switch located above the Huntley Gym. From this switch location, multiple feeders extend to the following locations:

(a) A 12kV feeder extends to a new 750kVA, 12kV to 480/277 volt transformer feeding the Quadrangle Trailer Swing Space.

(b) A 12kV feeder extends to a 150kVA, 12kV to 120/208 volt transformer feeding the Huntley Gym.

(c) A 12kV feeder extends to a 75kVA, 12kV to 120/240 volt transformer feeding the Tennis Court Area.

The 12kV underground system then extends to another underground vault and switch which then extends into the campus to a pole located adjacent to the Cosmetology Building.

The service extends up this pole and then overhead to a pole located behind the Warehouse/Maintenance Shop area. There is a pole mounted 12kV to 120/240 volt 100kVA transformer that serves the Maintenance Shop, Warehouse and Maintenance Paint Shop at the lower voltage.

This same pole also extends a 12kV overhead feed to the Cosmetology Building where it serves a High Voltage Substation. There is a 100kVA and a 50kVA, 12kV to 120/240 volt single and three phase transformers respectively serving the building.

The 12kV loop system continues along Olivewood Avenue and onto City College Drive, where it extends into an underground vault and to a separate switch assembly at the junction of Riverside Avenue. From this vault, an underground feeder extends back along Riverside College Drive to a 2500kVA, 12kV to 4160 volt transformer and switch which serve the entire 4160 volt service throughout the campus.

The 12kV loop system then continues along Ramona Drive, then along Magnolia Drive to a vault located at Terracina Drive intersection. A 12kV underground feeder then extends into the Campus to a 1500kVA, 12kV to 480/277 volt transformer that serves the new Digital Library.

The 12kV loop system continues on Magnolia to a series of high voltage 12kV switches located adjacent to the new Parking Structure. A 12kV feed extends from these switches down to the new 500kVA, 12kVA to 480/277 volt transformer serving the new Parking Structure. An adjacent high voltage 12kV switch serves across Magnolia to a 300kVA 12kV to 480/277 volt transformer serving the Arroyo Playing Fields.

The 12kV loop then continues along Magnolia Avenue to a vault located at the corner of 15th Street. The loop continues along Magnolia Av. past the campus property and terminates at the corner of 15th Street and Stadium Way in a high voltage 12kV switch that serves the Child Development. The 12kV feeders extend down to a 75kVA, 12kV to 120/208 volt transformer serving the facility.

Overhead 12kV Service

A separate 12kV service enters the Campus from a residential overhead pole line located on Prospect Avenue. The pole line extends down Prospect Avenue to the corner of Stadium Way where a pole mounted switch is located.

From this switch, the overhead service extends to a 50kVA pole mounted 12kV to 120/240 volt transformer. The secondary voltage then extends into the North Hall and College House.

The 12kV overhead service continues down Stadium Way to another pole located adjacent to the Cutter Pool Building. There is a 50kVA pole mounted 12kV to 120/240 volt transformer that serves the Cutter Pool Switchboard.

From the original pole on Stadium Way, the 12kV service extends down the pole and underground to a 12kV high voltage switch enclosure in the Stadium Area adjacent to the Student Parking Lot. From this switch, it extends around the playing field to a 750kVA, 12kV to 480 volt transformer serving the playing field lights. It also extends into a utility vault located under the stadium seating adjacent to the weight room. There are three 75kVA, 12kV to 120/208 volt transformer located in the vault that feed the main switchboard, located in the weight room electrical room.

High Voltage 4160 Volt System

The 4160 volt electrical distribution system is old and was originally installed in 1952. In 1952, Riverside Utility Company provided a 12kV to 4160 volt transformer. The transformer then serves a 5kV switch and meter located in the basement of the Landis Building.

At the time of the original installation, there were two oil fused cut out switches on the secondary side of the meter and they switches served two transformer banks. One bank consisted of (3)-75kVA transformers serving the Landis Building's Main Switchboard; transforming 4160 volts to 120/208 volts.

The other oil fused cut out served a 150kVA transformer located in the old Boiler House Building. The secondary voltage is unknown as the building no longer exists.

The original 4160 volt service thus consisted of (2) Oil Fused Cutouts and two transformer banks. As new buildings were added and remodeled, the system has been expanded, split, spliced and severely overloaded.

At the present time, there are (16) transformers, (16) Oil Fused Cutouts and (4) high volt switches forming part of the 4160V campus distribution system with a total connected capacity of 4850kVA.

The 4160V system is a radial system which emanates from the Landis Building. The Utility Company has replaced the original 12kV to 4160 volt transformer with a fairly new 2500kVA transformer and high voltage switch located on City College Drive. The 5kV underground feeder extends to the corner of Riverside Drive and then extends to a Utility Manhole M64 located adjacent to Fairfax Avenue.

The 4160 volt feeder is spliced in this manhole and then extends under the Music Building to a secondary utility manhole M63. From this point, it extends into the Landis Building Basement, where it terminates in a 600A, 5kV switch enclosure with a meter.

There are several pullboxes, as well as direct feeds extending from the back of the switch enclosure to the various Oil Fused Cutouts and high voltage switches located behind the meter section in a vault. The entire 4160 volt system radiates from this single switch enclosure.

Three of the old OFC's located in the Landis Vault were destroyed by circuit failure and have been replaced with more up to date Load Interrupter Switches (LIS). One of these switches extends through a series of manholes to the outdoor substation "BH" located adjacent to the Admission Building where it is spliced and feeds (2) additional LIS's. These switches feed transformers that sub feed the Admissions, Data and Technology building A&B. Last year, it was discovered that the 300kVA transformer was severely overloaded, so the 5kV feeder feeding this substation was spliced in a manhole and a new feeder extended down to the Technology "A" Substation. This substation has a 5kV primary OFC with a 225kVA transformer providing 120/240v 3 phase, 4 wire to the building.

The outdoor substation "BH" has a 300kVA, 5kV to 120/208v transformer and a 150kVA, 5kV to 120/208v transformer.

In the Landis Vault, one of the new LSI's feeds the (3) 75kVA transformers located in the Vault behind the Meter section. These transformers feed through the wall to a 1600 amp, 120/208 volt switchboard serving the Landis Auditorium.

The third new LSI feeds the Quadrangle Underground Vault. This vault has a 300kVA, 12kV to 120/208 volt transformer, as well as a 400kVA, 12kV to 480 volt transformer.

In addition, there is an old OFC located in the vault that feeds the Martin Luther King (MLK) Library manhole. Like MLK, this manhole has a splice box that splits the 5kV feeder and feeds into the MLK Building.

The MLK building has its electrical equipment located in the Mechanical Room. There is 5kV pullbox which serves a 5kV unit substation consisting of a LIS and a 1000kVA, 5kV to 480/277 volt transformer and secondary distribution.

From the MLK pullbox, the 5kV feeder extends through a series of pullboxes into an Electrical Room on the 2nd floor of the Life Science Building where it terminates in a pullbox with a splice box. This pullbox then serves a 400kVA, 5kV to 480 volt transformer located in the same room. It also extends a 5kV feeder overhead to another Electrical room in the Life Science building where there is a 500kVA, 5kV, 120/208volt transformer.

There is an additional feeder that extends through the Life Science Building then goes underground to an Electrical Room on the 2nd floor of the Student Center. In the Student Center, there is a high voltage pullbox that contains a tap box which feeds a 225kVA, 5kV to 480/277 volt transformer and a 300kVA, 5kv to 120/208volt transformer. New electrical work has recently been done in the Student Center to feed the remodeled Cafeteria. A 225 kVA 480V to 208Y/120V transformer and an 800 Amp 208Y/120V, 3 phase, 4 wire distribution board have been added to the exterior of the building and feed back into the Cafeteria.

There is an OFC located in the Landis Auditorium electrical room adjacent to the building switchboard that appears to feed the Music and Speech, Business Education and Automotive Buildings.

P2S Engineering was not able to verify the location of the primary switch for the 225kVa transformer serving the Administration Building, nor was able to locate the exact routing of its feeder. P2S was also unable to verify the exact feeder routing of the 12kV service to the Music and Speech Building.

P2S Engineering has attempted to trace this feeder but still needs to verify the exact details. The 5kV feeder appears to exit Landis and then goes into the side of the Music and Speech Building. We assume that it goes through the ceiling space then to a pullbox and then sweeps into the Electrical Room of the Music and Speech Building to the basement adjacent to the Main Chiller Plant. There is a 5kV feeder that terminates in a pullbox with a 4-way cable link box inside it.

From this box, the 5kV feeds to a 300kVA, 5kV to 480 volt transformer feeding mechanical equipment. There is another 5kV from this box serving a 225kVA, 5kV to 480 volt transformer which is also feeding mechanical equipment.

There is an additional OFC in the Electrical Room that feeds an underground exterior pullbox adjacent to the wall of the Electrical Room. There is a splice in this pullbox which feeds the Automotive Center exterior substation.

The Automotive Building has a substation with a 225kVA, 5kV to 120/240 volt transformer.

The other part of this splice appears to go to Business Education where it terminates in a 225kVA, 5kV to 120/208volt transformer.

It should be noted that the exact routing of these feeders needs to be verified.

There is 225kVA, 5kV to 120/240 volt WP transformer located at the Administration building. We were able to trace this feeder as far as a pullbox located on Riverside Avenue. We were not able to trace the feeder back to Landis from this pullbox, nor were we able to determine which protective device feeds this transformer. It is energized and therefore has power coming from Landis Auditorium.

Low Voltage Distribution System Feed from the 12kV System

At the present time, the Riverside Public Utility Company is providing service via its 12kV system (as previously identified) to (16) separate switchboard and meters fed from the secondary side of their high voltage transformers. These various buildings are served in the following manner:

The Digital Library building has a 3000 amp, 480/277 volt main switchboard and meter. The 480 volt is then transformed to 120/208 volt 3 phase, 4 wire. Based upon a 12 month period, the peak demand load for this building is 691kW or 831 amps on a 3000 amp service.

The New Parking Structure has an 800 amp, 480/277volt main switchboard and meter. The 480 volt is then transformed to 120/208v 3 phase, 4 wire, as needed. Based upon a 12 month period, the peak demand load for this building is 120kW or 144 amps on the 800 amp service.

The Arroyo Playing Field has a 400 amp 480/277 volt service switchboard and meter. The 480 volt is transformed to 120/208 volt 3 phase, 4 wire, as needed. This system is used only at night on an as needed basis, and is more than adequate for the requirements of the playing fields.

The Child Development building has a 225 amp, 120/208 volt service switchboard and meter. Based on a 12-month period, the peak demand load is 49.2kw or 137 amps.

The College House and North Hall are both provided with a 120/240 volt residential service and are adequately sized. No demand is available.

The Cutter Pool has a 400 amp, 120/240 volt service switchboard and meter. Based on a 12-month period, the peak demand load is 57.6kw or 139 amps.

The Stadium lighting is a stand alone system that has a 2000 amp, 480/277 volt main switchboard with a meter. Based on a 12-month period, the peak demand load is 168kw or 202 amps.

The Stadium Building electrical room located at the weight room has a 1200amps, 120/208 volt service. This service sub-feeds the Wheelock Gym with a 400 amp, 120/208 volt panel. The Art Building with a 400 amp service disconnect and 225 amp panel, and the Ceramics Building with a 400 amp, 120/208 volt panel.

Based upon a 12-month peak demand reading, the demand load is 216kW or 600 amps at 208 volts. The switchboard is fed by a bank of (3) 75 kVA transformers. The current demand load is getting close to the rated load.

The Huntley Gym has an 800 amp, 120/208 volt service switchboard and meter. This switchboard back feeds the old gym's switchboard. The Pilates Studio is also fed from this switchboard with a 225 amp panel. There is an additional feeder going from the main switchboard through a series of pullboxes and back feeding a 225 amp panel in the Cosmetology Building.

Based upon a 12-month peak demand reading, the demand load is 71kW or 197 amps at 208 volts.

The Cosmetology Building has (2) separate switchboards with totalized metering. One switchboard is a 400 amp, 120/240v, single phase switchboard. The other switchboard is 240 volt, 3 phase switchboard. As indicated, there is an additional 225 amp, 120/208 volt panel that is supplying power from the Huntley Gym.

Based upon a 12-month peak demand reading, the demand load is 108kW or 300 amps at 208 volts for the two switchboards.

The Tennis Courts have a 400 amp, 120/240 volt service switchboard and meter which is more than adequate for this facility.

The Maintenance Shop has a 400 amp, 120/240 volt, single phase, 3 wire service switchboard and meter.

Based upon a 12-month peak demand reading, the demand load is 41.2kw or 99.3 amps at 208 volts.

The Warehouse and Maintenance Paint Shop have a 200 amp, 120/240 volt, single phase service which is adequate for the facilities.

The Quadrangle Swing space is a new temporary facility with a 2000 amp, 120/208 volt service. Based upon a 12-month peak demand reading, the demand load is 366kW or 1017 amps.

Low Voltage Feed from the 4160 Volt System

Due to the fact that the 4160 volt system is metered at its source, there are no demand readings available at the individual buildings being served from the system. The various low voltage systems are as follows:

The Landis Auditorium has 1600 amp, 120/208 volt main switchboard. This switchboard services the Auditorium, as well as sub-feeding panels in the Music Hall.

The Admission and Computer Buildings are served from a 400 amp, 120/208 volt, 3 phase gutter assembly at Substation "BH". There are 400 amp and 200 amp panels located in these buildings.

The Technology "B" Building is served from Substation "BH" with a 400 amp, 120/208v, single phase feeder. There is a 400 amp, 120/208 volt, 3 phase panel located inside the building. There are also (2) additional panels "MA" & "MB" located in the basement storage area. There is a separate disconnect switch also in the basement that sub-feeds the portables for Physical Education, College Safety and Police with an overhead pole line.

The Technology "A" Building is served from a 1000 amp, 120/240 volt distribution switchboard located in the outdoor substation "SSTP" behind the building. This sub-feeds various panels located inside the building.

The Quadrangle Building is presently being served from an existing 1200 amp, 120/208 volt main switchboard, as well as a 600 amp, 480 volt switchboard feeding mechanical equipment.

The Martin Luther King Library Building has a 1600 amp, 277/480 volt switchboard section that is part of the 5kV substation. The 480 volt section serves a 750kVA transformer and 2500 amp, 120/208 volt, 3 phase secondary distribution switchboard.

The Life Science Building has an 800 amp, 480 volt switchboard feeding mechanical equipment and a 1600 amp, 120/208 volt switchboard for all other panels.

The Physical Science Building is sub-fed from both the 480 volt and 120/208 volt power supply in the Life Science Building.

The Student Center Building has a 600 amp, 480 volt service switchboard and an 800 amp 120/208 volt switchboard both fed from their perspective transformers.

The Music and Speech Building and the Music Hall are sub-fed from the Landis Auditorium main switchboard with small sub-panels at 120/208v, 3 phase.

The Business Education Building has an 800 amp, 120/208 volt service feeding the facility.

The Administrative Building is fed from the old blanked off 1200 amp, 120/240 volt service with associated panels.

The Automotive Center is fed from a 1600 amp, 120/240kV, 3 phase, 4 wire distribution switchboard located in the outdoor substation “SSAT” located in the parking lot. Their switchboard feeds various panels throughout the building.

7.4 ANALYSIS OF FUTURE NEEDS

An analysis of the current electrical distribution system of the Riverside Campus was conducted to evaluate the modifications required to support the future additions.

The current electrical distribution was also analyzed for electrical duct-banks/manholes that will be in conflict with the proposed facilities and will require relocation. A campus site plan identifying electrical duct-banks/manholes that require demolition/relocation and extension of feeders to new facilities to serve the planned facilities is provided in our proposed electrical site plan Figure 7b.

An evaluation of the existing electrical system currently serving the campus revealed that a new 12kV electrical infrastructure is required to provide the campus with a closed loop/primary selective arrangement to support existing and future planned facilities. In addition, an evaluation of the existing system revealed that the existing system provides limited redundancy because of its open loop configuration rather than being a closed loop system or a primary selective system. Since the campus will operate and maintain the 12kV switchgear and the electrical distribution system, the campus requires an electrical system that must provide

(a) Improved system reliability

(b) Ease of maintenance and isolation of circuits either during a fault or during a regular maintenance without interrupting power to every building on campus

(c) Be sized to accommodate existing loads and planned future loads resulting from new buildings addition as well as additions to existing buildings

(d) Be well coordinated to eliminate nuisance tripping of upstream protective devices (e) have all equipment listed for the short circuit availability at the point of installation.

An evaluation of the recent master plan revealed that a net additional 1,250,000 square feet of buildings is planned at the campus. A review of these proposed facilities and their usage revealed that the campus would add an additional installed capacity of 17,597 kVA to their existing installed capacity. Based on a demand factor of 40%, the campus will see an additional demand of only 7,039kVA. After subtracting the demand for the demolished buildings of 917KVA the total demand for the campus would be 10,654kVA. Note that the total square footage of the campus will increase by 113%.

A review of future installed capacity and current demand of the campus revealed that a new 1,200amp 15KV switchboard would be required to meet the demands of existing and future facilities. The campus currently has a peak demand of 3625kw PER Riverside Public Utilities. With an assumed power factor of 0.8 current peak demand at the campus is 4532kVA. See Table 7-3. That number is expected to grow to approximately 11,544KVA with the addition of new facilities and additions. This future estimate is projected based on the campus current ratio of installed capacity versus its current demand.

The following Table 7-1 depicts projected installed capacities and demand of proposed facilities shown in the master plan. The capacities are calculates based on standard industry watts/square foot in absence of a design for these facilities.

TABLE 7-1 INSTALLED CAPACITIES/DEMAND OF FUTURE FACILITIES

Bldg #	Building Name	Occupancy Type	Gross sqft	Load Factor W/sqft	Required Capacity in KVA	Demand in KVA @ 40% of Installed Capacity
P1	Student Services	Office	27,038	12.0	324	130
P2	Band Building	Academic	2,200	10.0	22	9
P3	Auto Technology	Academic	67,200	15.0	1,008	403
P4	Maintenance Offices	Office	6,560	12.0	79	31
P5	Maintenance Shipping	Industrial	9,840	10.0	98	39
P6	Applied Technology	Academic	22,289	12.0	267	107
P7	Cosmetology	Academic	38,974	15.0	585	234
P8	Parking Structure 1	Parking Structure	442,000	6.0	2,652	1,061
P9	Music/Landis Addition	Academic	11,586	12.0	139	56
P10	Administration	Office	27,038	12.0	324	130
	Total New Capacity Required		654,724		17,597	7,039
E	Total Existing Buildings	Mixed Use	1,270,394	12.0	15,245	6,098
E	Total Existing to Buildings to be Removed	Mixed Use	-191,120	12.0	-2,293	-917
E	Total Existing to Buildings to Remain	Mixed Use	1,079,274	12.0	12,951	5,181
	Total Campus Capacity		**1,733,998**		**30,548**	**12,219**

7.5 FINDINGS AND RECOMMENDATIONS

12kV System

The existing underground Riverside Public utility substructure is in very good condition and is well maintained. The existing pad mounted transformers and various switch enclosures are in good condition. The 12KV distribution system that circles the campus is a loop system and as such is very reliable. Riverside public utility has provided us with a Circuit Outage Chart which reflects the outages on each phase of the loop for the last ten years. It also reflects the cause of the outage and the duration of the outage. A review of this outage chart reveals that their record is highly commendable with no substantial outages.

The area of concern with the 12KV system is primarily with the older pole lines serving the Warehouse/Cosmetology area. The other concern is the Prospect Avenue Residential overhead pole line service that serves the North Hall, College House and Cutter Pool. However, this system also serves other more critical areas, such as the Stadium, Wheelock Gym, the Arts and Ceramic Buildings. These overhead pole line systems are at least fifty years old.

There are 16 separate RPU electrical bills that need to be paid each month, one for each of the meters at the campus. Most of these are FLAT charge or DEMAND charge, both of which have higher rates than the time of use charge (TOU). See Table 7-3

A meeting was held with the RPU's Engineering Department and the Senior Account Manager and they have been made aware of the future loads at the Riverside Campus. They may need to bring in a new circuit however there are not enough loads to warrant any up-grades to their facilities at this time.

4160 Volt System

The original system was installed in 1952 with (2) oil fused cutouts (OFC) and (2) transformer banks of single phase transformers. Since that time, it has been expanded, extended, spliced to serve various buildings on campus. The system has failures due to serious overloading and oil leaking out of the equipment. The Riverside Public Utility has changed out the existing 12KV / 4160 volts transformer serving this system a couple of years ago with a new 2500KVA transformer. The normal loading on a utility transformer is 35% to 40%. The present transformer has a demand load of 1792 kilowatts or 72%. The transformer can accommodate the load up to its maximum rating.

The original (2) transformers having a total rating of 300KVA have been replaced with (16) different transformers with a 5975 KVA capacity, (16) OFC's and (4) load interrupter switches (LIS) switches. There are numerous splices and pullboxes that have been added to accommodate the changes and additions.

There are OFC's at most transformer locations to provide primary overcurrent protection; however, there is no way to verify the fuse or trip setting of these devices, without pulling the OFC's apart. The existing OFC's are by various manufacturers and some cannot be repaired or reassembled once taken apart, thus posing a hazardous situation. In addition, the OFC's have an inherent low short circuit withstand capability.

The OFC's until recently were not serviced or maintained until one of the OFCs exploded and destroyed itself and the high voltage feeder. The remaining switch was serviced and refilled with oil. These switches need to be constantly monitored and serviced as they are over fifty-years old.

The 300KVA, 4160 volt transformer in Substation "BH" has a maximum secondary output of 800 amps. In 2006 the measured load was in excess of 1000 amps.

The solution at that time was to create a splice in the middle of the 5kV cable and bypass the transformer load and connect directly to Tech Building "A".

-Many of the buildings have OFC's and transformers in Electrical Rooms that are hazardous and do not meet legal code clearance and require work. The Life Science Building and the Student Center are both unsafe. The Landis Auditorium's 5kV vault has exposed live parts facing the 5kV LIS switches with inadequate code clearance.

The Landis Auditorium main switchboard has a 1600 amp, 120/208 volt rating with a 1600 amp main circuit breaker capacity, however, there are only three 75kVA transformers which would normally feed an 800 amp board not 1600 amp. There are periods where these transformers could be overloaded.

Many of the 5KV pullboxes have various types of tap boxes or splice boxes inside them. Some are inaccessible, some are leaking and others have no legal clearance at all. They exist behind transformers and other electrical equipment.

The Cosmetology Building has its own utility transformers and switchboard, however in 1999 the transformer and switchboard became severely overloaded. The situation was corrected by providing a separate 300 amp circuit from Huntley Gym Building at the bottom of the hill through a series of pullboxes and into the lower level of the building. In the event there is a problem with these new panels, you have to exit the building , go down the hill, get to Huntley Building, unlock the switchboard and disconnect the feeder.

In summation, the entire 4160 volt distribution system, which includes all of the core buildings; Landis, Quadrangle, the Martin Luther King Library, Life Science, Physical Science, Technology A and B, Music Hall, Music and Speech, Business Education, Administration and Automotive are all dependent on a single source which is comprised of a fifty-year old distribution system and equipment.

Recommendations

4160V Campus Distribution System

The 4160 volt system is over fifty-years old, many of the (16) transformers on this system have old oil fuse cutouts that have questionable fuse protection. The 5kV conductors are, for the most part, unprotected or if protected, do not have fuse coordination which could overload the conductors to the point of failure. The entire system is dependent on a single point of connection, fuse switch, conductor and transformer. Particular emphasis should be placed on the 55-year old switches which cannot be repaired in the near future.

A meeting was held with the RCCD Administrative Staff and the Maintenance Department and they preferred that the 4160 volt system be removed. See 12KV Distribution System Recommendations.

Since the existing distribution system is old, has oil fused cut outs that have low short circuit interrupting capacities and the distribution system lacks appropriate protection, we recommend that the 4160 volt system be removed.

12kV Distribution System / Recommendations

The 12KV underground distribution system is serviced and maintained by Riverside Public Utility and is in excellent condition and has just about unlimited capacity. Therefore, any future additions or remodeling should be added to the 12KV system.

1. To avoid the single point of service and to combine RPU electric meters to obtain a lower utility rate, it is recommended that a new campus owned primary 15kV metering section and switchgear be installed. The use of selector switches shall be provided to serve each building on campus through a loop system. This arrangement will facilitate isolation of buildings without shutting off the main system. There will be **two loops** in the electrical system. The loop on the perimeter of the campus will be a closed loop and is called the **lower loop**. The loop that is replacing the 4160 volt system on the upper part of campus is a primary selective loop and is called the **upper loop**.

Riverside Public Utilities (RPU) has stated that they will not allow RCCD to utilize their existing conduit, conductors, and manhole system that surrounds the campus on three sides. Therefore we recommend a new 12 KV loop system be installed with (2) loops to serve each building on the campus. We have written a letter to RPU asking that the RCCD riverside campus be allowed to share the existing RPU conduit system and under what conditions this might occur.

It is recommended that a new 12KV feeder be extended from the new lower loop into the CST switch at the corner of the Stadium Playing Field and Student Parking Lot. This would then enable the switching of the service from the residential overhead pole line on Prospect Avenue to be switched to the 12KV underground lower loop system.

It is also recommended that the 12KV overhead pole line at the back of the warehouse be phased out as soon as possible.

RPU usually picks up the cost for a new service however since this is a modification to the existing service RCCD will need to pay for the modifications. This is subject to the revenue test of Rule 11J. Rule 11J states that the applicant shall pay any cost in excess of two times the estimated increase in annual revenue.

2. Existing fuse size and type shall be determined. Based upon this information, a fused coordination study shall be done and a fuse replacement program be implemented.

3. Testing of the existing 50-year old grounding system should be conducted and a Short Circuit/Arc Flash study be conducted to coordinate the existing system.

Sample Arc Flash Warning

4. We recommend the use of aluminum cables rather than copper cables. Aluminum cables shall be used for all medium voltage cables and low voltage cables larger than 4/0 in an effort to save money.

5. We recommend the use of a wireless multi-metering system. The system should have an energy software package for energy analysis, 3 phase wireless meter transceivers for wireless metering and be capable of metering at 480 volts as well as 208 volts.

6. That the system shall be regularly maintained with yearly inspection
. of all OFC and splice boxes.

7. Check, tighten and torque all conductor connections.

8. One switchboard has three separate keys; one for each compartment. It is highly recommended that all the electrical equipment padlocks be changed to single key. There are approximately 60 different keys. It took a half an hour and three trips to the shop to open one lock.

Proposed Feeder Loops

The following Table 7-2 provides facilities along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that the existing substations/feeders can support the power demand of these facilities. Names of substations and feeder designations that will be used to serve these proposed facilities are provided in table below. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and also complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as provide a means of isolating building substations. These switches will be served from the nearest existing manhole located close to the proposed facility as shown in our proposed site plan. The UPPER loop will be completed by using 4" electrical duct banks with 15kV 3#350kcmil Aluminum EPR MV105 cables and the LOWER loop will be completed using 4" electrical duct banks with 3#500kcmil Aluminum EPR MV105 cables. Radial feeders originating from these selector switches will serve substations in each of the facilities.

TABLE 7-2 INSTALLED CAPACITIES BY SUBSTATION/ FEEDERS

FEEDER	BUILDING	INSTALLED CAPACITY IN KVA	DEMAND IN KVA
Lower Campus	Huntley Gym	266kVA	106.6.0kVA
	Cutter Pool	92kVA	36.9.0kVA
	Pilates Studio	52kVA	20.70kVA
	Athletic and P.E.	1kVA	0.6kVA
	Aquatics Complex	64kVA	25.6.0kVA
	Band Building	22kVA	8.8kVA
	Auto Technology	1008kVA	403.2kVA
	Maintenance Offices	79kVA	31.5kVA
	Maintenance Shipping	98kVA	39.4kVA
	Applied Technology	267kVA	107.0kVA
	Cosmetology	585kVA	233.8kVA
	Parking Structure 1	2652kVA	1060.8kVA
	College House	10kVA	4.0kVA
	North Hall/Apartments	54kV	21.6kVA
	Stadium	200kVA	200.0kVA
	Wheelock Gym	331kVA	132.4kVA
	Early Childhood Studies	164kVA	65.6kVA
	Digital Library "A" and "B"	1731kVA	692.4kVA
	Parking Structure Unit P/Tennis Courts Unit T	2252kVA	900.8kVA
	Field bathrooms (West)	1kVA	0.4kVA
	Field bathrooms (South)	1kVA	0.4kVA
	Field Equipment Shed	1kVA	0.4kVA
	Arroyo Baseball Field	200kVA	80.0kVA
	Administration	325kVA	130.0kVA
	Student Services	325kVA	130.0kVA
	Nursing & Science 1	789kVA	315.6kVA
	Nursing & Science 2	789kVA	315.6kVA
Total		**1,470kVA**	**5,918kVA**
		712Amps	**285Amps**

FEEDER	BUILDING	INSTALLED CAPACITY IN KVA	DEMAND IN KVA
Upper Campus	Quadrangle	957kVA	390.0kVA
	Technology A	202kVA	80.8kVA
	Landis Auditorium	420kVA	168.0kVA
	Life Sciences	343kVA	137.2kVA
	MLK High Tech Center	344kVA	137.63kVA
	Physical Sciences	369kVA	147.6kVA
	Planetarium	21kVA	8.4kVA
	Student Center	466kVA	186.4kVA
	Campus Police/ Safety	11kVA	4.4kVA
	Greenhouse	1kVA	0.4kVA
	Assessment Center	29kVA	11.6kVA
	Music Hall	71kVA	28.4kVA
	Outreach Center	17kVA	6.8kVA
	Vending Machine Structure	2kVA	2.0kVA
	Financial Services/Counseling/Outreach	3kVA	1.2kVA
	Student Government Supply Room	3kVA	1.2kVA
	Music/Landis Addition	139kVA	55.6kVA
	Administration	324kVA	129.6kVA
Total		**3,722kVA**	**1,497kVA**
		179Amps	**72Amps**

Grand Total		**1,852kVA**	7,415kVA
12kVA Load		**891Amps**	**357Amps**

The following Table 7-3 depicts all the existing RPU meters currently on the campus and there locations. All but 1 of these meters will be removed when the 12kV primary meter is installed. The meter at the Alumni House across Ramona Avenue will still be active.

