Final Draft February 2012

Riverside Community College District
4800 Magnolia Avenue
Riverside, CA 92506

District Standards + Campus Guidelines Handbook Team

Architecture

HMC Architects

Audio/Visual Consultant

PlanNet Consulting

Elevator Consultant

Lerch Bates Inc.

Hardware + Access Control Consultant

ASSA ABLOY Door Security Solutions

Irrigation Consultant

Sweeney + Associates

Lighting Consultant

Francis Krahe + Associates, Inc.

Mechanical/Electrical/Plumbing Engineering

P2S Engineering, Inc.

Signage + Wayfinding Consultant

Impact Design Associates (ida)

Roofing + Waterproofing Consultant

Independent Roofing Consultants

VOLUME 1

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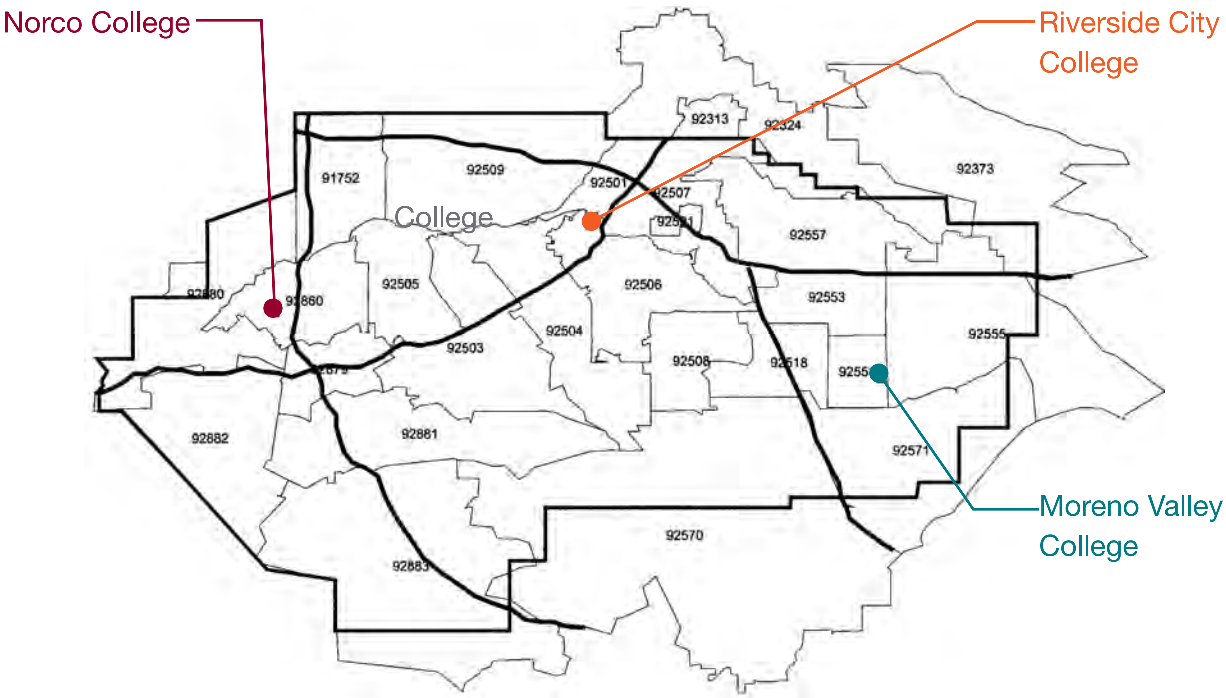
1 OVERVIEW



INTRODUCTION

Every project in the Riverside Community College District (RCCD) will address the guidelines and standards presented in this handbook. In addition, the guidelines set forth in this document should therefore be checked periodically to ensure they remain relevant. Setting standards for particular areas of interest and district concerns, the handbook guidelines are not exhaustive, but intended to work in conjunction with applicable building codes and regulations. It is expected that standards of care and best practices be applied to each particular discipline.

It is further understood that these standards and guidelines primarily refer to new construction. Inevitably there will be deviations, especially in regards to renovations. It is RCCD's intent to develop a process for approval of variances to these standards.

Riverside Community College District understands and encourages sustainability as an integral thinking process which cannot be isolated and should be applied to each and every discipline by each and every stakeholder. All new building projects shall achieve a minimum high performance rating of LEED® Certified. Refer to Section 2: Part B: Sustainable Design Guidelines.

PART A

HANDBOOK PURPOSE + USE

HANDBOOK PURPOSE + USE PART A

RIVERSIDE CITY COLLEGE - QUADRANGLE BUILDING

The purpose of this handbook is to establish the big picture vision for the Riverside Community College District (RCCD) by identifying a clear direction for its physical evolution and establishing a road map to the future. This document seeks to both provide boundaries ensuring cohesive campus identities while supporting creative expression and innovative design solutions unique to individual project programmatic and site characteristics at each campus. This handbook will serve as a reference for architects, engineers, consultants, graphic designers, district and college representatives, and others to inform decisions and design directions during the duration of the implementation of the Facilities Master Plans (FMP) at each college and site within the district.

Each section of this handbook is an integrated document that clarifies the natural, built, and social environments intended to support Riverside Community College District's academic mission. The sections describe the pragmatic aspects of capital improvements and implementation of the Facilities Master Plans at each college and site.

The adoption of these standards and guidelines will provide a clear and integrated framework within which future decisions about development of the District can be effectively made. The design of engineered systems will respond to standards set forth in this handbook with the objective of ensuring compatible infrastructure components working together in easily maintainable configurations. The specifications set forth address product, system, and/or manufacturer criteria specific to Riverside Community College District.

PART B
PROJECT PROCESS

INTRODUCTION

The objective of this project process outline is to inform project teams and stakeholders of the complete implementation process and milestones for design and construction work at Riverside Community College District. From programming, through construction and occupancy, this section will provide a procedural basis and facilitate a mutual understanding of expectations and requirements for all projects within the district.

The following pages breakdown each step into its critical components.

STEPS

- I. Project Definition
- II. Pre-Design
- III. Selection of Project Architect
- IV. Design
- V. External Approvals
- VI. Activities During DSA Plancheck Review
- VII. Project Acquisition
- VIII. Construction
- IX. Completion of the Work
- X. Occupancy
- XI. Project Closeout

GENERAL DESCRIPTION OF ROLES

These are the primary team members and stakeholders who are involved in the process:

I. Board of Trustees	• Provides objective oversight of the District's management. • Approval is required for all major capital plans and policy decisions affecting the District. • Sets policy and acts upon President's recommendation.
II. District Executive Cabinet	• Reviews project designs as determined by the District. • Approves composition of Programming Group.
III. District Strategic Planning Committee (DSPC)	• Serves as a forum where District's various constituencies can participate in assisting the District's Chancellor make decisions regarding the District's future and its current priorities.
IV. College Strategic Planning Process	• Ensure that institutional planning, unit/program review, and resource allocation are all fully integrated. • Members represent all constituencies of the colleges and make recommendations to the college President after receiving institution-wide input. • College President makes recommendations to DSPC. • Each of the three colleges have developed a campus specific strategic planning process.
V. Facilities Planning + Development (FP+D)	• Oversees all major capital construction projects within the District. • Maintains communication with the state Chancellor's office and consultants to ensure that projects conform to state and local statute and planning. • Acts as the liaison for all Capital projects to the RCCD's Board of Trustees and Chancellor. • Manages and coordinates consulting architects and engineers who provide design services for Capital projects. • Administers all State reporting for space assignment and space inventory. • Coordinates planning and design services for all improvements projects. • Communicates updates to the colleges on major construction plans, progress and disruptions. • Submits applications to State and regulatory agencies for project funding and project approval.

VII. Purchasing Department	• Handles the procurement of quality goods, services, and construction from responsible vendors at the lowest cost or best value. • Coordinates and works with the District's Facilities, Planning + Development Department, College Business Services departments, Maintenance and Operations departments, and the District's construction management firms on bids associated with public works projects. • Determines the appropriate bidding method based on the estimated project cost.
VII. College Advocate (CA)	• Acts as intermediary between Project Team and General Contractors. • Answers to FP+D Associate Vice Chancellor. • Provides constructability reviews of design documents at key milestones.
VIII. Construction Manager (CM)	• Selected on a project-by-project basis.
IX. Project Committee	• Oversees project, provides input and review comments for individual building projects. • Provides guidance during programming. • Receives information regarding changes to the projects.
X. Project Design Team	• Led by Architect under contract with the District. • Or led by Engineer for project with small design scope. • Includes other design consultants contracted to Architect.
XI. Independent District Consultants (as needed)	• Furniture, Fixtures and Equipment (FF+E) • Environmental Impact Report (EIR) • Topographical Survey • Hazardous Materials • Geotechnical Survey
XII. Programming Group	• Responsible for providing guidance during project programming and design. • Provides input and review comments for each individual building project.

I. PROJECT DEFINITION

IN ORDER OF REVIEW

A PRIMARY ENTITIES INVOLVED

1. FP+D
2. College Advocate
3. Master Plan Architect
4. College Administrators
   a. President
   b. Vice President of Business Services
4. DSPC
5. District Executive Cabinet
6. Chancellor
7. Board of Trustees

DURING DEVELOPMENT OF THE FACILITIES MASTER PLAN

B SITE

C SCOPE

G SCHEDULE + SEQUENCE

1. Considerations
   a. Available funding
   b. District and College priorities
   c. Program continuity
   d. Swing space need and availability
   e. Critical operational periods
   f. Dependencies
   g. Necessary predecessors
   h. Projects dependent upon completion

H EDUCATIONAL MASTER PLAN COORDINATION

D SIZE

I. As defined by

a. Facilities Master Plan
b. The California Community Colleges Chancellor's Office (CCCO)

E PROGRAMS

I. As defined by College and District analysis

F BUDGET

I. Source of Funding

a. Local (bond)
b. State
c. Partnerships:
- CCC/IDU
- Savings by Design
d. Other (i.e. philanthropists)

II. PRE-DESIGN

DEVELOPED BY MASTER PLAN ARCHITECT TO A CALIFORNIA COMMUNITY COLLEGE CHANCELLOR'S OFFICE (CCCCO) FINAL PROJECT PROPOSAL (FPP) LEVEL

A DEVELOP PROJECT PARAMETERS

1. Site Considerations
   a. Location of service utilities
   b. Determine project boundaries
2. Outline of Spaces
   a. Develop level of detail equal to JCAF 31
3. Basis of Building Systems Design
4. Budget
   a. Develop level of detail equal to JCAF 32
5. Schedule
   a. Develop level of detail equal to JCAF 32

B DEFINE PROJECT DELIVERY METHOD

1. Design, Bid, Build
   a. General contractor
2. Construction Management — Multiple Prime (CMMP)
3. Design Build

C DETERMINE USE OF OWNER CONTROLLED INSURANCE PROGRAM (OCIP)

1. Statewide Educational Wrap Up Program (SEWUP)
   a. SEWUP Joint Power Authority (JPA) will provide the OCIP on behalf of the owner

D COLLEGE SITE INFORMATION

1. Soils Report
2. Site Survey
3. Tree Survey

E SELECTION OF PROGRAMMING GROUP

1. Responsible Manager makes recommendations
2. College Vice President of Business Services approval required
3. Board of Trustee (BOT) approval required

DEFINE PROJECT PARTICIPANTS

1. District Executive Cabinet

a. Membership

- Chancellor
- Vice Chancellors
- Associate Vice Chancellors
- College Presidents
- District Chief of Staff

2. District Strategic Planning Commitee (DSPC)

a. Membership

- Chancellor
- Vice Chancellors
- Associate Vice Chancellors
- Executive Director, RCCD Foundation
- College Deans
- District's General Counsel
- District Chief of Staff
- College Presidents
- College Strategic Planning Administrative Co-Chairs
- College Strategic Planning Commitee Co-Chairs
- College Academic Senate Presidents
- CSEA Representative
- Steudent Trustee
- Confidential staff Representative

3. College Strategic Planning Process

a. Membership

- Refer to process at each College

4. Project Committee

a. Membership

- Master Plan Architect or Project Architect
- FP+D Representative(s)
- Vice President of Business Services
- Major Stakeholder Vice President
- Major Stakeholder Manager (Dean or Director)
- Designated Faculty + Staff

5. Programming Group

a. Membership

- Master Plan Architect or Project Architect (facilitator)
- Representatives of Major Groups of Building Users
- Information Services (IT) Representative
- Campus Safety Police Representative (security)
- Instructional Media Representative (IMC)
- Campus Facilities Representative(s)
- FP+D Representative(s)
- College Advocate (CA)

III. SELECTION OF PROJECT ARCHITECT

WITH PRIOR EXPERIENCE PERFORMING DESIGN OF SIMILAR STRUCTURES

A SOLICIT A POOL OF FIRMS

1. CA and FP+D Associate Vice Chancellor confer and determine firms for consideration
2. College Selection Committee to solicit RFQ/RFP from firms and compile responses

B REVIEW + RANK SUBMISSIONS

1. Ranking criteria
   a. Determined by specific project requirements
2. Submission review group
   a. Vice President of Business Services
   b. FP+D Associate Vice Chancellor
   c. FP+D Director of Construction
   d. College Advocate
   e. College representatives

C INTERVIEW TOP RANKED FIRM(S)

1. Interview information sheet
   a. Interview panel membership
   b. Date and time location
   c. Instructions to interviewees
2. Interview panel participants
   a. Vice President of Business Services
   b. College President (optional)
   c. Representatives of the relevant Division
      a. Academic building:
         - Dean
         - Two faculty
      b. Other project types:
         - Composition of the interview group will include primary stakeholders
3. Select two firms and make recommendations to College President
4. Check firm references
5. College President selects firm to award contract

D CONTRACT DEVELOPMENT + APPROVAL

1. Conducted by CA and FP+D Associate Vice Chancellor
2. Considerations
   a. District's Standard Architectural Agreement
      a. Appendix
      b. Scope of Services
         - Mandatory site walk with design team
      c. Fee Structure
         - Basic services
         - Specialty consultants
         - Fee basis
            - Fixed
            - Percentage
            - Hourly
            - Additional Services
      d. Invoicing + Billing percentages
      e. Deliverable
      f. Schedule
3. Board Recommendation
   a. FP+D Associate Vice Chancellor will prepare board agenda item recommending entering into an agreement
      a. College President/College Vice President of Business Services
      b. Executive Cabinet
      c. Board of Trustees
   b. Contract Approvals

E SELECTION OF FF+E CONSULTANT

1. Ideally, selected simultaneously with Project Architect
   a. District/College to determine on project-by-project basis when FF+E consultant is selected
2. Refer to Part C

IV. DESIGN

A PROGRAMMING/SCHEMATIC DESIGN

1. Review as-built conditions
2. Coordinate with District Standards + Campus Guidelines Handbook
3. Coordinate fire lanes and hydrants
4. Consult with utility providers
   a. Moreno Valley College
      - So Cal Gas Company
      - So Cal Edison
      - Eastern Municipal Water District (EMWD)
      - City of Moreno Valley
   b. Norco College
      - So Cal Gas Company
      - Riverside Public Utilities
      - City of Norco
      - So Cal Edison
   c. Riverside City College
      - So Cal Gas Company
      - Riverside Public Utilities
      - Western Municipal Water District (WMWD)
5. Reviews
   a. College Cabinet
   b. Programming Group
   c. District IS Department
   d. Peer Review Engineering
   e. FF+E Consultant
6. Start DSA Collaborative Process
7. Client Approvals
   a. President and College Cabinet
   b. Associate Vice-Chancellor of Information Services
8. Start DSA Collaborative Process

B DESIGN DEVELOPMENT PHASE

1. Define bidding strategy
2. Reviews
   a. College Cabinet
   b. Programming Group
   c. District IS Department
   d. Peer Review Engineering
   e. FF+E Consultant
3. Client Approvals
   a. President and College Cabinet
   b. District IS Department “sign off”

C CONSTRUCTION DOCUMENTS PHASE

1. Reviews
   a. College Cabinet
   b. Programming Group
   c. Peer Review Engineering
   d. FF+E Consultant

2. Client Approvals
   a. President and College Cabinet
   b. Board of Trustees (BOT)

D COMPLIANCE WITH FUSION+GIS+ ONUMA SYSTEM

1. All site and facilities data to be formulated to support FUSION+GIS+ONUMA
2. Start with the classification system and deliver all plansand documents back to RCCD with the same system

V. EXTERNAL APPROVALS

A DIVISION OF THE STATE ARCHITECT

1. Structural (SSS)
2. Fire Life Safety (FLS)
3. Access Compliance (ACS)
4. California Geologic Survey (CGS)
5. CALGreen Code
6. California Energy Code (CEC)

B OTHER AGENCIES

1. Riverside County Fire Authority
2. Department of Health Services
3. Department of Toxic Substances Control
   a. Norco College
4. Federal Department of Education
   a. Norco College
5. US Green Building Council (USGBC)
   a. Norco College

STATE FUNDED PROJECTS ONLY

C CHANCELLOR'S OFFICE (CCCCO)

1. Space Utilization
2. Approvals
   a. Release of funds for:
      - Preliminary plans
      - Working drawings
      - Release of equipment funds
   b. Approval of working drawings + proceed to bid:
      - Owner Controlled Insurance Program to be included in construction amount
   c. Request for bid approval

D INVOLVED PARTIES

1. Project Architect
2. College Advocate
3. FP+D
4. Master Plan Architect (optional)

VI. ACTIVITIES DURING DSA PLANCHECK

PROJECT SPECIFIC

A PREPARE PROJECT SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

1. Coordinate with campus wide SWPPP

B STATE WATER RESOURCE CONTROL BOARD

C LOGISTICS

1. Coordinate with Vice President of Business Services
2. Coordinate with FP+D

D PRE-QUALIFICATION

1. At the discretion of the District

E CONTRACTOR RECRUITMENT

1. Coordinate with master contractor list
2. Coordinate with master Construction Manager list

F BIDDING STRATEGIES

1. Coordinate with furniture installation
   a. Add language to bid documents regarding coordination of furniture and data sub-contractor
   b. Coordinate with FF+E Consultant (optional consultant)

VII. PROJECT ACQUISITION

A INVOLVED PARTIES

1. Purchasing Department
2. Construction Manager
3. FP+D
4. College Advocate
5. Project Architect
6. College Vice President of Business Services
7. College President
8. DSPC
9. District Executive Cabinet
10. Chancellor
11. Board of Trustees

B DETERMINE BIDDING METHOD

1. Formal or informal bidding
2. General Contractor (District project) or Construction Management (CM) project utilizing multi-prime project delivery method

C ADVERTISEMENT

G BID REVIEW

H BID RECOMMENDATION

D JOB WALK

E RFI'S + ADDENDA

F BID OPENING

I APPROVAL TO AWARD BID

1. FP+D recommends to Board of Trustees
2. Award of contract to "responsible bidder" by Board of Trustees

J CONTRACT EXECUTION

1. FP+D
2. College Vice President of Business Services

K NOTICE TO PROCEED

1. Project Architect
2. Construction Manager
3. Copy to DSA on category 1 + 2 projects

VIII. CONSTRUCTION

A GROUNDBREAKING CEREMONY

1. Invitations
   - a. College
   - b. Chancellor's office
2. Set up
   - a. Podium / Sound System
   - b. Banner
   - c. Shovels
   - d. Picture
3. Project Information
   - a. Project Architect
   - b. Construction Manager
   - c. FP+D
4. Public Notice
   - a. Public Relation Department

B MOBILIZATION

1. Campus notification of changes
   - a. Vice President of Business Services
   - b. FP+D
2. Parking Requirements
   - a. Disabled Access
   - b. Staff
3. Roadway + walkway closures
4. Riverside Community College District public information signs

C CONSTRUCTION PHASE

1. Managed by FP+D and CM
2. College is the client
   - a. Vice President of Business Services is client liaison

RIVERSIDE CITY COLLEGE - NURSING/SCIENCE BUILDING


NORCO COLLEGE - OPERATIONS CENTER

IX. COMPLETION OF THE WORK

A INVOLVED PARTIES

1. College President and/or Vice President of Business Services
2. FP+D
3. Project Inspector
4. College Advocate
5. Architect of Record (AOR)
6. Contractor
7. Construction Manager (CM)
8. Commissioning Agent (third party as required)

B FUNCTIONAL PERFORMANCE TESTING

1. Perform per the Commissioning Plan
2. Prepare list of deficiencies and how they were mitigated

C DETERMINATION OF SUBSTANTIAL COMPLETION

1. Stage in the progress of The Work when work is complete and in accordance with the Contract Documents so the District can occupy or use The Work for its intended purpose
2. Determined by the AOR and Project Inspector upon request by the Contractor

D JOINT INSPECTION OF WORK

1. Commences upon achievement of Substantial Completion of the Work
2. All involved parties participate in inspection

E JOINT PREPARATION OF THE "PUNCH LIST"

1. "Punch List" is prepared by AOR, CM, FP+D, and VP of Business Services
    a. Comprehensive list of items of The Work to be corrected or completed by the Contractor
    b. The exclusion of, or failure to include, any item on the Punch List shall not alter or limit the obligation of the Contractor to complete or correct any portion of The Work in accordance with the Contract Documents

F TIME FOR COMPLETING "PUNCH LIST" ITEMS

1. Established jointly by FP+D, CA, AOR, CM, VP of Business Services, and the Contractor

G COMPLETION OF "PUNCH LIST" ITEMS

1. Contractor to complete all Punch List items within the time established

H FINAL ACCEPTANCE

1. Contract has been fully performed by the Contractor
2. Determined by the AOR, CA, CM, FP+D, and Project Inspector upon request by the Contractor

X. OCCUPANCY

A GRAND OPENING

1. FP+D to coordinate

B POST OCCUPANCY EVALUATION

1. FP+D and assigned District staff to conduct analysis

C SPACE INVENTORY UPDATE

1. FP+D to coordinate

4. AOR to prepare simplified floor plans reflecting as-built conditions and room numbering
   a. AutoCAD or Revit files
   b. Spreadsheet listing room numbers, names, and ASF

XI. PROJECT CLOSEOUT

A DSA

1. FP+D to oversee

B MANUALS

1. A systems manual is required
2. CM to deliver to FP+D
3. FP+D to log and distribute to College
4. Coordinate with Commissioning Agent and/or Building Official

C WARRANTIES

1. FP+D to coordinate with College representatives
2. CM to coordinate with contractors

XI. PROJECT CLOSEOUT (CONT'D)

D TRAINING

1. Systems Operation Training is required
2. CM to coordinate all training activities through FP+D and College representatives
3. Coordinate with Commissioning agent and/or Building Official

E AS-BUILT DRAWINGS

1. A system's manual is required
2. All project data and graphics shall be formatted in a way to facilitate import of deliverable data into FUSION+GIS+ONUMA

F COMMISSIONING REPORT

G CCCCO

1. State funded projects are administrated through the FUSION* System

2. FP+D to update FUSION with final project costs per JCAF 32 and final Quarterly Report

3. FP+D to update FUSION with final JCAF 31 consistent with constructed project and info provided by AOR

*FUSION = Facilities Utilization, Space Inventory Option Net

PART C

FURNITURE, FIXTURES, + EQUIPMENT (FF+E) PROCEDURES

FURNITURE, FIXTURES, + EQUIPMENT (FF+E) PROCEDURES PART C

INTRODUCTION

This section provides an overview of the procedural process for integrating FF+E components, new construction projects. The design professional selected by the District should approach the interior design with a vision that embraces the physical needs of education, administration, and students while accommodating long term flexibility.