TABLE 7-3 ELECTRIC METER LOCATIONS

Address	Location	Meter #	Switchboard Rating	Voltage	Peak KW Demand	Amps
4565 Saunders	Facilities Vehicle Shop-West Wall	98369	400A	120/240, 3Ø	46	110
4678 Saunders	East Wall Old Warehouse	102827	200A	120/240, 1Ø	12.8	53.4
*4678 Saunders, Suite A	Swing Space	108754	1200A	120/208, 3Ø 277/480V, 3Ø	366	440
4654 Saunders	South Wall Huntley Gym Boiler Rm	106088	800A	120/208, 3Ø	71	197
3500 Prospect	Cutter Pool Room 15	38695	400A	120/240, 3Ø	57.6	139
3615 Terracina	Weight Room 119	101350	1200A	120/208, 3Ø	216	600
3616 Terracina	Exterior Lighting Switchboard	109583	2000A	277/480, 3Ø	168	201
3617 Saunders	North Hall under stairwells East End	72378	200A	120/240, 1Ø	N/A	-
3600 Prospect	College House East Wall	214853	200A	120/240, 1Ø	N/A	-
4800 Magnolia	ECS Mechanical Room next to Transformers	28615	200A	120/208, 3Ø	49.2	137
4726 Riverside Avenue	Main Meter (T.O.U) down in basement	100300	600A	4160V	1792	238
3564 Ramona Avenue	Back Yard	215151	200A	120/240, 1Ø	0	-
*4699 Olivewood	Cosmo/Mechanical Room A/C Equipment	103491	400A/200A	120/240, 1Ø 240v, 3Ø	108	260
4800 Magnolia, Suite A	DLLRC	106217	3000A	277/480V, 3Ø	690	830
4800 Magnolia, Suite B	Parking Structure	109485	800A	277/480V, 3Ø	49.2	60

N/A – Not applicable.

Total Peak Demand= 3625KW / .8 = 4532KVA

Electrical Power Cost Breakdown

The Riverside Public Utility company has increased their customer charge and added a reliability charge to their rate structure since 2007 and will increase their reliability charge in 2010.

The rates listed below are for commercial users and for the year 2010:

(a) For Flat rate Tier 1 the cost is 13.51 cents per kilowatt hour and for Tier 2 the cost is 20.64 cents per Kilowatt hour. Note that the Reliability charge went up $30 from $30 to $60.

(b) For Demand rate Tier 1 the cost is 11.11 cents per kilowatt hour and for Tier 2 the cost is 12.17 cents per Kilowatt hour. Note that the Reliability charge went up $45 from $45 to $90.

(c) For the TOU-E301 12kV bulk power purchase the rate is:
On-Peak 10.33 cents per kilowatt hour.
On-Peak 8.28 cents per kilowatt hour.
On-Peak 7.27 cents per kilowatt hour.
Note that the Reliability charge went up $550 from $550 to $1,100.

7.6 SITE LIGHTING SYSTEM DESCRIPTION

Objective

The purpose of this study is to evaluate the existing exterior lighting system at Riverside City Campus of the Riverside Community College and provide recommendations to create a visually comfortable, safe, and aesthetically pleasing exterior environment. Our study references Illuminating Engineering Society Handbook (ninth edition) and IES RP-33 recommended practice as the reference documents in evaluating the exterior lighting system.

Summary of Scope

The following aspects of the exterior lighting system are addressed in this study:

- Type and photometric distribution (Photometric distribution provides luminous intensity of luminaries in specified planes and angles) of existing exterior light fixtures.
- Evaluation of fixture types with respect to energy usage, light output, quality of light, brightness, and maintenance.
- Type of lamps, their color temperatures, and their wattages.
- Existing lighting levels.
- Glare.
- Safety and Comfort.
- Standardization of equipment. (Light fixtures and Lamp source).

Conclusion

A variety of exterior light fixtures equipped with a wide range of lamp sources currently illuminate the walkways, roadways, parking lots and building exteriors of Riverside Community College. It is apparent that the exterior light fixtures have been added in various phases of campus development without an adequate effort to standardize around a central equipment type or a lamp source.

Although a few areas meet or exceed the light levels currently recommended by the Illuminating Engineering Society (IES), the majority of the campus light levels fall below these recommended levels. Some of the contributing factors for the inconsistent exterior lighting throughout the Riverside campus are:

- Incorrect spacing and mounting heights of light fixtures
- Use of a wide range of light sources (high pressure sodium, metal halide, and fluorescent) with different color temperatures and different wattages
- Wrong application of fixtures (photometric distributions and light sources)
- Inadequate light fixtures
- Burned out lamps

Standardization of equipment coupled with its correct application and correct photometric distribution is recommended to improve the existing exterior lighting at the campus. Standardization of equipment would not only result in lower maintenance and inventory costs, but also would also reduce energy costs of the campus.

To accomplish the above, we recommend the following steps:

- A single lamp source is selected for illuminating roadways, parking lots, and pathways leading to the campus buildings. Since a high-pressure sodium lamp has a lower color temperature and provides a warm color, we recommend that this lamp be standardized for campus exterior lighting.
- All roadways and parking lots in the campus are illuminated with shoe box type fixtures equipped with full cutoff optics. We recommend replacement/addition of light fixtures as required in these parking lots to achieve IES recommended light levels. A detailed recommendation for each parking lot is provided in our recommendation section.
- All existing post top fixtures, Globe fixtures and other decorative fixtures in the campus be replaced with a common cut off decorative fixture (A cutoff luminaire is defined by I.E.S as a luminaire that produces a luminous intensity of 10% or less at a vertical angle of 80 degrees above nadir) that will provide a visually comfortable environment and aesthetically blend with the architectural buildings in the campus. The cut off fixtures would also prevent glare. These new fixtures will be spaced to meet the current IES recommended light levels for pathways.
- Bollard lights should be avoided as much as possible to illuminate pathways within the campus due to their narrow distribution and inability to illuminate wider pathways effectively. The bollards are also particularly vulnerable to vandalism because of their lower mounting heights,
- Metal Halide lamps are recommended to highlight the architecture of buildings due to their high color rendering index and high color temperature
- Illumination levels of all pathways, roadways and parking lots in the campus shall be designed to meet the current recommended light levels by IES (an average of at least 0.5fc with a uniformity ratio of 4:1. Uniformity ratios are a measure of luminance differences between surfaces or areas and are expressed as ratio of maximum or average illumination to minimum illumination for a given area. Higher uniformity ratios with in the field of view can reduce the ability to see a task, create a safety hazard and cause annoyance). This will not only provide a visually comfortable environment, but also a safe environment, since people often associate higher or greater luminance with safer surroundings.

The campus exterior lighting at Riverside Community College presently consists of a wide variety of exterior light fixtures equipped with a broad range of lamp sources that currently illuminate the pathways, parking lots and roadways of the campus.

The majority of the exterior light fixtures currently lighting the parking lots are shoe box fixtures and have sharp cut off characteristics. Almost all of these fixtures are equipped with high pressure sodium vapor lamps. The walkways are illuminated with a combination of Globe fixtures or post top fixtures and in some cases shoe box fixtures. These fixtures are equipped with a wide variety of lamps ranging from metal halide to compact fluorescent lamps.

The lighting levels around the campus vary extensively from almost 0.0 footcandle in some parking areas to as high as 26 fc in the new parking structure with uniformity ratios (average foot-candles to minimum foot-candles in excess of 10:1 in certain areas). The footcandle readings were recorded using a digital light meter (model EA30 manufactured by Extech instruments) during the month of October 2009.

The following description provides type of fixture, existing footcandle levels and type of lamps being used in each area of the campus. See attached campus photometric plan.

Pathways

Pedestrian walkways throughout the campus are illuminated with Globe light fixtures that offer no cutoff. The Globes are mounted on 10' high concrete poles. The fixtures are equipped with 70 watt metal halide lamps or have been replaced with 42 watt compact fluorescent lamps. Due to a visible reflector and the lamp source, these fixtures are not well shielded and contribute to glare. Also in the absence of a refractor, the fixtures do not illuminate the parking lots and pathways effectively. The walkway light levels ranging from .02 foot-candles to 1 fc in certain areas.

The light output directly beneath a globe fixture that has a compact fluorescent lamp does not even measure one footcandle.

The uniformity ratios (which are a measure of the (maximum or average footcandle/minimum footcandle) are extremely high and are far above the normally recommended (4:1) uniformity ratios by the Illuminating Engineering Society (IES) thus creating a high contrast environment.

Pathways adjacent to the Modular buildings at the Lovekin Complex or swing space are illuminated with Sports light type fixtures. These lights were for the old soccer field and have been turned off to save energy. The modular building "porch lights" are the only means of lighting for the entire area. The wall mounted light fixtures (porch lights) are equipped with compact fluorescent lamps. The light level readings vary from 0.1 fc to 1.2 fc. And the pathways along Sanders Ave. are dark due to the trees obstructing the globe fixtures.

The roadway light fixtures do contribute to the pathway lighting but the illumination levels do not meet the IES recommended levels.

Parking lots

Parking Lot A is illuminated with Globe light fixtures that offer no cutoff. The Globes are mounted on 10' high concrete poles. The fixtures are equipped with high pressure sodium vapor lamps or compact fluorescent lamps. The parking lot has footcandle readings ranging from 0.76 foot-candles under the fixture to 0.04 foot-candles in certain areas of the parking lot. The uniformity ratios (which are a measure of the (maximum or average footcandle/minimum footcandle) are high and are far above the normally recommended (4:1) uniformity ratios by the Illuminating Engineering Society (IES) thus creating a high contrast environment. Due to the fixtures being not uniformly spaced, majority of the parking areas are relatively dark and render the parking lot unsafe during evening hours.

Student Parking Lots B & C is illuminated with modern shoebox light fixtures mounted on 25' high poles. The fixtures are equipped with high pressure sodium vapor lamps. The parking lot has footcandle readings ranging from 0.2 foot-candles between the fixtures 16 foot-candles under the fixture. These parking lots have higher footcandle readings than other parking lots but still lack a sufficient number of poles to do the job. The uniformity ratios (average footcandle / minimum footcandle) here again are extremely high and are far above the normally recommended (4:1) uniformity ratios by the Illuminating Engineering Society (IES).

Parking Lot D is illuminated with an older model shoebox light fixture mounted on 25' high poles. The fixtures are equipped with high pressure sodium vapor lamps. The parking lot has footcandle readings ranging from 0.8 foot-candles between the fixtures 3 foot-candles under the fixture.

Main Parking Lot E located on the south side of campus is illuminated with cobra head type fixtures equipped with high pressure sodium lamps and lens. The lamps are old and barely glow at night. The footcandle readings vary from 1.5 fc under the fixture to .05 foot-candles farther away from the fixture. The light levels do not meet the recommended IES levels, and fall below the current recommended levels of 0.5fc average.

Parking Lots F & G are illuminated with multiple flood lights mounted on 30' high poles. The fixtures are equipped with high pressure sodium vapor lamps. The parking lot has footcandle readings ranging from 0.1 foot-candles between the fixtures 6 foot-candles under the fixture. The uniformity ratios (average footcandle / minimum footcandle) here again are extremely high and are far above the normally recommended (4:1) uniformity ratios by the Illuminating Engineering Society (IES).

Cosmetology Parking Lot H is illuminated with pole mounted light fixtures and wall packs.

The parking lot has light levels ranging from 0.10 fc to 4.5fc. The uniformity ratios (average footcandle/minimum footcandle) here again are extremely high and are far above the normally recommended (4:1) uniformity ratios by the Illuminating Engineering Society (IES).

Parking Lot J near the Old Campus Police Station is not properly illuminated. Several modular buildings have been removed, and there has not been any lights added to compensate for the new available space. The only visible light is provided from a flood light attached to the adjacent Technology Building-B. The north end of the lot has light levels ranging from 0.8 fc to 5.7 fc.

Parking Lot K is illuminated with a shoebox light fixture mounted on 20' high poles. The fixtures are equipped with high pressure sodium lamp. The parking lot has minimum footcandle readings ranging from 0.5 fc to 6 fc directly under a double headed fixture.

Parking Lot L has been demolished. The remaining driveway at the north side of campus is not well illuminated. The driveway has light levels ranging from 0.06fc to 0.2fc. The handicap parking lot on the west side of the pool house is not well illuminated do to the many obstructions in front of the pole mounted fixtures.

Parking Lots N & U located east of Olivewood seemed to have a sufficient amount of poles with multiple shoeboxes on each pole. However the majorities of the fixtures have been turned off due to time clock issues or were burn out at the time of the survey.

Parking Lots P & Q are illuminated with a smaller shoebox light fixture mounted on 15' high poles. The fixtures are equipped with only 70 watt or 100 watt metal halide lamps. The parking lot has minimum footcandle readings ranging from 0.06 fc to 1.7 fc directly under a double headed fixture and .65 foot-candles directly under a fixture with a single head.

Racquetball Parking Lot Y is illuminated with shoebox light fixtures mounted on 25 foot poles. The fixtures are equipped with high pressure sodium lamps.

The parking lot has light levels ranging from 0.2 foot-candles to 3.1 foot-candles.

Staff Parking lot Z is adequately illuminated due to the wall packs and flood lights that have been added to the exterior of the Wheelock Gym in addition to the existing pole mounted fixtures. The parking lot has light levels ranging from 0.5 fc to 3.5 fc.

Parking Structure is illuminated with fluorescent strip light fixtures and has ample illumination. The parking structure has footcandle readings ranging from 4 foot-candles between fixtures and 26 foot-candles under the fixtures.

Tennis Courts north of the Huntley Gym have flood lights that stay on into the night. There are reports that they are still on past 2:00am in the morning.

7.7 SITE LIGHTING RECOMMENDATIONS

The Riverside Community College campus is currently illuminated with a wide variety of exterior light fixtures equipped with a broad range of lamp sources.

Standardization of equipment coupled with its correct application and photometric distribution is recommended to improve the existing exterior lighting at the campus.

The following key exterior lighting design issues form part of a well designed exterior lighting system.

- Appearance of Space and Luminaires
- Direct Glare
- luminance (vertical)
- Light distribution on surfaces
- Light Pollution/Trespass
- Modeling of faces or objects.
- Point(s) of interest
- Reflected glare
- Source/task/eye geometry

The above issues have been kept in mind while providing our recommendations. In order to achieve our objective and have a well designed exterior lighting system in the campus, we prioritize our recommendations as follows:

1. All existing post top fixtures, Globe fixtures and other decorative fixtures in the campus are replaced with a common cut off decorative fixture that will provide a visually comfortable environment and aesthetically blend with the architectural buildings in the campus. The cut off fixtures would also prevent glare. These new fixtures will be spaced to meet the current IES recommended light levels for pathways.

2. A single lamp source is selected for illuminating roadways, parking lots, and pathways leading to the campus buildings. Since a high-pressure sodium lamp has a lower color temperature and provides a warm color, we recommend that this lamp be standardized for campus exterior lighting.

3. Illumination levels of all roadways and parking lots in the campus are designed to meet the current recommended light levels by IES (an average of at least 0.5fc with a uniformity ratio of 4:1). This would include addition/ deletion of light fixtures (based on foot-candle readings) to achieve the IES comfortable environment, but also a safe environment, since people always associate higher or greater luminance with safer surroundings.

4. Provide a lighting control panel and photocells to control all light fixtures at the same time. If a control panel is not a viable solution then replace the existing time clocks with astronomical time clocks.

5. The tennis courts north of the Huntley Gym need to be controlled by an astronomical time clock and photocell.

6. Metal Halide lamps are used to highlight the architecture of buildings owing to their high color rendering index and high color temperature.

7. Replace all burned out lamps and ballasts.

8. Trim the trees and obstructions.

LEGEND:

(1)	EXISTING BUILDING
— E —	EXISTING ELEC. LINE
SS#	SELECTOR SWITCH
EMH	ELECTRICAL MANHOLE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

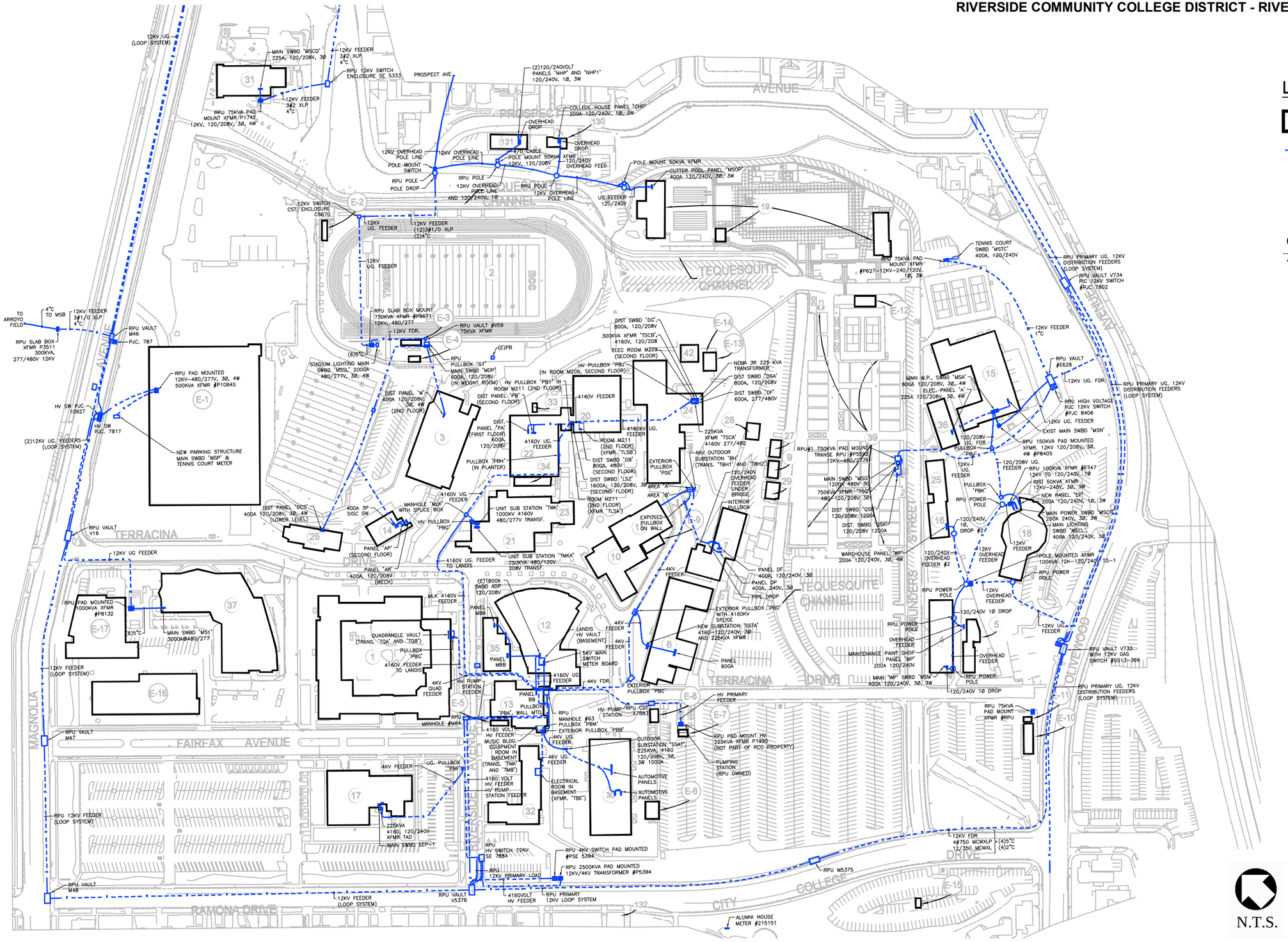
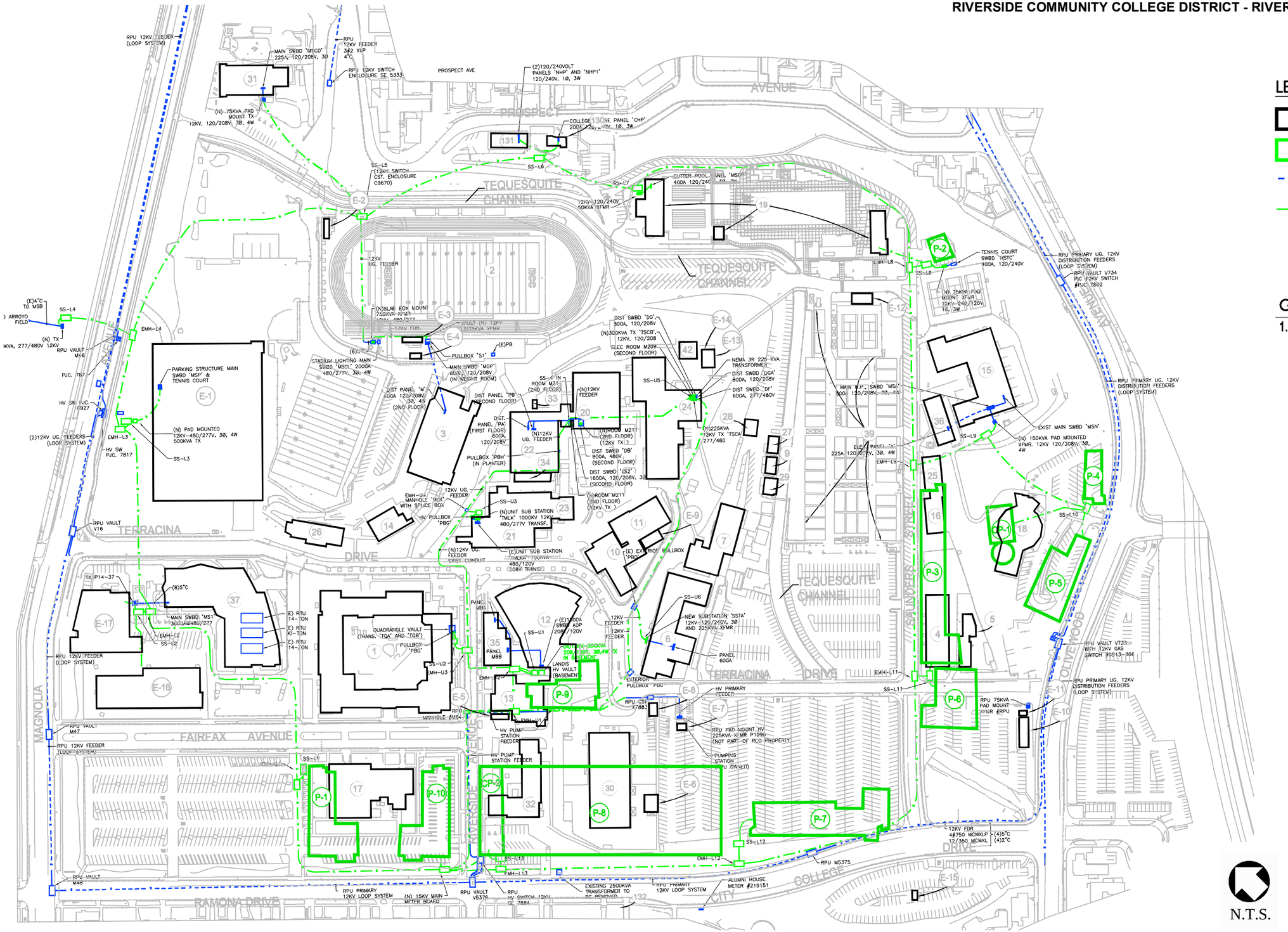


FIGURE 7a
EXISTING UTILITY MAP - ELECTRICAL



N.T.S.

LEGEND:

(1)	EXISTING BUILDING
(P-1)	PROPOSED BUILDING
– – E – –	EXISTING ELEC. LINE
—— E ——	PROPOSED ELEC. LINE
SS#	SELECTOR SWITCH
EMH	ELECTRICAL MANHOLE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