Best Practices:

- Coordinate FF+E at the same time as architectural space programming.
- It is recommended that both architectural and FF+E consultants contracts are released at the same time for proper coordination.

A FF+E CONSULTANT TO SPACE PLAN WITH ARCHITECTS

1. Coordinate during schematic design
    - a. Electrical locations and requirements
    - b. Telecom locations and requirements
    - c. Backing requirements
    - d. Accessibility guidelines
2. Inventory existing FF+E property and create an inventory list

B FF+E CONSULTANT/ PROCUREMENT TEAM/ USER MEETINGS

1. Coordinate during design development
2. Furniture requirement discussions
    - a. Specific needs
    - b. Accessibility requirements
    - c. Ergonomic requirements
3. Determine furniture dealer
    - a. Supports interior designer efforts

C FF+E CONSULTANT TO WORK WITH BUILDING COLOR PALETTE

1. Coordinate during design development
2. Select appropriate fabric and furniture type
3. Documentation + specification of furniture package
    - a. Interior designer develops framework
    - b. Furniture dealer develops specifications
4. Prepare final furniture package
    - a. Deliver to College Advocate and College Vice President of Business Services
5. Prepare final sample boards
    - a. Deliver to College Advocate and College Vice President of Business Services

D FURNITURE SCHEDULE/ SPECIFICATIONS

1. Coordinate during design development
   - a. FP+D
   - b. Architect
   - c. User Group
2. Develop schedule
   - a. Product research, bidding, procurement, and installation
3. Furniture dealer prepares final specifications and FF+E purchase lists
   - a. FF+E Consultant reviews + distributes for approval
4. Approval of furniture package
   - a. FP+D
   - b. Project Architect
   - c. User Group

E FURNITURE ACQUISITION (BIDDING PURCHASING)

1. Contracted through design firm
   - a. FP+D and College Advocate team may opt to do bidding
2. Purchasing to utilize Leveraged Procurement Agreement
   - a. Agreement to include discount structures available to school districts and higher education institutions
   - b. CMAS, FCCC, GSA, NJPA, TCPN, US Communities, etc.

F AWARD OF FURNITURE CONTRACT

1. Coordinated by Purchasing Department and Vice President of Business Services

G COLLEGE TO ISSUE PURCHASE ORDER

1. Issued by Vice President of Business Services

H OVERSEE FURNITURE FABRICATION, DELIVERY , AND INSTALLATION

1. Oversight contracted through FF+E Consultant
   - a. Data sub-contractor to test and certify cabling and connections
   - b. Furniture punch list
   - c. Invoices to be submitted to FP+D and College Advocate for auditing purposes
   - d. Assistwith relocation management as needed

RCCD | RIVERSIDE COMMUNITY COLLEGE DISTRICT

MORENO VALLEY COLLEGE | NORCO COLLEGE | RIVERSIDE CITY COLLEGE

END OF SECTION 1

2 DISTRICT DESIGN GUIDELINES

RCCD | RIVERSIDE COMMUNITY COLLEGE DISTRICT

MORENO VALLEY COLLEGE | NORCO COLLEGE | RIVERSIDE CITY COLLEGE

INTRODUCTION

The design guidelines consist of principles and strategies to be incorporated into the design process, to yield holistic campuses sensitive to universal, environmental, and crime prevention design solutions. They aim towards the same goal: human health, well-being, and quality of life.

These principles should be primary considerations and intentionally integrated into every project. Circulation systems, material choices, furniture systems, space layouts, and all other elements should reflect the discussed principles so all students, faculty, staff, and visitors of all backgrounds and characteristics feel welcomed, comfortable, and unrestricted.

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II. Universal Instructional Design
III. Commitment
IV. Goals
V. The Principles of Universal Design
VI. Important Considerations
VII. Standardization
VIII. Implementation
IX. Resources + References

PART B - SUSTAINABLE DESIGN GUIDELINES

Introduction

I. Important Considerations
II. Implementation
III. Resources + References

PART C - CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) GUIDELINES

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I. Important Considerations
II. Implementation
III. Resources + References

PART D - FUSION+GIS+ONUMA SYSTEM GUIDELINES

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I. Tools
II. Implementation
III. Resources + References

PART A
UNIVERSAL DESIGN (UD) GUIDELINES

UNIVERSAL DESIGN (UD) GUIDELINES PART A

INTRODUCTION

Universal Design (UD) refers to designs that accommodate the widest range of potential users in all educational products and environments.

The basic concept of UD is that people's mobility and accessibility are largely determined by the built environment. It shifts from the individual to community; rather than assuming that people must accommodate the built environment; it assumes that the built environment should accommodate users of all characteristics and abilities. Design standards must go beyond an "average person" or they will fail to accommodate the diversity of potential users. In alignment with the District's *Diversity Initiative*, UD assumes comfortable use for individuals with an array of characteristics, including; gender, race and ethnicity, age, stature, physical abilities and disabilities, visual and auditory limitations, height, and learning styles. This in turn, creates a sense of comfort and belonging to a community.

Not only does UD support and complement the Americans with Disabilities Act (ADA), it also goes beyond it, in that it is performance based rather than prescriptive with minimal compliances. Design approach to any facility should be comprehensive and should address holistic usability issues. To yield seamless mobility options, considerations should be given to all possible obstacles that may exist in buildings, transport systems, paths of travel, and roads.

UNIVERSAL DESIGN (UD)

I. DISTRICT DIVERSITY INITIATIVE

"Riverside Community College District is committed to building a diverse and accessible institution that fosters intellectual and social advancement. All District programs and activities seek to affirm pluralism of beliefs, opinions, and life experiences because promoting diversity benefits the learning environment and enhances the work place. The diversity we engender makes us stronger as an institution for our students and the community we serve."

- BP 7100: Commitment to Diversity

II. UNIVERSAL INSTRUCTIONAL DESIGN

Traditionally, students with disabilities or other limitations were singled out by being required to provide documentation to prove that they are in need of special accommodations. Whether it was entering through the back of the building due to non-accessible front entries, or having to take tests in a separate location, or requesting volunteer note-takers reinforces the stigma of disabled students being different from other students. This takes away from the student's primary role of learning, and places unnecessary psychological burden.

Providing individualized accommodations for students meets legal access requirements, however discourages productive equal learning. Universal Design makes education and all it's facilities accessible to all with no extra accommodations or adjustments necessary for those with special needs. It levels the playing field so all the students can have a sense of belonging, and it retains graduating rates of students with disabilities.

III. COMMITMENT

Full accessibility within and between all buildings and open spaces continues to be a guiding principle for all planned development at Riverside Community College District. Development of construction plans for development projects within the District must incorporate all relevant elements of the District's *ADA Transition Plan* (ADA/TP) dated July 24, 2009 for the project area. Review of the applicable portions of the *ADA Transition Plan* must be coordinated with the Facilities Planning + Development (FP+D) Department. In addition to compliance with all regulations regarding disability accessibility and the District's ADA/TP, construction planning should incorporate principles of Universal Design to create barrier-free access and design elements that ease use for all individuals. The *ADA Transition Plan* should be updated with each future construction project and evaluated to identify and resolve access issues.

IV. GOALS

- Design environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.
- Implement a long-term plan for effective upgrade of accessibility compliance throughout the District and conduct scheduled maintenance of all access features.
- Provide barrier-free access path of travel (POT) for all major connective open spaces.
- Provide learning and work spaces that promote safe, equitable, and universally accessible conditions that facilitate participation regardless of physical abilities.
- Utilize the "Principles of Universal Design" [North Carolina State University, The Center for Universal Design] to guide construction/development of all aspects of the District environment. Accessibility should not be an additional or secondary consideration, but rather integrated into the main design of any project.
- Design environments that are welcoming, comfortable, accessible, attractive, and functional. Specific considerations should be made for climate, entrances and routes of travel, furniture and fixtures, information resources and technology, and safety.

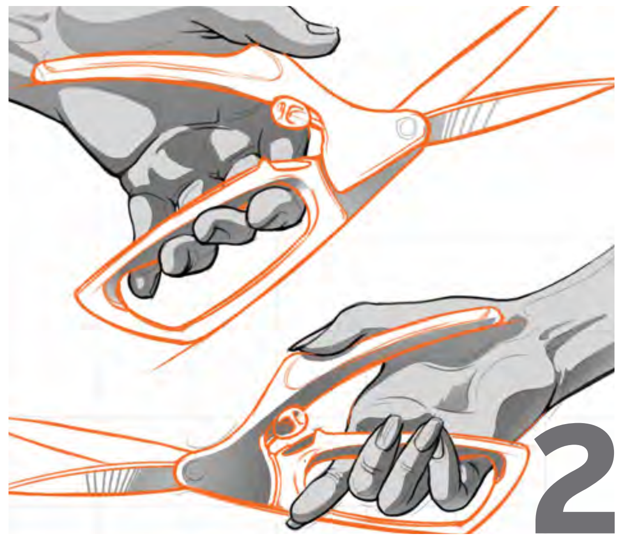
V. THE PRINCIPLES OF UNIVERSAL DESIGN

EQUITABLE USE

The design is useful and marketable to people with diverse abilities.

1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
1b. Avoid segregating or stigmatizing any users.
1c. Provisions for privacy, security, and safety should be equally available to all users.
1d. Make the design appealing to all users.

FLEXIBILITY IN USE



The design accommodates a wide range of individual preferences and abilities.

2a. Provide choice in methods of use.
2b. Accommodate right-handed or left-handed access and use.
2c. Facilitate the user's accuracy and precision.
2d. Provide adaptability to the user's pace.

SIMPLE + INTUITIVE USE

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or education level.

3a. Eliminate unnecessary complexity.
3b. Be consistent with user expectations and intuition.
3c. Accommodate a wide range of literacy and language skills.
3d. Arrange information consistent with its importance.
3e. Provide effective prompting and feedback during and after task completion.

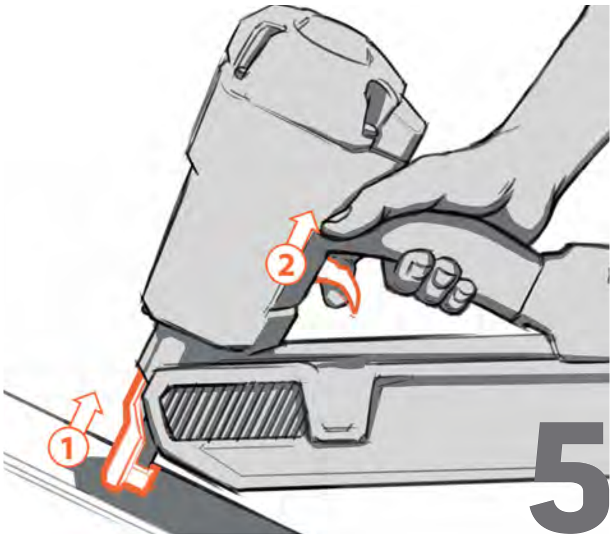
PERCEPTIBLE INFORMATION

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

4a. Use different modes for redundant presentation of essential information.
4b. Provide adequate contrast between essential information and its surroundings.
4c. Maximize "legibility" of essential information.
4d. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
4e. Provide compatibility with a variety of techniques used by people with sensory limitations.

V. THE PRINCIPLES OF UNIVERSAL DESIGN (CONT'D)

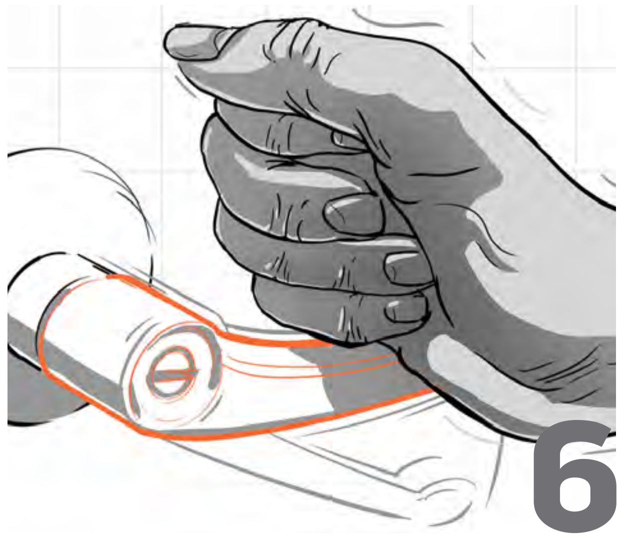
TOLERANCE FOR ERROR



The design minimizes hazards and the adverse consequences of accidental or unintended actions.

5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
5b. Provide warnings of hazards and errors.
5c. Provide fail safe features.
5d. Discourage unconscious action in tasks that require vigilance.

LOW PHYSICAL EFFORT



The design can be used efficiently and comfortably and with a minimum of fatigue.

6a. Allow user to maintain a neutral body position.
6b. Use reasonable operating forces.
6c. Minimize repetitive actions.
6d. Minimize sustained physical effort.

SIZE + SPACE FOR APPROACH + USE

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

7a. Provide a clear line of sight to important elements for any seated or standing user.
7b. Make reach to all components comfortable for any seated or standing user.
7c. Accommodate variations in hand and grip size.
7d. Provide adequate space for the use of assistive for personal assistance.

VI. IMPORTANT CONSIDERATIONS

PARKING

- Ensure that the number of accessible parking stalls and drop-offs meet current ratios. Consider whether ratios should be adjusted to facilitate equitable access to high use facilities.
- Place parking dispensers, emergency phones, and other parking lot resources at accessible heights and free of any barriers.
- Locate a bumper or curb to prevent encroachment of cars over adjacent walkways.

SIDEWALKS + PAVING

- Provide accessible paths of travel (POT) to/from parking and buildings.
- Provide the same means of use for all users whenever possible.
- Increase walkway widths and provide smooth walking surfaces to improve convenience for all users.

CURB CUTS

- Provide curb cuts and ramps at sidewalk intersections or paths of travel.
- Note: curb ramps are important for people in wheelchairs as well as people with handcarts, strollers, scooters, walkers, crutches, etc.

FURNISHINGS + SEATING

- Provide a clear line of sight to important elements for any seated or standing user.
- Avoid segregating or stigmatizing any users.
- Consider height appropriate furniture and casework.
- Provide height adjustable furniture where appropriate.
- Provide mobile furnishings that can easily be rearranged for different learning objectives and groupings.

SIGNAGE

- Provide visible directional signage indicating direction of accessible path at decision points.
- Specify large directional signs with high contrast print.
- Arrange information consistent with its importance.

THRESHOLDS + BUILDING ENTRY + DOORS + CIRCULATION

- All building entries shall be universally accessible.
- Doors to be automatically operated; either through motion sensors or by a push of a button.
- Ensure circulation and corridors to be wide and clear of obstacles.
- Provide sufficient space that enhances flexibility in use and accommodates wheelchair turning radius in elevators, classrooms, offices, public spaces, and corridors.

VI. IMPORTANT CONSIDERATIONS (CONT'D)

RAMPS

7

- Modify the landscape so that it creates an attractive, natural, on-grade access to the main or primary entrance of a building in lieu of building ramps, if possible.

DRINKING FOUNTAINS

8

- Provide accessible dual-height drinking fountains along accessible paths of travel with clear signage.

TOILET ROOMS

9

- Locate accessible toilet rooms along accessible paths of travel with clear signage.
- Consider locating Family Restrooms within facilities to address the needs of parents with children who need assistance and individuals with a disability who require assistance.
- Consider fixtures that are easily accessible, understandable, and operable.

INFORMATION TECHNOLOGY

- Incorporate hardware and software products that are usable by a broad audience.
- The design of output and display should maximize the number of people who can comfortably hear and see the information presented.
- Controls should be easy to reach, operate, and understand through labeling.
- Assistive listening technology (ALS) should be incorporated in all instructional spaces.

INSTRUCTION

- Curriculum should reflect an awareness of the unique nature of each learner and the need to address differences.
- Multiple means of representation gives learners various ways to acquire information and knowledge.
- Multiple means of action, expression, and engagement provides learners alternative means for demonstrating what they know, tap into their interests, and increase motivation.

STUDENT SERVICES

- Planning, policies, and evaluation should address diverse issues.
- Physical environments and products should be accessible, comfortable, safe, and welcoming.
- Staff should be prepared to work with all students.
- Publications and website content should be easily accessible.
- Events should be accessible to all potential participants.

VII. STANDARDIZATION

EVACUATION CHAIR
STRYKER MODEL 6254

- Install in every story in a multi-story building with no ground access on one or more levels.
- Provide aggressive track and foot strap (or updated model).
- Evacuation chair to be located in closet or area of refuge where available. Staff to be informed of location.

VIII. IMPLEMENTATION

UD can be implemented in all planning or design processes for new facilities, or as a special process relating to existing facilities.

STRATEGIES FOR IMPLEMENTATION

- Realize that UD is a mind-set and will ultimately increase the value of the facilities.
- Enlist the support of professional organizations to help provide educational tools to designers, decision makers, and managers.
- Establish District and campus level of UD standards.
- Realize that guidelines can be tailored to specific environments.
- Use the most current guidelines and standards.
- Obtain feedback from users with special needs.
- Consider UD objectives at all design stages of buildings, landscaping, circulation, transport, physical spaces, informational technology, instruction, and student services.
- Realize that incorporating UD into existing facilities does not mean a major renovation, yet can be done incrementally in an inclusive way of thinking about users when making even minor updates or repairs by asking, “does this change meet the principles of Universal Design?”
- Prevent barriers from users or community by providing educational tools for design.
- Consider “marketing” the UD commitment and features, as it is the “right thing to do,” similar to the green building movement and the LEED rating system (discussed in the following section).