FIGURE 7b
FUTURE CONDITIONS UTILITY MAP - ELECTRICAL
12kV SYSTEM

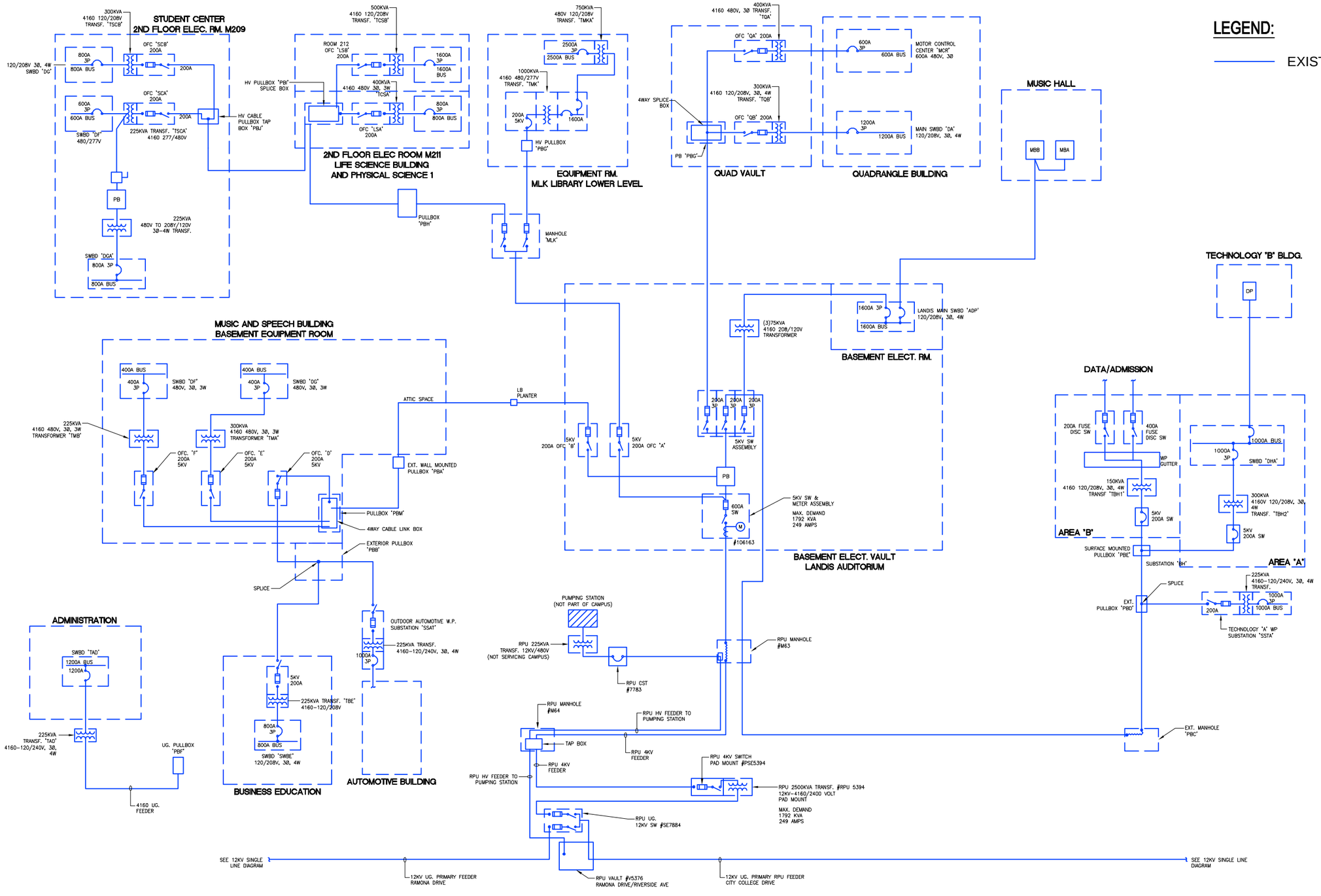


FIGURE 7c
EXISTING ELECTRICAL SYSTEM - 4160V SINGLE LINE DIAGRAM

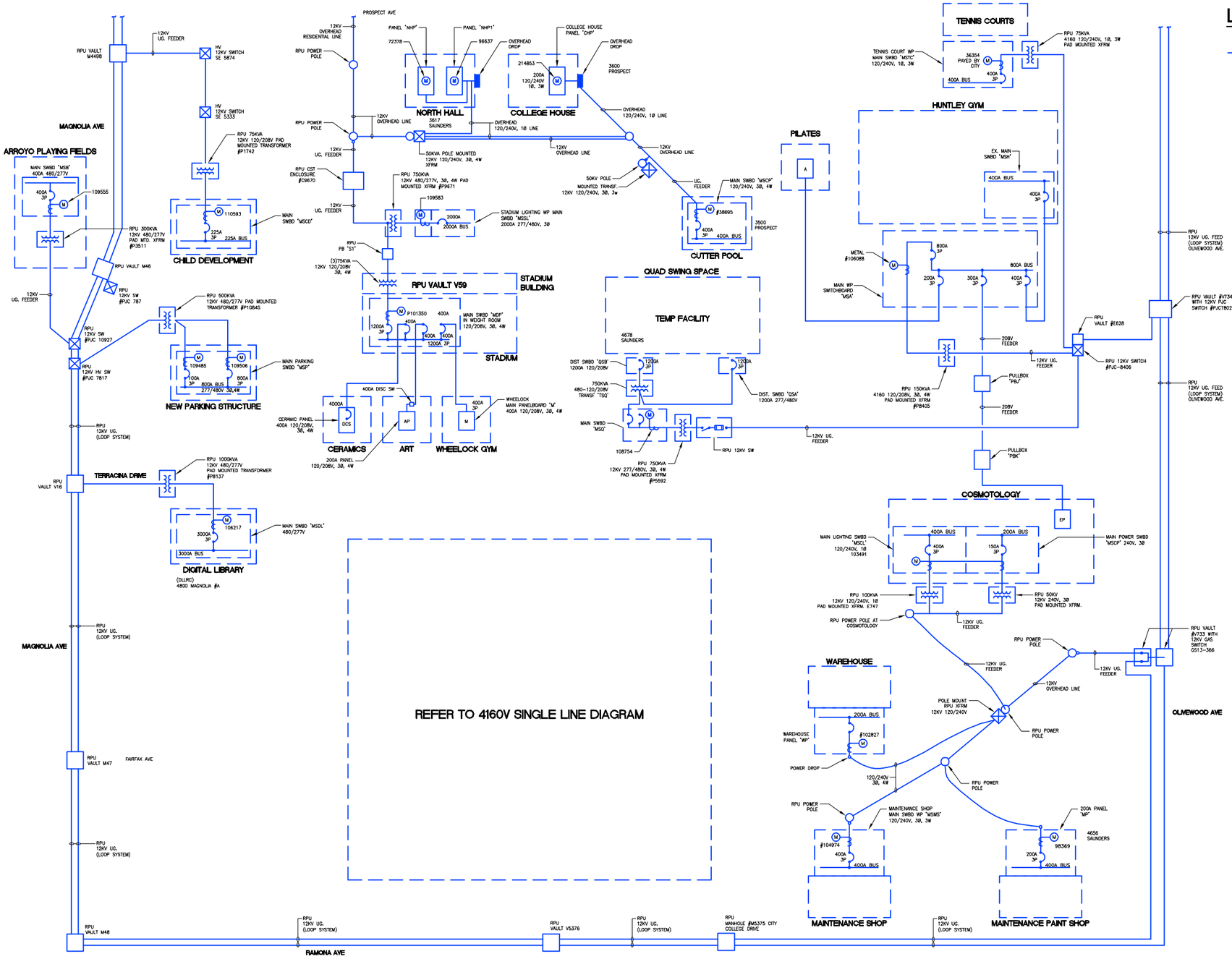


FIGURE 7d
EXISTING ELECTRICAL SYSTEM - 12KV SINGLE LINE DIAGRAM

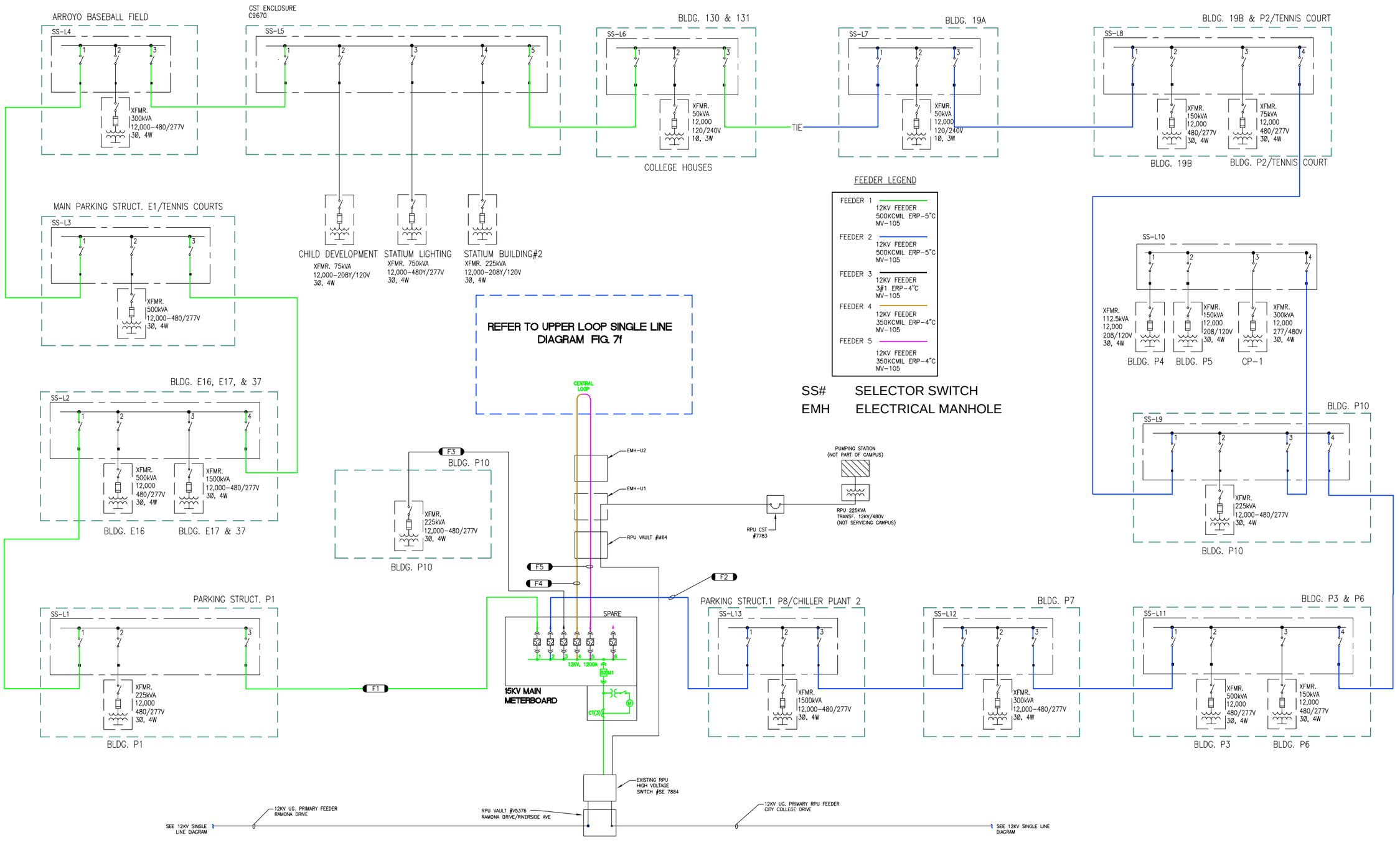


FIGURE 7e
PROPOSED ELECTRICAL SYSTEM - 12 KV LOWER LOOP SINGLE LINE DIAGRAM

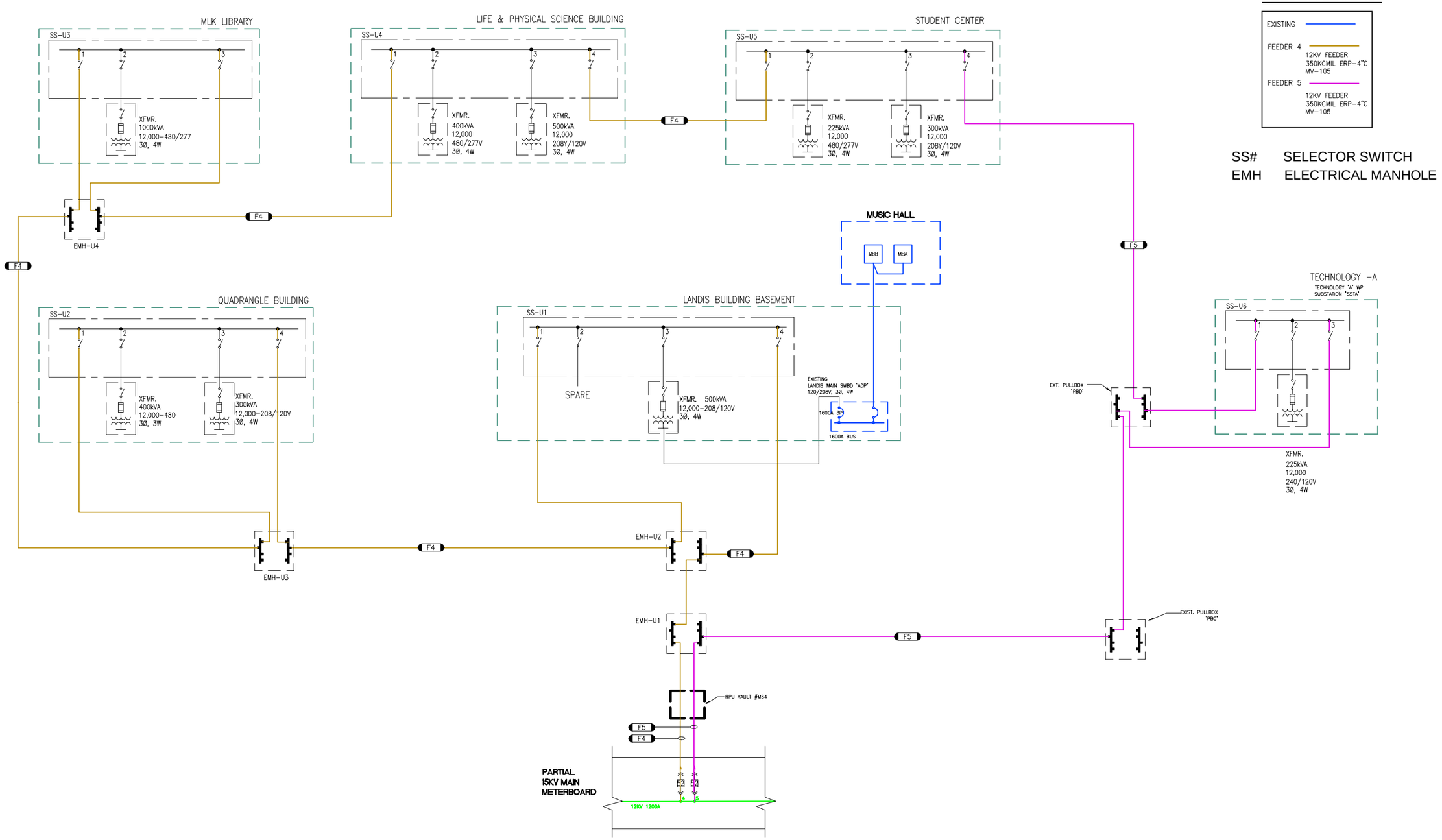


FIGURE 7f
PROPOSED ELECTRICAL SYSTEM -12KV UPPER LOOP SINGLE LINE DIAGRAM

SECTION 8 – TELECOMMUNICATIONS

8.1 SYSTEM DESCRIPTION

The local telecommunication services are currently provided by AT&T Corporation, who is the Local Exchange Carrier (LEC) for the voice network and data. The (LEC) provides a 400 pair copper cable terminated in the MPOE in Administration Building #1. The Riverside City Community College voice network consists of a NEC 2400 PBX Voice Switch located in a free standing brick building known as the MDF. This building is was expanded in the second quarter of 2007. The campus is deploying VOIP through the NEC 2400 PBX.

The main distribution facility (MDF) is located on the Westside of the MLK Building. The fiber optic services are provided by AT&T and consist of 24 strands of single mode cable with 4 strands terminated at the DMS 2000 and 20 strands dead. The fiber optic cable is terminated in the MDF building.

Although the campus will not see major growth in terms of additional classroom and office space many of the existing buildings will be replaced as part of the campus master plan.

To meet the changing needs of the campus, the existing campus Telecommunication Infrastructure System has been evaluated and will require major upgrading as necessary to accommodate the plan expansion.

We consider alternatives for improvements, make cost-effective and specific recommendations as necessary, to alter/upgrade/modify the existing telecommunication infrastructure to support new buildings, major renovations and building retrofits that form part of the proposed campus Facilities Master Plan.

8.2 METHODOLOGY

The following methodology was adopted in formulating our utility infrastructure master plan. The following methodology was adopted in formulating our utility infrastructure master plan.

A critical aspect in the evaluation of the existing telecommunications systems serving a facility is a detailed and accurate field investigation of the current systems. A detailed survey of the existing telecommunications system that currently serve the facilities at the Riverside City College campus and existing conditions, together with potential problems, are being identified. The surveyed information has been verified through available record drawings, field investigations and meetings with the campus facilities staff.

Alterations/upgrade/modifications necessary to support new buildings, major renovations and building retrofits that will form part of the proposed campus facilities were identified.

8.3 ANALYSIS OF EXISTING SYSTEMS

The existing MDF that serves the campus at the time of the survey was in poor condition with limited space. The addition of the 200 square feet helped resolve some of the limited space issue. However, this space will not meet the long term needs of the campus. It will require major upgrading and expansion to meet the needs of the new proposed buildings and the modernization of any existing buildings.

The campus Networking Operating Center (NOC) is located in Data Processing Building #11. This building will be replaced as part of any master plan and it will require the relocation of the Network Operating Center (NOC). At the time of the survey the plan is to relocate the NOC to the first floor of the Life Science building.

The existing inter-building telecommunication pathways are found to be inadequate for most of the existing buildings located around the main part of the campus.

The existing inter-building telecommunication pathways are found to be inadequate for the existing buildings at the north and east end of the campus.

The existing building BDFs are inadequate and lack proper grounding, lighting, HVAC and Security Access.

In some buildings, the telecommunications equipment, cables and pathways are co-located with high voltage.

The existing fiber optic cable backbone consists of traditional multi-mode 62.5mm and single-mode fiber optic cables.

8.4 ANALYSIS OF FUTURE NEEDS

Replace existing conduit system with a new telecommunication conduit system including manholes/pull boxes. This should be part of the electrical infrastructure upgrade that is required for campus distribution. This new infrastructure could be designed as one project and constructed in phases as the funding became available.

The best design for a campus network would be to link each building directly to the NOC/MDF this is called a Hierarchical Star inter-building backbone. However for larger inter-building networks more Hierarchical levels are recommended. This allows for a small number of buildings to be connected to other buildings rather than linking the building directly to the NOC/MDF.

Provide for new pathways to all (BDF's) for all buildings on campus.

8.5 FINDINGS AND RECOMMENDATIONS

1. Adopt Telecommunication Infrastructure Design Standards.

   The Telecommunication Infrastructure Design Standards document is intended to provide the Architect, Electrical Engineer, HVAC Consultant, Civil Consultant and Telecommunication Consultant with the basic requirements and standards for network cabling infrastructure in a new or remodeled facility at the City College campus site.

   Telecommunication Infrastructure Design Standards are designed using standards and materials that will provide the greatest longevity and function for current and future application areas. Standardization of components, installation methods and labeling will ensure that all cabling installation projects have a consistent functionality, and operational appearance.

2. Provide new conduits systems to include Manhole, Pull Boxes, Hand-holes and building penetrations. This should be included in the first phase of constructions.

3. Provide new fiber optic cables from the new (MDF/NOC) to each building on campus. Recommend minimum fiber optic cables to be 24 strands single mode.

4. Provide for new copper cable for all buildings on the campus. Copper cable to be sized .5 pair for each voice outlet.

5. For the Sports Complex and other buildings that are away from the main campus, provide for a de-centralized network for the voice and data networks. This would require space that meets the EIA/TIA telecommunications design standards.

LEGEND:

- (1) EXISTING BUILDING
- EXISTING TELECOM LINE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

N.T.S.

FIGURE 8a
EXISTING UTILITY MAP - TELECOMMUNICATIONS PLAN

LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING
- EXISTING TELECOM LINE
- PROPOSED TELECOM LINE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

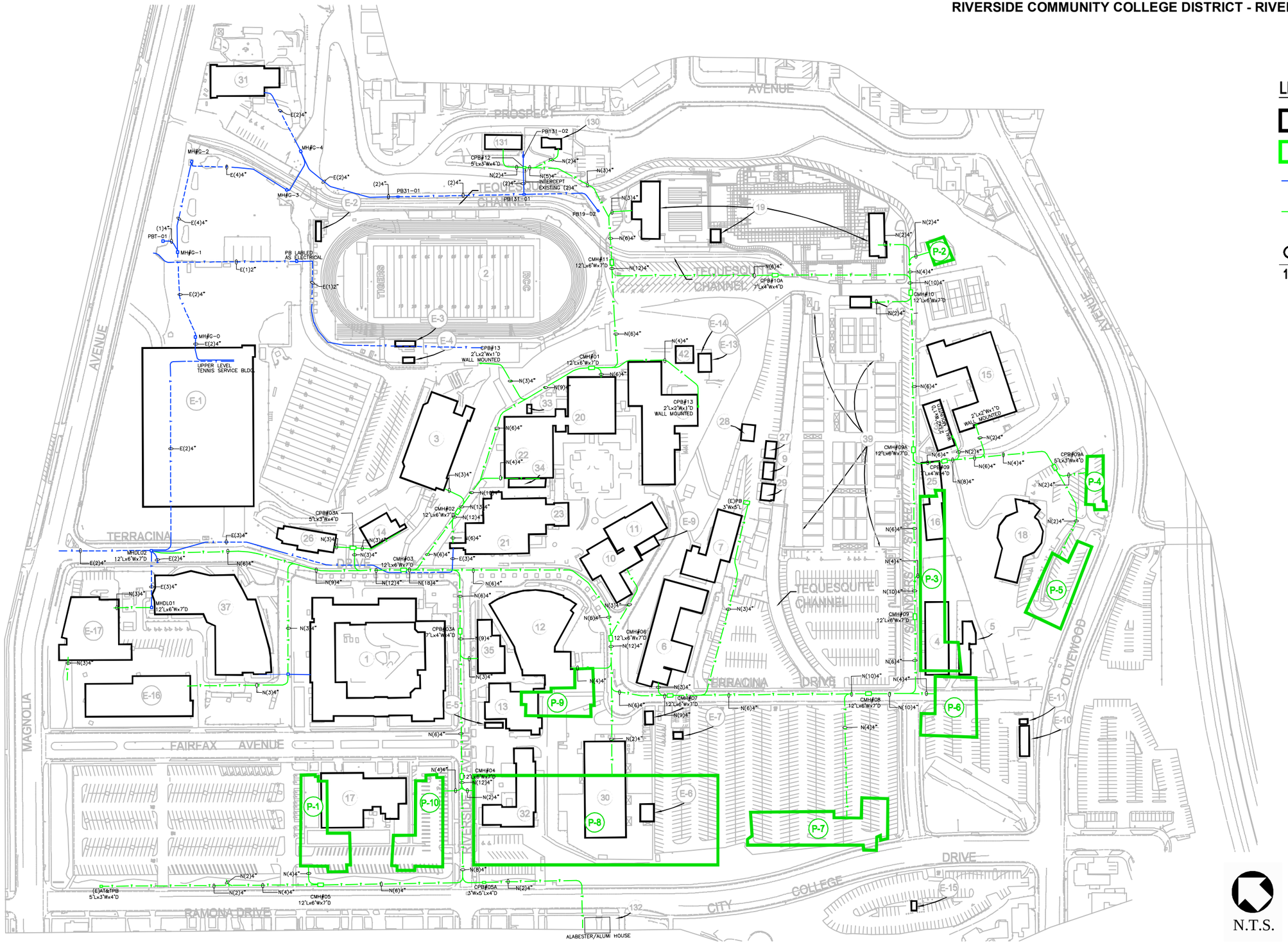


FIGURE 8b
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS CONDUIT PLAN

LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING
- PROPOSED TELECOM LINE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

N.T.S.

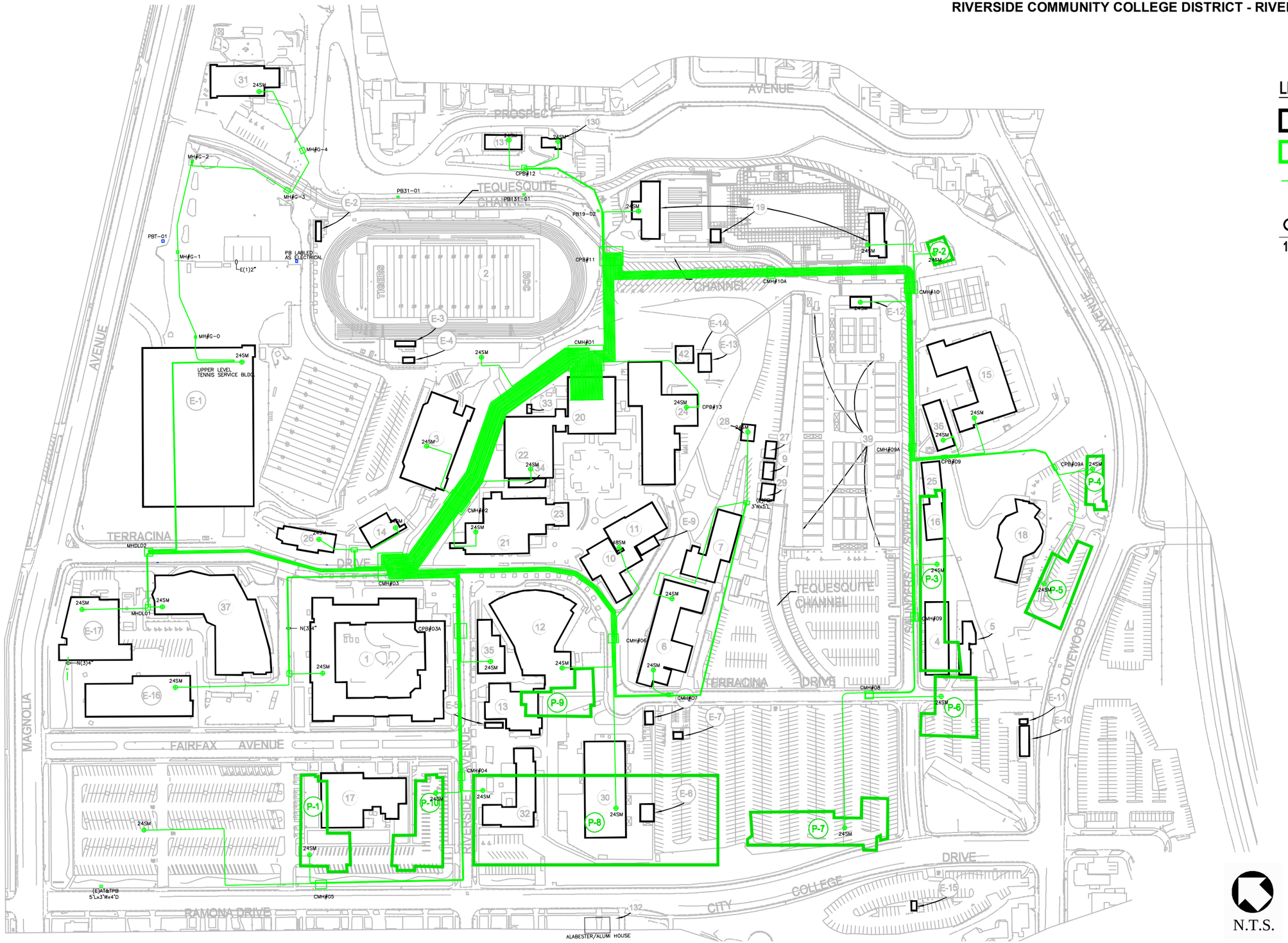
FIGURE 8c
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS COPPER PLAN

LEGEND:

- (1) EXISTING BUILDING
- (P-1) PROPOSED BUILDING
- PROPOSED TELECOM LINE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.



N.T.S.

FIGURE 8d
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS FIBER PLAN

SECTION 9 – CENTRAL PLANT

9.1 EXISTING PLANT DESCRIPTION

There are no central plants on the campus. There are a few instances where a few buildings share a common plant, but this is limited. Most of the buildings on campus have individual heating and cooling systems.

There are some buildings that have water-cooled chillers and heating water boiler systems. However, most of the buildings have DX cooling and either gas heat or electric heat. The smaller buildings tend to have the less expensive heating and cooling systems.

See Table 9a for a summary of existing building heating and cooling loads and system types.

9.2 METHODOLOGY

The objective of this report is to evaluate the existing heating and cooling systems that current serve the campus and provide recommendations to improve, modify or upgrade those systems to support planned new buildings, major renovations, and building retrofits that form the proposed campus Facilities Master Plan.

An important aspect in this evaluation was a detailed and accurate field investigation of the current systems.

A detailed survey of the existing mechanical systems that currently serve the facilities at the Riverside College campus and existing conditions was undertaken and existing layout, capacity and potential problems were identified. The surveyed information was verified through available record drawings, field investigations and meetings with the campus facilities staff.

9.3 ANALYSIS OF EXISTING SYSTEMS

As discussed earlier, there are no existing central plants. Those individual plants that do exist are in reasonable condition and may have several years of service life left. As these systems begin to age and have increasing maintenance issues and costs, conversion to central plant becomes more advisable. A time schedule for building conversions should be developed based on the age and condition of each building's equipment.

9.4 ANALYSIS OF FUTURE NEEDS

From the summary of building loads in Table 9b, it can be seen that some existing buildings will be demolished, some will remain, and new buildings will be added to the campus. Although the time table has not been established, a plan and schedule should be developed to build a central plant for providing chilled water to as many buildings as is practical.

It is not practical to convert all buildings to chilled water. Some of the existing smaller buildings that will remain and are currently cooled by DX equipment, may not be candidates for conversion. But all new larger buildings should be designed to be cooled with chilled water produced at a central plant.

Central chilled water plants can produce chilled water more efficiently than multiple smaller remotely located chillers. Smaller chillers usually end up being air-cooled. Refer to the comparison in the Table below.

Chiller Type	Chiller	Condenser Water Pumps	Cooling Tower	Total kW/ton
Air-Cooled Chillers				
kW/ton (IPLV)	0.55	0	0	**0.55**
kW/ton (full load)	1.10	0	0	**1.10**
Water-Cooled Chiller (400 ton Turbocor)				
kW/ton (IPLV)	0.37	0.03	0.04	**0.44**
kW/ton (full load)	0.53	0.03	0.06	**0.62**
Water-Cooled Chiller (750 ton Trane)				
kW/ton (IPLV)	0.39	0.03	0.04	**0.46**
kW/ton (full load)	0.56	0.03	0.06	**0.65**

COMPARISON OF ENERGY USE FOR AIR-COOLED AND WATER-COOLED CHILLERS

9.5 FINDINGS AND RECOMMENDATIONS

1. We recommend converting existing DX buildings to chilled water cooling where practical, and connecting to stub-outs from the main piping runs. It may be more economical to leave some smaller buildings as they are and not connect them to the central plant and piping system. These decisions will have to be made on a case by case basis after careful review and analysis.

2. We recommend water cooled chillers compared to air-cooled chillers to improve overall system efficiency. We recommend combining some of the buildings into common systems where it makes geographical sense. We have divided the buildings into upper campus buildings and lower campus buildings.

3. We will also recommend the use of thermal energy storage tanks in order to reduce overall chiller plant capacity and to improve overall plant efficiency. Thermal storage tanks will discharge during peak cooling periods. They will re-generate during off-peak hours when the ambient air is cooler and cooling loads are less. There may be some incentives from the utility to use electricity during off- peak hours.

4. We recommend designing and installing the central plants in preparation for conversion and connection of buildings to a central plant.

5. We recommend designing and installing new distribution piping with stub-outs for each building, as shown on the site plan.

6. It is not recommended to convert buildings to a central heating water plant. Localized heating is preferred because there is no advantage to having centralized heating water. Only where buildings are clustered does it make sense to share a central boiler system. The Business Education Building, Music Building and the Performing Arts Building are an example of a cluster of buildings where it would make sense to have a common heating water system. The Physical Science and Life Science Buildings is another example.

TABLE 9a

Riverside Building Load Summary - Existing

BUILDINGS			Central Plant Service		COOLING					HEATING					REMARKS	Gross Area
Map #	Report #	NAME / DESCRIPTION	Loop	Cooling / Heating	Calc'd (TON)	Installed (TON)	Demand on CP utilities Tons	Estimated Diversified CP Load Tons	Peak CHW Flow (GPM)10°	Calc (MBH)	Inst (MBH)	Demand on CP utilities (MBH)	Estimated Diversified CP Load (MBH)	CP HHW Flow (GPM)40°		ft^2
3	1	Quadrangle		CHW/HW	203.1	215		0.0	0	1218.7	3,000		0.0	0		81,246
21	2	Stadium			14.9	-		0.0	0	89.1			0.0	0		8,910
20	3	Wheelock Gym			82.8	-		0.0	0	496.6			0.0	0		33,105
33	*4*	*Maintenance & Operations*			18.8	-		0.0	0	150.0			0.0	0	To be demolished	*7,500*
	5	*Maintenance Pit Shop*			0.0			0.0	0	35.4			0.0	0	To be demolished	*1,770*
27	6	Technology A			42.1	-		0.0	0	252.5			0.0	0		16,830
26	*7*	*Technology B*			51.4	-		0.0	0	308.4			0.0	0	To be demolished	*20,560*
	9	Saftey & Security Center			2.5	-		0.0	0	17.3			0.0	0		864
15	*10*	*Admissions & Counseling*			22.0	-		0.0	0	151.1			0.0	0	To be demolished	*7,554*
14	*11*	*Student Financial Services*			20.7	-		0.0	0	142.0			0.0	0	To be demolished	*7,100*
7	12	Landis Auditorium		CHW/HW	100.0	-		0.0	0	450.0	1800		0.0	0		30,003
5	*13*	*Music Building*		CHW/Gas	23.9	120		0.0	0	143.3	200		0.0	0	To be demolished	*9,553*
19	*14*	*Art Building*			19.9	-		0.0	0	119.3			0.0	0	To be demolished	*7,953*
30	15	Huntley Gym			55.5	-		0.0	0	333.0			0.0	0		22,203
32	*16*	*Main Warehouse*			0.0			0.0	0	136.0			0.0	0	To be demolished	*6,800*
2A &B	*17*	*Administration*		DX/Gas	55.6	50		0.0	0	381.4	1500		0.0	0	To be demolished	*19,069*
34	*18*	*Cosmetology*		DX/Gas	32.2	30		0.0	0	193.5	1259		0.0	0	To be demolished	*12,897*
25	19	Cutter Pool			16.5	-		0.0	0	99.0			0.0	0		6,597
12	20	Life Sciences		CHW/HW	71.6	100		0.0	0	429.6	1,500		0.0	0		28,642
8	21	MLK High Tech Center		CHW/HW	103.8	150		0.0	0	622.6	-		0.0	0		41,507
11	22	Physical Sciences		CHW/HW	65.8	155		0.0	0	395.0	1,500		0.0	0		26,335
10	23	Planetarium		DX/Gas	7.3	-		0.0	0	26.4	-		0.0	0		1,763
13	24	Student Center		CHW/HW	97.0	150		0.0	0	582.1	-		0.0	0		38,804
32	*25*	*Warehouse Annex B*			0.0			0.0	0	62.0			0.0	0	To be demolished	*3,100*
18	*26*	*Ceramics*			21.8	-		0.0	0	130.8	-		0.0	0	To be demolished	*8,717*
	27	Athletics Center			2.3			0.0	0	13.5			0.0	0		902
	28	Campus Police/ Safety			2.6			0.0	0	18.0			0.0	0		902
	29	Portable 3			2.8			0.0	0	16.7			0.0	0		1,112
28	*30*	*Automotive Technology*		DX/Gas	52.0			0.0	0	312.2			0.0	0	To be demolished	*20,812*
17	31	Early Childhood Studies			34.3	-		0.0	0	205.9			0.0	0		13,729
4	*32*	*Business Education*		CHW/Gas	55.3			0.0	0	331.5	500		0.0	0	To be demolished	*22,100*
	33	Greenhouse			0.0			0.0	0	1.8			0.0	0		*119*
9	34	Assessment Center			7.0	-		0.0	0	48.0			0.0	0		2,400
6	35	Music Hall			14.9	-		0.0	0	89.3			0.0	0		5,952
31	36	Pilates Studio			10.8	-		0.0	0	64.6			0.0	0		4,308
1	37	Digital Library "A" and "B"		DX/HW	270.6	378		0.0	0	1623.5	2340		0.0	0		108,234
29	*39*	*Lovekin Complex*			86.4			0.0	0	518.4			0.0	0	To be demolished	*34,560*
13A	42	Outreach Center			4.1			0.0	0	28.0			0.0	0		1,400
	46	Student Govt. Center			2.8			0.0	0	19.2			0.0	0		960
24	130	College House			2.5			0.0	0	14.7			0.0	0		980
23	131	North Hall			13.5			0.0	0	81.2			0.0	0		5,410
35	132	Alumni House			11.3			0.0	0	77.6			0.0	0		3,882
36	E-1	Parking Structure/Tennis Courts			0.0			0.0	0	6757.9			0.0	0		450,525
	E-2	Field bathrooms (West)			0.0			0.0	0	2.3			0.0	0		115
	E-3	Field bathrooms (South)			0.0			0.0	0	2.3			0.0	0		115
	E-4	Field Equipment Shed			0.0			0.0	0	0.0			0.0	0		78
	E-5	*Faculty Offices*			0.7			0.0	0	5.0			0.0	0	To be demolished	*250*
	E-6	*Automotive Paint Booth*			0.0			0.0	0	9.0			0.0	0	To be demolished	*450*
	E-7	Parking Lot Shed			0.0			0.0	0	1.5			0.0	0		73
	E-8	Vending Machine Structure			0.0			0.0	0	0.0			0.0	0		100
15A	*E-9*	*Outreach Portable*			1.1			0.0	0	7.5			0.0	0	To be demolished	*375*
	E-10	Maintenance Building			0.0			0.0	0	3.6			0.0	0		181
	E-11	Maintenance Shed			0.0			0.0	0	1.2			0.0	0		*58*
	E-12	Athletic and P.E.			0.4			0.0	0	2.1			0.0	0		140
13A	E-13	Financial Services/Counceling/Outreach			0.7			0.0	0	5.0			0.0	0		250
	E-14	Student Governement Supply Room			0.7			0.0	0	5.0			0.0	0		250
	E-15	Parking Lot Shed			0.0			0.0	0	0.0			0.0	0		250
	E-16	Science Building		CHW/HW	245.9			0.0	0	1475.5						98,364
	E-17	Nursing Building		CHW/HW	91.1			0.0	0	546.6						36,443
					2,043	1,348	0	0	0	19,254	13,599	0	0	0		1,265,161

TABLE 9b

Riverside Building Load Summary - Future

BUILDINGS			Central Plant Service		COOLING					HEATING						
CAMPUS MAP #	REPORT #	NAME / DESCRIPTION	Loop	Cooling/ Heating	Calc'd (TON)	Installed (TON)	Demand on CP utilities Tons	Estimated Diversified CP Load Tons	Peak CHW Flow (GPM) 16° dT	Calc (MBH)	Installed (MBH)	Demand on CP utilities (MBH)	Estimated Diversified CP Load (MBH)	CP HHW Flow (GPM) 40°	REMARKS	Gross Area ft^2
UPPER CAMPUS																
3	1	Quadrangle	Upper	CHW/HW	203.1		203.1	162.5	305	1218.7	3,000	1218.7	975.0	61		81,246
20	3	Wheelock Gym		none/Gas	82.8		0.0	0.0	0	496.6	-	0.0	0.0	0		33,105
27	6	Technology A		DX/Gas	42.1		0.0	0.0	0	252.5	-	0.0	0.0	0		16,830
7	12	Landis Auditorium	Upper	CHW/HW	100.0		100.0	80.0	150	1500.2	1,800	1500.2	1200.1	75		30,003
12	20	Life Sciences	Upper	CHW/HW	71.6		71.6	57.3	107	859.3	1,500	859.3	687.4	43		28,642
8	21	MLK High Tech Center	Upper	CHW/HW	103.8		103.8	83.0	156	622.6	750	622.6	498.1	31		41,507
11	22	Physical Sciences	Upper	CHW/HW	65.8		65.8	52.7	99	790.1	1,500	790.1	632.0	40		26,335
10	23	Planetarium		DX/Gas	7.3		0.0	0.0	0	26.4	-	0.0	0.0	0		1,763
13	24	Student Center	Upper	CHW/HW	97.0		97.0	77.6	145	582.1	750	582.1	465.6	29		38,804
-	28	Campus Police/ Safety		DX/Elec	2.6		0.0	0.0	0	18.0		0.0	0.0	0		902
9	34	Assessment Center		DX/Gas	7.0		0.0	0.0	0	48.0		0.0	0.0	0		2,400
6	35	Music Hall		DX/Gas	14.9		0.0	0.0	0	89.3		0.0	0.0	0		5,952
1	37	Digital Library "A" and "B"	Upper	DX/HW	270.6		0.0	0.0	0	1623.5	2,000	1623.5	1298.8	81		108,234
13A	42	Outreach Center		DX/Elec	4.1		0.0	0.0	0	28.0		0.0	0.0	0		1,400
-	46	Student Govt. Center		DX/Elec	2.8		0.0	0.0	0	19.2		0.0	0.0	0		960
13B	E-13	Financial Services/Counseling/Outreach		DX/Elec	0.7		0.0	0.0	0	5.0		0.0	0.0	0		250
13B	E-14	Student Governement Supply Room		DX/Elec	0.7		0.0	0.0	0	5.0		0.0	0.0	0		250
	E-16	Science Building	Upper	CHW/HW	245.9		245.9	196.7	369	1475.5		1475.5	1180.4	74		98,364
	E-17	Nursing Building	Upper	CHW/HW	91.1		91.1	72.9	137	546.6		546.6	437.3	27		36,443
New	P1	Student Services	Upper	CHW/HW	78.9		78.9	63.1	118	540.8		540.8	432.6	27		27,038
New	P7	Cosmetology	Upper	CHW/HW	97.4		97.4	77.9	146	584.6		584.6	467.7	29		38,974
New	P8	Parking Structure	Upper	CHW/HW	0.0		0.0	0.0	0	0.0		0.0	0.0	0		442,000
New	P9	Music/Landis Addition	Upper	CHW/HW	29.0		29.0	23.2	43	173.8		173.8	139.0	9		11,586
New	P10	Administration	Upper	CHW/HW	78.9		78.9	63.1	118	540.8		540.8	432.6	27		27,038
					1,698	0	1,262	1,010	1,893	12,046	11,300	11,058	8,847	553		1,100,026
LOWER CAMPUS																
30	15	Huntley Gym	Lower	CHW/HW	55.5		55.5	44.4	84	333.0		333.0	266.4	17		22,203
31	36	Pilates Studio	Lower	CHW/HW	10.8		10.8	8.6	16	64.6		64.6	51.7	3		4,308
-	E-10	Maintenance Building		none/none	0.5		0.0	0.0	0	3.6		0.0	0.0	0		181
-	E-11	Maintenance Shed		none/none	0.1		0.0	0.0	0	1.2		0.0	0.0	0		58
-	E-12	Athletic and P.E.		DX/Elec	0.4		0.0	0.0	0	2.1		0.0	0.0	0		140
New	P2	Band Building	Lower	CHW/HW	5.5		5.5	4.4	8	33.0		33.0	26.4	2		2,200
New	P3	Auto Technology	Lower	CHW/HW	168.0		168.0	134.4	252	1008.0		1008.0	806.4	50		67,200
New	P4	Maintenance Offices	Lower	CHW/HW	19.1		19.1	15.3	29	131.2		131.2	105.0	7		6,560
New	P5	Maintenance Shipping	Lower	CHW/HW	24.6		24.6	19.7	37	196.8		196.8	157.4	10		9,840
New	P6	Applied Technology	Lower	CHW/HW	55.7		55.7	44.6	84	334.3		334.3	267.5	17		22,289
					340	0	339	271	509	2,108	0	2,101	1,681	105		134,979
		ENTIRE CAMPUS			2,038	0	1,602	1,281	2,402	14,154	11,300	13,159	10,527	658		1,235,005

LEGEND:

(1) EXISTING BUILDING

GENERAL NOTES

1. UNLESS OTHERWISE NOTED. DX AIR CONDITIONING SYSTEM ON BUILDINGS.
2. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

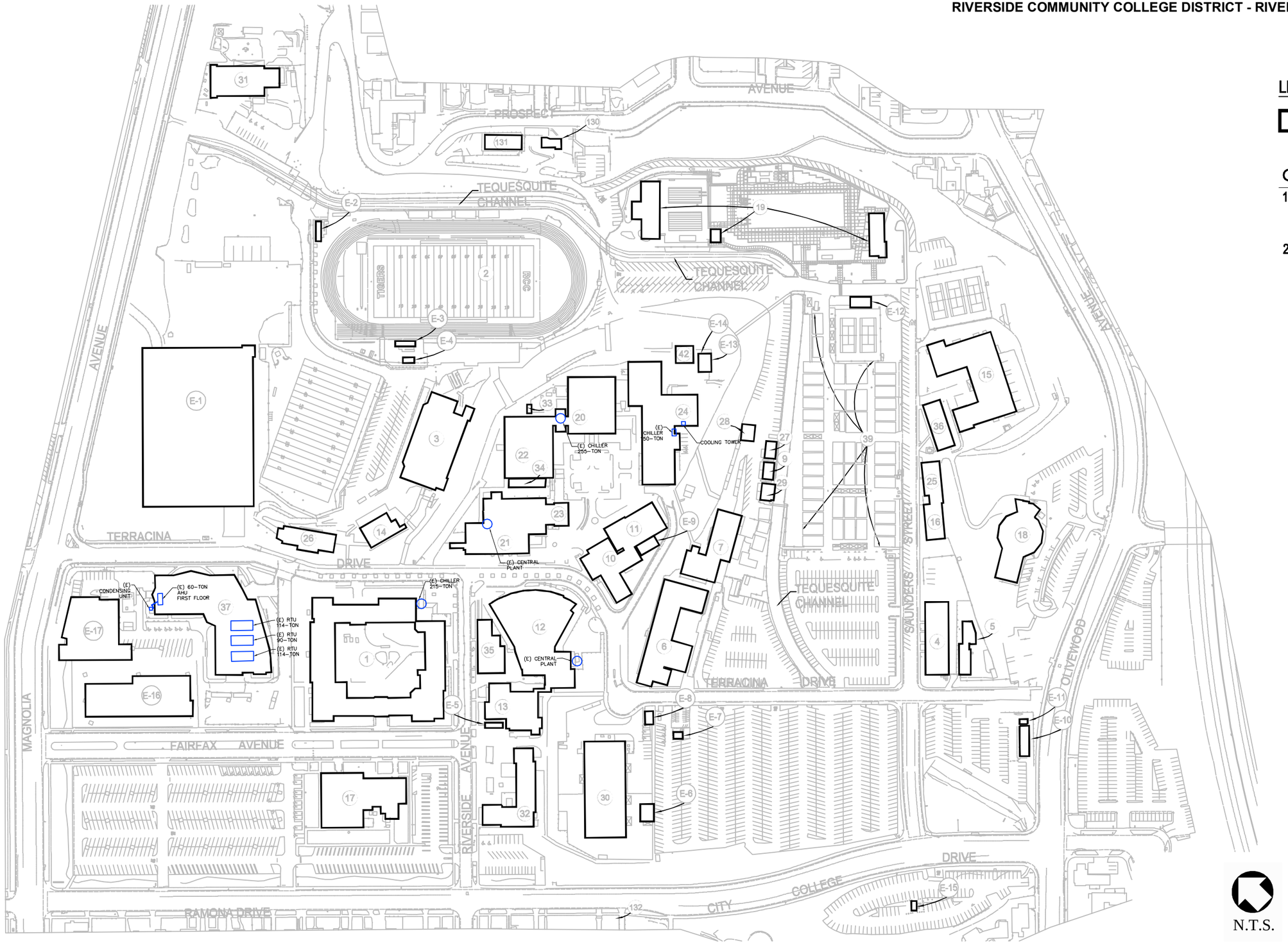
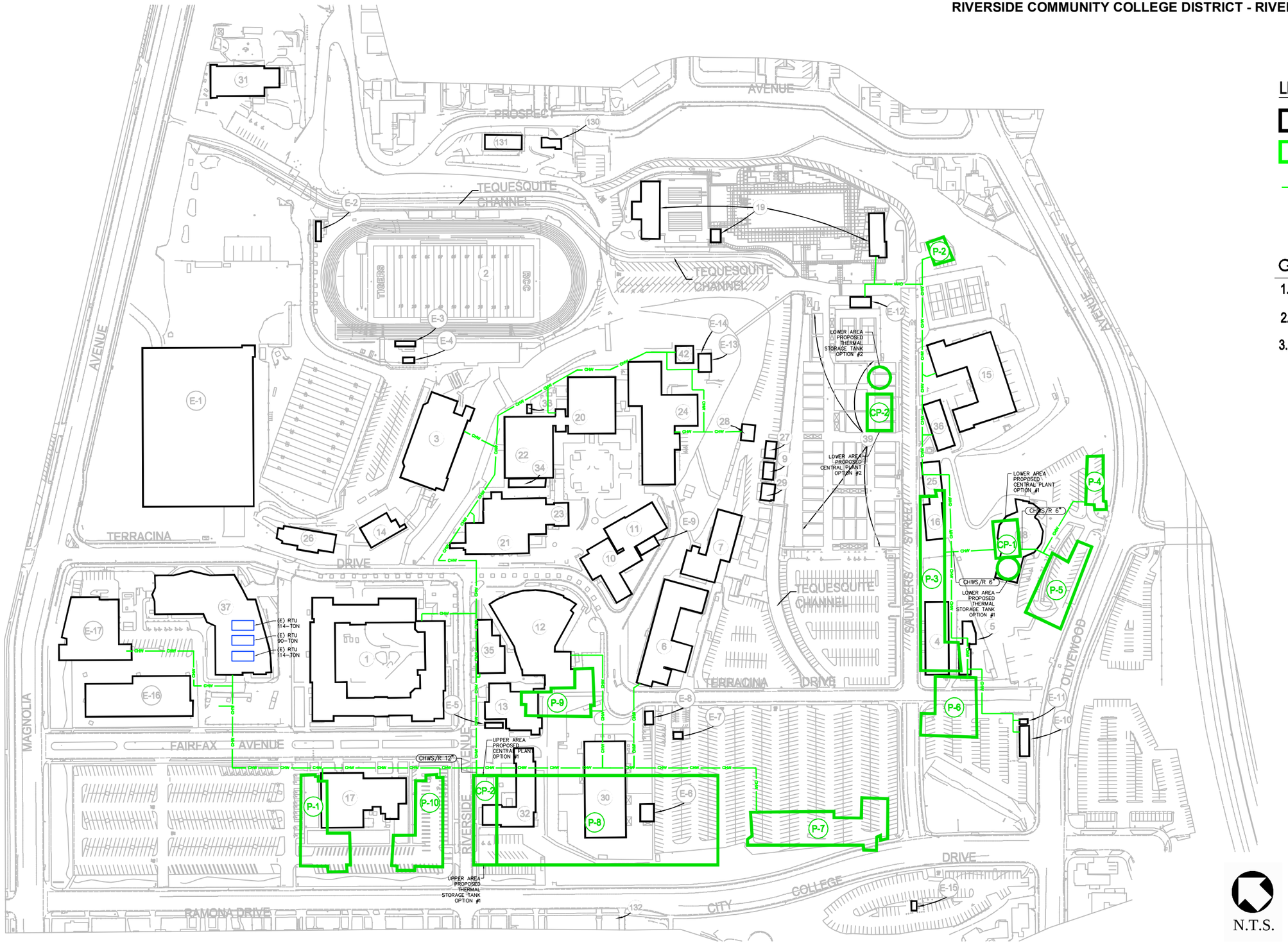


FIGURE 9a
EXISTING UTILITY MAP - EXISTING FACILITIES



LEGEND:

- EXISTING BUILDING
- PROPOSED BUILDING
- PROPOSED CHW LINE
- PROPOSED P.O.C. FOR FUTURE BUILDING

GENERAL NOTES

1. FOR CHILLED WATER ONLY
2. HEATING HOT WATER TO BE PROVIDED AT EACH BUILDING.
3. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

FIGURE 9b
FUTURE CONDITIONS UTILITY MAP - CENTRAL PLANT CHILLED WATER

SECTION 10 – NATURAL GAS SYSTEM

10.1 SYSTEM DESCRIPTION

Background and Scope

Riverside City College, one of three colleges within the Riverside Community College District, is a two-year public community college situated in the community of Riverside California. The campus is located on former Poly High School site and opened in 1916. The City Campus has become one of California's leading community colleges and is a landmark in downtown Riverside.

The campus derives its service from the Southern California Gas Company. The natural gas is provided by high pressure service laterals leading into the campus.

See Exhibits 7a for reference to the existing site natural gas distribution system and Exhibit 7b for the proposed building site natural gas distribution system.

Objective

Natural Gas System master plan consists of evaluating the existing flow capacity available at the meters, the impact of the proposed facilities on the capacity of existing gas distribution system, identifying the required modifications/upgrades to the existing gas distribution system to support the future build out of the campus and to analyze the existing supply distribution for buried gas lines that will be in conflict with the proposed facilities that will require relocation.

10.2 METHODOLOGY

The following methodology was adopted in formulating our Natural Gas utility infrastructure master plan. The methodology presented below outlines the critical tasks that were performed in development of this master plan report.

- A critical aspect in the evaluation of the existing Natural Gas system serving a facility is a detailed and accurate field investigation of the current system. Meetings and discussions with the campus helped gather existing information and any potential problems faced with the system. A detailed survey of the existing Gas system that currently serve the facilities at Riverside City campus was undertaken, and existing conditions, together with potential problems, were identified. The surveyed information was verified through available record drawings and meetings with the campus facilities staff.
- A load flow study of the existing and future loads was developed and existing and proposed capacity requirements were developed. A BTUH/sq.ft. of proposed and existing facilities was assumed in our load studies. For some existing buildings where this information was available, existing installed capacities of the gas fired equipment were taken to estimate the total loads.
- The Natural Gas system was then evaluated for capacity, functionality, reliability, ease of maintenance, age, and its ability to serve the present and future needs of the campus.
- Alterations/upgrade/modifications necessary to support new buildings, major renovations, and building retrofits that form part of the proposed campus facilities master plan were identified.
- Recommendations were developed to support new buildings, major renovations, and building retrofits that form part of the proposed campus facilities master plan were identified.
- Costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

10.3 ANALYSIS OF EXISTING SYSTEM

The Riverside City College campus is currently served from thirteen gas meters located in various locations. The first meter is located on the south side of Huntley gym which serves the gym and Cosmetology deriving gas service from the cities 4" main line running along Olivewood Avenue. The second meter is located just north of Cutter Pool serving the buildings that surround the pool and derives its gas service from the cities main line running along Prospect Avenue. The third gas meter is located on the North side of the Digital Library serving only that building which derives gas service from the cities 3" main line running along Terracina Drive. The fourth gas meter is located on the North-East corner of the Quadrangle complex serving only that complex which derives gas service from the cities 3" main line running along Riverside Avenue. A fifth gas meter is located on the North-West side of the Ceramics building which serves only that building and derives its service from the cities 3" main line running along Terracina Drive. The sixth gas meter is located on the South-West corner of the Wheelock Gym serving the gym, Stadium and the Art building. It is unknown how this meter derives its gas service. The seventh gas meter is located on the West side of the Admissions & Counseling building which serves Admissions, Data Processing, MLK, Planetarium, Physical Science, Life Science and the Student Center building. It is unknown how this meter derives its gas service. The eighth gas meter is located on the North-West side, behind Technology A building serving Tech. A, Tech. B and a portion of the Student Center building which derives gas service from the cities 4" main line running along Terracina Drive. The ninth gas meter is located on the North-West side of the Music building serving the Music, Landis auditorium and the Business Education building which derives its gas service from the cities 3" main line running along Riverside Avenue. The tenth gas meter is located in an underground vault on the north side of the Administration building serving only that building and deriving gas service from the cities 2" main line running along Fairfax Avenue.

The eleventh gas meter is located on North-East corner of the Automobile Tech. building which serves only that building and derives gas service from the cities main line running along City College Drive. The twelveth gas meter is located on the South-East corner, behind the Maintenance/Operations building which only services that building and derives gas service from the cities 4" main line running along Terracina Drive. Lastly, the thirteenth gas meter is believed to be located on the north side of the campus, off Prospect Avenue serving the College House, the North Hall/Apartments and possibly Child Development complex. The exact location has not yet been confirmed.

The listed meter numbers are not based upon any campus map or any documented campus information. Numbers were assigned to depict its location and identification for the purpose of this report.

Majority of the Campus gas infrastructure was installed in the mid 1920's and is in good standing condition. Natural Gas service is derived from Southern California Gas Company's high pressure system. The distribution system throughout the campus has undergone extensions over the years to accommodate campus expansions, renovations and additions. Gas mains are steel pipe ranging from 3/4 inch to 4-inches in diameter. Discussions with the campus maintenance facilities staff revealed that at some locations, pipe runs have been replaced with PVC pipe with some portions retrofitted with P.E. or steel pipe. PVC pipe is not the recommended plastic pipe material to be used for a natural gas distribution system.

Natural Gas downstream of the meters are distributed at medium pressure at approximately 5 psig throughout the campus in most locations with the exception of some metered systems running at low pressure. The medium-pressure gas is reduced to low-pressure gas at building connections via gas pressure regulators installed either above grade or in underground vaults. The low-pressure gas is then piped to serve hot water boilers that serve for Space Heating and water heaters that serve for domestic hot water needs to plumbing fixtures. Natural gas is used for domestic water heating and industrial hot water.

The total estimated combined gas load demand for the existing system served through all meters is approximately 45,460 MBH (thousand BTU's per hour). At 1,000 BTU per cubic-foot-per-hour (CFH) natural gas conversion factor, the required gas flow demand is 45,460 CFH.

Figure 10a – Existing Utility Map – Natural Gas shows the existing natural gas distribution piping system throughout the campus.

Table 10-1 provides approximate Heating and Domestic connected load demands based on building square footage in absence of metered data in each building.

TABLE 10-1: EXISTING GAS DEMAND LOADS

Bldg. No.	Building Name	Occupancy Type	Gross Area (Sq. Ft.)	Heating Load Factor (BTUH/sq.ft.)	Estimated Heating Load (CFH)	Estimated Domestic Load (CFH)	Total Gas Load (CFH)
METER 1							
15	Huntley Gym	Gymnasium	22,203	45	1,050	735	2,520
16	Main Warehouse	Warehouse	6,800	20	*No gas service to this building*		
18	Cosmetology	Classroom/Lab	12,897	N/A	*925	*335	*1,260
25	Warehouse Annex B	Warehouse	3,100	20	*No gas service to this building*		
36	Pilates Studio	Classroom	4,308	35	*Unknown if building derives gas service*		
39	Lovekin Complex	Academic/Office	34,560	30	*Unknown if building derives gas service*		
	TOTAL						**3,780**
METER 2							
19	Cutter Pool	Locker Area	6,597	N/A	*150	*270	420
19	Cuttel Pool	Equipment Room	-	N/A	*2,340	-	2,340
19	Aquatic Complex	Academic	5,333	N/A	**2,500	-	2,500
E-12	Athletic & P.E.	Academic	140	N/A	*No gas service to this building*		
E-13	Financial Services	Office	250	N/A	*No gas service to this building*		
E-14	Student Govern.Supply Rm.	Office	250	N/A	*No gas service to this building*		
	TOTAL						**5,260**
METER 3							
37	Digital Library A and B	Library	108,234	N/A	*2,520	*Heating Only*	*2,520
E-16	Nursing & Science 1	Academic	65,725	35	2,420	1,210	3,630
E-17	Nursing & Science 2	Academic	65,725	35	2,420	1,210	3,630
	TOTAL						**9,780**
METER 4							
01	Quadrangle	Classroom	81,246	35	2,995	1,495	4,490
	TOTAL						**4,490**

METER 5							
26	Ceramics Sculpture	Classroom/Lab	8,717	35	190	95	285
	TOTAL						**285**

METER 6							
Bldg. No.	**Building Name**	**Occupancy Type**	**Gross Area (Sq. Ft.)**	**Heating Load Factor (BTUH/sq.ft.)**	**Estimated Heating Load (CFH)**	**Estimated Domestic Load (CFH)**	**Total Gas Load (CFH)**
02	Stadium Lockers	Public Gathering	8,910	40	375	225	600
03	Wheelock Gym	Gymnasium	33,105	45	1,570	1,100	2,670
14	Art building	Classroom	7,953	35	295	150	445
E-1	Parking Struct./Tennis Courts	Parking	450,525	N/A	*No gas service to this building*		
E-2	Field Bathrooms (West)	Restroom	115	N/A	*No gas service to this building*		
E-3	Field Bathrooms (South)	Restroom	115	N/A	*No gas service to this building*		
E-4	Field Equipment Shed	Storage	78	N/A	*No gas service to this building*		
	TOTAL						**3,715**

METER 7							
10	Admissions/Counseling	Office	7,554	30	240	95	430
11	Data Processing	Office	7,100	30	225	90	315
20	Life Science	Classroom	28,642	35	1,055	530	1,585
21	MLK High Tech. Center	Classroom/Lab	41,507	35	1,530	765	2,295
22	Physical Science	Classroom/Lab	26,335	35	970	485	1,455
23	Planetarium	Classroom	1,763	35	75	35	110
24	Student Center	Classroom	38,804	N/A	See meter #8	*1,260	*1,260
33	Greenhouse	-	119	N/A	*No gas service to this building*		
34	Assessment /Placement	Office	2,400	30	*Unknown if building derives gas service*		
E-9	Outreach Portable	Office	375	N/A	*No gas service to this building*		
	TOTAL						**7,450**

METER 8							
06	Technology A	Classroom/Lab	16,830	35	620	310	930
07	Technology B	Classroom/Lab	20,560	35	760	380	1,140
09	Safety/Security C	Office	864	N/A	*No gas service to this building*		
24	Student Center	Classroom	38,804	N/A	*2,000	See meter #7	*2,000
27	Athletics Center	Office	902	N/A	*No gas service to this building*		
28	Campus Police/Safety	Office	902	N/A	*No gas service to this building*		
29	Portable 3	Office	1,112	N/A	*No gas service to this building*		
42	Outreach Center	Office	1,400	30	*Unknown if building derives gas service*		
46	Student Govt. Center	Office	960	30	*Unknown if building derives gas service*		
	TOTAL						**4,070**

METER 9							
Bldg. No.	**Building Name**	**Occupancy Type**	**Gross Area (Sq. Ft.)**	**Heating Load Factor (BTUH/sq.ft.)**	**Estimated Heating Load (CFH)**	**Estimated Domestic Load (CFH)**	**Total Gas Load (CFH)**
12	Landis Auditorium	Public Gathering	30,003	N/A	*1,800	*Heating Only*	*1,800
13	Music Building	Classroom	9,553	35	350	175	525
32	Business Education	Classroom	22,100	35	815	410	1,225
35	Music Hall	Classroom	5,952	35	*No gas service to this building*		
E-5	Faculty Offices	Office	250	N/A	*No gas service to this building*		
	TOTAL						**3,550**

METER 10							
17	Administration	Office	19,069	30	600	240	840
	TOTAL						**840**

METER 11							
30	Automobile Technology	Shop	20,812	40	805	485	1,290
E-6	Automotive Paint Booth	Industrial	450	N/A	*No gas service to this building*		
E-7	Well House	Industrial	73	N/A	*No gas service to this building*		
E-8	Vending Machine Structure	Retail	-	N/A	*No gas service to this building*		
	TOTAL						**1,290**

METER 12							
04	Maintenance & Ops.	Offices	7,500	30	240	95	335
05	Maintenance Pit Shop	Plant Facilities	1,770	20	*Unknown if building derives gas service*		
E-10	Well House	Industrial	181	40	-	**100	100
E-11	Well House	Industrial	58	N/A	*o gas service to this building*		
E-15	Well House	Storage	250	N/A	*No gas service to this building*		
	TOTAL						**435**

METER 13							
Bldg. No.	**Building Name**	**Occupancy Type**	**Gross Area (Sq. Ft.)**	**Heating Load Factor (BTUH/sq.ft.)**	**Estimated Heating Load (CFH)**	**Estimated Domestic Load (CFH)**	**Total Gas Load (CFH)**
31	Child Development	Classroom	13,729	35	345	170	515
130	College house	Residential	980	35	*Unknown if building derives gas service*		
131	North Hall/Apts.	Residential	5,410	35	*Unknown if building derives gas service*		
	TOTAL						**3,715**
	GRAND TOTALS		**1,267,037**				**45,460**

Indicated loads are estimated (based on square footage)
** Indicates Actual load (based on recent as-built drawings or field verification of Installed equipment)*
***Indicates Anticipated load (based on anticipated Installed gas fired equipment)*

10.4 ANALYSIS OF FUTURE NEEDS

An analysis of the current Natural Gas system was conducted to evaluate a) existing flow capacity available at the meters b) the impact of the proposed facilities on the capacity of existing gas distribution system and c) modifications/upgrades required to the existing gas distribution system to support the future build out of the campus. The current gas distribution was also analyzed for buried gas lines that will be in conflict with the proposed facilities and will require relocation. A campus site plan identifying piping that require demolition/relocation and extension of service lines to new facilities to serve the planned facilities is provided in our proposed gas site plan.

An evaluation of the facilities planned as part of the Utility Program master plan revealed that a net additional 654,724square feet of buildings/spaces are planned at the campus. A review of these proposed facilities and their usage revealed that the campus would add an additional combined load of 9,475 CFH to the existing metered systems.

Figure 10b – Future Conditions Utility Map – Natural Gas shows the proposed natural gas distribution piping system throughout the campus.

Table 10-2 provides approximate Heating and Domestic load demands of the proposed facilities that are being added to the campus and are depicted by Meter numbers. Meter number designations can be found on the Utility Plans. The demands are calculated based on building square footage.

TABLE 10-2: FUTURE GAS DEMAND LOADS

Bldg. No.	Building Name	Occupancy Type	Projected Construction Completion Year	Gross Area (Sq. Ft.)	Heating Load Factor (BTUH/sq.ft.)	Estimated Heating Load (CFH)	Estimated Domestic Load (CFH)	Total Gas Load (CFH)
METER 1 – *Additional load to existing system*								
P3	Auto Technology	Academic	-	67,200	35	2,475	1,235	3,710
P4	Maintenance Offices	Office	-	6,560	30	*No gas service to this building*		
P5	Maintenance Shipping	Industrial	-	9,840	45	*No gas service to this building*		
P6	Applied Technology	Academic	-	22,289	35	820	410	1,230
	TOTAL							**4,940**
METER 2 – *No Additional load to existing system*								
	TOTAL							**0**
METER 3 – *No Additional load to existing system*								
	TOTAL							**0**
METER 14 – *New Service*								
P1	Student Services	Office	-	27,038	30	850	340	1,190
P2	Band Building	Academic	-	2,200	35	*No gas service to this building*		
P7	Cosmetology	Academic		38,974	35	1,435	720	2,155
P8	Parking Structure 1	Parking	-	442,000	N/A	*No gas service to this building*		
P9	Music/Landis Addition	Academic	-	11,586	35	*Will derive gas service from existing system*		
P10	Administration	Office	-	27,038	30	850	340	1,190
	TOTAL							**4,535**
	GRAND TOTALS			**654,724**				**9,475**

Indicated loads are estimated (based on square footage)
*** Indicates Anticipated load (based on anticipated Installed gas fired equipment)*

10.5 FINDINGS AND RECCOMENDATIONS

An evaluation of the existing Natural Gas system was undertaken to study the modifications/upgrades required to support the future facilities planned at the campus. The study also evaluated the reliability and redundancy of the existing system.

A review of the load demands of the future facilities and current load demands with loads of the demolished buildings subtracted from the totals of the campus revealed that the existing main medium pressure distribution lines are adequately sized to meet the demands of existing and future facilities on the campus with the exception of the main line fed from meter #2. In addition, meter upgrades with a higher capacity output will be required in some locations.

Following are our recommendations to upgrade the existing Natural Gas infrastructure at the campus to (a) Improve system reliability (b) provide ease of maintenance and isolation of lines either during a failure or during a regular maintenance without interrupting gas supply to other buildings on campus and (c) to provide adequate capacity service lines to accommodate existing loads and planned future loads resulting from new buildings addition as well as additions to existing buildings:

Table 10-3 provides a description of the impact of work involved with the proposed locations of each building in relation to the existing campus Natural Gas system.

TABLE 10-3: DESCRIPTION OF IMPACT

Bldg. No.	Building Name	Gross Area (Sq. Ft.)	Description
P1	Student Services	27,038	The proposed building does not interfere with the existing underground gas service lines. The proposed building will be served from a new service line fed from the new meter 14.
P2	Band Building	2,200	The proposed building does not interfere with the existing underground gas service lines. The proposed building will not require gas service.
P3	Auto Technology	67,200	The proposed building does not interfere with the existing underground gas service lines. The proposed building will be served from a new service line extended from the existing system fed from meter 1.
P4	Maintenance Offices	6,560	The proposed building does not interfere with the existing underground gas service lines. The proposed building will not require gas service.
P5	Maintenance Shipping	9,840	The proposed building does not interfere with the existing underground gas service lines. The proposed building will not require gas service.
P6	Applied Technology	22,289	The proposed building interferes with an existing underground city owned gas service line leading into the campus from Olivewood Avenue serving meter #8 & meter #12. This line can be abandoned in place or capped and removed. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #1.
P7	Cosmetology	38,974	The proposed building does not interfere with the existing underground gas service lines. The proposed building will be served from a new service line fed from the new meter 14.
P8	Parking Structure 1	442,000	The proposed building does not interfere with the existing underground gas service lines. The proposed building will not require gas service.
P9	Music/Landis Addition	11,586	The proposed building does not interfere with the existing underground gas service lines. The proposed addition will be served from the new system fed from Meter #14. Alternatively, it can also be served from the existing piping within the already existing building.
P10	Administration	27,038	The proposed building does not interfere with the existing underground gas service lines. The proposed building will be served from a new service line fed from the new meter 14.