IX. RESOURCES + REFERENCES

Center for Universal Design at NC State University
www.design.ncsu.edu/cud

Universal Design Newsletter
www.UniversalDesign.com

National Center on Universal Design for Learning
www.udlcenter.org

Curriculum Transformation & Disability: Implementing Universal Design in Higher Education
Jeanne L. Higbee, Editor. 2003. Center for Research on Developmental Education and Urban Literacy, General College, University of Minneapolis, MN.

Universal Design in Education: Principles & Applications
Sheryl Burgstahler, Ph.D. 2005. DI-IT, University of Washington College of Engineering.

Best Practices for Universal Design
Sacramento Transportation & Air Quality Collaborative, October 2005. Bicycle & Pedestrian Facility Design Best Practices.

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PART B

SUSTAINABLE DESIGN GUIDELINES

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

- Brundtland Report, United Nations, 1987

INTRODUCTION

Riverside Community College District has a long-term commitment to environmental, economic, and social sustainability through the implementation of sustainable design principles in district planning efforts.

- Buildings shall be designed to include the green building measures specified as mandatory in the current CALGreen code and Title 24 of the California Code of Regulations. Where feasible and appropriate, the District will direct design consultants to pursue LEED certification.
- Building design should employ sustainable design practices that are successfully expressed as integral aspects of the building design.
- Buildings should demonstrate how passive sustainable strategies can be successfully employed and how high performance environments may be achieved.
- Whether in the orientation of the building, building geometry, material selection, or architectural features such as deep roof overhangs, building design should celebrate the use of renewable resources and of passive systems which promote occupant health and comfort by providing access to natural daylighting and fresh air.
- The goal of these guidelines is to facilitate a discussion about sustainability as it relates to each future district project.

*Note: Each College is currently preparing a campus-specific Sustainability Plan. Infrastructure, all preject teams should review these documents in addition to the information in this *Handbook*

I. IMPORTANT CONSIDERATIONS

PLANNING + DESIGN

- Planning, design, and development methods should include environmentally responsible site selection, building design, building siting, and development.
- This will protect, restore, and enhance the environmental quality of the site and respect the integrity of adjacent campus buildings.

ENERGY EFFICIENCY

- All district systems should be compatible and operate efficiently, thus optimizing energy use and performance.
- Strategies such as the “right-sizing” of building mechanical systems and the design of tighter building envelopes can help to achieve districtwide energy efficiency.
- Envelope alone shall meet or exceed Title 24 by 15%.

WATER EFFICIENCY + CONSERVATION

- Achieve water efficiency and conservation through efficient use of water indoors, outdoors, and in waste water conveyance.
- By employing a variety of water-wise strategies, limited water resources may be conserved and safeguarded.
- Landscape management best practices, such as drought-tolerant climate appropriate native plants, aid in water conservation and protection of local watersheds.

MATERIAL CONSERVATION + RESOURCE EFFICIENCY

- Achieve material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, and building commissioning or testing and adjusting.

ENVIRONMENTAL QUALITY

- Reducing the quantity of air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of a building's contractors, installers, occupants, and neighbors.
- This section also addresses acoustics and sound control.

ENERGY SELF-SUFFICIENCY/ INDEPENDENCE

- Reduce energy capacity requirements from electric grid by utilizing available economically feasible technology such as wind, solar, and biomass for on-site energy generation.

I. IMPORTANT CONSIDERATIONS (CONT'D)

TRANSPORTATION

- Provide on-site vehicle charging stations to encourage existing and future electric or hybrid vehicle owners.
- Provide a substantial, prominent, and lockable bike rack areas to encourage students, faculty, and staff to ride instead of drive.
- Engage local public transportation agencies to consider stops near the Colleges, to encourage students, faculty, and staff to ride instead of drive.

LIFE CYCLE COST + TOTAL COST OF OWNERSHIP (TCO)

- Understanding all of the hard and soft costs expended over the life of an item can bring awareness of any hidden costs associated with additive maintenance and replacement.
- Wise FF+E selections can increase productivity, effectiveness, learning outcomes, pride, and retention to users.
- FF+E should have an average lifespan of 30 years and should reduce TCO since it demands less involvement from M+O, IT, and facilities staff.

DAYLIGHTING

- Maximize daylighting in all spaces to maximize natural energy and minimize the use of indoor lighting.
- Daylight harvesting is a method by which daylight sensors detect the presence of sunlight available in a space, and adjusts the lights automatically throughout the day. Systems for daylight harvesting should be considered for energy management and savings.

OPERATIONS + FACILITIES

- Seek to operate and maintain a computerized energy management system to provide centralized reporting and control of district energy related activities.
- Scheduling of building or facility use should be optimized to maximize and consolidate usage to conserve energy and resources.

EDUCATION

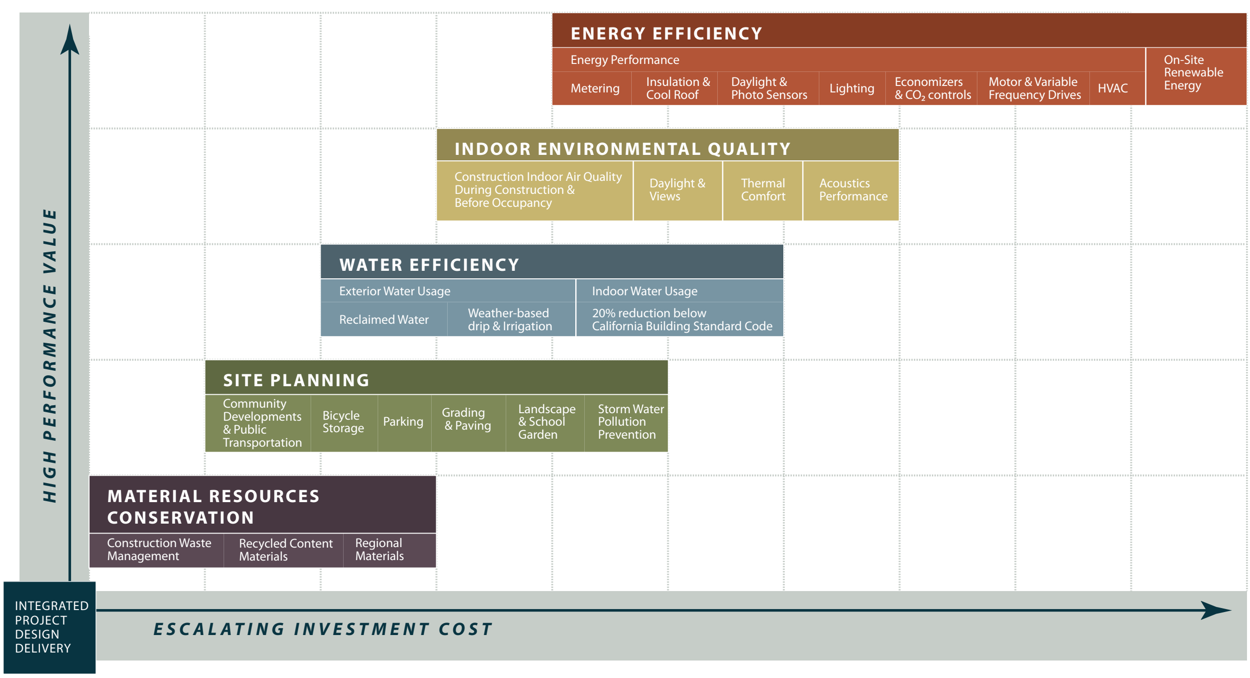
- Educating the student body, faculty, and staff about sustainability and the District's goals will bring awareness of the macro and micro ways each individuals can contribute to the community as a whole for a sustainable future.
- This can be done through workshops or through displays that display information on the District's energy use, water conservation, recycling volumes, etc.

II. IMPLEMENTATION

Sustainable design can be implemented at a district and college level in existing and new facilities on a project-by-project basis, as well as within policies that shape environmentally sensitive habits. Garnering interest from the college community will ultimately lead to a more sustainable environment and community.

STRATEGIES FOR IMPLEMENTATION

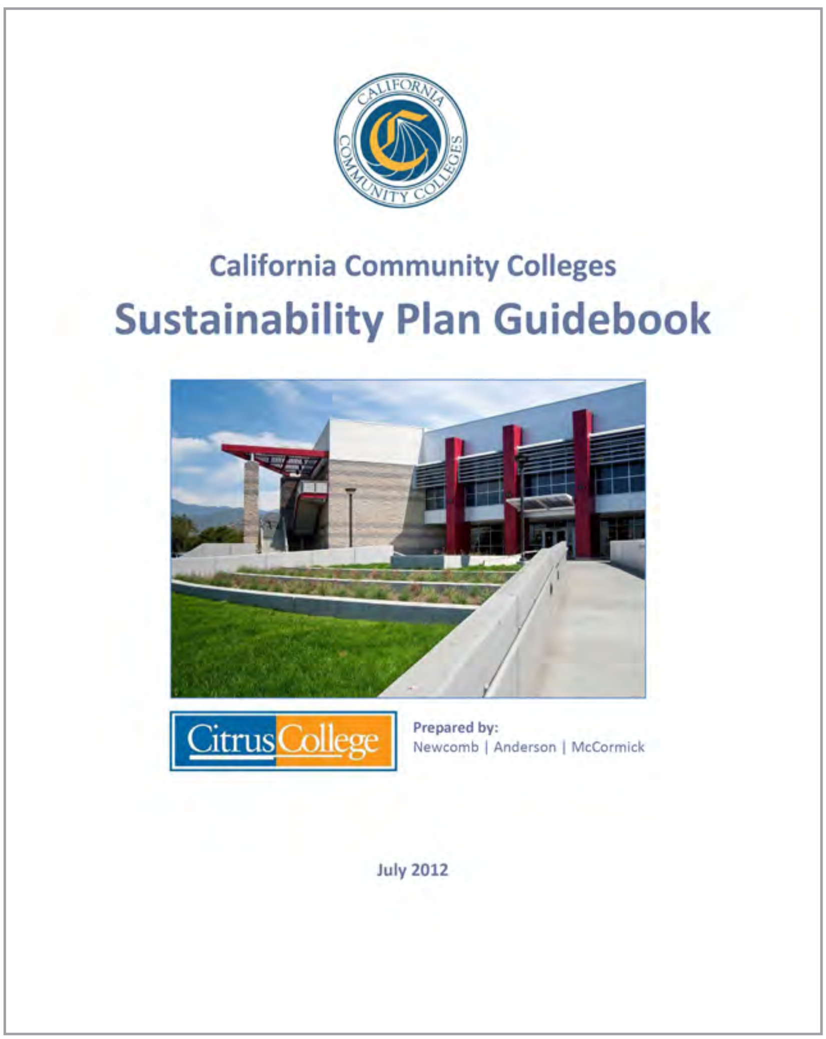
- Form a steering committee including district and college leadership to develop an energy and sustainability plan to provide campuses with a strategic direction for both the short and long-terms.
- Establish goals in all areas of instruction, operations, construction, facilities, energy conservation, energy production, water conservation, and environmental integrity. Reference the California Community Colleges Board of Governors *Energy and Sustainability Policy* to help establish goals.
- Engage the community in sustainable workshops to educate and get input from individuals who are primarily affected by the facilities.
- Incorporate sustainable measures in all new buildings, additions, and renovations.



III. RESOURCES + REFERENCES

Utilize the California Community Colleges (CCC) *Sustainable Plan Guidebook* for a detailed outline of implementing sustainable designs within the District.

This document outlines the many CCC guidelines, state-wide policies, and regional standards focused on sustainability. The document clearly notes that "legislation and public policy is a constantly changing landscape and it will be important for districts and campuses to stay abreast of these evolving issues." However, this *Guidebook* is an excellent starting point for any RCCD project.


California Community Colleges
Sustainability Plan Guidebook
Prepared by:
Newcomb | Anderson | McCormick
July 2012

PART C

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) GUIDELINES

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) GUIDELINES PART C

INTRODUCTION

Crime Prevention Through Environmental Design (CPTED) is based on the concept that proper design of the built environment can lead to reduction of incident and fear of crime, promotion of safety, and improvement in the quality of life. It takes the proactive approach of crime prevention concepts to the next level, by analyzing site design, and working with community and development agencies to collectively create safer spaces in new and existing projects.

CPTED guidelines are not intended to create an impermeable fortress. Engaging designers, campus communities, local agencies, and neighborhood communities through educational initiatives will create buy-in and a sense of ownership and accountability for all to maintain safe facilities. Furthermore, simple and inexpensive solutions can be implemented for positive safe environments and can be created without the use of intimidating methods or elements such as high fences and fortress-like construction.

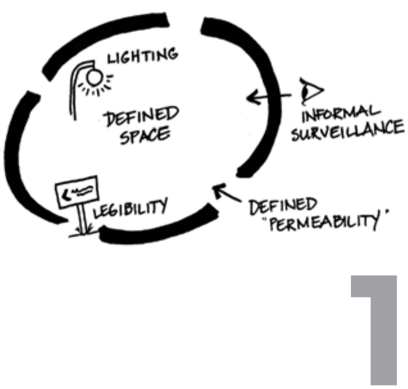
The following guidelines provide a starting point for the District and it's campuses to help guide both design and renovation projects. CPTED should be a holistic approach incorporated into the design process, to ensure the highest levels of crime prevention possible, and promote safe educational environments.

PART C

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) GUIDELINES

I. IMPORTANT CONSIDERATIONS

DEFENSIBLE SPACE

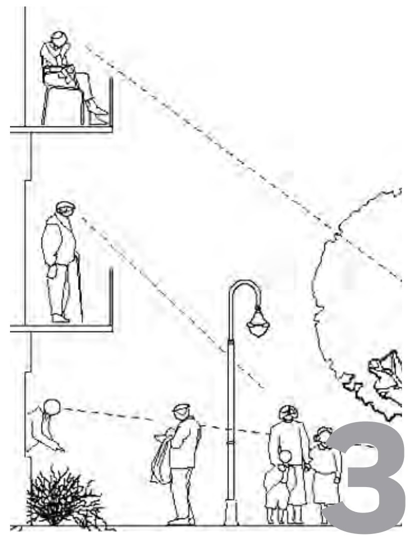


- Divide environment into smaller, clearly defined areas or zones.
- Design areas as either public, semi-private, or private.
- Divide zones with some type of barrier. These can be either physical or symbolic.
- Good lighting is one of the most effective crime deterrents. When used properly, light discourages criminal activity, enhances natural surveillance opportunities, and reduces fear.

ACCESS CONTROL (NATURAL)

- Avoid remote locations for common areas.
- Employ natural elements like doors, shrubs, fences, and gates to deny access to a crime target and to create a perception of risk to offenders.
- Supplement measures with physical and mechanical means of access control—locks, bars, and alarms.
- A system should be in place to lock down a building in an active shooter scenario.

SURVEILLANCE (NATURAL)



- Utilize design features, such as the proper placement and design of windows, lighting, and landscaping, to increase the visibility of a property or building, and therefore, providing a greater potential to observe intruders and inappropriate behavior.
- Use design to provide opportunities to see and be seen; from within buildings, adjacent properties, and site perimeter.

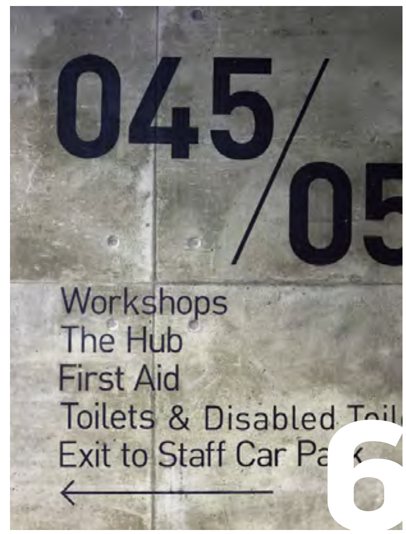
TERRITORIAL REINFORCEMENT

- Encourage an individual to take control of his or her enviroment and defend it against attack.
- Create both real and perceptual barriers to entry and movement.
- Physical barriers should be substantial in nature and physically prevent movement.
- Employ design elements such as sidewalks, fencing, landscaping, and entry plazas to help distinguish between public and private areas.

MAINTENANCE

- Use rules and regulations to define the use and maintenance of territories.
- Utilize continued upkeep to indicate greater concern by users and indicate a lower tolerance of disorder.
- Proper maintenance protects the public health, safety, and welfare in all existing structures and on all existing premises by establishing minimum requirements and acceptable standards.

ORIENTATION + SIGNAGE



- All the main entry doors to buildings should have signage and be clearly visible.
- Emergency evacuation signage should be standardized for buildings and campuses.
- Building name signage should be located on all four sides of a building to aid responding agencies.
- Building roofs should be labeled for identification by responding agencies using helicopters.

II. IMPLEMENTATION

CPTED can be implemented at both the District level and at a campus level in both existing and new facilities. Garnering interest and participation from the College and neighboring communities will be the ultimate goal in securing safe learning environments. Below are a series of recommendations to implement CPTED.

STRATEGIES FOR IMPLEMENTATION

- Form a steering committee including district and college leadership to develop a CPTED action plan, realizing that each campus has unique issues to be addressed.
- Encourage all consultants on projects (architects, engineers, etc.) to enroll in a course to learn about CPTED strategies.
- Educate the campus community (students, faculty, and staff) and the neighborhood community about CPTED-based crime prevention strategies.
- Communicate the District's and College's issues, concerns, and strategies through online or printed publications to promote buy-in from all within the communities.
- Empower the community to take greater responsibility for quality of life issues. Utilize student leadership to help in empowering the student population.
- Consider a "comments welcome" policy where students can contribute comments or solutions to things they observe around campus, either in spaces, actions, or upkeep.
- Engage other players such as city officials, community leaders, and the local power company, to support implementing CPTED principles on their end through upkeep of neighborhood streets, lights, litter, vacant lots, graffiti control, etc.

III. RESOURCES + REFERENCES

National Crime Prevention Council
www.ncpc.org

National Institute of Crime Prevention: CPTED Training
www.cptedtraining.net

CPTED Training & Consulting
crimepreventioninfo.com

Using Crime Prevention Through Environmental Design in Problem-Solving
August 2007 by Diane Zahm. U.S. Department of Justice Office of Community Oriented Policing Services

Best Practices for Using Crime Prevention Through Environmental Design in Weed and Seed Sites
2009 by National Crime Prevention Council.

Crime Prevention Through Environmental Design - General Guidelines For Designing Safer Communities
January 20, 2000 by the City of Virginia Beach Municipal Center

PART D

FUSION+GIS +ONUMA SYSTEM GUIDELINES

INTRODUCTION

The California Community College (CCC) system is the largest system of public higher education in the world. In order for the State to standardize and streamline space management for CCC facilities statewide, the CCC system uses FUSION (Facilities Utilization, Space Inventory Option Net).

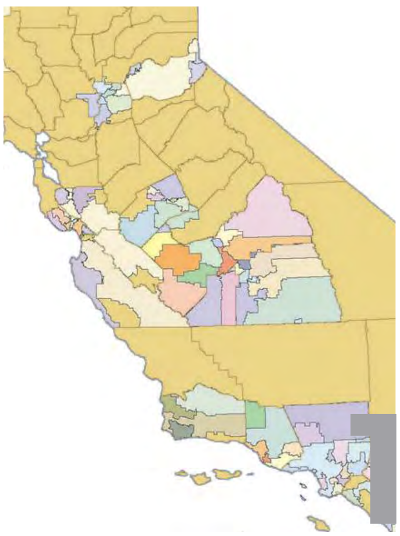
The California Community College (CCC) system has adopted the use of FUSION + GIS + ONUMA, which is an online platform that synchronizes multiple databases which will allow visualization of 2D and 3D floor plans. The data visualization serves as a quality check, highlights discrepancies, and creates a self-correcting mechanism.

FUSION + GIS + ONUMA will provide accurate information for the planning of new facilities. Design professionals can be provided with integrated facility data at the start of new construction or renovation in BIM. Once projects are completed, the as-built information can be fed back to the FUSION + GIS + ONUMA platform and provide realtime project and facility management, coordination, and control.

It is critical that all future RCCD projects are compatible with FUSION + GIS + ONUMA platform for easy data entry and collection.

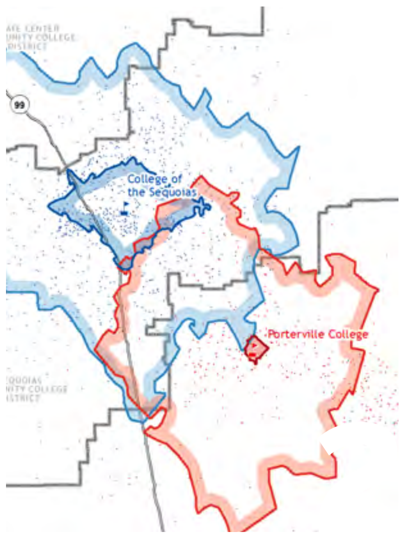
I. TOOLS

FUSION SYSTEM



- A database of all of California community college facilities that tracks the condition assessments and develops cost modeling for maintenance projects.
- Enables colleges to plan budgets and help facilitate the passing of much-needed bond measures.