The following is a summary of additional recommendations for improvements to the existing natural gas system:

1. Existing low pressure system serving Cutter pool buildings is not of adequate size to handle an additional load to serve the Aquatic Complex currently under construction. Gas meter system #2 should be upgraded to accommodate the connected loads. A possible meter upgrade to a higher output capacity meter and replacement of low pressure lines with medium pressure supply lines will be required.

2. Earthquake valves for emergency gas supply shut-off should be provided at each meter location on the downstream side of the regulator.

3. We also recommend that all buildings be sub-metered to monitor gas consumption and get a clear understanding of the total gas energy being spent at each of the buildings. This will help the campus better manage their energy budget and thus the operating costs at the campus.

Table 10-4 below provides connected load demands of the existing, future facilities and facilities that are being demolished. This information reveals the following;

Meter 1: Replace existing meter with a higher capacity meter having a max CFH output of no less than 10,000 CFH. Southern California Gas Company shall provide this service.

Meter 2: Replace existing meter with a higher capacity meter having a max CFH output of no less than 7,500 CFH. Provide a medium supply pressure on the campus side. Southern California Gas Company shall provide this service.

Meter 3: Replace existing meter with a higher capacity meter having a max CFH output of no less than 7,500 CFH. Southern California Gas Company shall provide this service.

Meter 4: There are no additional loads to this system. The system shall remain as is.

Meter 5: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 6: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 7: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 8: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 9: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 10: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 11: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 12: The use of this meter can be discontinued. City owned distribution supply line should be capped. Southern California Gas Company shall provide this service. The meter and associated components shall also be removed.

Meter 13: Specifics of this meter are unknown however this meter shall have a max CFH output of no less than 5,000 CFH.

Meter 14: New Service with a max CFH output of no less than 10,000 CFH.

Meter 15: New Service with a max CFH output of no less than 13,000 CFH.

LEGEND:

1 EXISTING BUILDING

EXISTING GAS LINE

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

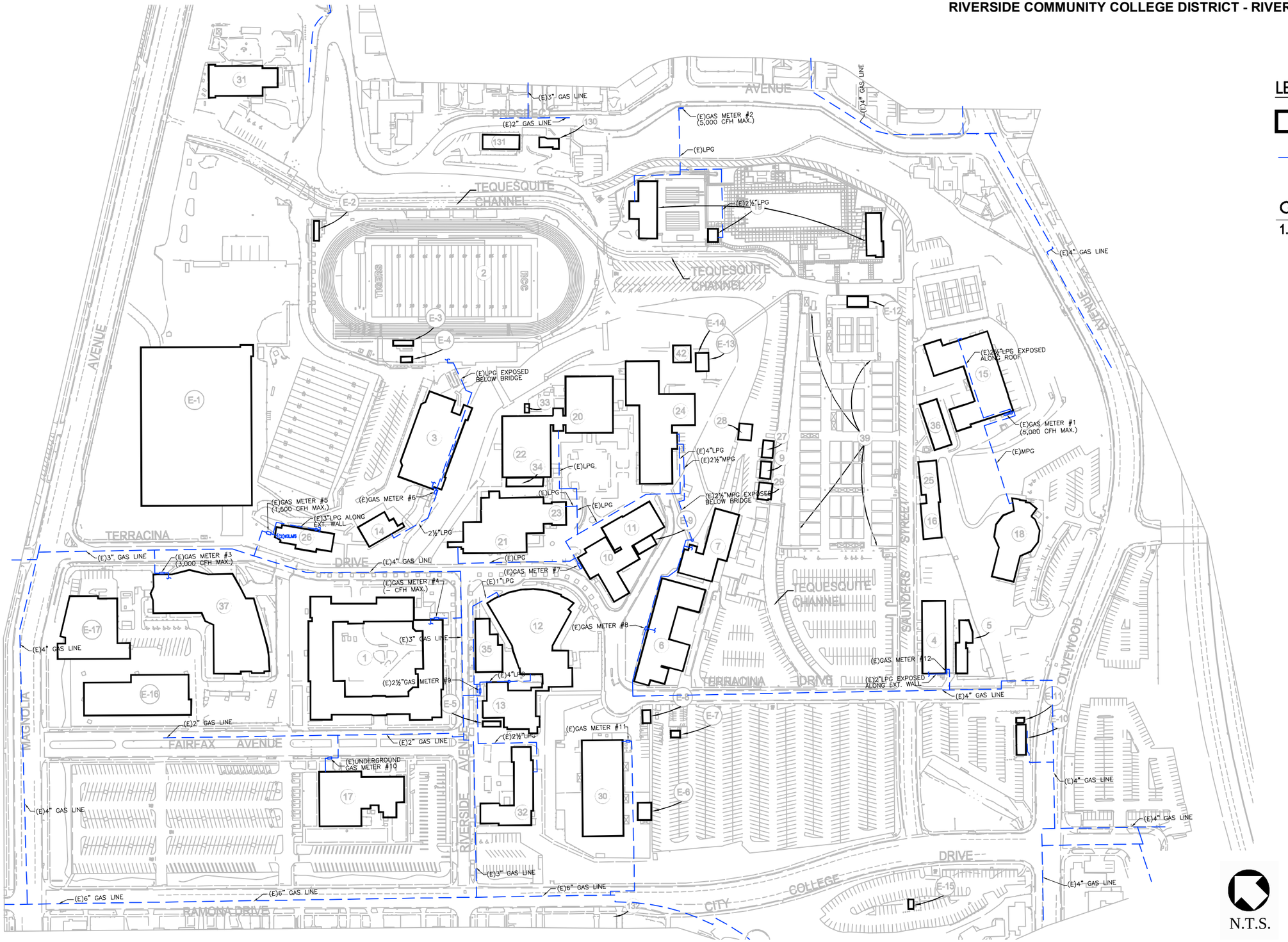
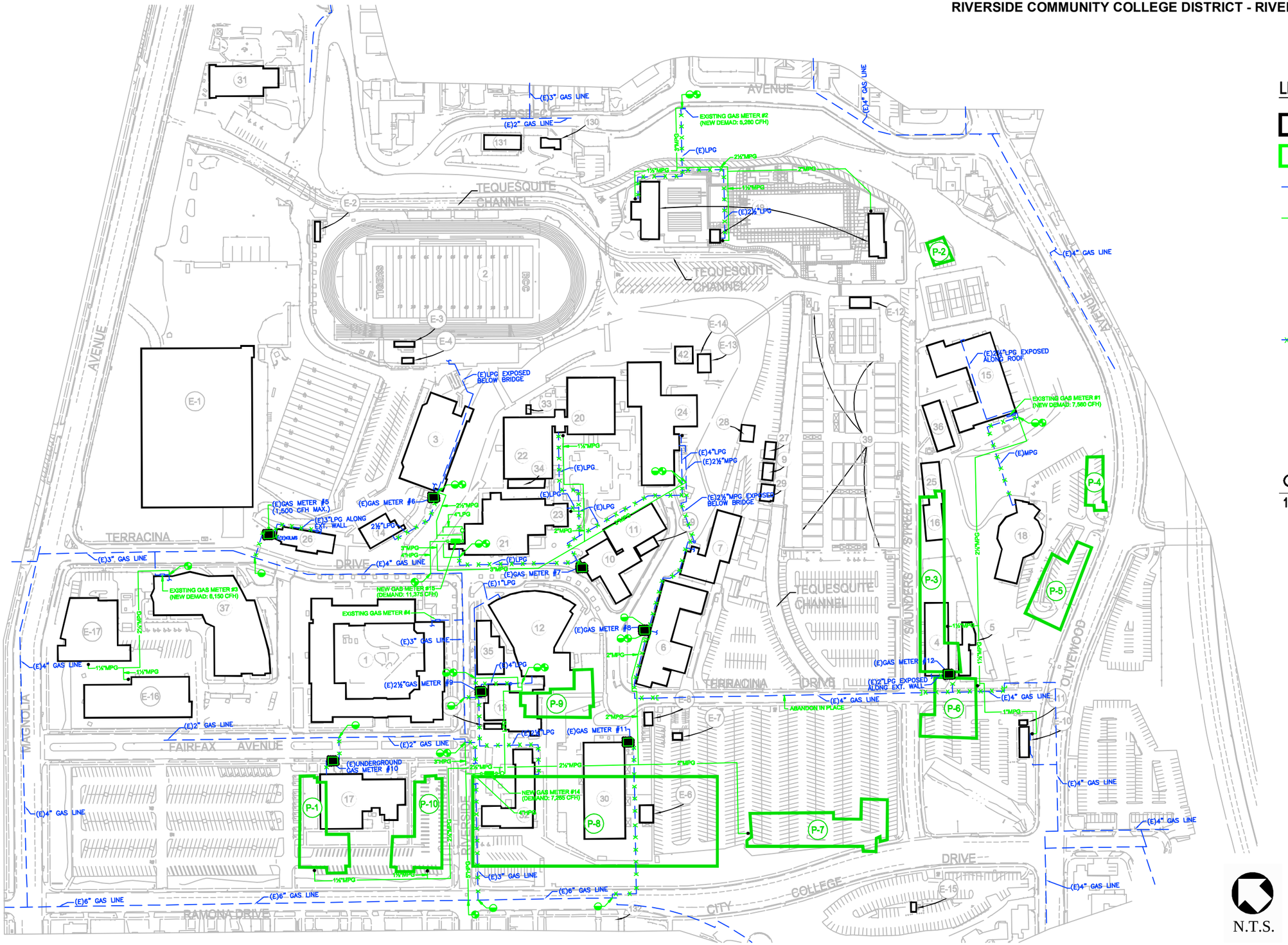


FIGURE 10a
EXISTING UTILITY MAP - NATURAL GAS



LEGEND:

- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING GAS LINE
- PROPOSED GAS LINE
- PROPOSED P.O.C. (POINT OF CONNECTION)
- PROPOSED P.O.D. (POINT OF DISCONNECT)
- GAS LINE TO BE REMOVED
- EXISTING GAS METER TO BE REMOVED
- PRESSURE REGULATOR AT BLDG. POINT OF ENTRY

GENERAL NOTES

1. SEE TABLES ES-1 AND ES-2 FOR BUILDING LIST.

N.T.S.

FIGURE 10b
FUTURE CONDITIONS UTILITY MAP - NATURAL GAS

APPENDIX A

Workshop Notes, Meeting Minutes and Campus Review / Annotated Drawings
Pothole Exhibit and Videography Exhibit

Meeting Re: Riverside Community College District (RCCD) – LRDP Review

MEETING MINUTES

Mtg Date: September 3, 2009
Time: 8:30AM – 12:00 Noon
Location: RCCSO Building
Subject: RCCD Infrastructure – LRDP Review for each Campus
Project: Infrastructure Upgrade Projects

Attendees:

See Distribution below -
RCCD Representatives
Tilden-Coil Representative
PSOMAS Team

The purpose of the meeting was to discuss and review the current status of the existing Long Range Development Plans for each Campus. Topics discussed are described below:

TOPICS DISCUSSED	COMMENTS / ACTIONS REQUIRED
1. Overview of Infrastructure Projects Progress and Schedule.	a. An update overview of the Infrastructure project scope and schedule was discussed.
2. Master Plan Review of Each Campus **a. Moreno Valley Campus (MV)**	a. From RCCD: The MV Campus differs greatly from the 2007 MV - LRDP. The changes discussed were summarized on the Masterplan Mark-up (see attached.) Steinberg Architects can be contacted to obtain a progress print of latest Masterplan. b. From PSOMAS : a schematic Masterplan Working Exhibits will be prepared to reflect the target LRDP to be used for Infrastructure Review.
b. Norco Campus (NC)	a. From RCCD: The Norco Campus has minor changes and anticipated Phasing related to the Jan 2008 NC - LRDP. The changes were summarized on the redline

Meeting Re: Riverside Community College District (RCCD) – LRDP Review

TOPICS DISCUSSED	COMMENTS / ACTIONS REQUIRED
c. Riverside City Campus (RC)	Masterplan mark-up (see attached.) Also, a secondary access outlet to Mountain Ave. will be needed prior to buildout of the LRDP. b. From PSOMAS : a schematic Masterplan Working Exhibits will be prepared to reflect the target LRDP to be used for Infrastructure Review. a. From RCCD: The City Campus has is consistent with the current March 2008 RC - LRDP. Minor alternatives were summarized on the Masterplan Mark-up (see attached.) b. From PSOMAS : The current Masterplan LRDP will used for Infrastructure Review.

Minutes Prepared: Bruce Kirby (PSOMAS) - September 11, 2009

The preceding minutes were prepared by Psomas and are interpretations of items discussed and decisions reached at the above referenced meeting. Any persons desiring to add or otherwise change the minutes, are asked to send their comments in writing to Vicky Cabangbang (Vicky.cabangbang@psomas.com) no later than one week following the date minutes were prepared; otherwise the minutes will stand as written.

DISTRIBUTION / Attendees :
Orin Williams, RCCD
Bart Doering, RCCD
Calvin Belcher, RCCD
Rick Hernandez, RCCD
Reagan Romali, RCCD MV
Dr. Gaither Loewenstein, RCCD NC
Norm Godin, RCCD RC
Jason Howarth, Tilden-Coil
Steve Bastian, P2S (Mech)
Ed Burtch, P2S (Elect)
Bill Leming, P2S (Tele)
Bruce Kirby PSOMAS (S/W/SD)
Jeff Chess, PSOMAS

ATTACHMENTs:
- Sign-In Sheet
- Meeting Agenda
- (3) Masterplan Mark-up (one for each Campus)

9/3/2009 - RCCD WORKSHOP - LRFMP's

Bill Laming	PSOMAS	562-497-2999
CALVIN J. BELCHER	RCCD	951-453-5188
JEFF CHESS	PSOMAS	2135223491
BRUCE KIRBY	PSOMAS	951-300-2827
GAITHER LOEWENSTEIN	RCC-NORCO	951-372-7199
JASON HOWARTH	TRUEN-COFL	951-684-5901
BART DOERING	RCCD	951-201-2779
Steve Bastian	P2S	562-497-2999
ED BURTCH	P2S EHG	562-497-2999

PSOMAS

Balancing the Natural and Built Environment

Meeting Agenda

Date / Time : **September 3, 2009 - 8AM-12Noon**

Type of Meeting: **Development Plan Workshop - Validate LRFMP (Master Plan)**

Meeting Facilitator: **Jeff Chess - PSOMAS**

Invitees: **RCCD Representatives**

Items For Each Campus

I. Issues

a) **Progress Update / Schedule Review**

b) **Master Plan Review - as published**

- **2007 Moreno Valley Campus Long Range Educational & Facilities Masterplan (Jan 2008)**
- **Norco Campus Long Range Facilities Masterplan (Jan 2008)**
- **Riverside City College – Long Range Educational Masterplan (March 2008)**

c) **Identify All Build-out Facilities**

d) **Proposed Facilities – (Confirmation, Documented Changes, Pending Status)**

e) **Identify Known Phasing**

f) **Summarize any Impacts to Schedule**

g) **Next Steps**

II. Adjournment

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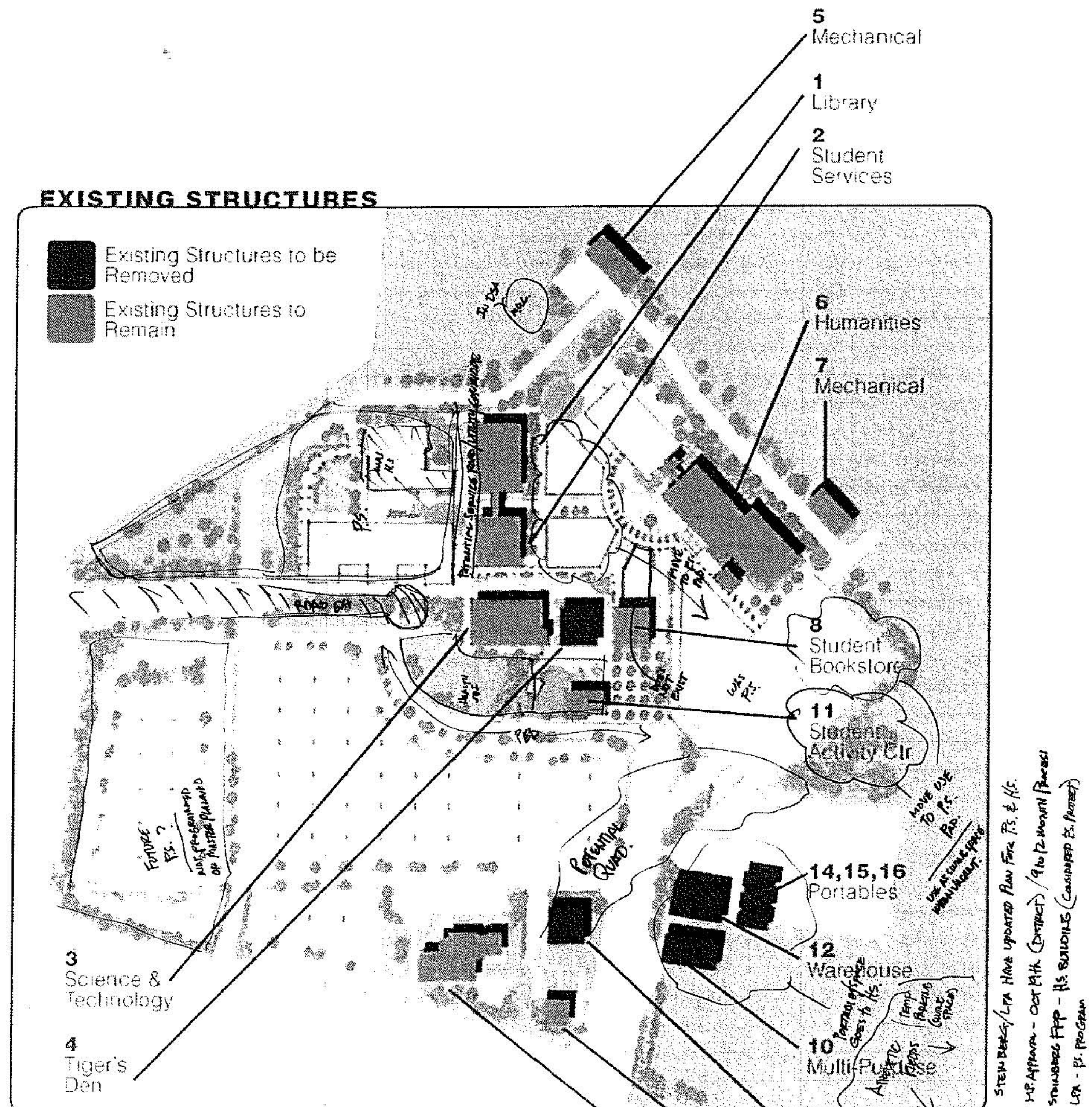
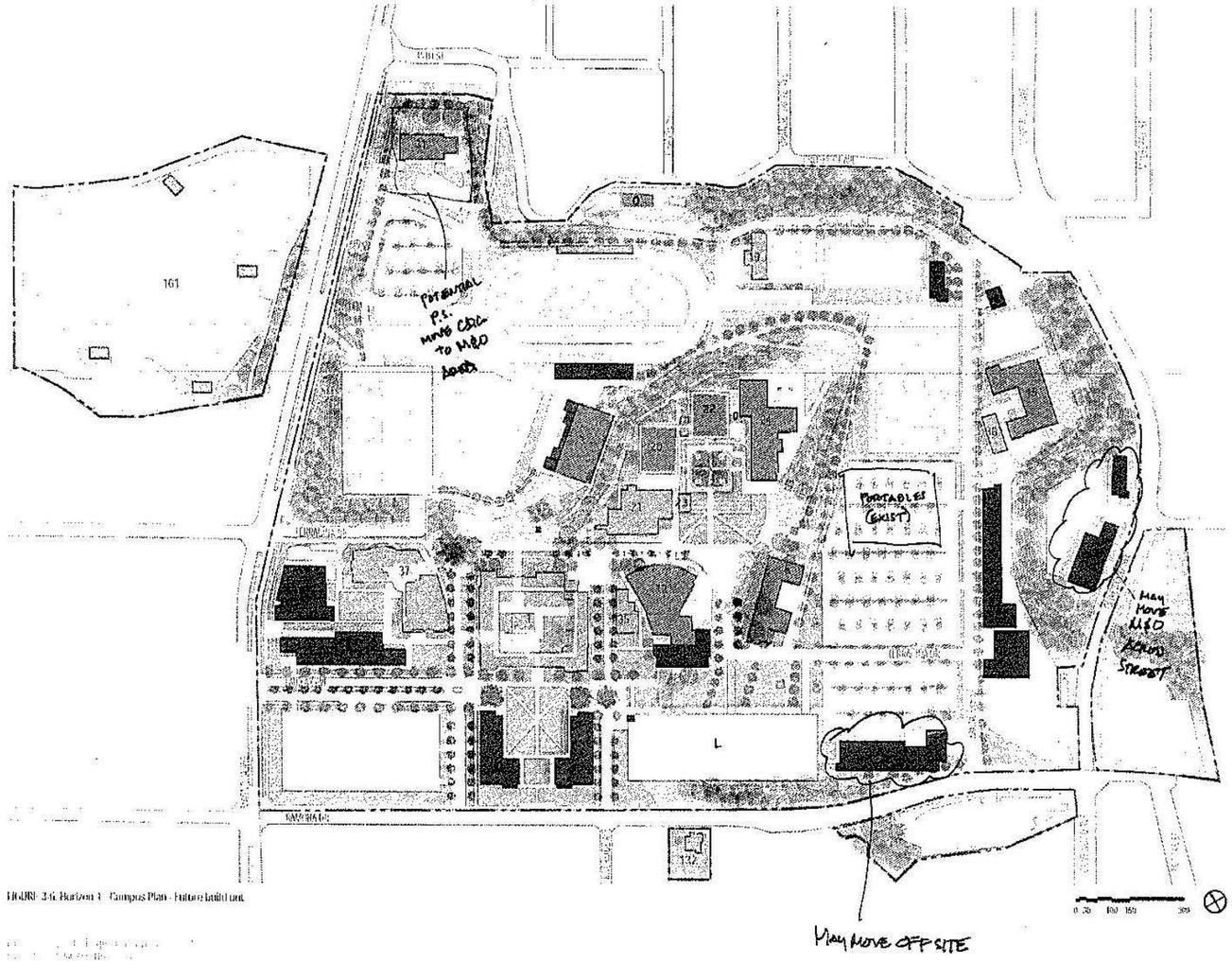


EXISTING STRUCTURES
Existing Structures to be Removed
Existing Structures to Remain
5
Mechanical
1
Library
2
Student Services
6
Humanities
7
Mechanical
8
Student Bookstore
11
Student Activity Ctr
14,15,16
Portables
12
Warehouse
10
Multi-Purpose
3
Science & Technology
4
Tiger's Den

HORIZON 1 - FACILITIES PLAN



NEW BUILDINGS

- A NURSING & SCIENCES 1
- B NURSING & SCIENCES 2
- C STADIUM
- D AQUATICS COMPLEX
- E ADMINISTRATION
- F STUDENT SERVICES
- G COSMETOLOGY
- H M&O SHIPPING
- I M&O OFFICES
- J APPLIED TECH CENTER
- K AUTO TECHNOLOGY
- L PARKING STRUCTURE
- M BAND BUILDING
- N MUSIC / LANDIS ADD
- O CAMPUS POLICE/SAFETY

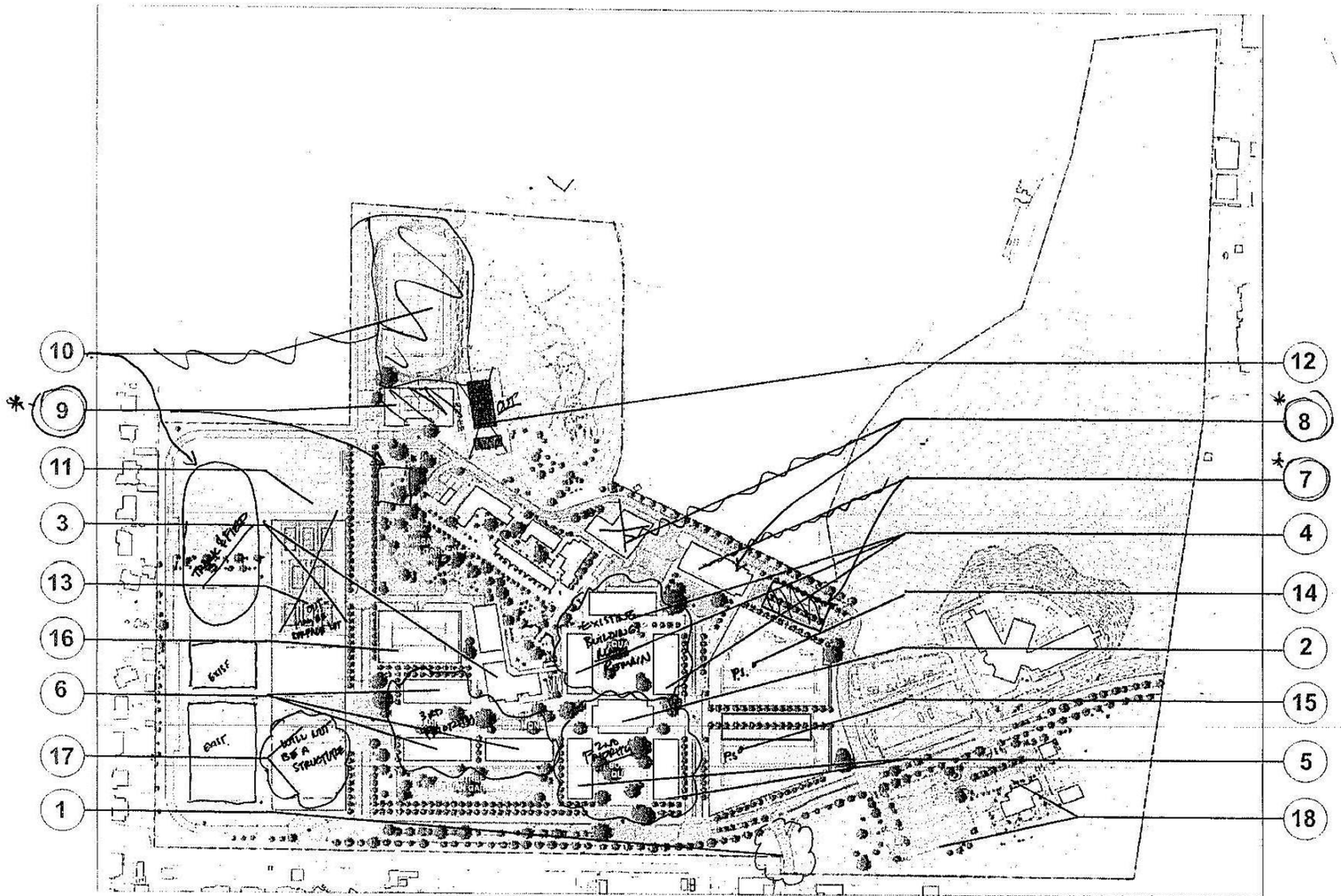
EXISTING BUILDINGS

- 1 QUADRANGLE
- 3 RENO - WHEELOCK
- 6 RENO - (N) ART & CERAMIC
- 12 RENO - LANDIS AUDITORIUM
- 15 RENO - HUNTLEY GYM
- 19 CUTTER POOL
- 20 RENO (N) CLASSROOM / II
- 21 MILK HIGH TECH CENTER
- 22 RENO - (N) BUSINESS ED.
- 23 PLANETARIUM
- 24 RENO - STUDENT CENTER
- 31 RENO - CHILD DEVELOPMENT
- 35 MUSIC HALL
- 36 PILATES
- 37 DIGITAL LIBRARY
- 132 ALUMNI HOUSE
- 161 EVANS SPORTS BUILDINGS

LEGEND

- EXISTING BUILDINGS
- NEW BUILDINGS
- RENOVATION

FIGURE 3.6: Horizon 1 - Campus Plan - Future Institution



The Norco Campus at 16,000 Students. *Simple two and three story rectangular classroom and lab buildings are arranged around simple rectangular quadrangles with grass and trees at the heart of campus. Athletics occupies the west side and northwest corner of campus and visual and performing arts the northeast corner of campus. Two and three level parking structures are situated close to the campus core on its east and west sides.*

* City Does not want Road - Require General Plan Amendment
- Until Limit Buildout *
- Considering Sat. Campus.

(9) Fit Done

MEETING MINUTES

Date: February 15, 2010 3:00 PM to 4:00 PM
Location: RCCD Building – Third Floor Conference Room
3845 Market Street
Riverside, CA 92501
Subject: RCCD – Infrastructure Utility Program Project
Project Coordination Meeting
Project: RCCD Infrastructure Utility Program Project
Project No: 1RCC020100

Attendees:

Bart L. Doering – RCCD
Calvin Belcher - RCCD
Jeff Chess – Psomas
Bruce Kirby – Psomas

Introduction:

This project meeting took place on February 11, 2010 at RCCD Office to discuss the remaining items required to complete the Utility Program Study. The following are the discussion items originating at the meeting.

TOPIC / *COMMENTS*

1. **REMAINING STEPS:**
   - A. **Confirmed (MV) Master Plan** - *RCCD Confirmed that the Master Plan (Future Buildings Exhibit) for the Moreno Valley (MV) that includes the Proposed Campus Expansion Areas (in blue) is complete.*
   - B. **MV Assumptions** – *Psomas agreed to provide a list of "general utility requirements and assumptions for each of the "blue" items identified on the Exhibit.*
   - C. **MV Assumptions Confirmation** – *RCCD agreed to review and confirm these general assumptions.*
   - D. **Confirmed (NC) Master Plan** - *RCCD Confirmed the Master Plan (Future Buildings Exhibit) for the Norco Campus (NC) is complete.*

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Meeting Re: Riverside Community College District (RCCD) Infrastructure Upgrade Project – 1RCC020100

- E. **Confirmed (RC) Master Plan** - *RCCD Confirmed the Master Plan (Future Buildings Exhibit) for the Riverside Campus (RC) is complete.*
- F. **Future Buildings Exhibits** - *Psomas agreed to use these Master Plan Exhibits for all (3) Campuses and then analyze and update the recommendations for each Utility on each Campus.*
- G. **Re-Issue DRAFT Utility Program Study** – *Psomas agreed to re-issue the Study for each Campus.*
- H. **Review DRAFT Utility Program Study** – *RCCD agreed to a review meeting for each Campus Study to confirm limits of proposed Utilities (prior to Cost Estimate.)*
- I. **Final DRAFT Utility Program Study** – *Psomas agreed to incorporate any comment and add Cost element to the Study and issue Final DRAFT*
- J. **District Infrastructure Budget**– *RCCD shared that the District has established an Infrastructure Budget of $6-7M (including soft costs) for all three Campuses. Psomas agreed with RCCD that by inspection this budget is deficient. Remaining Soft Cost will include Final Master Planning and Construction Documents.*
- K. **Prioritized Recommendations Summary** – *RCCD and Psomas agreed to a Meeting that will include Tildon-Coil, and review final costs and also provide a Prioritized List of Recommendations based upon available budgets, to be included in the final report.*
- L. **Presentation of FINAL Study** – *RCCD and Psomas agreed to meet with each Campus representative to present their Report along with our priority list. This list will be edited or confirmed by the Campus Representative(s).*
- M. **Issue FINAL Utility Program Study** – *Psomas agreed to issue Final FINAL Utility Program Study.*

2. **OTHER ITEMS:**
   - A. **Riverside Campus Sewer –** *Psomas to obtain location of recent sewer discovery at the Southwest corner of Campus related to the New Nursing Building.*
   - B. **Remaining Item Schedule** – *For efficiency, each Campus document will be updated on it's own schedule. Psomas to provide a Schedule to address the 'Remaining Items."*

Minutes Issued: February 18, 2009

The preceding minutes were prepared by Psomas and are interpretations of items discussed and decisions reached at the above referenced meeting. Any persons desiring to add or otherwise change the minutes, are asked to send their comments in writing to Bruce Kirby at Psomas (bruce.kirby @psomas.com) no later than one week following the date minutes were prepared; otherwise the minutes will stand as written.

DISTRIBUTION:

See attendees.: cc. Jason Howarth (Tildon-Coil)

ATTACHMENTS:

- Original Meeting Agenda
- Schedule for Remaining Items (to Follow)

MEETING MINUTES

Date: **March 1, 2010 4:00 PM to 5:00 PM**
Location: **RCCD Building – Third Floor Conference Room**
3845 Market Street
Riverside, CA 92501
Subject: **RCCD – Infrastructure Utility Program Project**
Project Coordination Meeting
Project: **RCCD Infrastructure Utility Program Project**
Project No: **1RCC020100**

Attendees:

Bart L. Doering – RCCD
Calvin Belcher - RCCD
Bruce Kirby – Psomas

Introduction:

This project meeting took place on March 1, 2010 at RCCD Office to discuss the remaining item required to complete the Utility Program Study. The following are the discussion items originating at the meeting.

TOPIC / *COMMENTS*

1. REMAINING STEPS:

A. **Confirmed (MV) Master Plan Assumptions** - *Psomas provided a list of "general utility requirements and assumptions for each of the "blue" items identified on the Exhibit. RCCD agreed with these assumptions (listed below.)*

B. **(MV) Assumptions :**

Per our meeting notes, here are the Assumptions for the Campus Expansion Areas (Blue items) on our Future Buildings Exhibit.

A. New Landscape and Lighting Area - electrical lighting, and irrigation needs only.

B. Pedestrian Pathway with Fire Access - electrical lighting needs for walkway lights, and irrigation (No sewer, fire water, tele, gas)

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Meeting Re: Riverside Community College District (RCCD) Infrastructure Upgrade Project – 1RCC020100

C. Park/ Benches - electrical lighting needs for walkway lights, and irrigation (No sewer, tele, gas)

D. Possible Quad Area - electrical lighting needs for walkway lights, and irrigation (No sewer, tele, gas)

E. 500 stall Parking Lot - electrical needs for parking lot lights, irrigation for islands, pavement drainage ,and emergency phones (No sewer, or gas)

F. (2-3) lane road widening - electrical roadway lighting, and re-alignment of backbone utilities to match new alignment (No sewer, tele, gas)

G. 1000-1500 seat Outdoor Amphitheater - outdoor concrete stepped amphitheater with minor 1,000 sf concession stand, one set of restrooms, event lighting, (sewer, water, gas, tele, and elect)

H. Gymnasium – Two basketball courts with bleachers on each side and includes concession stand, one set of restrooms, lighting, weight room, men & women locker rooms, coaches/ staff offices, equipment room, physical education classrooms. A 40,000 sf building is used. (sewer, water, gas, tele, and elect.)

I . Fields / Track (North) - Single 400 meter track with single football field. Include support bldgs such as one set of restrooms and minor 1,00 sf concession buildings. (sewer, water, gas, tele, and elect.)

J. Fields / Track (South) - Single baseball field. Include support bldgs such as one set restrooms and minor 1,000 sf concession buildings. (Sewer, water, gas, tele, and elect.)

These assumptions were confirmed for our purposes in establishing general scale demand calculations.

Minutes Issued: March 9, 2010

The preceding minutes were prepared by Psomas and are interpretations of items discussed and decisions reached at the above referenced meeting. Any persons desiring to add or otherwise change the minutes, are asked to send their comments in writing to Bruce Kirby at Psomas (bruce.kirby @psomas.com) no later than one week following the date minutes were prepared; otherwise the minutes will stand as written.

DISTRIBUTION:

See attendees.: cc. Jason Howarth (Tildon-Coil) : Ed Burch (P2S)

ATTACHMENTS:

None

MEETING MINUTES

Date: March 30, 2010 10:00 AM to 11:30 AM
Location: RCCD Building – Third Floor Conference Room
3845 Market Street
Riverside, CA 92501
Subject: RCCD – Infrastructure Utility Program Project
Review of City Campus DRAFT Study
Project: RCCD Infrastructure Utility Program Project
Project No: 1RCC020100

Attendees:
Bart Doering and Calvin Belcher – RCCD
Jason Howarth – Tilden / Coil - (Not Available)
Steve Bastian and Ed Burtch – P2S
Jeff Chess and Bruce Kirby – Psomas

Introduction:

This project meeting took place on March 30, 2010 at RCCD Office to review the DRAFT Utility Program Study for the City Campus. Also to discuss remaining steps required to complete the Utility Program Study fro all Campuses. The following are the discussion items originating at the meeting.

TOPIC / *COMMENTS*

1. Overview of Each Section - DRAFT Utility Program Study:

A. **Table of Contents / Executive Summary / "Wet" Civil Utilities (Swr/Wtr/SD) Sections** -

Psomas provided a description of each section in the report and received the following comments (below) from RCCD.

B. **Mechanical / Electrical / Plumbing Sections** -

P2S provided a description of each section in the report and received the following comments (below) from RCCD.

C. **General Comments to Study and Exhibits (applies to all sections) -**

RCCD provided input to the report which generated the following list to items:

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Meeting Re: Riverside Community College District (RCCD) Infrastructure Upgrade Project – 1RCC020100

- *Psomas to provide Minor updates to the Exhibit graphics in terms of bold / background / color / text height– for overall clarity of information.*
- *Psomas mentioned that FINAL Reports will be bound with hard covers with tabs at each section.*
- *Psomas to add Revision Box for each version of the Study through Final issuance.*
- *Psomas to prioritize the "Recommendation" sections for each utility.*
- *Psomas to provide DVD copy of Sewer Video to Bart (RCCD).*
- *Psomas to contact GKK and obtain current CD's for Nursing-Science Bldg (currently under constriction) and show as an existing feature.*
- *Psomas to contact Tilden-Coil to get current CD's for the Aquatic Center (currently under constriction) and show as an existing feature.*

2. Next Steps – to finalize DRAFT Utility Program Study:

A. **Checklist Summary** -

Psomas to compile all the Prioritized Recommendations from the Utility Study onto one Master Spreadsheet Checklist. This Checklist will be added as an Appendix to the Study and provided to the Campus Representatives for their review / approval / signature.

B. **Apply Costs** -

Once the Checklist is accepted, Psomas will apply costs to all the recommendations in the Study and add these as an Appendix to the Study.

C. **Schedule** -

Psomas will have the Updated City Campus Report (with Checklist) available 5/20 and will be ready to meet with the City College representative to get sign-off for the prioritization of recommendations.

Minutes Issued: April 5, 2010

The preceding minutes were prepared by Psomas and are interpretations of items discussed and decisions reached at the above referenced meeting. Any persons desiring to add or otherwise change the minutes, are asked to send their comments in writing to Bruce Kirby at Psomas (bruce.kirby @psomas.com) no later than one week following the date minutes were prepared; otherwise the minutes will stand as written.

DISTRIBUTION:

See attendees list

BLDG #	BUILDING NAME
1	QUADRANGLE
2	STADIUM
3	WHEELOCK GYM
4	MAINTENANCE SHOP
5	MAINTENANCE PT SHOP
6	TECHNOLOGY A
7	TECHNOLOGY B
9	SAFETY/SECURITY C
10	ADMISSIONS COUNSEL
11	DATA PROCESSING
12	LANDIS AUDITORIUM
13	MUSIC BUILDING
14	ART BUILDING
15	HUNTLEY GYM
16	MAIN WAREHOUSE
17	ADMINISTRATION
18	COSMETOLOGY
19	CUTTER POOL
20	LIFE SCIENCE
21	MLK HIGH TECH CENTER
22	PHYSICAL SCIENCE
23	PLANETARIUM
24	STUDENT CENTER
25	WAREHOUSE ANNEX B
26	CERAMICS SCULPTURE
27	ATHLETICS CENTER
28	CAMPUS POLICE/SAFETY
29	PORTABLE 3
30	AUTO TECHNOLOGY
31	CHILD DEVELOPMENT
32	BUSINESS EDUCATION
33	GREENHOUSE
34	ASSESSMENT/PLACEMENT
35	MUSIC HALL
36	PILATES
37	DIGITAL LIBRARY "A" AND "B"
130	COLLAGE HOUSE
131	NORTH HALL/APARTMENTS
132	ALUMI HOUSE

- DOM / FIRE / RECLAIMED
- METERS @ ALL BLDGS
- FIRE LINE TO EACH BLDG
- CITY WATER DEPT.

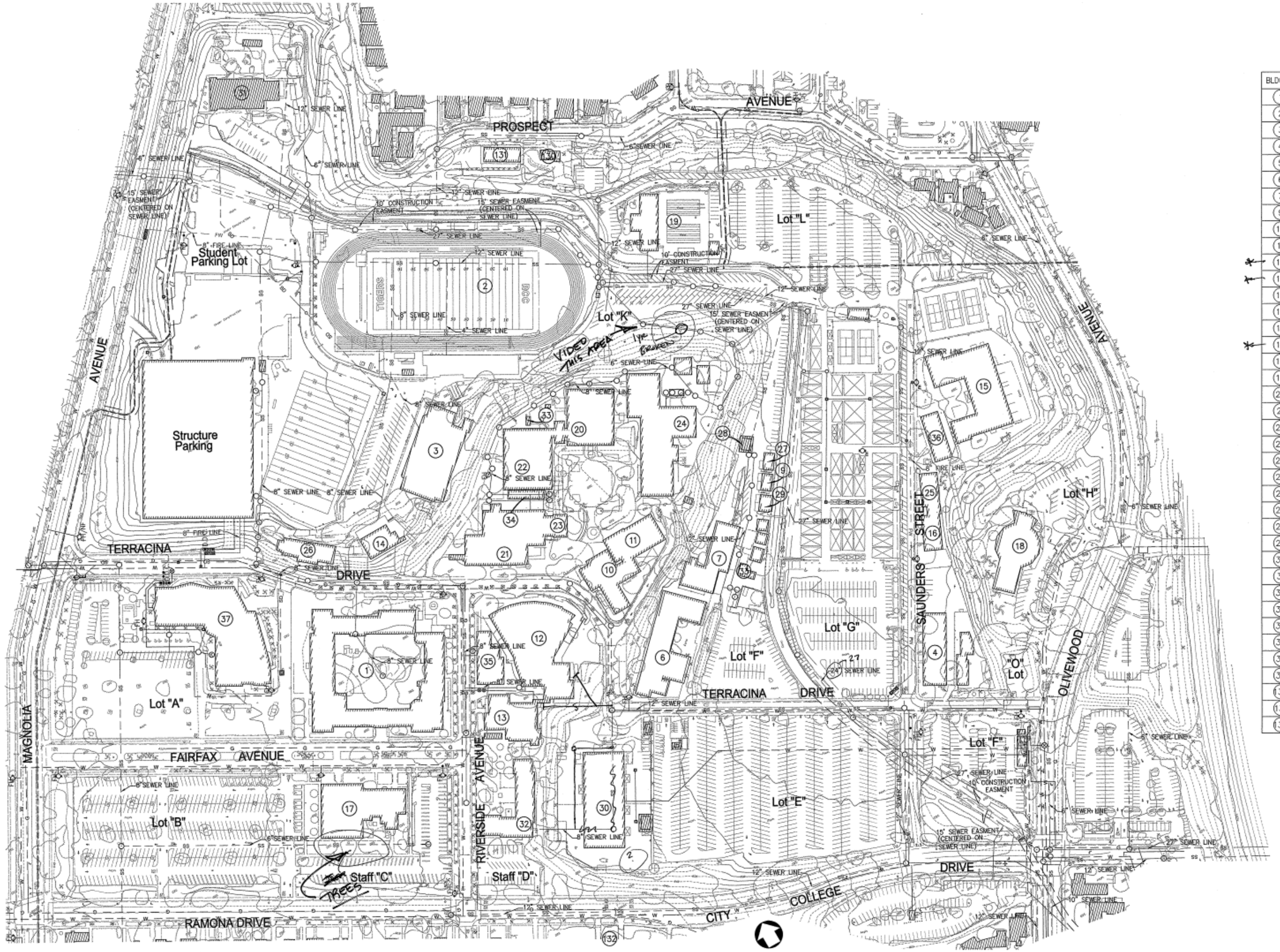
DIG SHEET COLORS

SITE WALK 8/10/09

B.K. SET 8/10/09

Riverside City Campus
Existing WTR Exhibit
PSOMAS
DATE: 7-27-2009 REVISED ON:
JOB No:18CC020100 SHEET 1 OF 1

Riverside Community College District



BLDG #	BUILDING NAME
1	QUADRANGLE
2	STADIUM
3	WHEELOCK GYM
4	MAINTENANCE SHOP
5	MAINTENANCE PT SHOP
6	TECHNOLOGY A
7	TECHNOLOGY B
9	SAFETY/SECURITY C
10	ADMISSIONS COUNSEL
11	DATA PROCESSING
12	LANDIS AUDITORIUM
13	MUSIC BUILDING
14	ART BUILDING
15	HUNTLEY GYM
16	MAIN WAREHOUSE
17	ADMINISTRATION
18	COSMETOLOGY
19	CUTTER POOL
20	LIFE SCIENCE
21	MLK HIGH TECH CENTER
22	PHYSICAL SCIENCE
23	PLANETARIUM
24	STUDENT CENTER
25	WAREHOUSE ANNEX B
26	CERAMICS SCULPTURE
27	ATHLETICS CENTER
28	CAMPUS POLICE/SAFETY
29	PORTABLE 3
30	AUTO TECHNOLOGY
31	CHILD DEVELOPMENT
32	BUSINESS EDUCATION
33	GREENHOUSE
34	ASSESSMENT/PLACEMENT
35	MUSIC HALL
36	PILATES
37	DIGITAL LIBRARY "A" AND "B"
130	COLLAGE HOUSE
131	NORTH HALL/APARTMENTS
132	ALUMI HOUSE

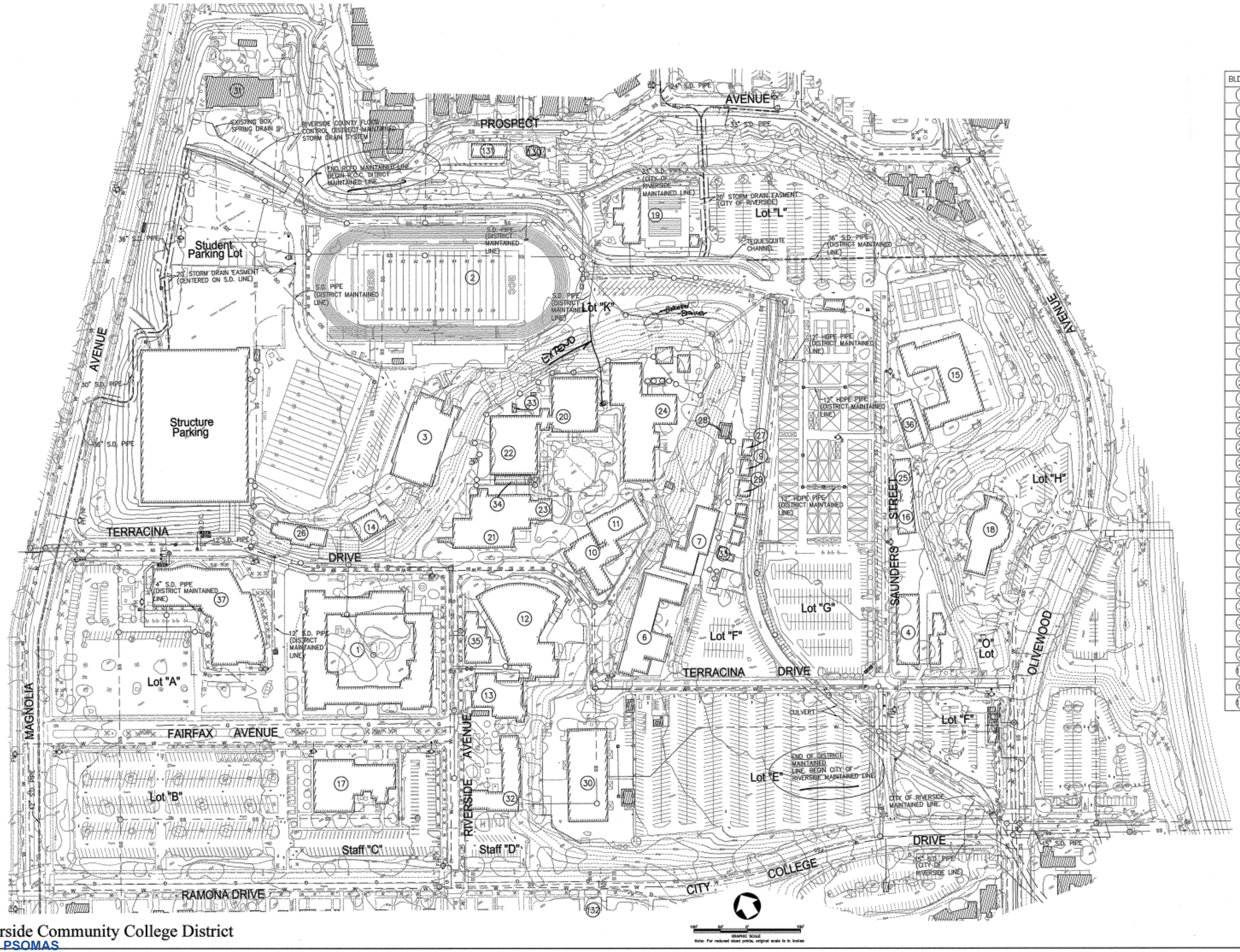
NEW SEWER
- REPLACEMENT
- NOT RELINED
- NOT SUMMER PROJECT

8/10/09 SITE WALK

BK - SET 8/10/09

Riverside City Campus
Existing SSWR Exhibit
PSOMAS
DATE: 7-27-2009 REVISED ON:
JOB No: 18CC020100 SHEET 1 OF 1

Riverside Community College District



BLDG #	BUILDING NAME
1	QUADRANGLE
2	STADIUM
3	WHEELOCK GYM
4	MAINTENANCE SHOP
5	MAINTENANCE PT SHOP
6	TECHNOLOGY A
7	TECHNOLOGY B
9	SAFETY/SECURITY C
10	ADMISSIONS COUNSEL
11	DATA PROCESSING
12	LANDIS AUDITORIUM
13	MUSIC BUILDING
14	ART BUILDING
15	HUNTLEY GYM
16	MAIN WAREHOUSE
17	ADMINISTRATION
18	COSMETOLOGY
19	CUTTER POOL
20	LIFE SCIENCE
21	MLK HIGH TECH CENTER
22	PHYSICAL SCIENCE
23	PLANETARIUM
24	STUDENT CENTER
25	WAREHOUSE ANNEX B
26	CERAMICS SCULPTURE
27	ATHLETICS CENTER
28	CAMPUS POLICE/SAFETY
29	PORTABLE 3
30	AUTO TECHNOLOGY
31	CHILD DEVELOPMENT
32	BUSINESS EDUCATION
33	GREENHOUSE
34	ASSESSMENT/PLACEMENT
35	MUSIC HALL
36	PILATES
37	DIGITAL LIBRARY "A" AND "B"
130	COLLAGE HOUSE
131	NORTH HALL/APARTMENTS
132	ALUMI HOUSE

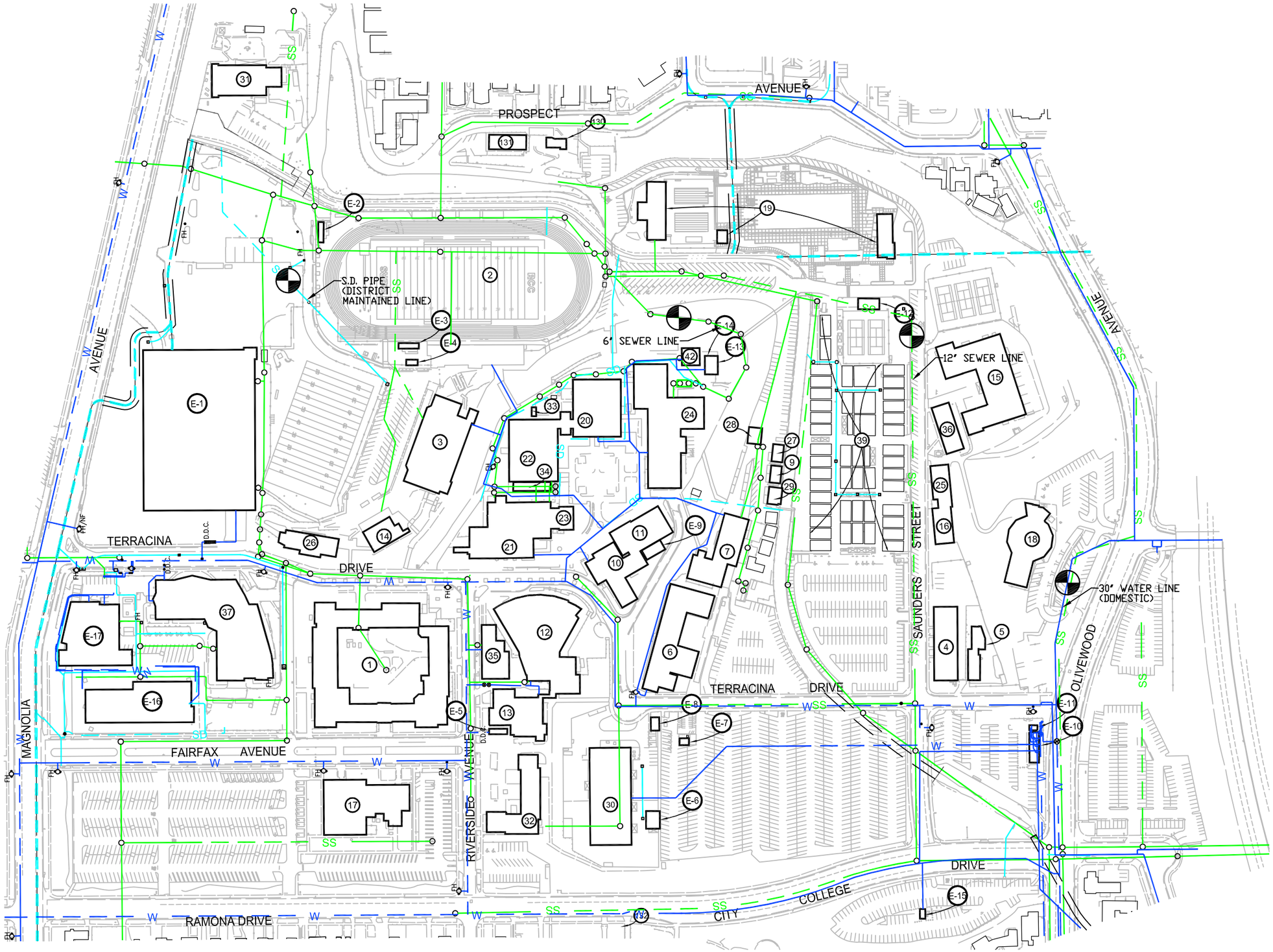
8/10/09 SITE WALK

- SD CHANNEL / MAINT.

8/10/09 BK - SET

Riverside Community College District

Riverside City Campus
Existing SD Exhibit
PSOMAS
DATE: 7-27-2009 REVISED ON:
JOB No:18CC020100 SHEET 1 OF 1



LEGEND

- POTHOLE LOCATION
- SS — SEWER LINE
- W — DOMESTIC WATER LINE
- SD — STORM DRAIN LINE

220' 110' 0' 220'

GRAPHIC SCALE

Note: For reduced sized prints, original scale is in inches

Riverside City Campus Pothole Locations Exhibit

PSOMAS

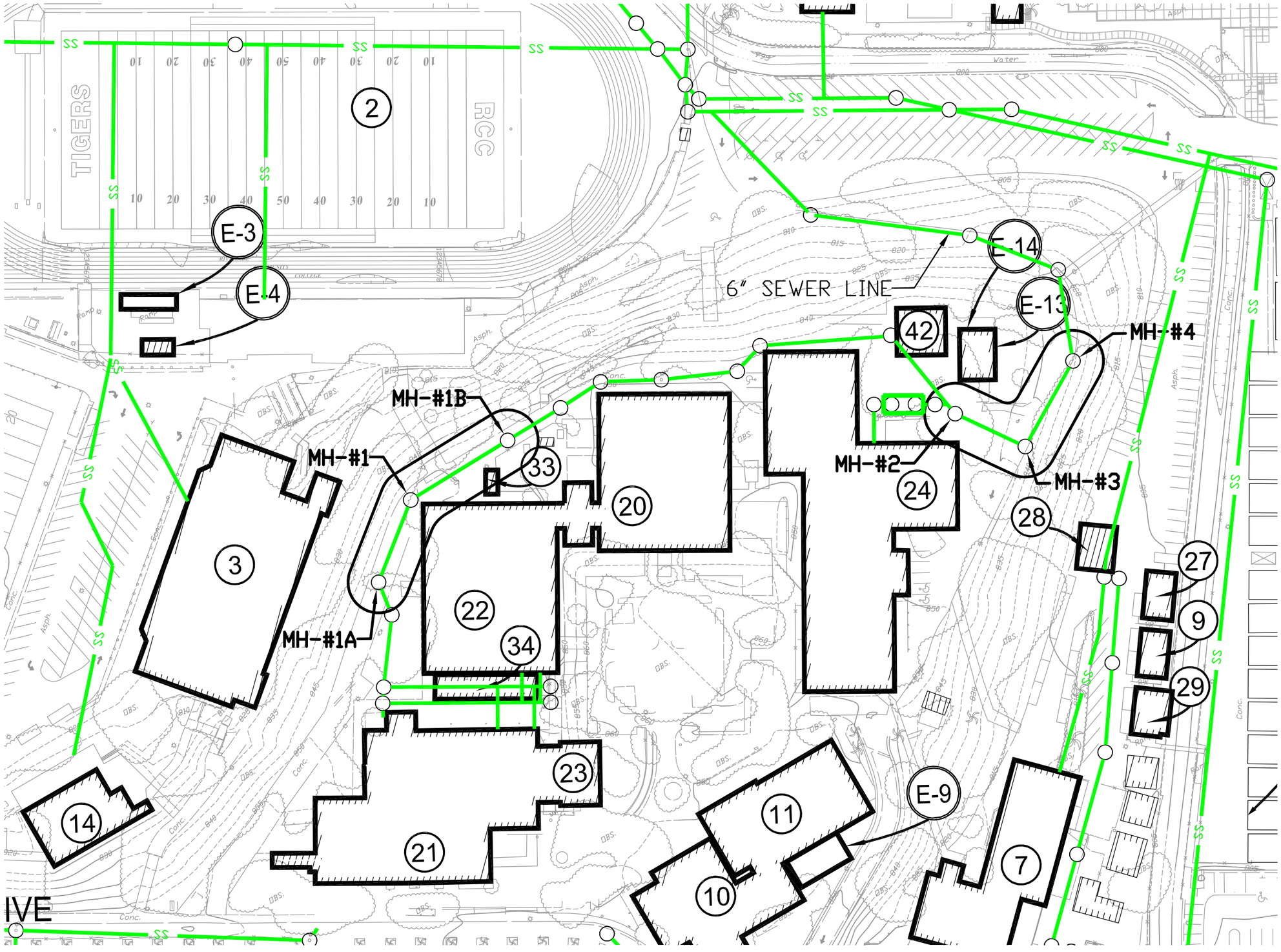
DATE: 8-19-09 REVISED ON: 6-1-10

JOB No:1RCC020100

SHEET 1 OF 1

Riverside Community College District

Plotted: 06/01/2010 11:53:23.39 | Drawing: \\RIVERSIDE1\Projects\1RCC020100(RiversideTeamFilesOnly)\ENGR\EXHIB\RC_Pothole_Exhibit.dwg | Layout: 11X17 | By: mandersen



LEGEND:

- VIDEO LOCATION
- SS — SEWER LINE

GENERAL NOTES:

1. SEE ADVANCED SEWER TECHNOLOGIES' (AST) SEWER INSPECTION REPORT DATED 3-27-10 FOR INSPECTION RESULTS.

80' 40' 0' 80'
GRAPHIC SCALE
Note: For reduced sized prints, original scale is in inches