CCCGIS



- Geographic information systems (GIS) puts facilities and site data in context with latitude, longitude and other data.
- Provides a common repository for the various maps, documents, links, and other tools.
- CCCGIS Collaborative provides campus property boundary data as well as building footprints for selected campuses.
- The data is the basis of locating building data in the correct location.

ONUMA

- Web-based Building Information Modeling (BIM) tool.
- Licensed to individual and enterprise users for use in the design and management of projects and facilities.
- ONUMA system is a system to connect data from the various systems and provide access to data in a graphical format.

II. IMPLEMENTATION

The requirements and recommendations to produce data that can be used in FUSION + GIS + ONUMA vary depending on the type of application used to create floor plans for the buildings. For new construction or renovations, design professionals are to use BIM based software.

The basic requirement for any work with CCC districts is for the BIM model to show spaces with proper classification (using statewide naming and numbering system).

Construction contracts require the deliverable of digital documents. In addition to any CAD or BIM requirements for design and construction, project data and graphics shall be formatted in a way to facilitate the import of the deliverable data back into FUSION + GIS + ONUMA.

STRATEGIES FOR IMPLEMENTATION

- Comply with the minimum BIM requirements.
- All spaces in BIM defined with proper classification.
- Ensure BIM digital deliverables from all design professionals are compatible with FUSION + GIS + ONUMA.
- Refer to *Guidelines for working with the FUSION + GIS + ONUMA System.*

III. RESOURCES + REFERENCES

ONUMA
www.onuma.org

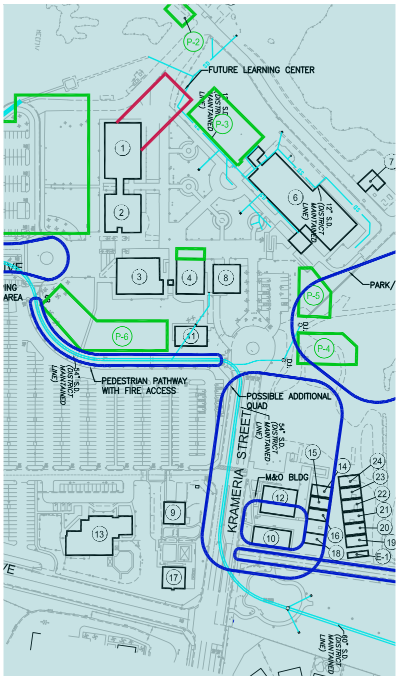
Foundation for California Community Colleges
www.foundationccc.org

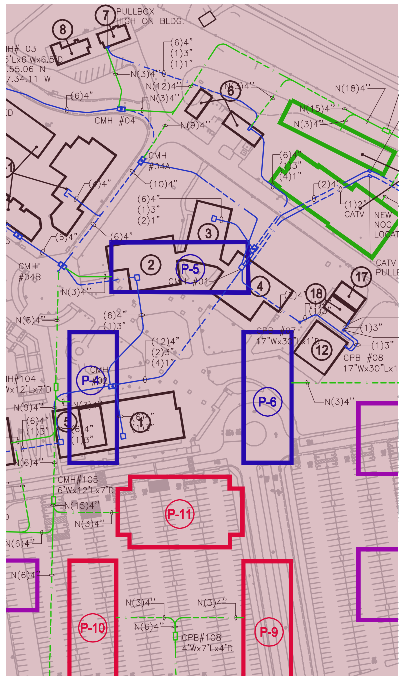
CCCGIS Collaborative
www.cccgis.org

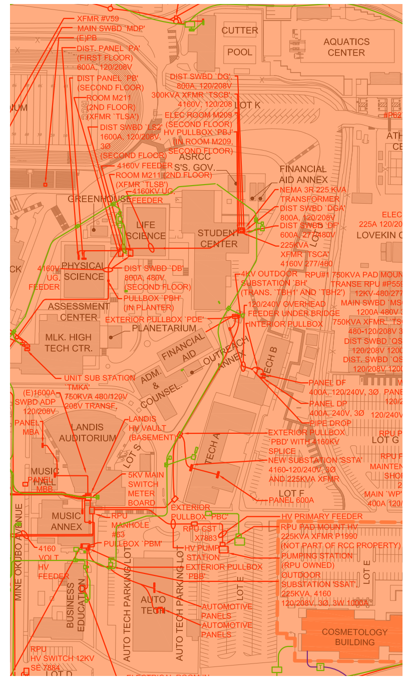
END OF SECTION 2

3 SITE UTILITIES + INFRASTRUCTURE

RIVERSIDE COMMUNITY COLLEGE DISTRICT - DISTRICT STANDARDS + CAMPUS GUIDELINES HANDBOOK







INTRODUCTION

The main purpose for establishing a site utilities and infrastructure guideline is to assist RCCD to prepare better for enrollment, program, and building growth and to plan ahead for the budgeting, design, and development of infrastructure projects.

Currently, all three RCCD Campuses are developing updated facilities master plans. Therefore, the campus site plan diagram presented in this section illustrate existing conditions at the time of publication of this *Handbook* and Horizon 1 planned, designed, or under construction projects.

It is highly recommended that any time a campus master plan is updated, that the site utilities and infrastructure diagrams are updated immediately thereafter.

Furthermore, careful attention should be paid to integration of sustainable design principles and preparation of data and documents that are compatible with the FUSION+GIS+ONUMA platform. Refer to Section 2.

Note: the current scope of this *Handbook* does not include civil or telecommunications guidelines. In the future, it is highly recommended that this Section be completed.

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SECTION 3
MORENO VALLEY COLLEGE

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PART A
ELECTRICAL UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG–TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

I. EXISTING CONDITIONS:

- Moreno Valley College is currently fed from two Southern California Edison (SCE) 12kV high voltage lines primary metering and distribution system. This power is then transformed down to low voltage where it is distributed throughout the site. The north SCE line off of Lasselle Street provides power to two transformers on the north and south side of the campus. The north side of campus is served by two 750 kVA transformers that feed two 3000 amp 480Y/277V-3 phase 4-wire distribution boards in the two central plants on the campus. These distribution boards provide service to most of the buildings throughout the campus. The south SCE line is fed off of Kraneria Street and feeds individual buildings and meters mostly on the south side of the campus.

II. GOALS:

- The goal is to serve new buildings and major building remodels with 480-volt service feeders from the two central plants (MECH 1+MECH 2). However, the campus has not had much success in increasing the size of the SCE transformers to accommodate new loads, so the alternate method of distribution is to feed the buildings directly from the north or south SCE lines and provide separate pad mounted SCE transformers and meters.

III. HORIZON 1 IMPLEMENTATION:

- Extend 480-volt underground feeders to new buildings from the existing buildings.
- The proper digging equipment shall be used for rocky conditions. There shall be no “discovery” or change orders for rock. The campus is built on rock.

IV. LONG–TERM IMPLEMENTATION:

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. 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 improved system reliability
- Provide ease of maintenance and isolation of circuits either during a fault or during a regular maintenance without interrupting power to every building on campus
- Be sized to accommodate existing loads and planned future loads resulting from new buildings addition as well as additions to existing buildings
- Be well coordinated to eliminate nuisance tripping of upstream protective devices
- Have all equipment listed for the short circuit availability at the point of installation.
- The campus has not opted to provide a new 12kV closed loop system at this time.
- Both of SCE’s 750KVA transformers will be inadequate to meet the future demands of the campus. The SCE transformers will need to be increased in size to 2500kVA each to meet the future demand.

HIGH VOLTAGE DISTRIBUTION

The site is presently fed by Southern California Edison from two different locations. The north campus is fed by 12kV high voltage distribution system that enters the site on the northwest corner of Lasselle Ave and Campus Drive. These 12kV XLP underground conductors are extended through a single 5” conduit and a series of manholes to a Southern California 12KV switch. The switch then back feeds into a capacitor bank. Service then continues with 12 kV XLP underground conductors to a 750 KVA transformer and an additional capacitor bank located at Mechanical Building No. 1. A second 12kV XLP conductor run is extended in a single 5” conduit through a manhole to another 750 KVA transformer located at Mechanical Building No. 2. These SCE transformers then transform from 12kV primary voltage to a 480Y/277 V, 3-phase, 4-wire system with a 3000 A main switchboard at each location. It should be noted that the two 3000 A 480/277 V switchboards were once each metered individually, however these meters have been removed and a new radio transmitting meter and antenna has been installed in the 12kV high voltage switch enclosure. The present system provides for a combined load of 6000 Amps of secondary distribution at 480/277 V, 3-phase, 4-wire. There is a 5” empty conduit stubbed out from Southern California Edison manhole E-4 located at Mechanical Building No.2 to the west for future expansion of the 12kV system. The south campus area is fed by a 12kV high voltage underground distribution system that extends from a Southern California Edison manhole located on Krameria Street through a single 5” conduit to a 150 KVA transformer located on the corner of Cahuilla Ave. and Krameria Street. The 12kV feeder dead-ends at this location. The 150 KVA SCE transformer then transforms the 12 kV to 208/120 Volt, 3-phase, 4-wire. There is an 800 Amp switchboard and meter located adjacent to the Head Start building. This switchboard sub-feeds a 400 Amp switchboard and meter located adjacent to the existing warehouse facility as well as back-feeding the old 400 A switchboard. It should be noted that even though there are no provisions for future expansion at this location, the 5” conduit feeding the transformer allows for an increase in available capacity. These buildings have their own SCE feed and will not be added to the campus loop.

LOW VOLTAGE DISTRIBUTION SYSTEM

North Campus

The Southern California Edison transformer presently feeds a 3000 A main switchboard (designated as ‘MSB’) located at Mechanical Building No.1. The main switchboard is protected by a 3000 A ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pullboxes throughout the campus to the various buildings. These buildings are listed as follows:

- The library is fed with an 800 Amp circuit breaker and feeder to an 800 A secondary distribution switchboard. The 480 Volts are then transformed to 120/208 Volts for secondary distribution. It should be noted that this 800. A circuit breaker feeder indicated a maximum high leg conductor reading of 67 Amps at the time of this report.
- The Science Tech Building has a 1200 A circuit breaker and feeder to a 1200 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 100 A circuit breaker feeder indicated a maximum high leg conductor reading of 81 Amps at the time of this report.
- The Student Services Building appears to be fed by a 100 A circuit breaker and 200 A conductor (because of voltage drop) feeding a 400 A, 480/277 V, secondary distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 34 Amps at the time of this report.

IV. LONG–TERM IMPLEMENTATION (CONT'D):

- The Bookstore and Student Activity Buildings are fed with a single 100 Amp circuit breaker and 100 Amp conductors. This single feeder is then provided with a 600 Volt disconnect switch which feeds a 75 KVA transformer and secondary 208/120 Volt panel at each building. It should be noted that this 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 17 Amps at the time of this report.
- The Humanities building is fed with a 1200 Amp circuit breaker and 1200 Amp conductors to a 1200 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that this 1200 Amp circuit breaker indicated a maximum high leg conductor reading of 143 Amps at the time of this report.

South Campus

The Southern California Edison 150 KVA transformer feeds an 800 Amp 208/120 Volt main switchboard and meter which sub-feeds the old switchboard feeders, the President's office, and the Head Start building. It should be noted that the campus is presently paying for the power consumption for the Head Start building. The same 150 KVA transformer also feeds a 400 Amp main switchboard which feed the warehouse, multi-purpose, and portable buildings.

Note:
The SCE T/F is 1/2 full with 50% spare capacity. The peak 12-month demand on this switchboard is 61 kW or 169 A at 208 V. Underground Distribution Network The secondary distribution network throughout the campus is by a series of duct banks with 4" and 5" conduits and manholes. There are spare conduits throughout the system.

- We recommend a new 12 KV closed loop system be installed to serve each building on the campus. 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 closed loop system. This arrangement will facilitate isolation of buildings without shutting off the main system.
- We recommend that the configuration of the future Learning Center be adjusted to avoid the electrical feeders to existing buildings on campus.
- A Short Circuit / Arc Flash study be conducted to coordinate the proposed system.
- Conduct a coordination study of the proposed system to effectively coordinate all protective devices in the campus.
- The existing north campus distribution network is adequate to accommodate 106,000 square feet of expansion without modifying the system. If additional capacity (above 106,000 square feet) is required, it is recommended that Southern California Edison be requested to upgrade the (2) 750KVA transformers. It is recommended that SCE be notified every time a new load or building is added to the system.
- We recommend the use of proper digging equipment for trenching any new electrical feeders as it is well known that the campus has a granite base. The amount of time and the rental of proper equipment should be included in the base bid of any job at Moreno Valley Campus where trenching is involved and not included in a change order as "discovery" after the fact.
- 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.
- 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. Note: The infrastructure exhibits and report are designed for copper conductors.
- The existing south campus is fed from a Southern California Edison 12 kV network via a manhole on Krameria Street with a 5" conduit to the present 150 KVA transformer. Their system can easily be expanded by SCE and a new 12 KV feeder installed to accommodate one or two new transformers similar to the north campus and could provide an additional 6000 Amps of capacity at 480 Volts. It is not recommended that the two campuses be combined on a single feeder. However, at some future date they could be extended to a neutral point and a high voltage selector switch installed which would allow the ability to switch from one high voltage feeder to the other in the event of a major loss of power on either feeder (both of which are fed from the same substation).

PART A ELECTRICAL UTILITIES

INTRODUCTION

Insert text

Refer to:

Moreno Valley
Electrical Distribution Plan

February 7, 2001

Riverside Community College District

Moreno Valley Electrical Distribution Survey

February 7, 2007

P2S Engineering, Inc.

P2S


SCE Pullbox


SCE Pullbox

SCE Pullbox and Capacitor Bank

SCE Pullbox


SCE Capacitor Bank

Executive Summary

Background and Scope

Moreno Valley College, one of three colleges within the Riverside Community College District, is a two-year public community college situated in the suburban community of Moreno Valley, California. The campus was built in two phases with the majority of the buildings being built in phase one. The Moreno Valley Campus is fast becoming the health education center of choice in the Inland Empire with strong programs in health sciences, human and public services. Each semester more than 7,000 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 Southern California Edison via a 12kV high voltage primary distribution system. This power is then transformed down to low voltage where it is then metered and distributed throughout the site. P2S evaluated the existing power distribution system currently serving the existing Moreno Valley College Campus.

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.

Methodology

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

-A critical aspect in the evaluation of the existing power distribution systems serving a facility is a detailed and accurate field investigation of the current systems. A detailed survey of the existing power distribution system that currently serves the facilities at Moreno Valley 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 as well as discussion with the Southern California Edison service representative.

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

Report Overview

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 in this survey submittal:

-Executive summary

-High voltage system description and photographs of the existing equipment.

-Low voltage system description and photographs of the existing equipment.

-Review of the current power consumption including current electric rate structure, main meter demand peak chart and campus kVA demand chart as well as total electric consumption cost.

-Available spare electrical capacity including future building capacity.

-Existing manhole conditions and photos.

-Existing pull box conditions and photos.

-Existing handhole conditions and photos.

-AutoCAD drawings of the existing electrical site distribution system as well as single line drawings for both the north and south campus.


SCE High Voltage Switch

SCE HV Switch w/ Meter Antenna


SCE 750 kVA Transformer Mech Bldg 1

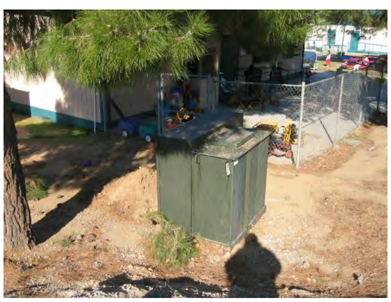

SCE Capactor Bank Mech Bldg 1

SCE Capacitor Bank Mech Bldg 1

SCE Pullbox

SCE 750 kVA Transformer

SCE 750 kVA Transformer



SCE 150 kVA Transformer

SCE 150 kVA Transformer

Summary of our Findings and Recommendations

Electrical Power Distribution

Findings

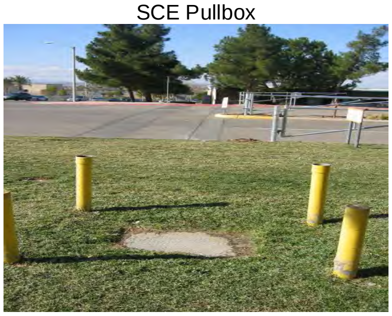
High Voltage Distribution

The site is presently fed by Southern California Edison from two different locations. The north campus is fed by 12kV high voltage distribution system that enters the site on the northwest corner of Lasselle Ave and Campus Drive. These 12kV XLP underground conductors are extended through a single 5" conduit and a series of manholes to a Southern California 12kV switch. The switch then back feeds into a capacitor bank. Service then continues with 12 kV XLP underground conductors to a 750 kVA transformer and an additional capacitor bank located at Mechanical Building No. 1. A second 12kV XLP conductor run is extended in a single 5" conduit through a manhole to another 750 kVA transformer located at Mechanical Building No. 2. These SCE transformers then transform from 12kV primary voltage to a 480Y/277 V, 3-phase, 4-wire system with a 3000 A main switchboard at each location.

It should be noted that the two 3000 A 480/277 V switchboards were once each metered individually, however these meters have been removed and a new radio transmitting meter and antenna has been installed in the 12kV high voltage switch enclosure (see photograph). The present system provides for a combined load of 6000 Amps of secondary distribution at 480/277 V, 3-phase, 4-wire. There is a 5" empty conduit stubbed out from Southern California Edison manhole E-4 located at Mechanical Building No.2 to the west for future expansion of the 12kV system.

The south campus area is fed by a 12kV high voltage underground distribution system that extends from a Southern California Edison manhole located on Krameria Ave. through a single 5" conduit to a 150 kVA transformer located on the corner of Cahuilla Ave. and Krameria Ave. The 12kV feeder dead-ends at this location. The 150 kVA SCE transformer then transforms the 12 kV to 208/120 Volt, 3-phase, 4-wire. There is an 800 A switchboard and meter located adjacent to the Head Start building. This switchboard subfeeds a 400 Amp switchboard and meter located adjacent to the existing warehouse facility as well as backfeeding the old 400 A switchboard. It should be noted that even though there are no provisions for future expansion at this location, the 5" conduit feeding the transformer allows for an increase in available capacity.


SCE Pullbox


SCE Pullbox


Main Switchboard "MSB"


Main Switchboard "MSB"


Main Switchboard "MSB2"

Low Voltage Distribution System

North Campus

The Southern California Edison transformer presently feeds a 3000 A main switchboard (designated as 'MSB') located at Mechanical Building No.1. The main switchboard is protected by a 3000 A ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pullboxes throughout the campus to the various buildings. These buildings are listed as follows:

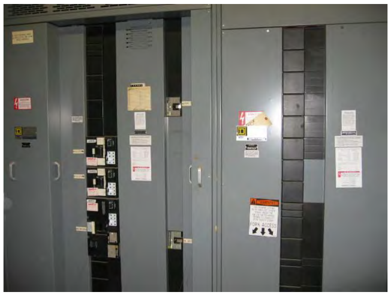
-The library is fed with an 800 A circuit breaker and feeder to an 800 A secondary distribution switchboard. The 480 Volts are then transformed to 120/208 Volts for secondary distribution. It should be noted that this 800 A circuit breaker feeder indicated a maximum high leg conductor reading of 67 Amps at the time of this report.

-The Science Tech Building has a 1200 A circuit breaker and feeder to a 1200 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 100 A circuit breaker feeder indicated a maximum high leg conductor reading of 81 Amps at the time of this report.

-The Student Services Building appears to be fed by a 100 A circuit breaker and 200 A conductor (because of voltage drop) feeding a 400 A, 480/277 V, secondary distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that the 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 34 Amps at the time of this report.

-The Bookstore and Student Activity Buildings are fed with a single 100 Amp circuit breaker and 100 Amp conductors. This single feeder is then provided with a 600 Volt disconnect switch which feeds a 75 kVA transformer and secondary 208/120 Volt panel at each building. It should be noted that the 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 17 Amps at the time of this report.

-The Humanities building is fed with a 1200 Amp circuit breaker and 1200 Amp conductors to a 1200 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that this 1200 Amp circuit breaker indicated a maximum high leg conductor reading of 143 Amps at the time of this report.


Main Switchboard “MSB2”


Transformer


Main Switchboard “MSB” (South)


Main Switchboard “MSB” (South)


Old Main Switchboard “MS” (South)

South Campus

The Southern California Edison 150 kVA transformer feeds an 800 Amp 208/120 Volt main switchboard and meter which subfeeds the old switchboard feeders, the President’s office, and the Head Start building. The peak 12-month demand for this switchboard is 41 kW or 122 A at 208 V. It should be noted that the campus is presently paying for the power consumption for the Head Start building.

The same 150 kVA transformer also feeds a 400 A main switchboard and meter which feeds the warehouse, multi-purpose, and portable buildings. The peak 12-month demand on this switchboard is 50 kW or 139 A at 208 V.

Underground Distribution Network

The secondary distribution network throughout the campus is by a series of duct banks with 4” and 5” conduits and manholes. There are spare conduits throughout the system (see separate section for manhole layouts and photographs).

Conclusion

The existing Edison substructure is in very good condition and is adequately sized for the campus’ present needs. The existing 15 kW conductors have the capability of feeding all major additions. The Southern California Edison transformers have a combined capacity of 1500 kVA. Edison and all other utilities size their equipment for a 40% demand factor. At the present time there is 6000 Amps of capacity in the two main switchboards with a combined 12-month peak demand load of 712 kW on 854 Amps at 480 Volts, 3-phase.

Based upon a design load of 20 Watts per square foot, an additional 170,000 square feet of new building could be added to the two existing main switchboards, transformers, and primary feeder. This available spare capacity would accommodate any anticipated upgrades or renovations throughout the existing campus buildings.

The secondary distribution switchboards are all adequately sized for any additional loads, retrofits or remodels that may be required. The maximum connect load is 12% of the rated switchboard (This is for the Humanities Building). All others are even more lightly loaded.

Recommendations

-The existing north campus distribution network is adequate to accommodate 170,000 square feet of expansion without modifying the system.


Old Main Switchboard “MS” (South)


Main Switchboard “MSF” (South)


Power Panel “PP” (South)

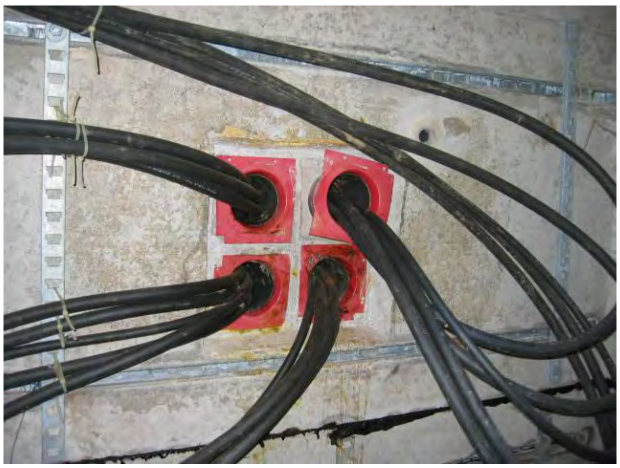

Warehouse Panel “WP” (South)

-If additional capacity (above 170,000 square feet) is required, it is recommended that Southern California Edison by requested to upgrade the 12kV feeder conductors. The 5” conduit system will allow them to drastically increase their available capacity.

-Southern California Edison has a very good reputation for maintaining their networks. The weak point in the distribution system is the single 5” conduit feeding the entire north campus (see recommendations for the south campus).

The existing south campus is fed from a Southern California Edison 12 kV network via a manhole on Krameria Ave. with a 5” conduit to the present 150 kVA transformer. Their system can easily be expanded by SCE and a new 12 kV feeder installed to accommodate one or two new transformers similar to the north campus and could provide an additional 6000 Amps of capacity at 480 Volts. It is not recommended that the two campuses be combined on a single feeder. However, at some future date they could be extended to a neutral point and a high voltage selector switch installed which would allow the ability to switch from one high voltage feeder to the other in the event of a major loss of power on either feeder (both of which are fed from the same substation).

Manhole A



Manhole A

Manhole A

Manhole A

Pullbox D

Manhole B

Manhole C

Manhole C

Manhole C

Manhole C

SCE Pullbox

SCE Pullbox

SCE Pullbox

SCE Capacitor Bank

SCE Pullbox and Capacitor Bank

SCE High Voltage Switch

SCE HV Switch w/ Meter Antenna

SCE 750 kVA Transformer Mech Bldg 1

SCE Capactor Bank Mech Bldg 1

SCE Capacitor Bank Mech Bldg 1

SCE Pullbox

SCE 150 kVA Transformer

SCE 750 kVA Transformer

SCE 150 kVA Transformer

SCE 750 kVA Transformer

SCE Pullbox

SCE Pullbox

Main Switchboard “MSB”

Main Switchboard “MSB”

Main Switchboard “MSB2”

Main Switchboard “MSB2”

Main Switchboard “MSB” (South)

Transformer

Old Main Switchboard “MS” (South)

Main Switchboard “MSB” (South)

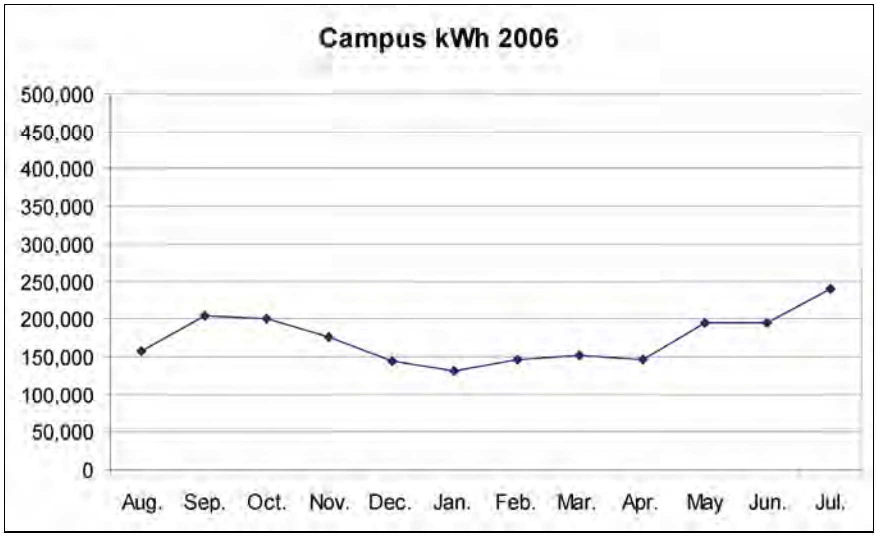
Old Main Switchboard “MS” (South)

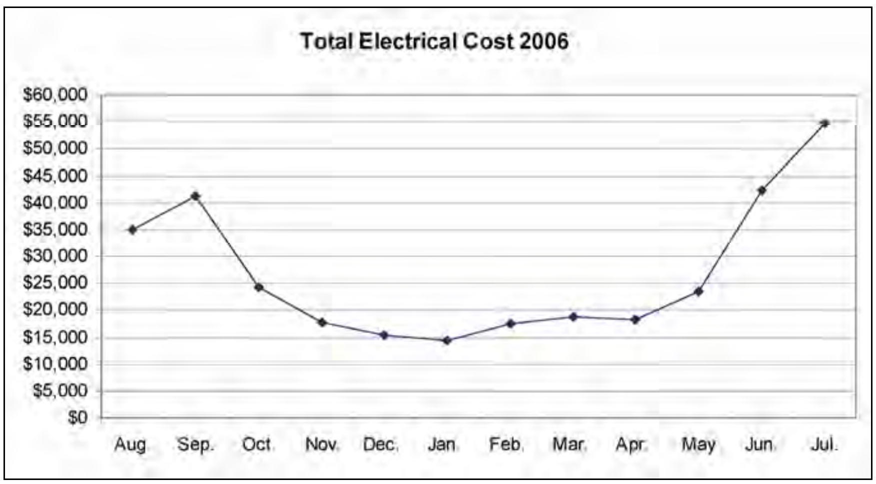
Main Switchboard “MSF” (South)

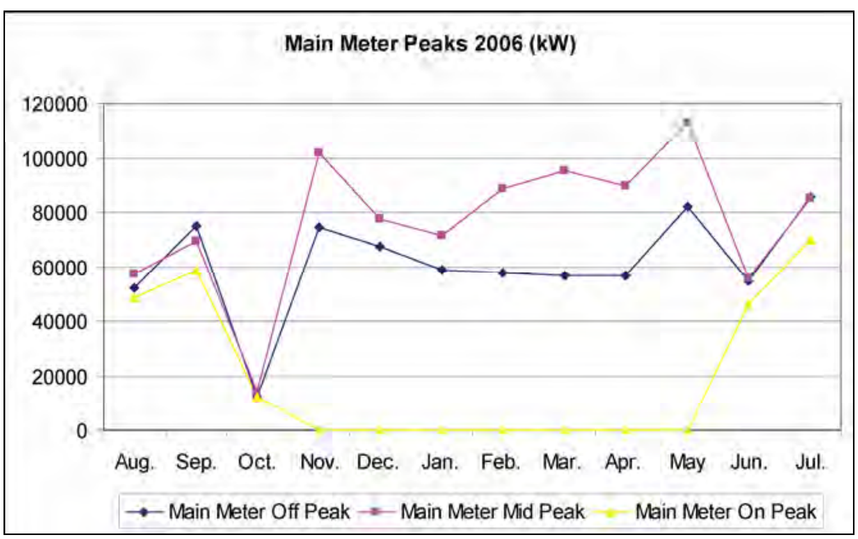
Power Panel “PP” (South)

Warehouse Panel “WP” (South)

Moreno Valley Campus Energy Usage





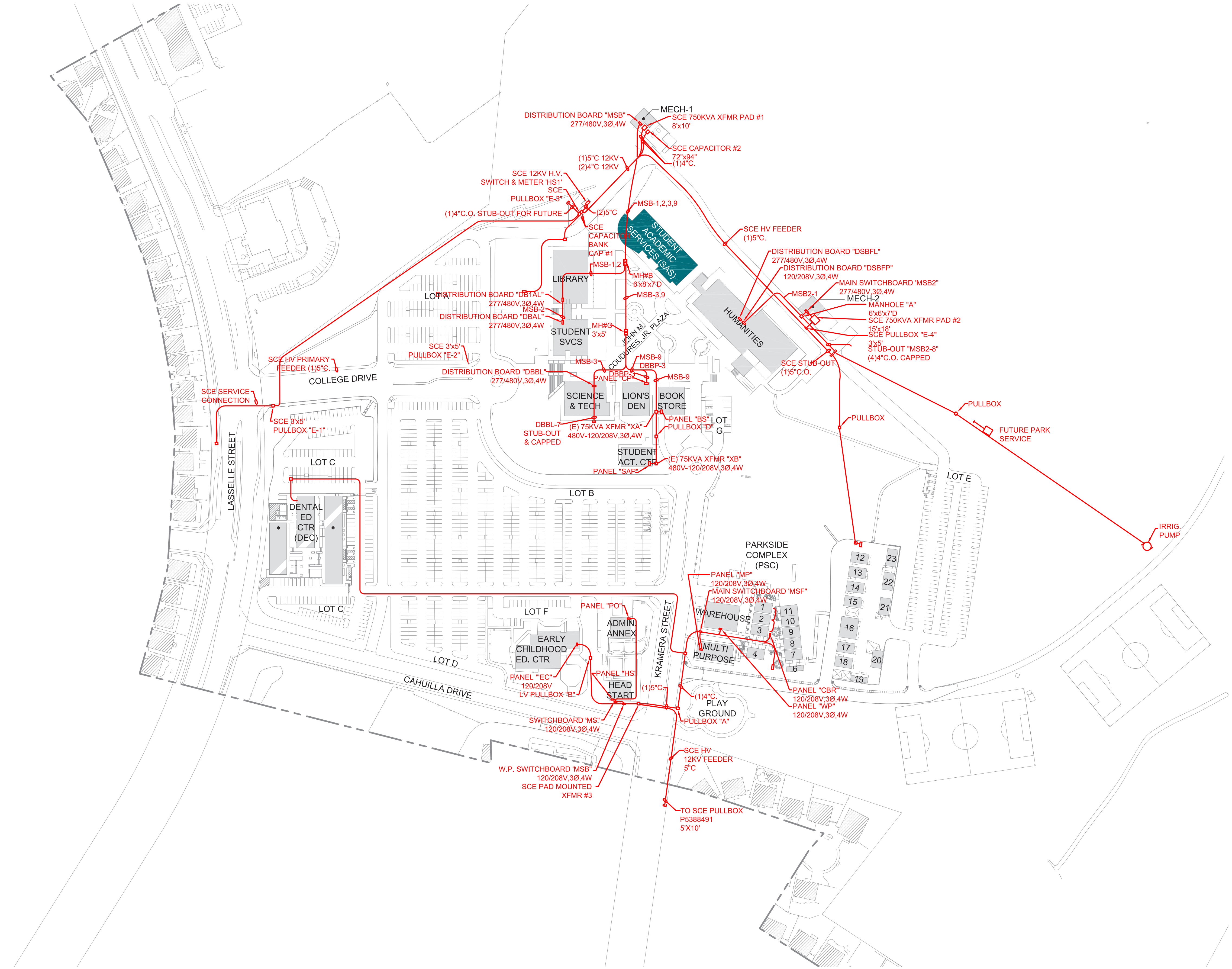


LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- EXISTING ELECTRICAL
- IRRIGATION PUMP

ABBREVIATIONS

C - CONDUIT
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
LV - LOW VOLTAGE
MH - MANHOLE
MSB - MAIN SWITCHBOARD
SCE - SOUTHERN CALIFORNIA EDISON
V - VOLTAGE
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER



0 ft 120 ft 240 ft
SCALE: 1" = 240'-0"

EXISTING ELECTRICAL SITE PLAN

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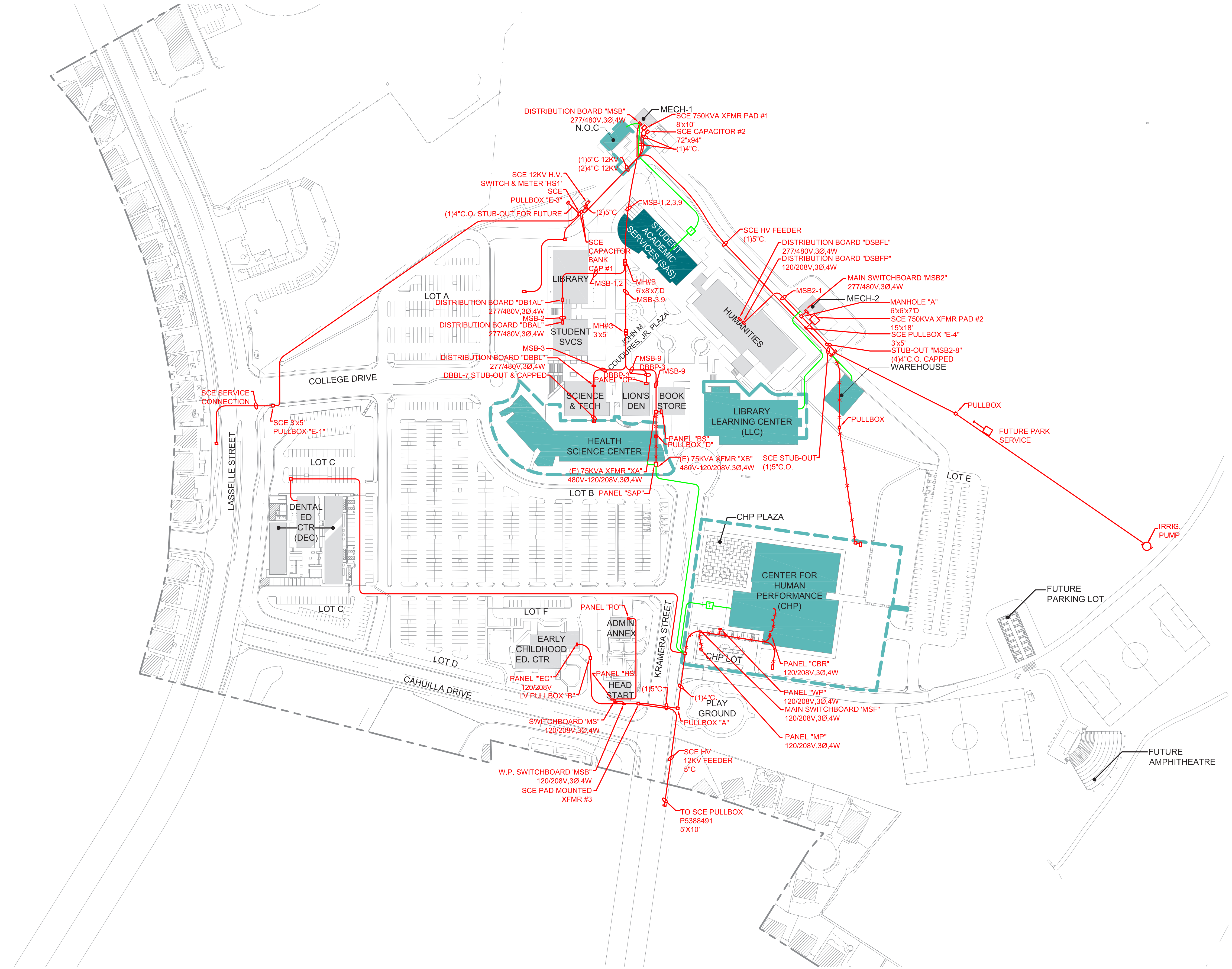
LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- FACILITIES IN DESIGN
- EXISTING ELECTRICAL
- DEMOLISHED ELECTRICAL
- PROPOSED ELECTRICAL
- MAIN TRANSFORMER
- IRRIGATION PUMP

ABBREVIATIONS

C - CONDUIT
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
LV - LOW VOLTAGE
MH - MANHOLE
MSB - MAIN SWITCHBOARD
SCE - SOUTHERN CALIFORNIA EDISON
V - VOLTAGE
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER



0 ft 120 ft 240 ft

SCALE: 1" = 240'-0"

HORIZON 1 ELECTRICAL SITE PLAN

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PART B

FUEL DISTRIBUTION UTILITIES

FUEL DISTRIBUTION UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG–TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

I. EXISTING CONDITIONS:

- Moreno Valley College is currently served from a single gas meter located on the north-west side of the MECH 1 central plant building which serves the MECH 2 central plant, Humanities building, and Science and Technology building. The meter is fed through a 4-inch gas company line deriving its service from a 4-inch high pressure gas main running along Lasselle Street.
- The majority of the campus underground gas infrastructure was installed in the late 1980'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 several modifications over the years to accommodate campus expansions, renovations, and additions such as the addition of the MECH 2 central plant and the Humanities building. Gas mains are believed to be plastic pipe and range from 3/4-inch to 4-inches in diameter.
- Natural gas downstream of the meters are distributed at medium-pressure at approximately 5 pounds per square inch gauge throughout the campus. 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 domestic hot water needs at plumbing fixtures. Natural gas is used for domestic water heating and industrial hot water.
- The total estimated gas load demand for the existing system (heating and domestic) is approximately 8,865 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 8,865 CFH.

II. GOALS:

- Basis of the recommendations to upgrade the existing Natural Gas infrastructure at the campus are 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.
- Locate future buildings so they do NOT interfiere with existing underground gas service lines.
    - Avoid re-routing lines wherever is possible.

III. HORIZON 1 IMPLEMENTATION:

- The existing main medium pressure distribution lines are adequately sized to meet the demands of existing and future facilities on the campus.
- Earthquake valves for emergency gas supply shut-off should be provided at each meter location on the downstream side of the regulator. A Monitoring Switch is an option feature that is available enabling the valves open and closed position to be monitored remotely. The switch uses up to a 24-V AC or 24- VDC current, relays a 250-mA current indicating to the monitoring device whether the valve is in it open/closed position. The signal can be relayed through a signal cable to continuously notify a PLC, PC or alarm system of the valves position.
- Meter #1: Replacement of existing meter with a higher capacity meter having a max CFH output of no less than 15,000 CFH is required. Southern California Gas Company shall provide this service.
- Install new meter (#2) with a max. CFH output of no less than 15,000 CFH. This meter shall serve most of the proposed buildings and future campus expansions. Southern California Gas Company shall provide this service.
- All buildings to 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.
- Use proper digging equipment for trenching as it is well known that the campus has a granite base. The amount of time and the rental of proper equipment should be included in the base bid of any job at the Moreno Valley Campus where trenching is involved and not included in a change order as “discovery” after the fact.