Riverside City Campus Videography Location Exhibit

PSOMAS

DATE: 8-19-09 REVISED ON: 4-29-10
JOB No:1RCC020100
SHEET 1 OF 1

Riverside Community College District

APPENDIX B

Prioritized List and Summary of All Proposed Recommendations

	PRIORITIZED LIST AND SUMMARY OF PROPOSED RECOMMENDATIONS	Estimated Construction Cost
SECTION 1 – SEWER SYSTEM -Page 7		
1	Replace or repair damaged sewer lines that were identified in the two 400-ft segments, especially in the sloped areas. Any sewer leaks in these areas could provide potential hillside failures in these graded areas.	
2	Tree removal or sewer encasement may be required to eliminate future damage from tree roots.	
3	Add a public sewer mainline relocation into Olivewood Avenue, due to the addition of proposed Building P-5.	
4	In order to provide a clear site for future development, remove the existing sanitary sewer mains and 4-inch laterals currently serving any existing buildings to be demolished. Existing systems can be cut and capped at the existing manholes.	
5	It is recommended that the college continue to further investigate the existing campus wide pipe condition and capacity to provide further recommendations for improvements as the campus expands.	
6	Any recommendations should be coordinated with the City of Riverside Water Public Works Department to ensure that they are incorporated into the City Sewer Master plan.	
	SUBTOTAL:	**$407K**
SECTION 2 – WATER SYSTEM - Page 11		
1	Relocate 12-inch (City of Riverside) main domestic water service loop to avoid proposed Building P-6.	
2	Relocate 30-inch transmission (City of Riverside) main into Olivewood Avenue to avoid the proposed Building P-5.	
3	Remove and/or relocate existing domestic water or fire water pipes that may be in conflict with new building footprints. Mainline water systems can be cut and capped at the proposed project limits.	
4	Install new fire hydrants as needed within 300 feet of proposed buildings per requirements.	
5	Review the California Building Code requirements for Fire service with the addition of each proposed building, since the requirements are based upon final building type, size, height, and occupancy use.	
6	Provide individual meters at each building as they are constructed or renovated.	
	SUBTOTAL:	**$647K**
SECTION 3 – IRRIGATION WATER SYSTEM - page 14		
1	Proposed new irrigation piping shall be purple PVC pipe and maintain minimum horizontal and vertical clearances with adjacent potable water lines.	
2	Upgrade water sensor technology, as needed, during expansion projects to stay up to date on water saving technological advances.	
3	Install and maintain back flow prevention devices as needed to insure water quality safety.	
4	Provide individual irrigation meters for each landscape zone.	
	SUBTOTAL:	**$839K**
SECTION 4 – STORM DRAIN SYSTEM - Page 15		
1	Relocation of the east-west mainline that leaves Olivewood Avenue and is in conflict with proposed Building P-2.	
2	The ultimate conversion of the existing open topped concrete trapezoidal channel to a closed box culvert will allow the campus increased access opportunities and additional development space.	
	SUBTOTAL:	**$3,148K**
SECTION 5 – CHILLED WATER SYSTEM - Page 18		
1	New buildings should be provided with air handlers instead of fan coils to make better use of air side economizers and also greater delta T's through the chilled water coils. This is also essential for maximizing the capacity of the Chilled Water Thermal Energy Storage Tanks.	
2	For energy efficiency reasons, water cooled chilled water plants are proposed. A comparison of full load and part load efficiencies is noted for current state of the art chillers.	
3	The campus is geographically divided into an upper campus and a lower campus. It makes sense to divide the central plants in a similar manner. We have shown the proposed central plant for the upper campus to be incorporated with the proposed parking structure P-8 The chillers and pumps would be on the lower floors of the parking structure. The cooling tower would be on the upper level.	
4	The use of Thermal Energy Storage (TES) tanks is also recommended. The storage tanks can take advantage of cooler temperatures during off peak hours and possibly favorable electric rates during these hours. They will reduce the overall capacity of the chillers in the plant by taking care of peak loads.	
5	The proposed location of the central plant for the lower campus is shown behind the proposed location for the Maintenance office and Maintenance Shipping (P-4 and P-5) near the current cosmetology building. Another option would be to locate it down on the flats where the re-locatable units now are (Lovekin Complex).	
6	Piping distribution system will need to be installed in roadways or parking areas to allow placement of new buildings without being over the proposed pipe locations. See the site plan (Figure 9b) for the proposed main pipe routing.	
7	All new buildings that are fed from the central system should have BTU metering capabilities that tie into a central DDC system with strong energy management capabilities. Similarly, existing buildings should be retrofitted with new BTU monitoring capabilities.	
8	The lower campus system could be combined with the upper campus system, but the pipe would have to cross the canal. The cost of the extra piping from the upper campus system would have to be balanced against the cost of another central plant for the lower campus. The lower campus could be kept independent since the buildings are more spread out compared to the upper campus.	
	SUBTOTAL:	**$2,229K**

Agreed and Accepted By: _____

	PRIORITIZED LIST AND SUMMARY OF PROPOSED RECOMMENDATIONS	Estimated Construction Cost
SECTION 6 – HEATING WATER SYSTEM - Page 20		
1	For those smaller buildings that have electric heat, we would recommend changing out strip heat to heat pumps. Heat pumps are three to four times more efficient than straight electric heat.	
2	It is more economical to heat smaller buildings with packaged gas furnaces than to provide a boiler system. This will need to be studied on a case by case basis. It is probably not economical to change existing buildings from gas heat to hot water, unless it is a larger building. Again, this would need to e evaluated by building.	
3	It is recommended to localize the generation of heating hot water rather than having all heat generation in one location. There is no improvement in overall system efficiency by a centralized heating water system. Current SCAQMD regulations limit economical boiler sizing to less than 2.0 million BTU per boiler.	
4	For heating water systems, pumping and piping systems should take advantage of higher temperature difference coils to allow for lower flows. This provides more efficient pumping systems.	
5	Heating water pumps should have VFD's and all control valves should be two way so that reduced flow at part load conditions can further save pumping energy. However, VFD's below 3 hp are not as economically beneficial and therefore are not recommended.	
	SUBTOTAL:	**$100K**
SECTION 7 – ELECTRICAL SYSTEM - Page 22		
1	To avoid the single point of service and to combine RPU electric meters to obtain a lower utility rate,it is recommended that a new campus owned primary 15kV metering section and switchgear be installed We recommend a new 12 KV loop system be installed with (2) loops to serve each building on the campus.	
2	Existing fuse size and type shall be determined. Based upon this information, a fused coordination study shall be done and a fuse replacement program be implemented.	
3	Testing of the existing 50-year old grounding system should be conducted and a Short Circuit/Arc Flash study be conducted to coordinate the existing system.	
4	We recommend the use of aluminum cables rather than copper cables. Aluminum cables shall be used for all medium voltage cables and low voltage cables larger than 4/0 in an effort to save money.	
5	We recommend the use of a wireless multi-metering system. The system should have an energy software package for energy analysis, 3 phase wireless meter transceivers for wireless metering and be capable of metering at 480 volts as well as 208 volts.	
6	That the system shall be regularly maintained with yearly inspection of all OFC and splice boxes.	
7	Check, tighten and torque all conductor connections.	
8	One switchboard has three separate keys; one for each compartment. It is highly recommended that all the electrical equipment padlocks be changed to single key. There are approximately 60 different keys. It took a half an hour and three trips to the shop to open on lock.	
	SITE LIGHTING SYSTEM DESCRIPTION	
1	All existing post top fixtures, Globe fixtures and other decorative fixtures in the campus are replaced with a common cut off decorative fixture that will provide a visually comfortable environment and aesthetically blend with the architectural buildings in the campus. The cut off fixtures would also prevent glare. These new fixtures will be spaced to meet the current IES recommended light levels for pathways.	
2	A single lamp source is selected for illuminating roadways, parking lots, and pathways leading to the campus buildings.Since a high-pressure sodium lamp has a lower color temperature and provides a warm color, we recommend that this lamp be standardized for campus exterior lighting.	
3	Illumination levels of all roadways and parking lots in the campus are designed to meet the current recommended light levels by IES (an average of at least 0.5fc with a uniformity ratio of 4:1). This would include addition/ deletion of light fixtures (based on foot-candle readings) to achieve the IES comfortable environment, but also a safe environment, since people always associate higher or greater luminance with safer surroundings	
4	Provide a lighting control panel and photocells to control all light fixtures at the same time. If a control panel is not a viable solution then replace the existing time clocks with astronomical time clocks.	
5	The tennis courts north of the Huntley Gym need to be controlled by an astronomical time clock and photocell.	
6	Metal Halide lamps are used to highlight the architecture of buildings owing to their high color rendering index and high color temperature.	
7	Replace all burned out lamps and ballasts	
8	Trim the trees and obstructions	
	SUBTOTAL:	**$4,249K**
SECTION 8 – TELECOMMUNICATIONS - Page 40		
1	Adopt Telecommunication Infrastructure Design Standards. The Telecommunication Infrastructure Design Standards document is intended to provide the Architect, Electrical Engineer, HVAC Consultant, Civil Consultant and Telecommunication Consultant with the basic requirements and standards for network cabling infrastructure in a new or remodeled facility at the City College campus site. Telecommunication Infrastructure Design Standards are designed using standards and materials that will provide the greatest longevity and function for current and future application areas. Standardization of components, installation methods and labeling will ensure that all cabling installation projects have a consistent functionality, and operational appearance.	
2	Provide new conduits systems to include Manhole, Pull Boxes, Hand-holes and building penetrations. This should be included in the first phase of constructions.	
3	Provide new fiber optic cables from the new (MDF/NOC) to each building on campus. Recommend minimum fiber optic cables to be 24 strands single mode	
4	Provide for new copper cable for all buildings on the campus. Copper cable to be sized .5 pair for each voice outlet.	
5	For the Sports Complex and other buildings that are away from the main campus, provide for a de-centralized network for the voice and data networks. This would require space that meets the EIA/TIA telecommunications design standards.	
	SUBTOTAL:	**$4,025K**

Agreed and Accepted By: _____

	PRIORITIZED LIST AND SUMMARY OF PROPOSED RECOMMENDATIONS	Estimated Construction Cost
SECTION 9 – CENTRAL PLANT - Page 45		
1	We recommend converting existing DX buildings to chilled water cooling where practical, and connecting to stub-outs from the main piping runs. It may be more economical to leave some smaller buildings as they are and not connect them to the central plant and piping system. These decisions will have to be made on a case by case basis after careful review and analysis.	
2	We recommend water cooled chillers compared to air-cooled chillers to improve overall system efficiency. We recommend combining some of the buildings into common systems where it makes geographical sense. We have divided the buildings into upper campus buildings and lower campus buildings.	
3	We will also recommend the use of thermal energy storage tanks in order to reduce overall chiller plant capacity and to improve overall plant efficiency. Thermal storage tanks will discharge during peak cooling periods. They will re-generate during off-peak hours whe the ambient air is cooler and cooling loads are less. There may be some incentives from the utility to use electricity during off- peak hours.	
4	We recommend designing and installing the central plants in preparation for conversion and connection of buildings to a central plant.	
5	We recommend designing and installing new distribution piping with stub-outs for each building, as shown on the site plan.	
6	It is not recommended to convert buildings to a central heating water plant. Localized heating is preferred because there is no advantage to having centralized heating water. Only where buildings are clustered does it make sense to share a central boiler system. Th Business Education Building, Music Building and the Performing Arts Building are an example of a cluster of buildings where it would make sense to have a common heating water system. The Physical Science and Life Science Buildings is another example.	
	SUBTOTAL:	**$7,378K**
SECTION 10 – NATURAL GAS SYSTEM - Page 50		
1	Gas meter system #2 should be upgraded to accommodate the connected loads.	
2	Earthquake valves for emergency gas supply shut-off should be provided at each meter location on the downstream side of the regulator.	
3	We also recommend that all buildings be sub-metered to monitor gas consumption and get a clear understanding of the total gas energy being spent at each of the buildings. This will help the campus better manage their energy budget and thus the operating costs at the campus.	
	SUBTOTAL:	**$644K**

Agreed and Accepted By: _____

APPENDIX C

Conceptual Opinion of Cost

RIVERSIDE COMMUNITY COLLEGE DISTRICT

INFRASTRUCTURE UPGRADE PROJECT
UTILITY PROGRAM
RIVERSIDE CITY CAMPUS

CONCEPTUAL OPINION OF COST

JYI# V1716A

MAY 27, 2010

PREPARED FOR:

PSOMAS

BY:

JACOBUS & YUANG, INC.
6477 Telephone Rd.
Suite #10
Ventura, CA 93003
Tel (213) 688-1341 or (805) 339-9434

Prepared by Jacobus & Yuang, Inc.

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM		**JYI #:**	**V1716A**
LOCATION : RIVERSIDE, CA		**DATE:**	**27-May-10**
CLIENT: PSOMAS ASSOCIATES		**REVISED:**	
DESCRIPTION: CONCEPTUAL OPINION OF COST			

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	SUMMARY OF ESTIMATE				**$**
1.0	SANITARY SEWER SYSTEM	1,230	LF	331.37	407,582
2.0	WATER SYSTEM	980	LF	660.75	647,536
3.0	IRRIGATION WATER SYSTEM	804,750	SF	1.04	839,869
4.0	STORM DRAIN SYSTEM	1,840	LF	1,710.98	3,148,198
5.0	CHILLED WATER SYSTEM	16,400	LF	135.95	2,229,545
6.0	HEATING WATER SYSTEM	11	EA	9,090.91	100,000
7.0	ELECTRICAL SYSTEM	12,570	LF	338.04	4,249,102
8.0	TELECOMMUNICATIONS	12,750	LF	315.72	4,025,457
9.0	CENTRAL PLANT	8,000	SF	922.35	7,378,761
10.0	NATURAL GAS SYSTEM	6080	LF	105.93	644,085
11.0	MISCELLANEOUS	1	LS	100,000.00	100,000
	SUBTOTAL				**23,770,134**
12.0	PRORATES:				
12.1	GENERAL CONDITIONS	8.80%			2,091,772
12.2	ESCALATION	3.82%			987,285
12.3	MARKET FACTOR - See Below				-
12.4	TRAFFIC MITIGATION	0.50%			134,246
12.5	DESIGN CONTINGENCY	15.00%			4,047,516
12.6	ESTIMATE CONTINGENCY	10.00%			2,893,918
	SUBTOTAL				**33,924,871**
12.7	BONDS + INSURANCES	2.00%			678,497
12.8	CONTRACTOR'S FEE	6.00%			2,076,202
	TOTAL OF ESTIMATED PRICE				**36,679,570**
	MARKET FACTOR	-5.00%			**(1,833,978)**
	TOTAL ESTIMATE CONSTRUCTION COST INCLUDING MARKET FACTOR				**34,845,591**

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM	**JYI #:**	**V1716A**
LOCATION : RIVERSIDE, CA	**DATE:**	**27-May-10**
CLIENT: PSOMAS ASSOCIATES	**REVISED:**	
DESCRIPTION: CONCEPTUAL OPINION OF COST		

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL

ESCALATION CALCULATION

BASE MONTH	May-10
CONSTRUCTION START MONTH	Feb-11
CONSTRUCTION DURATION (MONTHS)	14
MID POINT OF CONSTRUCTION	Sep-11
% ANNUAL ESCALATION	3.00%
ALLOWANCE FOR ESCALATION (TO MIDPOINT OF CONSTRUCTION)	3.82%

NOTES:

1) PRICES ASSUME COMPETITIVE BIDS FROM AT LEAST 4-5 RESPONSIBLE GENERAL CONTRACTORS
2) ESTIMATED COSTS ARE BASED ON PREVAILING WAGE RATES
3) NO COST ESCALATION IS INCLUDED BEYOND THE ASSUMPTIONS SHOWN ABOVE. IF THE PROJECT IS PROTRACTED BEYOND THE MID POINT SHOWN ABOVE, ADJUSTMENT NEEDS TO BE MADE TO THE ESTIMATE FOR INFLATIONARY & MARKET CONDITIONS AT THE TIME
4) THE ESTIMATE REFLECTS TYPICAL GENERAL CONTRACTOR'S COSTS FOR THE PROJECT, & DOES NOT INCLUDE SOFT COSTS SUCH AS A/E FEES, CONSTRUCTION & PROJECT MANAGEMENT FEES, CONSTRUCTION CONTINGENCY, OWNER TESTING & INSPECTION & QUALITY MANAGEMENT COSTS, LEGAL FEES, FINANCING CHARGES, OR ANY OTHER TYPICAL SOFT COSTS - IT IS NECESSARY FOR THE USER TO ADD SUCH SOFT COSTS, TO DETERMINE THE TOTAL PROJECT BUDGET.
5) PRICES ARE BASED ON PREVAILING WAGE RATES
6) ESTIMATE IS BASED ON UTILITY PROGRAM AS PREPARED BY PSOMAS, DATED 4/26, 2010 AND RECEIVED 5/12/2010.

SPECIFIC EXCLUSIONS

1) FIRE SPRINKLER RETROFIT OF BUILDINGS IS NOT INCLUDED, BUT LATERALS, VALVING & METERS ARE INCLUDED
2) NO COSTS ARE INCLUDED FOR ASBESTOS & OTHER HAZARDOUS MATERIAL ABATEMENT
3) RETROFIT (E) BUILDINGS W/ BTU MONITORING CAPABILITIES & TIE TO CENTRAL DDC SYSTEM IS NOT INCLUDED.
4) COST TO CONVERT (E) DX BUILDINGS TO CHILLED WATER COOLING, (1) @ LOWER CAMPUS & (10) @ UPPER CAMPUS IS NOT INCLUDED
5) COST FOR REPLACING WALL METAL HALIDES IN BUILDINGS IS NOT INCLUDED
6) COST TO UPGRADE LIGHTING, HVAC, & SECURITY ACCESS TO (E) BUILDING BDF's IS NOT INCLUDED
7) HIGHER DESIGN AND ESTIMATE CONTINGENCIES ARE USED TO COVER UNCERTAINTY OF SCOPE. THE COST ESTIMATE WILL CHANGE WHEN MORE DEFINED SCOPE AND DRAWINGS BECOME AVAILABLE.
8) AIR-HANDLERS TO NEW BUILDINGS & WATER COOLED PLANT UPGRADES IS N.I.C.

SPECIFIC INCLUSIONS

1) BTU METERING CAPABILITIES TO PROPOSED BUILDINGS & TIE TO CENTRAL DDC SYSTEM W/ ENERGY MANAGEMENT CAPABILITIES IS INCLUDED, & ASSUMES THAT ALL 21 BUILDINGS FOR WHICH BTU MONITORING IS REQUIRED IS LOOPED WITH 1-1/2" PVC CONDUIT WITH CONDUCTORS TO LINK CAMPUS EMS
2) NEW BOX CULVERT IS ASSUMED TO BE +/- 16'W X 8' D

Prepared by Jacobus & Yuang, Inc.

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM	**JYI #:**	**V1716A**
LOCATION : RIVERSIDE, CA	**DATE:**	**27-May-10**
CLIENT: PSOMAS ASSOCIATES	**REVISED:**	
DESCRIPTION: CONCEPTUAL OPINION OF COST		

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL

OPINION OF COST

An Opinion of Cost is prepared from a survey of the quantities of work-items prepared from written or drawn information provided at the Conceptual or Schematic stage of the design.

Historical costs, information provided by contractors and suppliers, plus judgmental evaluation by the Estimator are used as appropriate as the basis for pricing.

Allowances as appropriate will be included for items of work which are not indicated on the design documents, provided that the Estimator is made aware of them, or which, in the judgement of the Estimator, are required for completion of the work.

JYI cannot, however, be responsible for items or work of an unusual nature of which we have not been informed.

BID

An offer to enter a contract to perform work for a fixed sum, to be completed within a limited period of time.

Jacobus & Yuang, Inc., however, cannot and does not guarantee that bids, or cost proposals for construction will not vary from this Opinion of Cost or Estimate.

MARKET CONDITIONS

In the current market conditions for construction, our experience shows the following results on competitive bids, as a differential from JYI final estimates:

Number of bids	Percentage Differential
1.....	+ 25 to 50%
2-3.....	+ 10 to 25%
4-5.....	+ 0 to 10%
6-7.....	+ 0 to - 5%
8 or more....	+ 0 to -15%

Accordingly, it is extremely important to ensure that a minimum of 4-5 valid bids are received

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM — **JYI #: V1716A**
LOCATION : RIVERSIDE, CA — **DATE: 27-May-10**
CLIENT: PSOMAS ASSOCIATES — **REVISED:**
DESCRIPTION: CONCEPTUAL OPINION OF COST

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
1.0	SANITARY SEWER SYSTEM				$
	REPLACE (E) DAMAGED SEWER LINES NORTH OF E-13 & E-14 BUILDINGS				
	SAWCUT (E) PAVING	360	LF	4.50	1,620
	DEMO/HAUL (E) PAVING DEBRIS	900	SF	4.00	3,600
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	1,320	SF	1.00	1,320
	POD/REMOVE (E) 27" SEWER LINE	400	LF	45.64	18,256
	NEW 27" SEWER LINE	400	LF	261.00	104,400
	P.O.C. TO EXISTING, 27"/27"	2	EA	1,950.00	3,900
	RESTORE PAVING, MATCH EXISTING	900	SF	5.00	4,500
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	1,320	SF	5.50	7,260
	REPLACE (E) DAMAGED SEWER LINES NORTH-WEST ALONG BUILDING #22				
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	1,600	SF	1.00	1,600
	POD/REMOVE (E) 8" SEWER LINE	400	LF	10.46	4,184
	NEW 8" SEWER LINE	400	LF	40.03	16,012
	P.O.C. TO EXISTING, 8"/8"	2	EA	812.50	1,625
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	1,600	SF	5.50	8,800
	TREE REMOVAL OR SEWER ENCASEMENT				
	NOTE: NO TREE COUNT FROM REPORT, HENCE JYI SELECTED SEWER ENCASEMENT				
	ENCASEMENT TO 8" SEWER PIPE	400	LF	14.81	5,924
	ENCASEMENT TO 27" SEWER PIPE	400	LF	33.72	13,488
	SEWER MAINLINE RELOCATION INTO OLIVEWOOD AVENUE				
	POD/REMOVE (E) 6" SEWER PIPE, SAWCUT & REMOVE (E) PAVING THEN RESTORE BACK	500	LF	34.70	17,350
	SAWCUT (E) ROADWAY PAVING	860	LF	4.50	3,870
	DEMO/HAUL (E) PAVING DEBRIS	1,720	SF	5.00	8,600
	NEW 6" SEWER LINE	430	LF	31.71	13,635
	P.O.C. TO EXISTING, 6"/6"	2	EA	650.00	1,300
	RESTORE ROADWAY PAVING, MATCH EXISTING	430	SF	7.00	3,010
	REMOVAL OF (E) SEWER MAINS & LATERALS FROM BUILDINGS TO BE DEMOLISHED				
	POD/REMOVE (E) 4" SEWER LATERALS + SAWCUT & REMOVE (E) PAVING, NO RESTORATION	460	LF	28.49	13,105
	POD/REMOVE (E) 6" SEWER MAINS + SAWCUT & REMOVE (E) PAVING, NO RESTORATION	630	LF	29.53	18,604
	POD/REMOVE (E) 8" SEWER MAINS + SAWCUT & REMOVE (E) PAVING, NO RESTORATION	700	LF	30.53	21,371
	REMOVE (E) SEWER MANHOLE + SAWCUT & REMOVE (E) PAVING, NO RESTORATION	1	EA	1,188.00	1,188
	CAP (E) SEWER PIPES	10	EA	250.00	2,500
	SITE SEWER FURTHER INVESTIGATION				
	FURTHER INVESTIGATION OF (E) CAMPUS WIDE SEWER PIPE CONDITION & CAPACITY TO PROVIDE FURTHER RECOMMENDATIONS FOR IMPROVEMENTS AS THE CAMPUS EXPANDS	1	LS	11,000.00	11,000

Prepared by Jacobus & Yuang, Inc.

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM — **JYI #: V1716A**
LOCATION : RIVERSIDE, CA — **DATE: 27-May-10**
CLIENT: PSOMAS ASSOCIATES — **REVISED:**
DESCRIPTION: CONCEPTUAL OPINION OF COST

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	ALLOWANCE FOR NEW BUILDING LATERAL PIPES, ASSUME 4"	500	LF	28.63	14,315
	ALLOWANCE FOR GRADE CLEANOUT	10	EA	325.00	3,250
	STUB & CAP FOR PROPOSED BUILDINGS	10	EA	375.00	3,750
	MISCELLANEOUS WORK				
	MISC. SEWER PIPING SYSTEM	1	LS	41,667.20	41,667
	PERMITS & TESTING	1	LS	15,051.13	15,051
	MISC. DEMO WORK	1	LS	7,525.57	7,526
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	5,000.00	5,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	5,000.00	5,000
	SUBTOTAL				**407,582**
2.0	WATER SYSTEM				$
	RELOCATE (E) 12" MAIN DOMESTIC WATER SERVICE LOOP TO AVOID PROPOSED BUILDING P-6				
	POD/REMOVE (E) 12" WATER PIPE, SAWCUT/REMOVE (E) PAVING THEN RESTORE BACK	270	LF	51.01	13,773
	SAWCUT (E) ASPHALT PAVING	1,040	LF	4.50	4,680
	DEMO/HAUL (E) PAVING DEBRIS	2,080	SF	5.00	10,400
	NEW 12" WATER PIPE	520	LF	83.41	43,373
	P.O.C. TO EXISTING, 12"/12"	2	EA	1,137.50	2,275
	THRUST BLOCKS	4	EA	550.00	2,200
	RESTORE PAVING, MATCH EXISTING	2,080	SF	5.00	10,400
	RELOCATE (E) 30" TRANSMISSION MAIN INTO OLIWOOD AVENUE TO AVOID PROPOSED BUILDING P-5				
	POD/REMOVE (E) 12" WATER PIPE, SAWCUT/REMOVE (E) PAVING THEN RESTORE BACK	340	LF	36.25	12,325
	SAWCUT (E) ROADWAY PAVING	680	LF	4.50	3,060
	DEMO/HAUL (E) PAVING DEBRIS	2,040	SF	5.00	10,200
	NEW 30" WATER PIPE	310	LF	154.96	48,038
	P.O.C. TO EXISTING, 30"/30"	2	EA	1,950.00	3,900
	THRUST BLOCKS	2	EA	750.00	1,500
	RESTORE PAVING, MATCH EXISTING	2,040	SF	5.00	10,200
	REMOVE AND/OR RELOCATE (E) DOMESTIC WATER OR FIRE WATER PIPES THAT ARE IN CONFLICT WITH NEW BUILDING				
	POD/REMOVE (E) BUILDING LATERAL PIPES, SAWCUT/REMOVE (E) PAVING THEN RESTORE BACK	940	LF	48.37	45,468
	POD/REMOVE (E) 10" WATER PIPE, SAWCUT/REMOVE (E) PAVING THEN RESTORE BACK	240	LF	51.07	12,257
	CAP (E) PIPES	14	EA	375.00	5,250
	INSTALL (N) FIRE HYDRANTS AS NEEDED WITHIN 300 FT OF PROPOSED BUILDINGS				
	SAWCUT (E) ASPHALT PAVING	300	LF	4.50	1,350
	DEMO/HAUL (E) PAVING DEBRIS	450	SF	5.00	2,250
	FIRE HYDRANT	3	EA	2,750.00	8,250
	NEW 6" FIRE WATER PIPE	150	LF	46.34	6,951
	THRUST BLOCKS	6	EA	550.00	3,300
	RESTORE PAVING, MATCH EXISTING	450	SF	5.00	2,250

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DESCRIPTION: CONCEPTUAL OPINION OF COST

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	REVIEW THE CALIFORNIA BUILDING CODE REQUIREMENTS FOR FIRE SERVICE WITH THE ADDITION OF EACH PROPOSED BUILDING				-
	FIRE SERVICE TO PROPOSED BUILDING (ASSUME AV. 4" Ø X 200' + BFP + FDC)	10	EA	13,002.00	130,020
	INDIVIDUAL METERS FOR EACH PROPOSED BUILDINGS				
	WATER SUB-METERS	10	EA	7,325.00	73,250
	ALLOWANCE FOR RPBFP/SOV ASSEMBLY	10	EA	4,000.00	40,000
	BUILDING LATERAL PIPES, ASSUME 4"	500	LF	39.26	19,630
	MISCELLANEOUS WORK				
	MISC. WATER PIPING SYSTEM/VALVES & SPECIALTIES	1	LS	65,818.64	65,819
	TESTING & STERILIZATION	1	LS	29,618.39	29,618
	MISC. DEMO WORK	1	LS	15,549.65	15,550
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	5,000.00	5,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	5,000.00	5,000
	SUBTOTAL			-	**647,536**
3.0	IRRIGATION WATER SYSTEM				$
	IRRIGATION WATER IMPROVEMENTS				
	RELOCATION & DEMOLITION OF VARIOUS (E) IRRIGATION WATER LINES IN ORDER TO ACCOMMODATE THE FUTURE DEVELOPMENTS	1	LS	-	INCLUDED
	NEW IRRIGATION PIPING, PURPLE PVC	1	LS	-	INCLUDED
	UPGRADE WATER SENSOR TECHNOLOGY	1	LS	-	INCLUDED
	INSTALL & MAINTAIN BACKFLOW PREVENTION DEVICES	1	LS	-	INCLUDED
	PROVIDE INDIVIDUAL IRRIGATION METERS FOR EACH LANDSCAPE ZONE	1	LS	-	INCLUDED
	LUMP SUM COST FOR THE ABOVE SCOPES (APPROXIMATE AREA OF PLANTING & IRRIGATION)	804,750	SF	1.00	804,750
	MISCELLANEOUS WORK				
	MISC. IRRIGATION WATER PIPING SYSTEM	1	LS	-	INCLUDED
	PERMITS & TESTING	1	LS	20,118.75	20,119
	MISC. DEMO WORK	1	LS	5,000.00	5,000
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	5,000.00	5,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	5,000.00	5,000
					839,869
4.0	STORM DRAIN SYSTEM				
	RELOCATION OF EAST-WEST MAINLINE				
	DEMO				
	POD/REMOVE (E) 36" STORMWATER PIPE	520	LF	26.75	13,910
	SAWCUT (E) ASPHALT PAVING	280	LF	4.50	1,260
	DEMO/HAUL (E) PAVING DEBRIS	1,680	SF	5.00	8,400
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	1,440	SF	1.00	1,440
	RESTORE PAVING, MATCH EXISTING	1,680	SF	5.00	8,400
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	1,440	SF	5.50	7,920
	RELOCATION				

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ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	SAWCUT (E) ASPHALT PAVING	800	LF	4.50	3,600
	DEMO/HAUL (E) PAVING DEBRIS	2,400	SF	5.00	12,000
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	720	SF	1.00	720
	NEW 36" STORMWATER PIPE	520	LF	176.87	91,972
	P.O.C. TO EXISTING, 36"/36"	1	EA	2,437.50	2,438
	P.O.C. TO OPEN CHANNEL	1	EA	1,625.00	1,625
	RESTORE PAVING, MATCH EXISTING	2,400	SF	5.00	12,000
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	720	SF	5.50	3,960
	CONVERSION OF (E) OPEN TRAPEZOIDAL CHANNEL TO A CLOSED BOX CULVERT				
	DEMO				
	DEMO (E) OPEN TRAPEZOIDAL CONCRETE CHANNEL, COMPLETE, APPROX 24' WIDE	1,320	LF	150.00	198,000
	P.O.D. STORM LATERAL PIPES	5	EA	1,462.50	7,313
	IMPROVEMENTS				
	NEW BOX CULVERT, +/- 16'W X say 8' D	1,320	LF	1,920.00	2,534,400
	P.O.C. (E) STORM LATERAL PIPES	5	EA	1,950.00	9,750
	MISCELLANEOUS WORK				
	MISC. STORM WATER PIPING SYSTEM	1	LS	137,671.13	137,671
	PERMITS & TESTING	1	LS	76,419.46	76,419
	MISC. DEMO WORK	1	LS	5,000.00	5,000
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	5,000.00	5,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	5,000.00	5,000
	SUBTOTAL				**3,148,198**
5.0	CHILLED WATER SYSTEM				
	AIR-HANDLERS TO NEW BUILDINGS				
	AHU's	10	EA	-	**N.I.C.**
	WATER-COOLED CHILLED WATER PLANTS				
	INCREASE EFFICIENCY OF PUMPING SYSTEM, INSTALL 2-WAY VALVES - EXISTING CHILLED WATER SYSTEM	4	LOC	3,500.00	**N.I.C.**
	VFD TO PUMPS - EXISTING CHILLED WATER SYSTEM	4	LOC	11,550.00	**N.I.C.**
	PROPOSED CHILLED WATER PLANTS	1	LS	-	**N.I.C.**
	LOWER AREA CHILLED WATER PIPE DISTRIBUTION				
	SAWCUT (E) ASPHALT PAVING	2,880	LF	4.50	12,960
	DEMO/HAUL (E) PAVING DEBRIS	4,320	SF	5.00	21,600
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	1,440	SF	1.00	1,440
	NEW 6" CHWS PIPE + INSULATION	1,800	LF	78.40	141,120
	NEW 6" CHWR PIPE + INSULATION	1,800	LF	78.40	141,120
	POINT OF CONNECTION TO (E) BUILDING + EXTERIOR WAL PENETRATION	6	EA	1,000.00	6,000
	RESTORE PAVING, MATCH EXISTING	4,320	SF	5.00	21,600
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	1,440	SF	5.50	7,920
	UPPER AREA CHILLED WATER PIPE DISTRIBUTION				
	SAWCUT (E) ASPHALT PAVING	11,720	LF	4.50	52,740
	DEMO/HAUL (E) PAVING DEBRIS	17,580	SF	5.00	87,900
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	2,160	SF	1.00	2,160
	BLDG. LATERALS, ASSUME 6" CHWS PIPE + INSULATION	4,460	LF	78.40	349,664