IV. LONG–TERM IMPLEMENTATION:

LEGEND

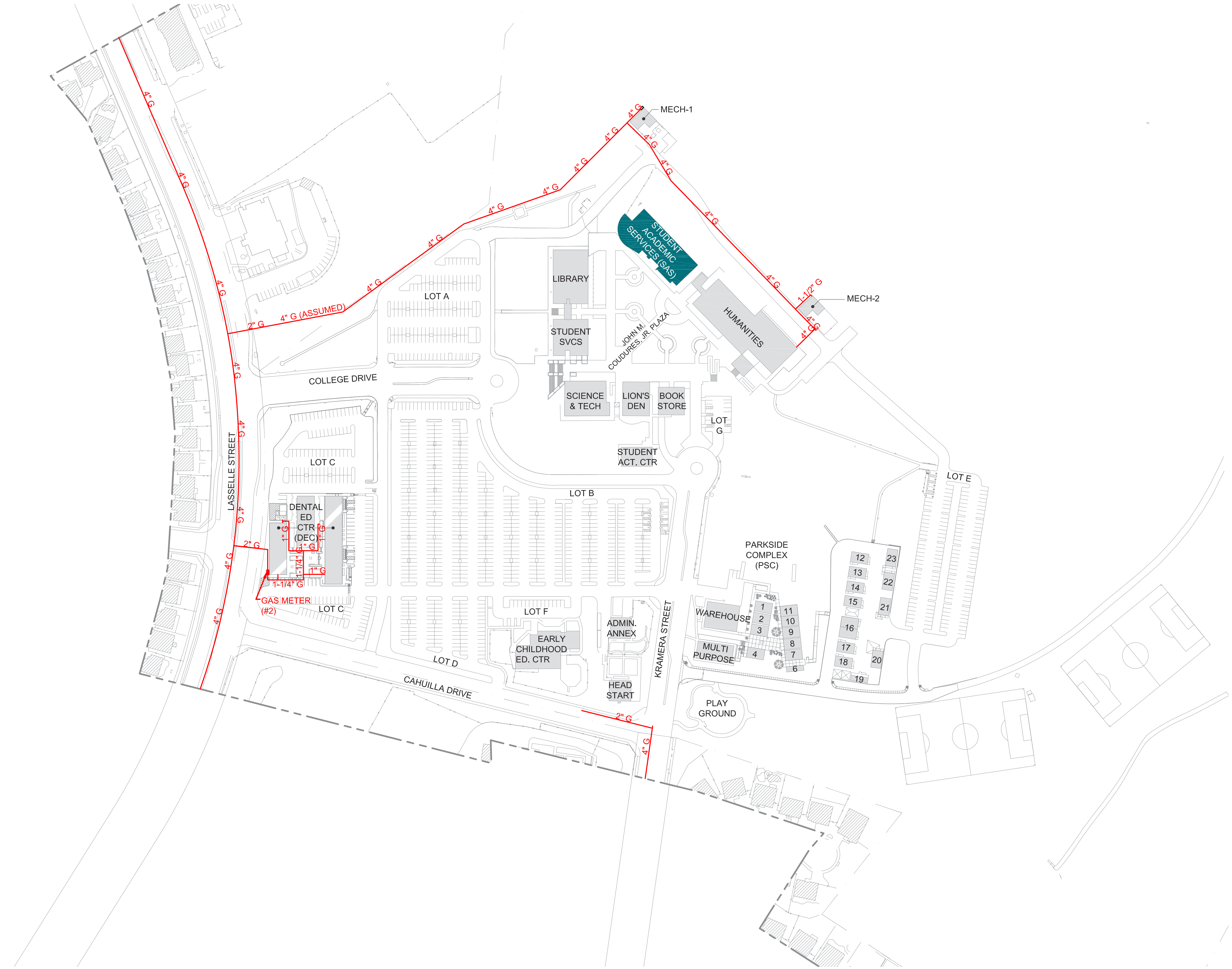
EXISTING FACILITIES

FACILITIES UNDER CONSTRUCTION

EXISTING FUEL DISTRIBUTION

ABBREVIATIONS

G - GAS



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SCALE: 1" = 240'-0"

EXISTING FUEL DISTRIBUTION SITE PLAN

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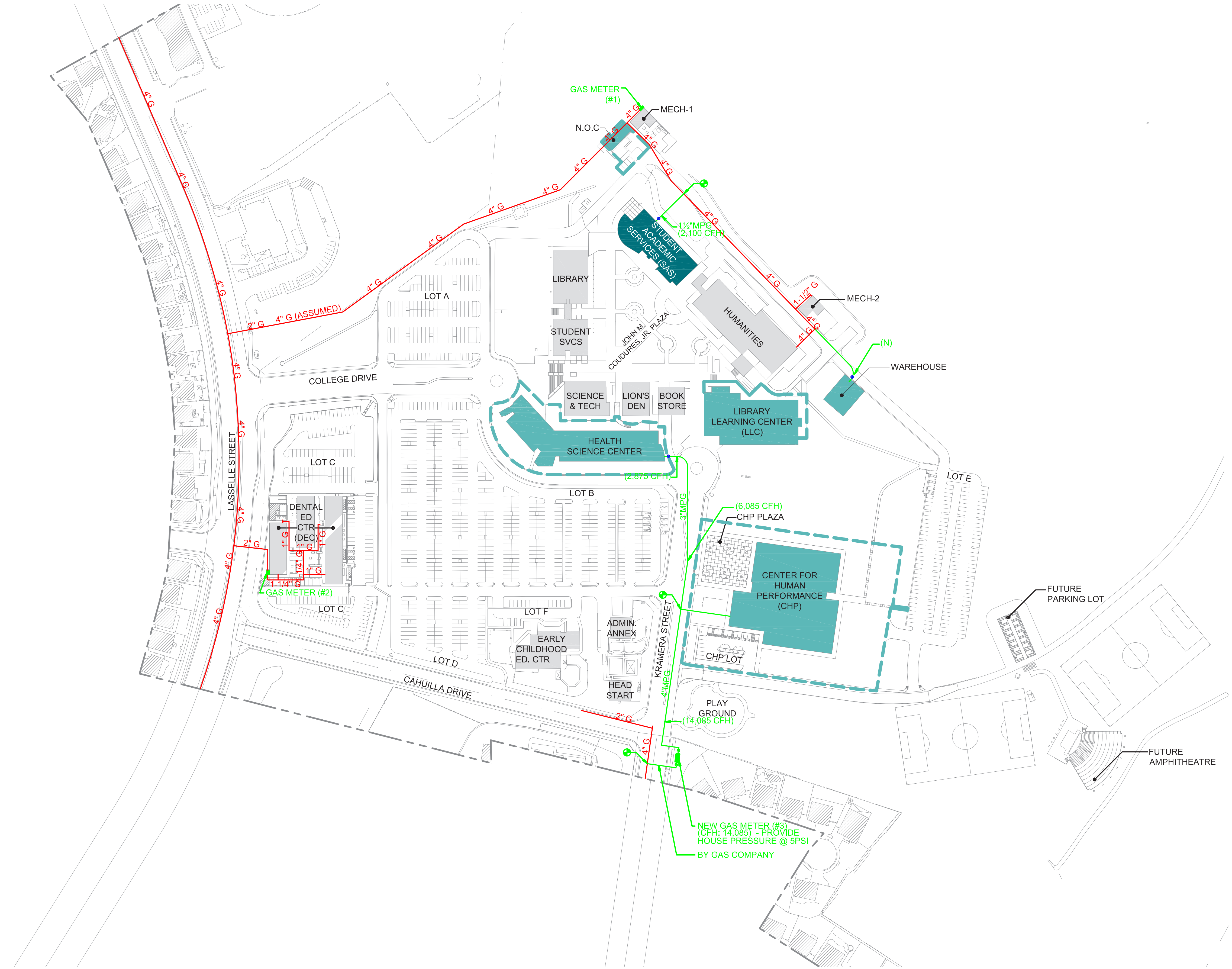
LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- FACILITIES IN DESIGN
- EXISTING FUEL DISTRIBUTION
- PROPOSED FUEL DISTRIBUTION
- PROPOSED P.O.C. (POINT OF CONNECTION)
- PROPOSED P.O.D. (POINT OF DISCONNECTION)
- PRESSURE REGULATOR AT BUILDING POINT OF ENTRY
- PROPOSED GAS METER

ABBREVIATIONS

CFH - CUBIC FOOT PER HOUR
G - GAS
HPG - HIGH PRESSURE GAS
MPG - MEDIUM PRESSURE GAS
PSI - POUNDS PER SQUARE INCH



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SCALE: 1" = 240'-0"

HORIZON 1 FUEL DISTRIBUTION SITE PLAN

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PART C
HYDRONIC ENERGY UTILITIES

PART C HYDRONIC ENERGY UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG–TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

Moreno Valley College has two central plants (MECH 1 and MECH 2) which provide chilled water in underground piping to serve select buildings on the campus.

Each plant has two gas-fired boilers.

In addition to the chilled water system cooling, the campus has some small split systems for telecom room cooling and local packaged systems for some buildings.

I. EXISTING CONDITIONS:

- The first central plant was built to serve the Library, Student Services, Science and Technology, and the Lion's Den buildings. The second central plant was built to serve the humanities building.
- The west part of the campus is served by (2) 140-ton air-cooled chillers located at Building MECH 1. MECH 1 also houses (2) 1 million BTU boilers. An underground piping system is utilized to distribute chilled and hot water from the central plant to the campus buildings. These air cooled chillers are expected to be changed out to water cooled chillers at a future date. Chiller capacity shall be evaluated for future expansion of chilled water utilities.
- The Humanities building is served by (2) 110-ton air-cooled chillers and an unknown boiler plant.
- Both systems are set up for constant flow and as such are energy inefficient. The buildings include 4-pipe fan coil units and are designed for approximately a 10 degrees F differential on the chilled water. For a campus environment, this is a very low differential, and leads to large pipe sizes and large pumping requirements when compared to a larger temperature differential design.

II. GOALS:

- All buildings, existing and new, will be tied into the central plants. No buildings will be required to have chillers.
- Packaged air conditioning equipment will only be required for isolated situations.
- The use of the central plants provides tremendous savings for both energy and maintenance.
- A chiller upgrade project will ensure adequate chilled water for future buildings.
- All new building should be metered for individual building's energy use, which also helps to identify energy saving opportunities or possible improper operation.
- Chilled Water piping should be added for all proposed buildings that will be fed from the central chilled water system. Piping should be added as new buildings are added. See drawings for existing and proposed chilled water piping at the end of section 9 – Central Plants.
- All buildings should have BTU metering capabilities and tie into a Central DDC system with robust energy management capabilities.
- Retrofit existing large buildings with BTU monitoring capabilities.
- All new buildings will be connected to the central cooling system.
- All new buildings will have stand alone heating water systems at each building.
- All new buildings should be served by air-handlers with heating water and chilled water coils.
- Provide chilled water temperature reset to raise chilled water supply temperature as cooling loads reduce based on outside air temperature. Higher supply temperature will allow the thermal storage to last longer at lower loads.
- All buildings should have BTU metering capabilities and tie into a Central DDC system with robust energy management capabilities. Retrofit existing buildings served by central plants with BTU monitoring capabilities.
- It is recommended to localize the generation of heating hot water rather than grouping it all in one central location. Current SCAQMD regulations limit economical boiler sizing to less than 2.0 million BTU per boiler.
- Existing centralized heating water plants should remain as is. Return water to the boilers should be kept as low as possible. This will improve overall thermal efficiency.
- Provide supply water temperature reset to lower discharge temperature as heating loads reduce with increased outside air temperature.

III. HORIZON 1 IMPLEMENTATION:

- The available chilled water capacities from the existing central plants shall be evaluated for spare capacity and redundancy.
- All new buildings shall be evaluated for connection to the existing central plants.
- HVAC equipment shall be tied into the existing central plants where existing plant capacity is available and redundancy maintained and where existing piping infrastructure is in place. The extension of chilled water piping shall be evaluated where piping is not currently installed.
- New buildings shall be designed with air handlers instead of fan coils to make better use of air side economizers and also greater delta T's across the chilled water coils.
- High efficiency DX air handlers shall be used where existing campus central plant services are not available. Currently the campus utilizes constant volume fan coils in a number of locations.

IV. LONG–TERM IMPLEMENTATION:

- For maximum energy savings, peak demand reduction and reduced carbon footprint, a Chilled Water Thermal Energy Storage (TES) tank is proposed on the hilltop overlooking the campus. This tank might also be useful for firefighting needs.
- For energy efficiency reasons an evaporative cooled, chilled water plant is proposed that would also feed the TES tank. A comparison of full load and part load efficiencies is noted below for current state of the art chillers.
- The air-cooled chillers should be transitioned to water-cooled chillers sometime in the future.
- 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 essential for maximizing the capacity of the Chilled Water TES tank.
- It is recommended to localize the generation of heating hot water rather than grouping it all in one location. Current SCAQMD regulations limit economical boiler sizing to less than 2.0 million BTU per boiler.

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LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- EXISTING CHILLED WATER (CHW)

ABBREVIATIONS

CHW - CHILLED WATER

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SCALE: 1" = 240'-0"

EXISTING HYDRONIC SITE PLAN

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LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- FACILITIES IN DESIGN
- EXISTING CHILLED WATER (CHW)
- EXISTING HEATING HOT WATER (HHW)
- PROPOSED CHILLED WATER (CHW)
- PROPOSED HEATING HOT WATER (HHW)

ABBREVIATIONS

AHU - AIR HANDLING UNIT

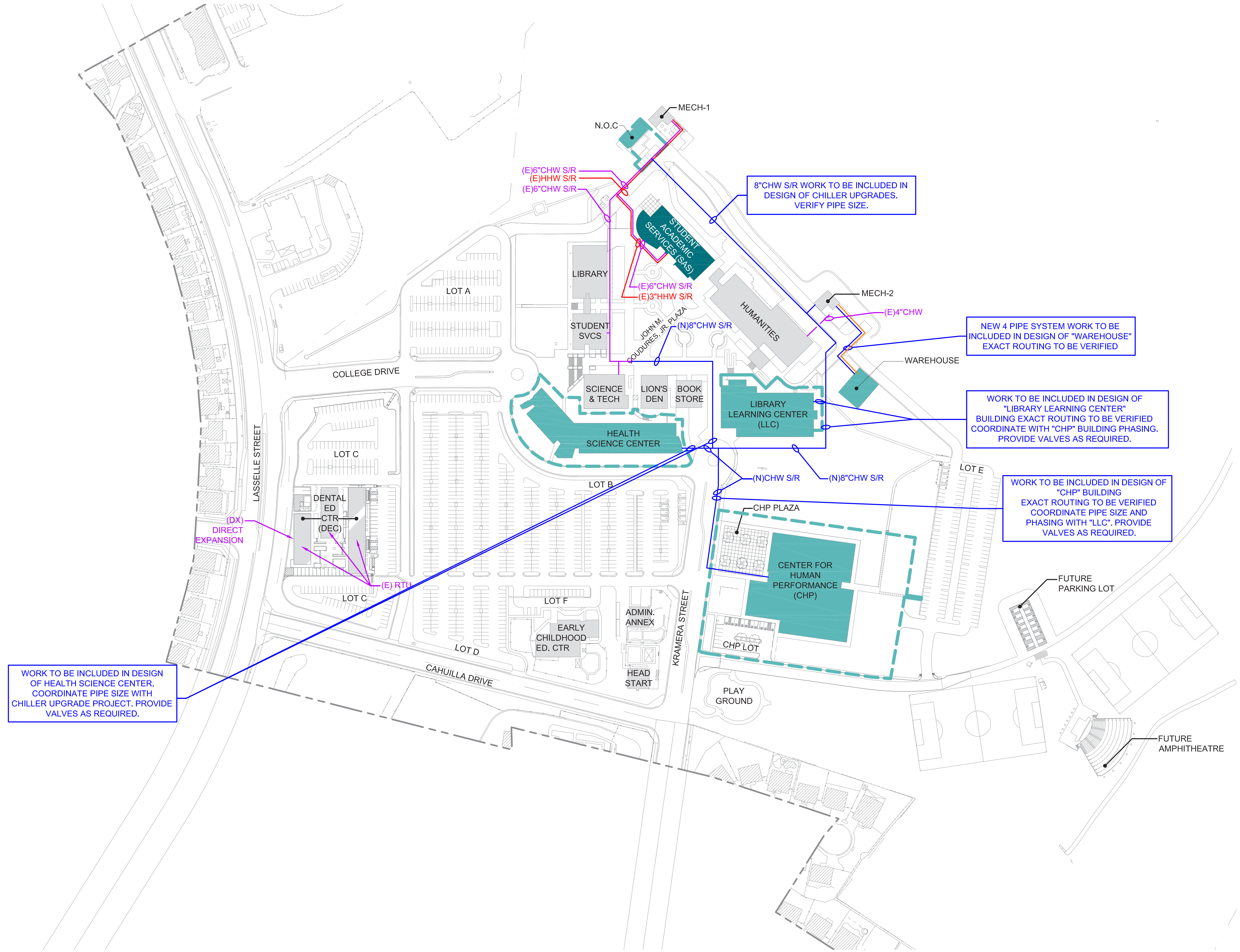
CHW - CHILLED WATER

DX - DIRECT EXPANSION

HHW - HEATING HOT WATER

RTU - ROOF TOP UNIT

S/R - SUPPLY AND RETURN



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SCALE: 1" = 240'-0"

HORIZON 1 HYDRONIC SITE PLAN

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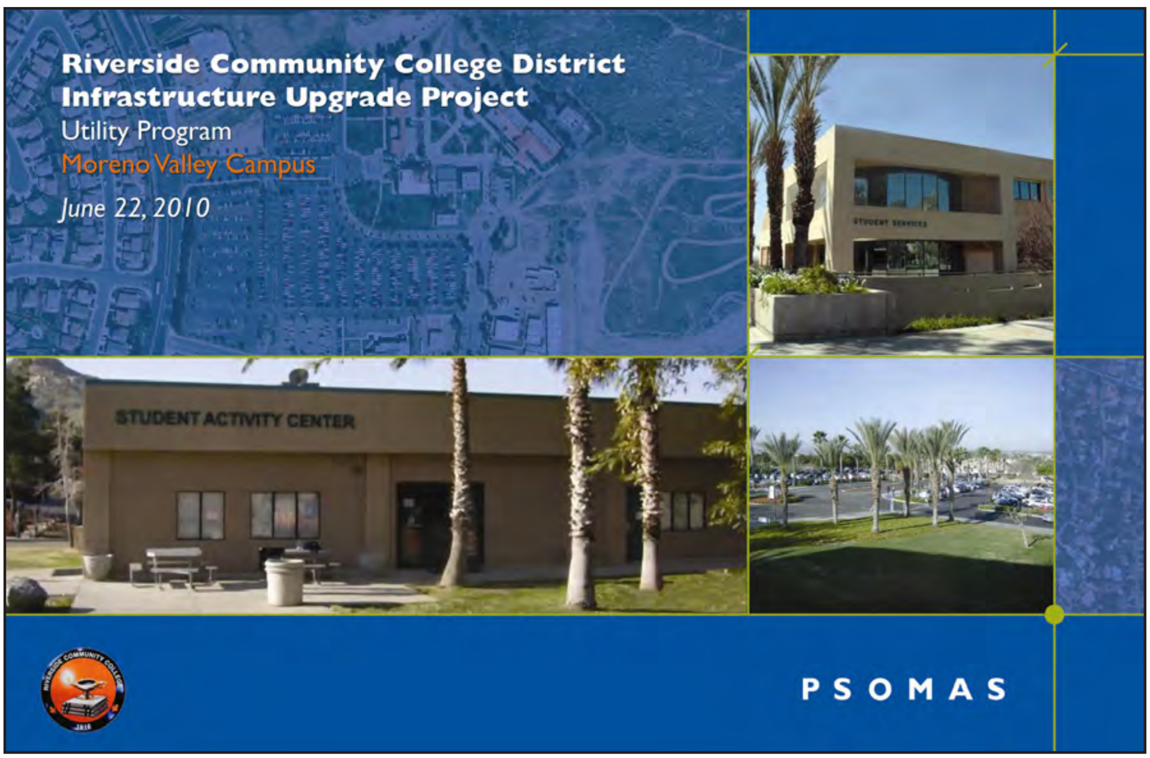
PART D
WATER UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Moreno Valley Campus

June 22, 2010

Section 2 - Water System



SECTION 2 – WATER SYSTEM

2.1 SYSTEM DESCRIPTION

The existing water distribution system serving the campus buildings operates separate domestic water and fire water distribution systems. The campus also uses a separate reclaimed water system to supply water for landscape irrigation and is discussed in Section 3 – Irrigation Water System.

The Eastern Municipal Water District (EMWD) provides water to both the domestic and fire water distribution systems. The domestic system is served by one meter and the fire water system is also served by one meter.

1. The existing domestic service enters the campus from the south on Krameria Street, approximately 200 feet north of Cahuilla Drive. The 8-inch service originates at from the 24-inch main in Krameria Street. After passing through an 8-inch meter and reduced pressure principle valve backflow preventer, the water is conveyed north to the campus distribution network via an 8-inch PVC pipe loop.

2. The existing fire service is located parallel to the 8-inch domestic water line (described above.) This 12-inch service originates off a separate 18-inch main in Krameria Street. After passing through a 12-inch meter and double check backflow preventer, the water is conveyed north to the campus distribution network via a 12-inch PVC pipe.

Per the our recent Fire Flow Data (dated September 24, 2009), the Fire Hydrant located at the end of Krameria Street near the center of Campus indicated that the 8-inch service has a minimum static pressure of 72 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.

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 also adequately support the demand for proposed buildings.

- During discussions with staff (2) additional existing laterals were identified: (1) lateral near the tank site access drive intersection that runs west and then tees to serve Bldgs 9, and 17. Also (1) lateral that runs east between Bldgs 10 & 12 that extends to Bldg 31 then onto Bldg 25 to serve the portable buildings.

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. Install new 8-inch domestic water service loop to serve the future buildings and provide redundancy. This second loop would tie to the 24-inch line in Lasselle Street.

2. It is also recommended that a second 12-inch domestic connection from the existing 24-inch water main in Lasselle Street be added at the Campus entry during the next major expansion to provide redundancy and provide a secondary water source for maintenance or repair.

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.

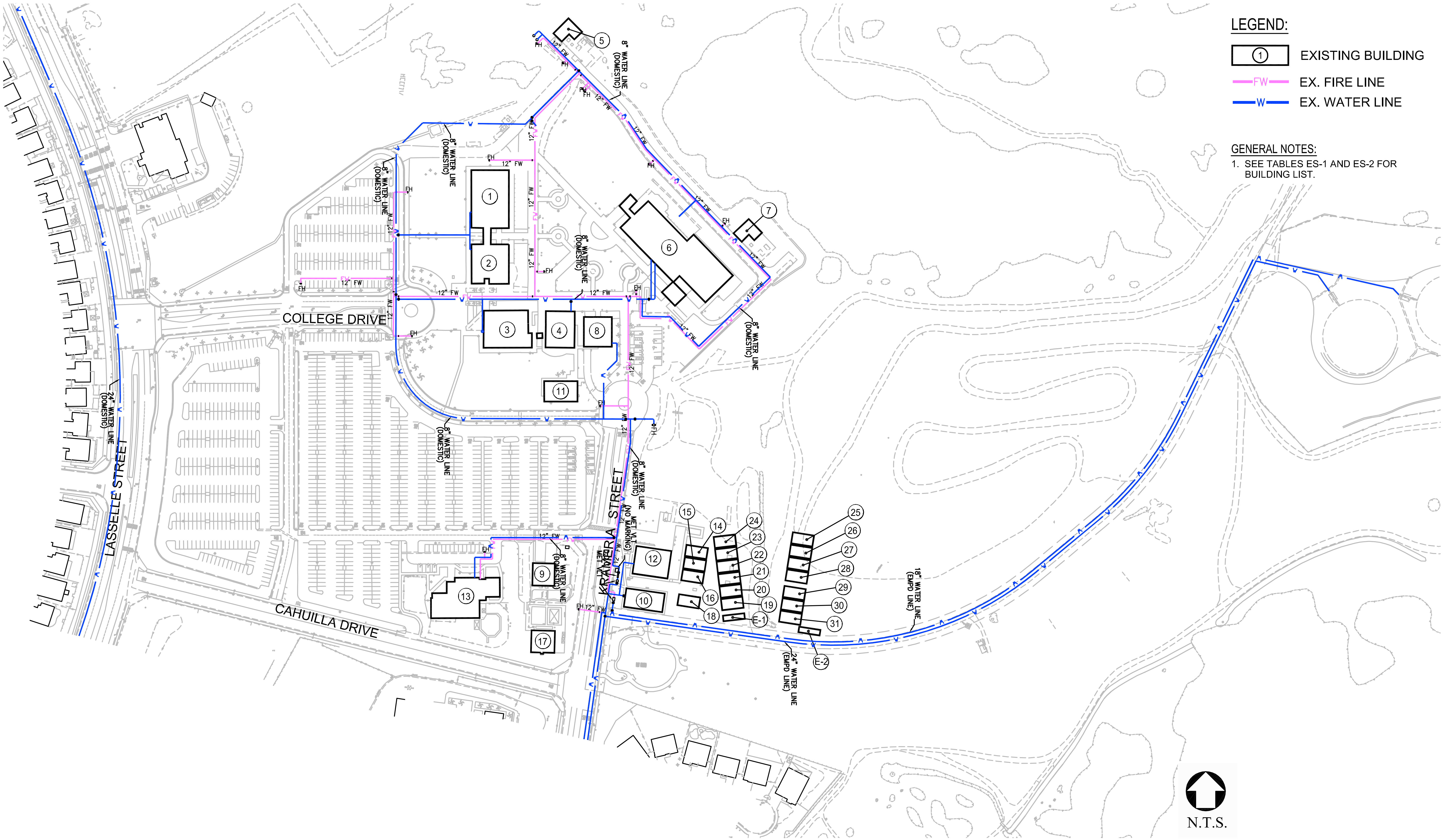


FIGURE 2A
EXISTING WATER DISTRIBUTION

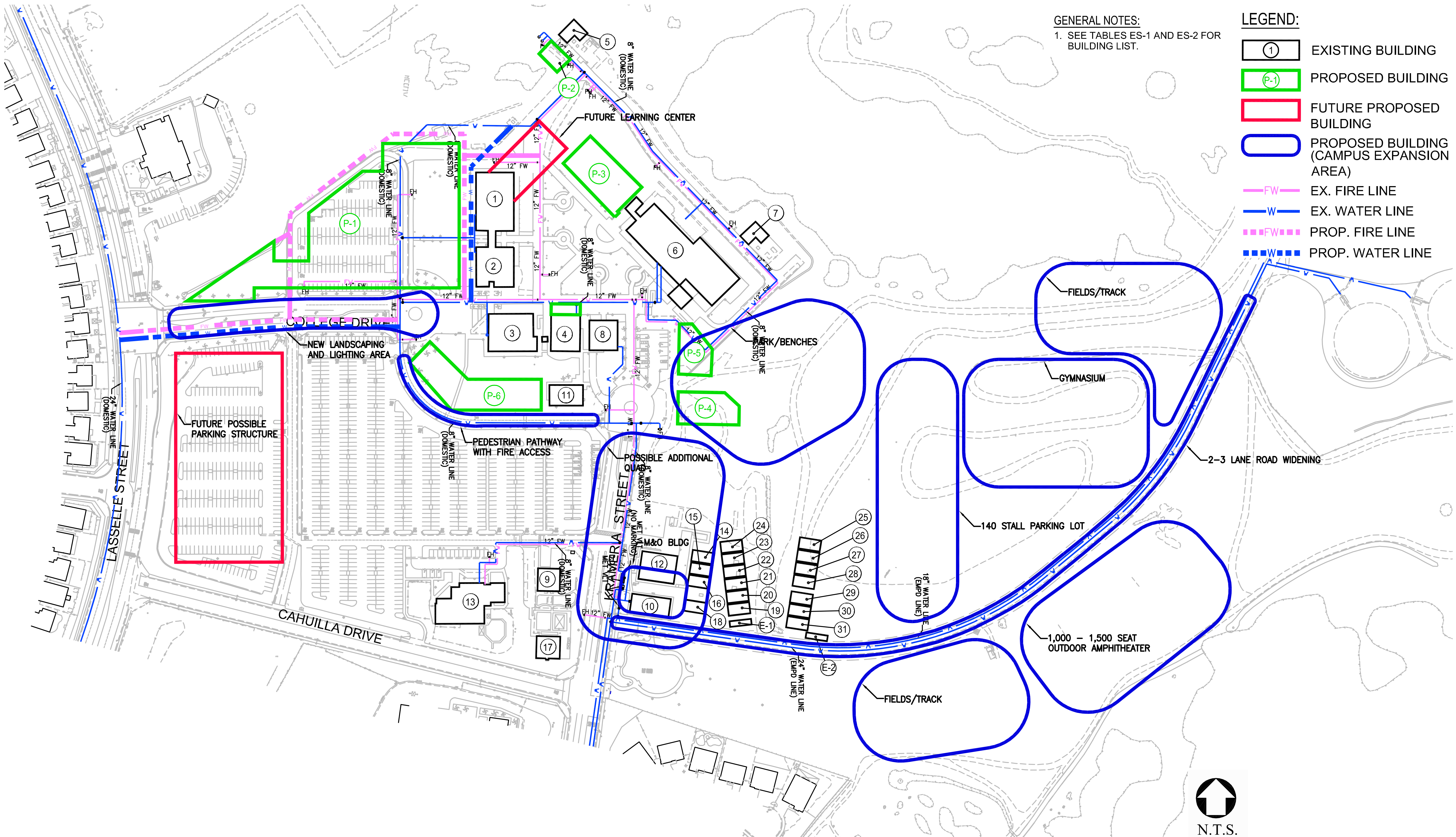


FIGURE 2B
PROPOSED WATER DISTRIBUTION

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PART E

SANITARY SEWERAGE UTILITIES

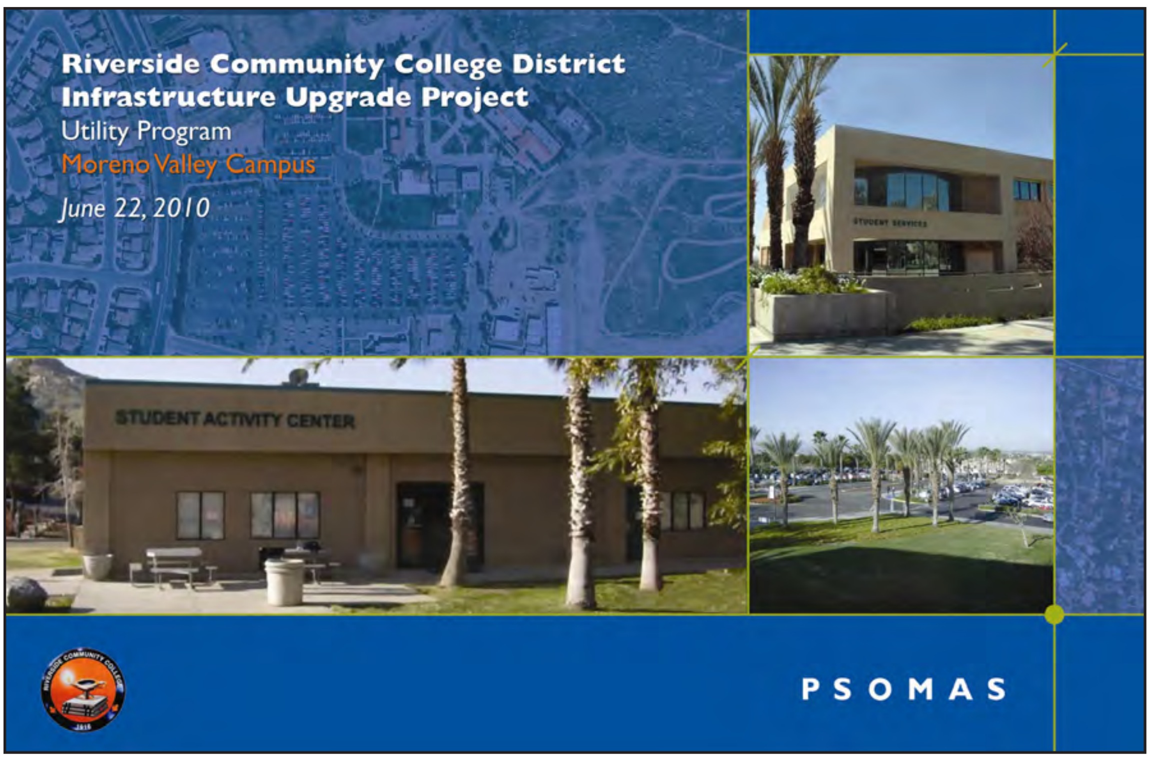
PART E SANITARY SEWERAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Moreno Valley Campus

June 22, 2010

Section 3 - Sanitary Sewer System



SECTION 1 – SANITARY SEWER SYSTEM

1.1 SYSTEM DESCRIPTION

The existing campus is served by two separate sanitary sewer systems.

The first main system flows to the west and joins the 8-inch sewer main in Lasselle Street at College Drive. An 8-inch mainline extends on Campus in College Drive and into the main campus. This 8-inch main line extends north and west through the campus and serves approximately 80% of the existing buildings.

The second main system flows to the south to Krameria Street. This system flows to an 8-inch sewer main located at Cahuila Drive. An 8-inch sewer main connects to the Krameria Street sewer and extends north 200-ft through the main parking lot and onto the Campus. This 8-inch main line then provides laterals east and west through the campus but only serves approximately 20% of the existing buildings.

The existing on-site sanitary sewer system mainline includes 8-inch PVC pipe with building laterals ranging between 4-inches and 6-inches in diameter. The (2) on-site sewer systems are independent and isolated and do not accept offsite upstream flows from any other 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.

- The single mainline to Building 5 has minimal velocities due to minor flows. This should increase based upon proposed expansion.
- (2) Additional existing lines were identified during staff review including : The lateral to Bldg 9 that ties to the Bldg 13 lateral in the main drive. Also, a lateral between Bldgs 10 & 12 that extends along the edge of the access road up to Bldg E-2.

Recommendations

Since no historical sewer flow concerns were expressed by the Campus representatives, and our analysis was favorable, we recommend 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:

1. Relocate existing mainline segment west of Buildings 1 and 2 to accommodate the proposed parking structure.
2. Minor relocation north of proposed building P5.
3. In order to provide a clear site for future development, remove the existing sanitary sewer mains currently serving any existing facilities to be demolished. Existing mainline systems can be cut and capped at the existing manholes.
4. Remove the existing 4-inch sanitary sewer service laterals currently serving any existing buildings to be demolished.
5. It is recommended that the college continue to further investigate the existing pipe condition and capacity to provide further recommendations for improvements as the campus expands.

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.