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ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	BLDG. LATERALS, ASSUME 6" CHWR PIPE + INSULATION	4,460	LF	78.40	349,664
	NEW 12" CHWS PIPE + INSULATION	1,940	LF	126.84	246,070
	NEW 12" CHWR PIPE + INSULATION	1,940	LF	126.84	246,070
	POINT OF CONNECTION TO (E) BUILDING + EXTERIOR WALL PENETRATION	13	EA	1,000.00	13,000
	RESTORE PAVING, MATCH EXISTING	17,580	SF	5.00	87,900
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	2,160	SF	5.50	11,880
	POINT OF CONNECTION TO (E) BUILDING + EXTERIOR WALL PENETRATION	13	EA	1,000.00	13,000
	MISCELLANEOUS WORK				-
	BTU METERING CAPABILITIES TO PROPOSED BUILDINGS	10	EA	2,500.00	25,000
	TIE TO CENTRAL DDC SYSTEM W/ ENERGY MANAGEMENT CAPABILITIES TO 21 BUILDINGS, ASSUME 1-1/2" PC CONDUIT & CONTROL CONDUCTORS IN DUCTBANK (DUCTBANK	10,880	LF	8.82	95,962
	RETROFIT (E) BUILDINGS W/ BTU MONITORING CAPABILITIES & TIE TO CENTRAL DDC SYSTEM	11	EA	-	**N.I.C.**
	MISC. CHWS/R PIPING SYSTEM/VALVES & SPECIALTIES	1	LS	136,035.54	136,036
	PERMITS & TESTING	1	LS	103,540.22	103,540
	MISC. DEMO WORK	1	LS	10,000.00	10,000
	STUB & CAP FOR PROPOSED BUILDINGS	10	EA	1,200.00	12,000
	STUB & CAP FOR EXISTING BUILDINGS	11	EA	1,200.00	13,200
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	10,000.00	10,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	10,000.00	10,000
	SUBTOTAL				**2,229,545**
6.0	HEATING WATER SYSTEM				
	SMALL BUILDINGS THAT HAVE ELECTRIC HEAT				
	REPLACE STRIP HEAT W/ HEAT PUMP	5	LOC	-	**N.I.C.**
	EXISTING HEATING WATER PUMPS				
	NEW VFD's	6	LOC	-	**N.I.C.**
	NEW 2-WAY CONTROL VALVES	6	LOC	-	**N.I.C.**
	MISC. DEMO/REPAIR WORK, ALLOWANCE	1	LS	100,000.00	100,000
	PERMITS & TESTING	1	LS		**N.I.C.**
	SUBTOTAL				**100,000**
7.0	ELECTRICAL SYSTEM				$
	UPPER CAMPUS LOOP				
	MAIN METERBOARD				
	15 KV MAIN METERBOARD & SWITCHGEAR, 6 SECTIONS, ENCLOSED	1	EA	95,000.00	95,000
	EXTRA FOR GROUND FAULT INTERRUPTER	1	EA	14,250.00	14,250
	EXTRA FOR METERING SECTION	1	EA	40,000.00	40,000
	EQUIPMENT GROUNDING	1	EA	1,500.00	1,500
	SELECTOR SWITCH				
	SS-U1, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-U2, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-U3, NEMA-3R + PAD	1	EA	10,000.00	10,000

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PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM — **JYI #: V1716A**
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ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	SS-U4, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-U5, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-U6, NEMA-3R + PAD	1	EA	10,000.00	10,000
	EQUIPMENT GROUNDING	6	EA	750.00	4,500
	TRANSFORMERS				
	TRANSFORMER, 300 KVA + PAD	1	EA	45,625.00	45,625
	TRANSFORMER, 400 KVA + PAD	1	EA	56,625.00	56,625
	TRANSFORMER, 225 KVA, NEMA-3R + PAD	2	EA	34,875.00	69,750
	TRANSFORMER, 300 KVA, NEMA-3R + PAD	2	EA	46,125.00	92,250
	TRANSFORMER, 400 KVA, NEMA-3R + PAD	1	EA	57,150.00	57,150
	TRANSFORMER, 500 KVA, NEMA-3R + PAD	1	EA	66,150.00	66,150
	TRANSFORMER, 1000 KVA, NEMA-3R + PAD	1	EA	77,400.00	77,400
	EQUIPMENT GROUNDING	9	EA	1,500.00	13,500
	MANHOLES & PULLBOXES				
	EMH-U1	1	EA	3,850.00	3,850
	EMH-U2	1	EA	3,850.00	3,850
	EMH-U3	1	EA	3,850.00	3,850
	EMH-U4 W/ SPLICE BOX	1	EA	4,500.00	4,500
	U/G PULLBOX	3	EA	8,100.00	24,300
	12 KV FEEDERS, "F4" & "F5"				
	4" PVC CONDUIT	3,210	LF	24.87	79,833
	4" GRC CONDUIT	310	LF	56.19	17,419
	#350 KCMIL ALUM EPR MV105	10,560	LF	8.20	86,592
	P.O.C. TO (E) ELECTRICAL MANHOLE	6	EA	2,000.00	12,000
	P.O.C. TO (E) LANDIS HV VAULT	1	EA	2,000.00	2,000
	TRANSFORMER FEEDERS				
	225 KVA FEEDER, PVC	40	LF	56.65	2,266
	300 KVA FEEDER, PVC	20	LF	84.45	1,689
	400 KVA FEEDER, PVC	20	LF	106.96	2,139
	500 KVA FEEDER, PVC	40	LF	140.60	5,624
	1000 KVA FEEDER, PVC	30	LF	246.01	7,380
	P.O.C. TO (E) BUILDING 600A PANEL	1	EA	1,000.00	1,000
	P.O.C. TO (E) BUILDING SWITCHBOARD	7	EA	1,000.00	7,000
	P.O.C. TO (E) BUILDING UNIT SUBSTATION	1	EA	1,500.00	1,500
	TRENCH & DUCBANK				
	SAWCUT (E) PAVING	3,040	LF	4.50	13,680
	DEMO/HAUL (E) PAVING DEBRIS	3,040	SF	5.00	15,200
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	2,560	SF	1.00	2,560
	CONCRETE DUCTBANK	2,800	LF	54.00	151,200
	RESTORE PAVING, MATCH EXISTING	3,040	SF	5.00	15,200
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	2,560	SF	5.50	14,080
	LOWER CAMPUS LOOP				
	SELECTOR SWITCH				
	SS-L1, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L2, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L3, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L4, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L5, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L6, NEMA-3R + PAD	1	EA	10,000.00	10,000

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ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	SS-L7, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L8, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L9, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L10, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L11, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L12, NEMA-3R + PAD	1	EA	10,000.00	10,000
	SS-L13, NEMA-3R + PAD	1	EA	10,000.00	10,000
	EQUIPMENT GROUNDING	13	EA	750.00	9,750
	TRANSFORMERS				
	TRANSFORMER, 75 KVA + PAD	1	EA	15,350.00	15,350
	TRANSFORMER, 112.5 KVA + PAD	1	EA	21,337.50	21,338
	TRANSFORMER, 150 KVA + PAD	3	EA	25,275.00	75,825
	TRANSFORMER, 225 KVA + PAD	1	EA	34,375.00	34,375
	TRANSFORMER, 300 KVA + PAD	1	EA	45,625.00	45,625
	TRANSFORMER, 500 KVA + PAD	1	EA	65,650.00	65,650
	TRANSFORMER, 50 KVA, NEMA-3R + PAD	1	EA	10,750.00	10,750
	TRANSFORMER, 75 KVA, NEMA-3R + PAD	1	EA	15,750.00	15,750
	TRANSFORMER, 150 KVA, NEMA-3R + PAD	1	EA	25,050.00	25,050
	TRANSFORMER, 225 KVA, NEMA-3R + PAD	1	EA	34,875.00	34,875
	TRANSFORMER, 300 KVA, NEMA-3R + PAD	1	EA	46,125.00	46,125
	TRANSFORMER, 500 KVA, NEMA-3R + PAD	2	EA	66,150.00	132,300
	TRANSFORMER, 750 KVA, NEMA-3R + PAD	2	EA	80,050.00	160,100
	TRANSFORMER, 1500 KVA, NEMA-3R + PAD	1	EA	114,700.00	114,700
	EQUIPMENT GROUNDING	18	EA	1,500.00	27,000
	MANHOLES & PULLBOXES				
	EMH-L1	1	EA	3,850.00	3,850
	EMH-L2	1	EA	3,850.00	3,850
	EMH-L3	1	EA	3,850.00	3,850
	EMH-L4	1	EA	3,850.00	3,850
	EMH-L8	1	EA	3,850.00	3,850
	EMH-L9	1	EA	3,850.00	3,850
	EMH-L11	1	EA	3,850.00	3,850
	EMH-L12	1	EA	3,850.00	3,850
	EMH-L13	1	EA	3,850.00	3,850
	U/G PULLBOX	1	EA	8,100.00	8,100
	12 KV FEEDERS, "F1" & "F2"				
	4" PVC CONDUIT	6,650	LF	24.87	165,386
	4" GRC CONDUIT	120	LF	56.19	6,743
	#500 KCMIL ALUM EPR MV105	20,310	LF	10.13	205,740
	TRANSFORMER/SWITCHBOARD FEEDERS				
	50 KVA FEEDER, PVC	40	LF	11.96	478
	75 KVA FEEDER, PVC	320	LF	23.93	7,658
	112.5 KVA FEEDER, PVC	20	LF	28.26	565
	150 KVA FEEDER, PVC	210	LF	32.56	6,838
	225 KVA FEEDER, PVC	420	LF	56.65	23,793
	300 KVA FEEDER, PVC	110	LF	84.45	9,290
	500 KVA FEEDER, PVC	170	LF	140.60	23,902
	750 KVA FEEDER, PVC	310	LF	195.46	60,593
	1500 KVA FEEDER, PVC	40	LF	427.01	17,080

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	112.5 KVA FEEDER, GRC	20	LF	38.88	778
	150 KVA FEEDER, GRC	20	LF	50.59	1,012
	200A PANEL FEEDER, GRC	90	LF	67.02	6,032
	225A SWITCHBOARD FEEDER, GRC	40	LF	87.43	3,497
	400A SWITCHBOARD FEEDER, GRC	140	LF	166.43	23,300
	800A SWITCHBOARD FEEDER, GRC	40	LF	343.55	13,742
	200A PANEL FEEDER, PVC	60	LF	46.80	2,808
	400A SWITCHBOARD FEEDER, PVC	20	LF	106.96	2,139
	600A SWITCHBOARD FEEDER, PVC	20	LF	174.25	3,485
	800A SWITCHBOARD FEEDER, PVC	20	LF	216.67	4,333
	2000A SWITCHBOARD FEEDER, PVC	20	LF	597.76	11,955
	P.O.C. TO (E) BUILDING SWITCHBOARD	11	EA	1,000.00	11,000
	P.O.C. TO (E) 400A SWITCHBOARD FEEDER TO NEW TRANSFORMER	1	EA	1,000.00	1,000
	TRENCH & DUCBANK				
	SAWCUT (E) PAVING	8,760	LF	4.50	39,420
	DEMO/HAUL (E) PAVING DEBRIS	8,760	SF	5.00	43,800
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	7,400	SF	1.00	7,400
	CONCRETE DUCTBANK	8,080	LF	54.00	436,320
	RESTORE PAVING, MATCH EXISTING	8,760	SF	5.00	43,800
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	7,400	SF	5.50	40,700
	OTHER RECOMMENDATIONS				
	PHASING OUT OF (E) 12KV OVERHEAD POLE LINE AT THE BACK OF WAREHOUSE, ALLOWANCE	1	LS	15,000.00	15,000
	TESTING OF (E) 50-YR OLD GROUNDING SYSTEM + SHORT CIRCUIT/ARC FLASH STUDY, ALLOWANCE	1	LS	12,000.00	12,000
	WIRELESS MULTI-METERING SYSTEM (w/ energy software package for energy analysis, 3 phase wireless meter transceivers for wireless metering and be capable of metering 480V & 208V), ALLOWANCE	1	LS	35,000.00	35,000
	ANNUAL INSPECTION OF (E) OIL FUSE CUT OUTS & SPLICE BOX, ALLOWANCE	1	LS	3,000.00	3,000
	CHECK, TIGHTEN & TORQUE ALL CONDUCTOR CONNECTIONS, ALLOWANCE	1	LS	3,000.00	3,000
	REPLACE ALL (E) ELECTRICAL EQUIPMENT PADLOCKS W/ SINGLE KEY, ALLOWANCE	60	EA	40.00	2,400
	SITE LIGHTING SYSTEM ALLOWANCES				
	REPLACE ALL (E) POST TOP FIXTURES & OTHER DECO FIXTURES W/ A COMMON CUT-OFF DECO FIXTURES THAT WILL PROVIDE A VISUALLY COMFORTABLE ENVIRONMENT & PREVENT GLARE, AND SPACED TO MEET THE CURRENT "IES" LIGHT LEVELS FOR PATHWAYS (ALLOWANCE BASED ON 5% OF SITE AREAS HAVING LIGHTED PATHWAYS: GROSS SITE = 3,360,000SF x 5% = 168,000 SF)	1	LS	168,000.00	168,000

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM	JYI #:	V1716A
LOCATION : RIVERSIDE, CA	DATE:	27-May-10
CLIENT: PSOMAS ASSOCIATES	REVISED:	
DESCRIPTION: CONCEPTUAL OPINION OF COST		

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	SINGLE-LAMP SOURCE FOR ILLUMINATING ROADWAYS, PARKING LOTS, & PATHWAYS, HIGH-PRESSURE SODIUM LAMPS (ALLOWANCE BASED ON 18% OF SITE AREAS HAVING LIGHTED ROADS & PARKING LOTS: GROSS SITE = 3,360,000SF x 18% = 604,800 SF - ASSUME (E) LIGHTS GET CHANGED TO HPS TYPE)	1	LS	151,200.00	151,200
	LIGHTING CONTROL PANEL & PHOTOCELLS TO CONTROL ALL LIGHT FIXTURES AT THE SAME TIME	1	LS	178,500.00	178,500
	TENNIS COURTS TO BE CONTROLLED BY ASTRONOMICAL TIME CLOCK & PHOTOCELL	1	LS	12,500.00	12,500
	WALL METAL HALIDES IN BUILDINGS	1	LS	-	**N.I.C.**
	REPLACE ALL BURNOUT LAMPS & BALLASTS (ASSUME SITE AREAS ONLY)	1	LS	2,500.00	2,500
	TRIM THE TREES & OBSTRUCTIONS	1	LS	8,160.00	8,160
	MISC. ELECTRICAL SYSTEM	1	LS	170,215.55	170,216
	PERMITS, TESTING & COMMISSIONING	1	LS	83,315.73	83,316
	SUBTOTAL			-	**4,249,102**
8.0	TELECOMMUNICATIONS				
	TELECOM CONDUITS & MANHOLES				
	(2) - 4" PVC CONDUIT	3,130	LF	44.15	138,190
	(3) - 4" PVC CONDUIT	3,220	LF	66.23	213,261
	(4) - 4" PVC CONDUIT	1,260	LF	88.30	111,258
	(6) - 4" PVC CONDUIT	5,140	LF	132.46	680,844
	CPB, 5'L X 3'W X 4'D	2	EA	3,290.00	6,580
	CPB, 7'L X 4'W X 4'D	4	EA	4,320.00	17,280
	CPB, 13'L X 5'W X 4'D	1	EA	8,220.00	8,220
	CMH, 12'L X 6'W X 7'D	12	EA	11,880.00	142,560
	WALL PULLBOX, 2'L X 2'W X 1'D, WP	4	EA	455.00	1,820
	REMOVE & REPLACE (E) MANHOLE, MHDLO1, 12' X 6' X 7'D	1	EA	14,850.00	14,850
	CONDUIT PENETRATION TO (E) BUILDING, (2) - 4" C.O.	7	EA	554.00	3,878
	CONDUIT PENETRATION TO (E) BUILDING, (3) - 4" C.O.	8	EA	654.00	5,232
	CONDUIT PENETRATION TO (E) BUILDING, (4) - 4" C.O.	2	EA	704.00	1,408
	CONDUIT PENETRATION TO (E) BUILDING, (6) - 4" C.O.	2	EA	804.00	1,608
	INTERCEPT (E) 2-4" C.O. & P.O.C. TO (E) CPB #12	1	EA	1,341.50	1,342
	P.O.C. TO (E) MANHOLE, (2) - 4" C.O.	1	EA	554.00	554
	P.O.C. TO (E) MANHOLE, (3) - 4" C.O.	2	EA	654.00	1,308
	P.O.C. TO (E) MANHOLE, (4) - 4" C.O.	1	EA	704.00	704
	P.O.C. TO (E) MANHOLE, (6) - 4" C.O.	1	EA	804.00	804
	TELECOM FIBER				
	(1) - 24 FOSM CABLES	6,320	LF	10.82	68,382
	(2) - 24 FOSM CABLES	2,020	LF	20.56	41,531
	(3) - 24 FOSM CABLES	580	LF	29.21	16,942
	(4) - 24 FOSM CABLES	880	LF	36.79	32,375
	(5) - 24 FOSM CABLES	270	LF	43.28	11,686
	(7) - 24 FOSM CABLES	880	LF	56.81	49,993
	(10) - 24 FOSM CABLES	690	LF	75.74	52,261
	(13) - 24 FOSM CABLES	260	LF	91.43	23,772
	(32) - 24 FOSM CABLES	210	LF	173.12	36,355

Prepared by Jacobus & Yuang, Inc.

PROJECT: INFRASTRUCTURE UPGRADE PROJECT - UTILITY PROGRAM	JYI #:	V1716A
LOCATION : RIVERSIDE, CA	DATE:	27-May-10
CLIENT: PSOMAS ASSOCIATES	REVISED:	
DESCRIPTION: CONCEPTUAL OPINION OF COST		

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	(35) - 24 FOSM CABLES	410	LF	177.99	72,976
	(50) - 24 FOSM CABLES	100	LF	216.40	21,640
	(1) - 24 FOSM CABLES TO (E) CONDUIT	990	LF	10.82	10,712
	(2) - 24 FOSM CABLES TO (E) CONDUIT	720	LF	20.56	14,803
	FIBER P.O.C. TO (E) BUILDING EQUIPMENT	25	EA	455.31	11,383
	FIBER P.O.C. TO (E) NOC - (50) 24FOSM	1	LS	11,382.81	11,383
	TELECOM COPPER				
	25 PR COPPER	410	LF	3.00	1,230
	50 PR COPPER	7,320	LF	5.70	41,724
	100 PR COPPER	1,180	LF	10.80	12,744
	200 PR COPPER	980	LF	20.40	19,992
	300 PR COPPER	780	LF	28.80	22,464
	400 PR COPPER	880	LF	33.60	29,568
	600 PR COPPER	680	LF	46.80	31,824
	900 PR COPPER	430	LF	64.80	27,864
	1200 PR COPPER	550	LF	86.40	47,520
	300X, 250XW, 50Xdd	300	LF	46.80	14,040
	900X, 700XW, 200Xdd	250	LF	108.00	27,000
	50 PR COPPER CABLES TO (E) CONDUIT	1,290	LF	6.84	8,824
	100 PR COPPER CABLES TO (E) CONDUIT	430	LF	12.96	5,573
	200 PR COPPER CABLES TO (E) CONDUIT	580	LF	24.48	14,198
	COPPER P.O.C. TO (E) BUILDING EQUIPMENT	25	EA	364.25	9,106
	COPPER P.O.C. TO (E) MDF - (2) - 1200 PR	1	LS	18,212.50	18,213
	TRENCH & DUCBANK				
	SAWCUT (E) PAVING	12,640	LF	4.50	56,880
	DEMO/HAUL (E) PAVING DEBRIS	12,640	SF	5.00	63,200
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	7,100	SF	1.00	7,100
	CONCRETE DUCTBANK	9,870	LF	72.00	710,640
	RESTORE PAVING, MATCH EXISTING	12,640	SF	5.00	63,200
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	7,100	SF	5.50	39,050
	OTHER SCOPES				
	ALLOWANCE FOR MAJOR UPGRADE TO (E) MDF AREA + ADDITIONAL 200SF	1	LS	110,000.00	110,000
	ALLOWANCE FOR RELOCATNG (E) NETWORKING OPERATING CENTER "NOC" FROM (E) BUILDING #11 TO (E) BUILDING #20 + RELATED ACCESSORIES/REPAIRS	1	LS	250,000.00	250,000
	NEW GROUNDING TO (E) BUILDING BDF's	25	EA	750.00	18,750
	UPGRADE LIGHTING, HVAC, & SECURITY ACCESS TO (E) BUILDING BDF's	25	EA	-	**N.I.C.**
	RELOCATE (E) TELECOM EQUIPMENT IN SOME BUILDINGS THAT ARE CO-LOCATED W/ HIGH VOLTAGE	1	LS	-	**N.I.C.**
	ALLOWANCE FOR PROVIDING A DE-CENTRALIZED NETWORK FOR THE VOICE & DATA NETWORKS @ SPORTS COMPLEX AND OTHER BUILDINGS THAT ARE AWAY FROM THE MAIN CAMPUS	1	LS	280,000.00	280,000
	MISC. ELECTRICAL SYSTEM	1	LS	187,929.83	187,930
	PERMITS, TESTING & COMMISSIONING	1	LS	78,930.53	78,931
	SUBTOTAL				**4,025,457**

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LOCATION : RIVERSIDE, CA — **DATE: 27-May-10**
CLIENT: PSOMAS ASSOCIATES — **REVISED:**
DESCRIPTION: CONCEPTUAL OPINION OF COST

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
9.0	CENTRAL PLANT				$
	CONVERSION OF EXISTING DX BUILDINGS TO CHILLED WATER COOLING				
	CONVERT (E) DX BUILDINGS TO CHILLED WATER COOLING, (1) @ LOWER CAMPUS & (10) @ UPPER CAMPUS	11	EA	-	**N.I.C.**
	P.O.C. CHWS/R TO BUILDING STUBS	11	PR	17,500.00	192,500
	CENTRAL PLANT, LOWER CAMPUS				
	NEW CP-1 BUILDING + COOLING TOWER	4,000	SF	300.00	1,200,000
	CENTRAL PLANT M,P,E EQUIPMENT	339	TON	2,500.00	847,500
	THERMAL STORAGE TANK	1	EA	400,000.00	400,000
	CENTRAL PLANT, UPPER CAMPUS				
	NEW CP-2/COOLING TOWER LOCATED @ UPPER PORTION OF (N) PARKING STRUCTURE	4,000	SF	250.00	1,000,000
	THERMAL STORAGE TANK LOCATED @ UPPER PORTION OF (N) PARKING STRUCTURE	1	EA	363,636.36	363,636
	CENTRAL PLANT M,P,E EQUIPMENT	1,262	TON	2,500.00	3,155,000
	MISCELLANEOUS WORK				
	PERMITS, TESTING & COMMISSIONING	1	LS	200,125.00	200,125
	MISC. DEMO WORK	1	LS	10,000.00	10,000
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	10,000.00	10,000
	SUBTOTAL				**7,378,761**
10.0	NATURAL GAS SYSTEM				
	DEMOLITION				
	REMOVE (E) GAS METER	8	EA	365.00	2,920
	P.O.D. GAS PIPES	30	EA	273.75	8,213
	CAP (E) 4" GAS PIPE	3	EA	319.38	958
	REMOVE (E) U/G GAS PIPINGS + SAWCUT/REMOVAL OF (E) PAVING + RESTORATION	3,910	LF	33.51	131,024
	NEW GAS PIPINGS				
	1" Ø GAS PIPE	350	LF	12.10	4,235
	1 1/2" Ø GAS PIPE	1,200	LF	19.10	22,920
	2" Ø GAS PIPE	1,020	LF	22.40	22,848
	2 1/2" Ø GAS PIPE	1,730	LF	25.98	44,945
	3" Ø GAS PIPE	910	LF	30.98	28,192
	4" Ø GAS PIPE	610	LF	35.97	21,942
	5" Ø GAS PIPE	260	LF	59.00	15,340
	P.O.C. TO EXISTING, 1"/1"	1	EA	157.50	158
	P.O.C. TO EXISTING, 2 1/2"/3"	1	EA	161.50	162
	P.O.C. TO EXISTING, 3"/3"	1	EA	176.50	177
	P.O.C. TO EXISTING, 3"/4"	1	EA	181.50	182
	P.O.C. TO EXISTING, 4"/4"	2	EA	189.00	378
	P.O.C. TO EXISTING, 5"/6"	1	EA	207.75	208
	P.O.C. 2 1/2" PIPE/NEW GAS METER	3	EA	150.00	450
	P.O.C. 4" PIPE/NEW GAS METER	1	EA	300.00	300
	P.O.C. 5" PIPE/NEW GAS METER	1	EA	375.00	375
	SAWCUT (E) PAVING	7,760	LF	4.50	34,920
	DEMO/HAUL (E) PAVING DEBRIS	7,760	SF	5.00	38,800

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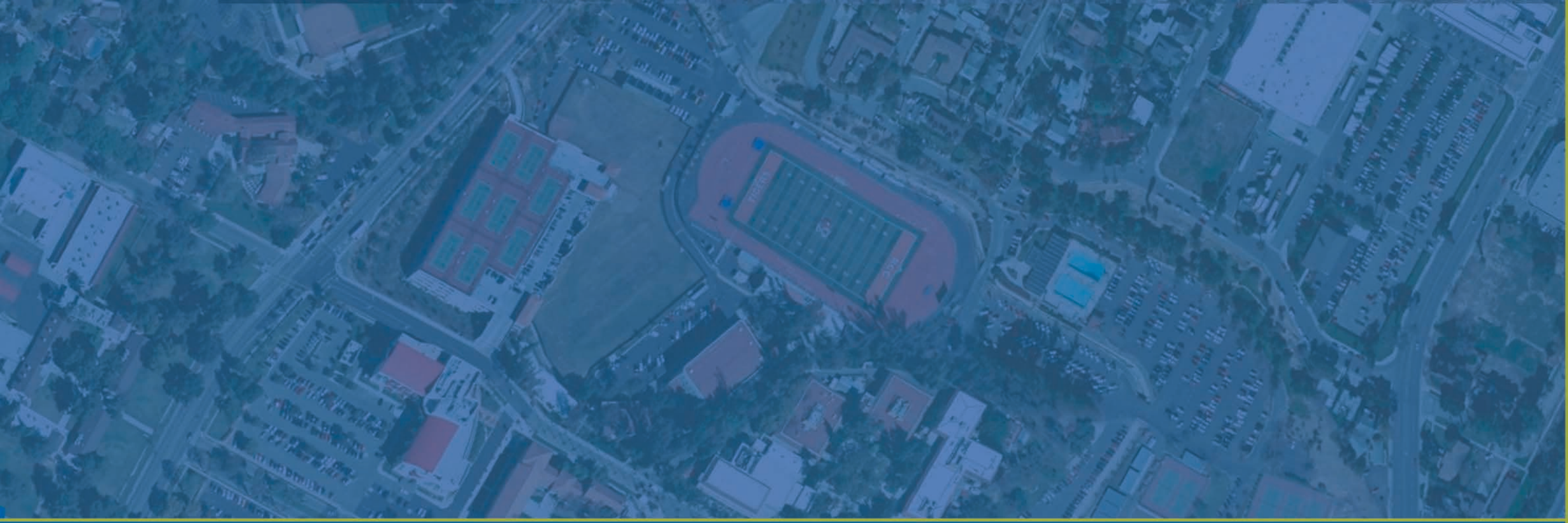
DESCRIPTION: CONCEPTUAL OPINION OF COST

ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL
	REMOVE PORTION OF (E) PLANTING/IRRIGATION	4,400	SF	1.00	4,400
	RESTORE PAVING, MATCH EXISTING	7,760	SF	5.00	38,800
	RESTORE PLANTING/IRRIGATION, MATCH EXISTING	4,400	SF	5.50	24,200
	GAS METERS				
	REMOVE & REPLACE (E) GAS METER #1, 2 1/2" + PRV/SEISMIC ASSEMBLY	1	EA	3,750.00	3,750
	REMOVE & REPLACE (E) GAS METER #2, 2 1/2" + PRV/SEISMIC ASSEMBLY	1	EA	3,750.00	3,750
	REMOVE & REPLACE (E) GAS METER #3, 2 1/2" + PRV/SEISMIC ASSEMBLY	1	EA	3,750.00	3,750
	NEW GAS METER #14, 5" + PRV/SEISMIC ASSEMBLY	1	EA	10,575.00	10,575
	NEW GAS METER #15, 4" + PRV/SEISMIC ASSEMBLY	1	EA	8,775.00	8,775
	GAS SUB-METERS TO (E) BUILDING + PRV/SEISMIC ASSEMBLY, 1 1/2" - 2 1/2"	11	EA	3,600.00	39,600
	GAS SUB-METERS TO (N) BUILDING + PRV/SEISMIC ASSEMBLY, 1 1/2" - 2 1/2"	10	EA	3,600.00	36,000
	MISCELLANEOUS WORK				
	MISC. GAS PIPING SYSTEM/VALVES AND FITTINGS	1	LS	38,026.71	38,027
	MISC. DEMO WORK	1	LS	7,500.00	7,500
	PROTECT-IN PLACE EXISTING UTILITIES	1	LS	7,500.00	7,500
	PERMITS, TESTING & COMMISSIONING	1	LS	30,313.56	30,314
	GENERAL PROTECTION ALLOWANCE, WORK AREA LIMIT	1	LS	7,500.00	7,500
	SUBTOTAL				**644,085**
11.0	MISCELLANEOUS				$
	ALLOWANCE FOR ADDITIONAL RESTORATION TO EXISTING SITE CONDITIONS DISTURBED DURING CONSTRUCTION	1	LS	100,000.00	100,000
	SUBTOTAL				**100,000**



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