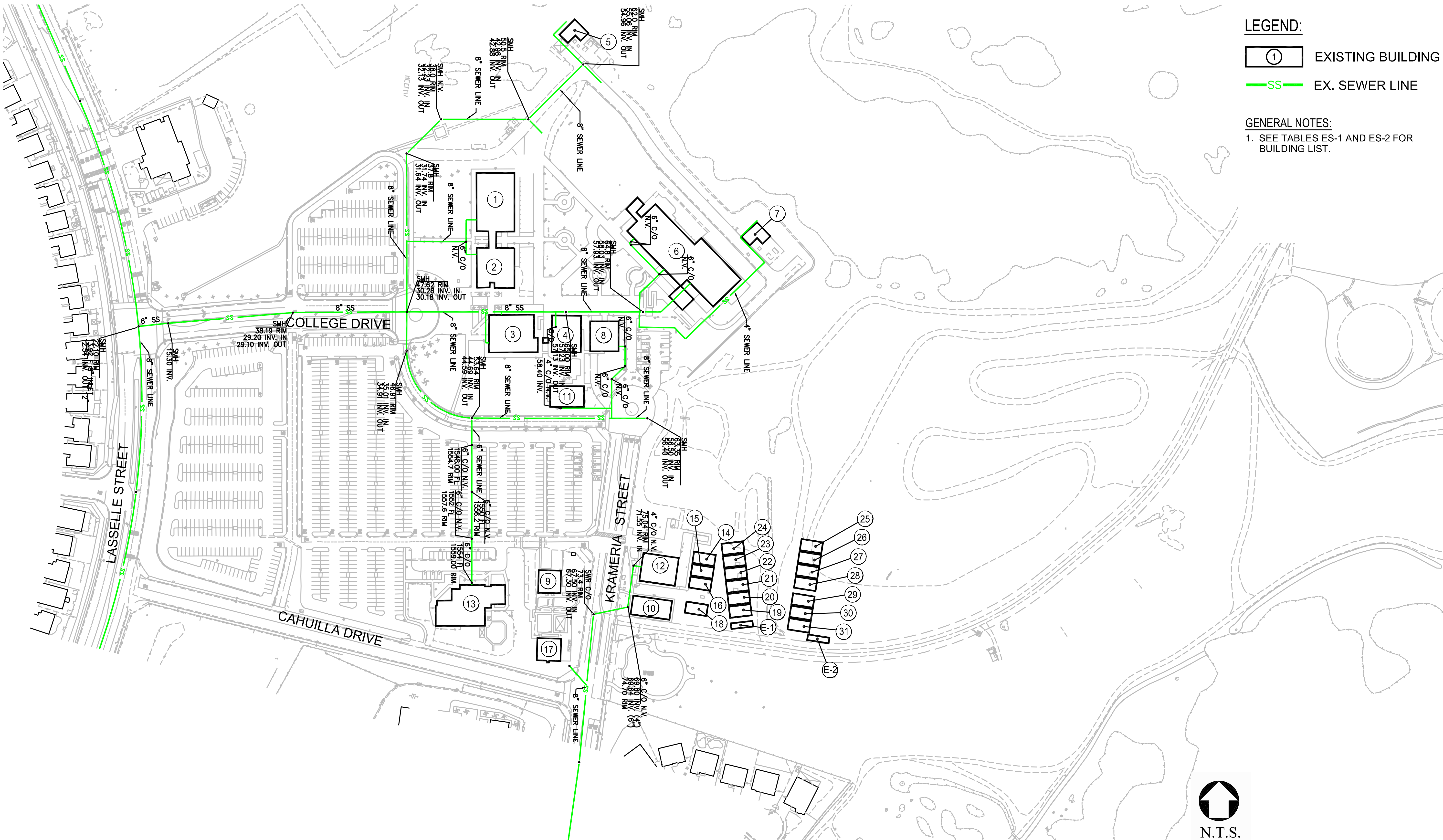


FIGURE 1A
EXISTING SANITARY SEWER SYSTEM

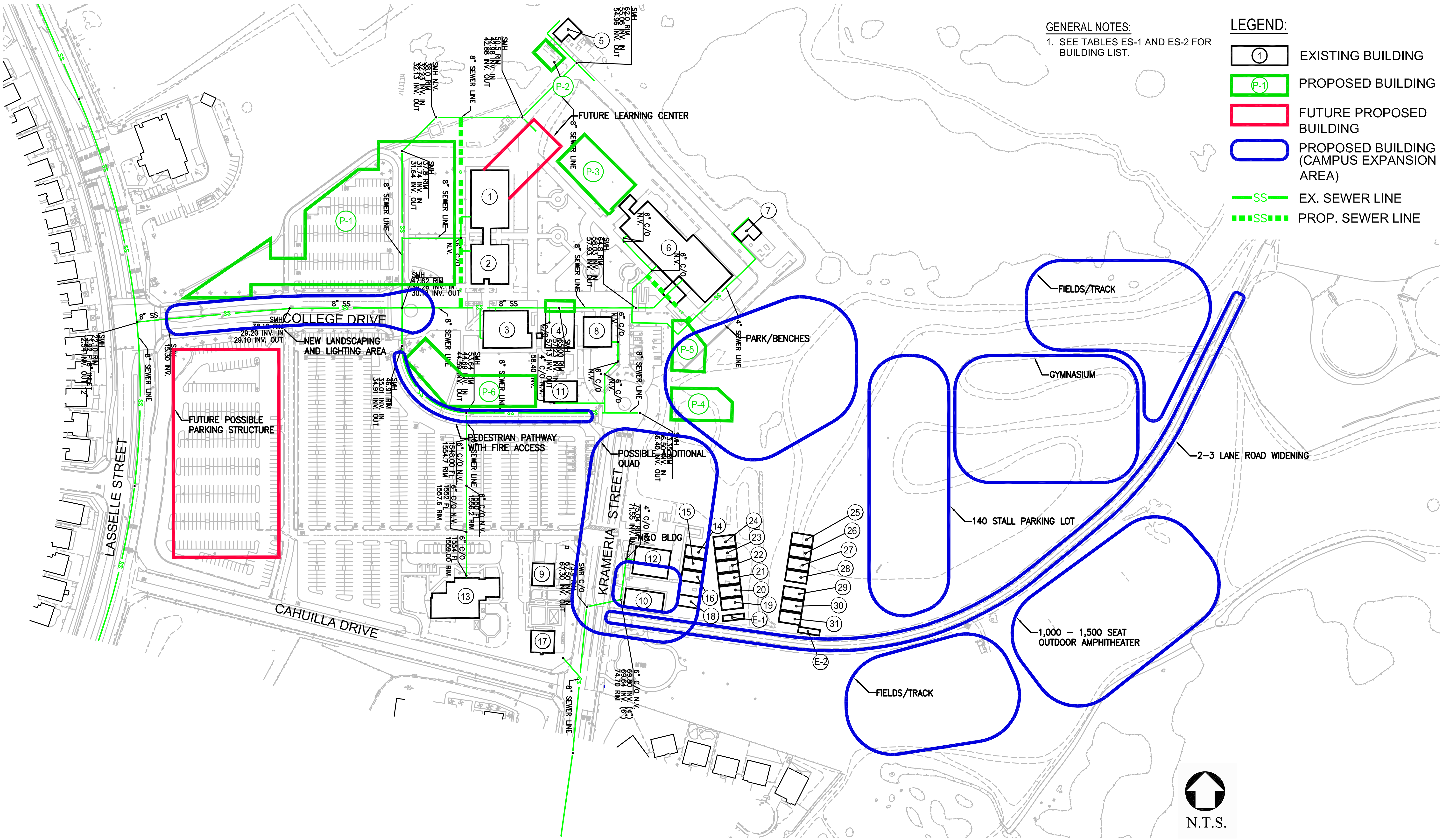


FIGURE 1B
PROPOSED SANITARY SEWER SYSTEM

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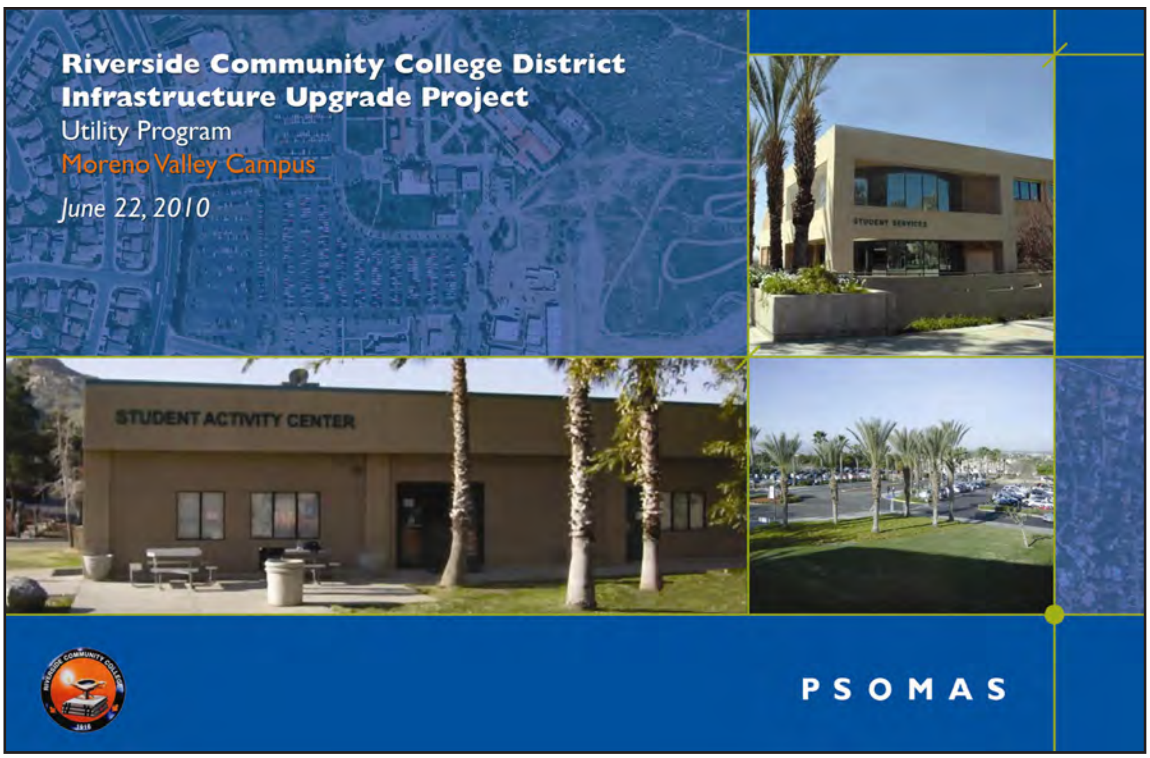
PART F
STORM DRAINAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Moreno Valley Campus

June 22, 2010

Section 4 - Storm Drain System



SECTION 4 – STORM DRAIN SYSTEM

4.1 SYSTEM DESCRIPTION

The existing campus storm drain mainline system consists of a Riverside County Flood Control District mainline (varies from 36-inch RCP to 54-inch RCP) made of reinforced concrete pipe.

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

- Off-site storm water from the east is captured upstream in a 36-inch County maintained main line and flows through the campus to a 54-inch outlet pipe and continues in a pipe into Lasselle Street.
- The campus 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.
- A small on-site water quality basin is located along the northwestern edge to provide an opportunity for natural vegetation and to provide a water quality element.
- The existing parking lots sheet flow to catch basins and then into the Lasselle Street storm drain mainline.
- Small and large on-site storm water detention basins are provided upstream.
- Small swale areas between buildings collect roof drainage and storm water runoff. This storm water is then recollected by area drains and discharged into the County main line system.

4.2 METHODOLOGY

The existing storm drain 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 primary drainage sub-areas for on-site and off-site tributary areas.
- Prepared existing condition hydrology model and estimated peak flow runoff rates for 100-year design storms.
- Verified on-site pipe capacity.

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.
- Annually clean existing storm drain lines due to upstream siltation.
- Based upon staff review, an existing dry well exists west of the Bldg 3.
- An storm drain lateral runs along the east side of Bldg 2, and 1 then it ties to the Inlet north west of Bldg 1.

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.

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 water mainline system:

1. Relocation of the west side mainline to re-establish the flow from the small detention basin back into the mainline system. This will need to be located between the proposed Building P1 and the existing slope.

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

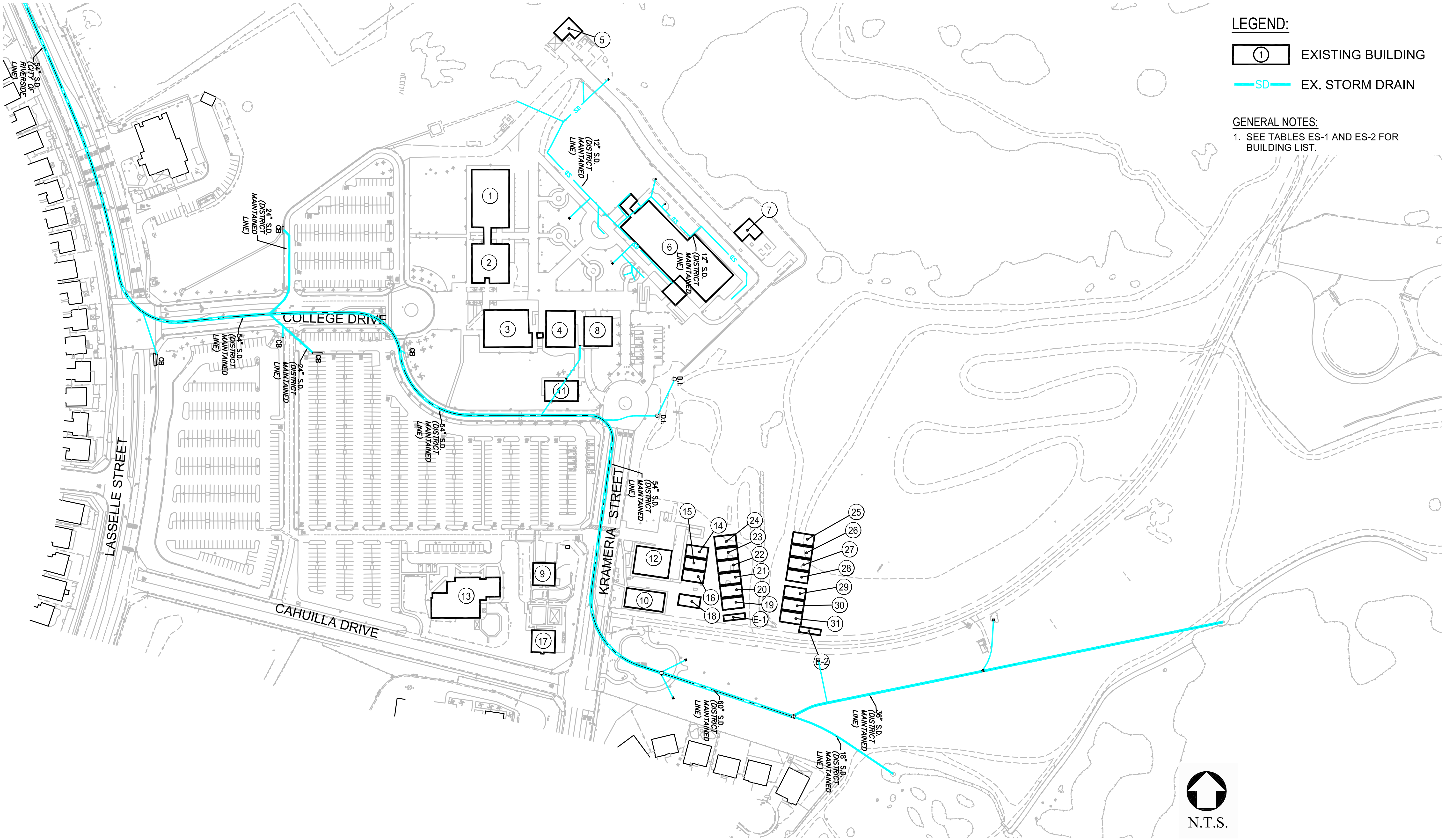


FIGURE 4A
EXISTING STORM DRAIN SYSTEM

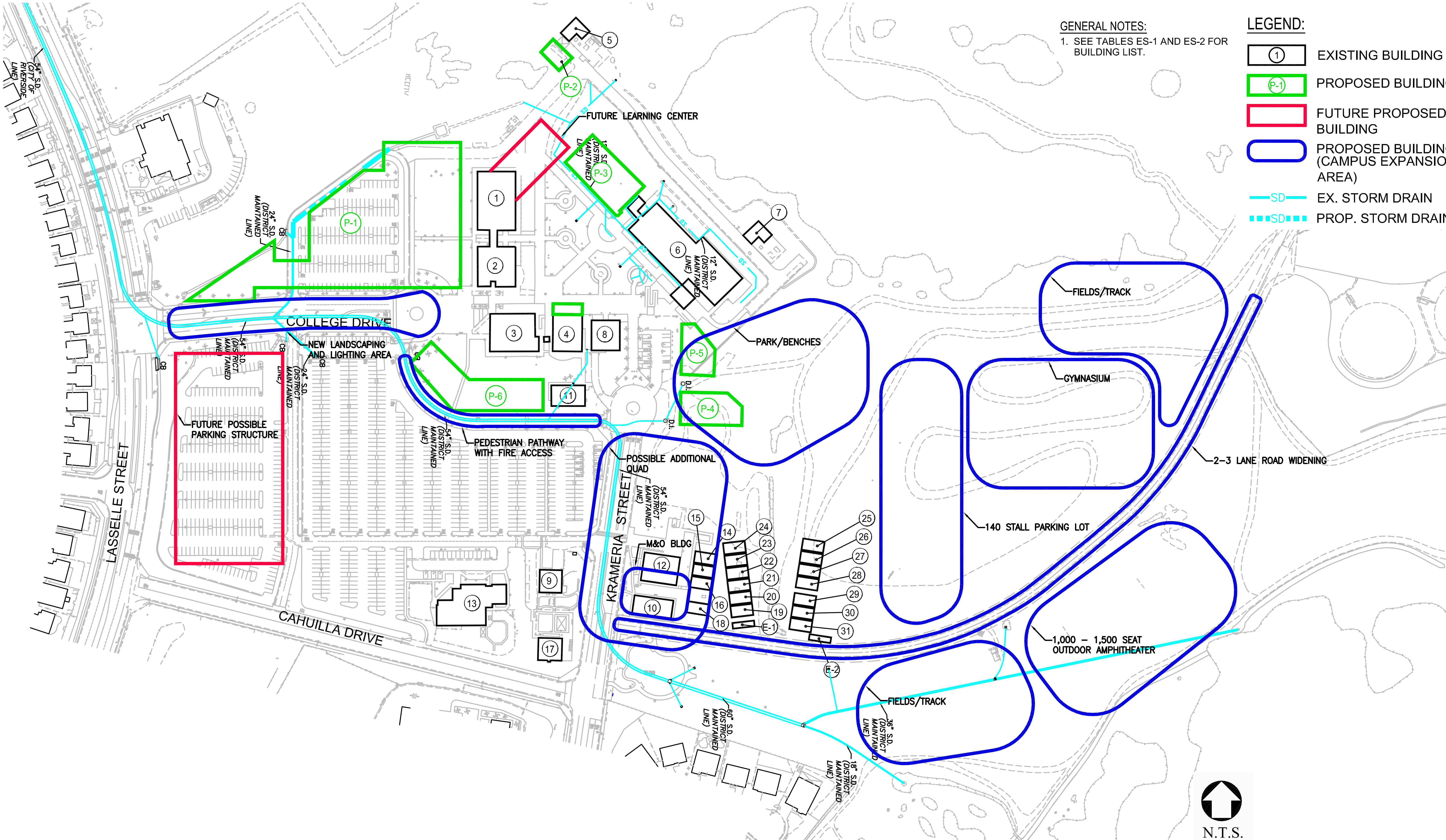


FIGURE 4B
PROPOSED STORM DRAIN SYSTEM

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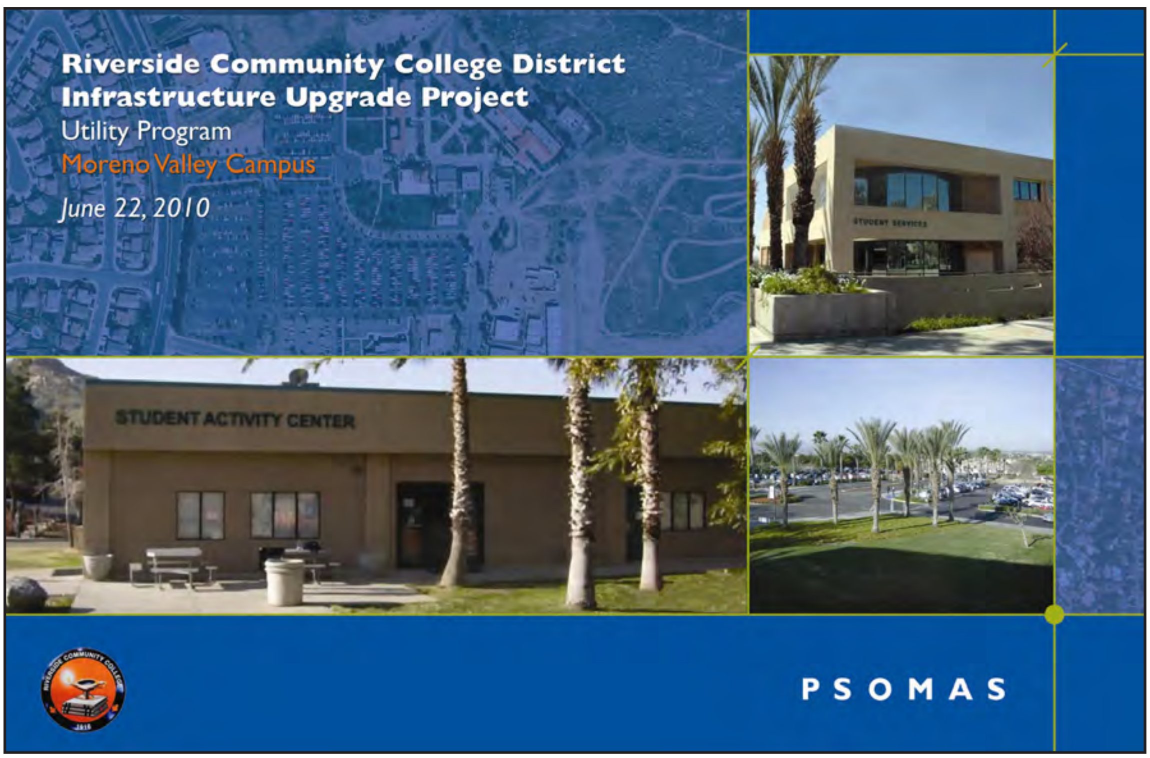
PART G
TELECOMMUNICATIONS UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Moreno Valley Campus

June 22, 2010

Section 8 - Telecommunications



SECTION 8 – TELECOMMUNICATIONS

8.1 SYSTEM DESCRIPTION

The local telecommunication services are currently provided by Verizon Corporation who is the Local Exchange Carrier (LEC) for the voice network. The (LEC) provides a 200 pair copper cable terminated on 4488 protector blocks. The Moreno Valley Community College voice network consists of a NEC 2400 PBX Voice Switch. The main distribution facility (MDF) is located in the Library Building #1.

The fiber optic service is provided by the Southern California Edison Company. The fiber optic cable is currently terminated in the Library Building #1 MDF room. A secondary fiber optic cable is provided by Sunesys from a telecommunication pole on the corner of Lasselle Street and Cahuilla Drive to the Head-Start Building BDF.

8.2 METHODOLOGY

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 Moreno Valley 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 is in fair condition however, 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 on the roof of the Science and Technology Building #3. The current NOC is inadequate to meet the future needs of the campus and is to be replaced. Current design plans have the location of the new NOC at the north end of campus near the M1 Mechanical Building.

The existing inter-building telecommunication pathways are found to be adequate for most existing buildings located around the John M. Coudures Jr. Plaza.

The existing inter-building telecommunication pathways are found to be inadequate for the existing buildings at the south end of the campus. The following buildings are included; Book Store, Student Activities Center, PCS Warehouse, Parkside Complex Portables, PCS Multi-Purpose, Administration Annex (President and Vice President offices, Early Childhood Education Center and the Head -Start Building.

Two new communications manholes, CMH#5A Northwest of the Humanities Building and CMH#7 North of the PCS Portables, with (3) 4” conduits were added to serve the additional portables placed on the Parkside Complex. (3) 4” conduits also leave CMH#7 to Hand Hole #BB. CMH#5A may be in the construction site of proposed structure “P-3 Instruction and Student Services” detailed in the campus master plan. The proposed location of building “P-6” may be able to take advantage of the existing (6) 4” and (6) 2” conduits stubbed out from the south side of the existing Science Tech Building

The existing building BDF’s 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 Southern California Edison fiber optic cable is currently located in pull boxes that have high voltage present which should be separated..

The existing fiber optic cable backbone consists of traditional multi-mode 62.5mm and single-mode fiber optic cables. Some of the inter-building fiber optic cables are rated of intra-building use and not recommended for outside use.

8.4 ANALYSIS OF FUTURE NEEDS

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

Replace much of the 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 extent of the replacement needed would be dependent upon the final proposed locations of future buildings.

The best design for a campus network would be to link each building directly to the NOC in a Star Topology for the inter-building backbone. Another consideration for larger inter-building networks is a Hierarchical Star configuration. This allows for a small number of buildings to be connected to a centralized location that supports the area in a star topology with the centralized building linked directly to the NOC.

Provide new fiber optic cables from the new (NOC) to each building on campus. Recommend that the minimum fiber optic cables to be 24 strands single mode and 12 strands of 50um (OM3) multi-mode cable. Provide for new copper cable for all buildings on the campus. Copper cable to be sized 1 pair for each voice outlet.

8.5 FINDINGS AND RECOMMENDATIONS

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.

Replace existing conduit system, as needed based on locations of new proposed structures in master plan, 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 new NOC should not utilize the existing conduit pathways to connect to the Local Exchange Carriers for the main campus copper and fiber feed. The new proposed “P1 Parking Structure” may disrupt the existing Verizon and Edison conduit structure which houses the main copper and fiber optic feed to the campus. A new dedicated pathway should be implemented to combine the Verizon copper and Edison fiber optic cables to run north east along the service road on the edge of campus to the new proposed NOC location.

The secondary fiber line from Sunesys should also feed the new NOC as a secondary fiber feed for the campus if possible.

The existing (12) 4” conduits that stub out from CMH#5 just past the Humanities Building should be tested for usability by pulling a mandrel through the conduits to see if any of the conduits may be used to help feed the south end of the campus.

It is recommended that the location of the proposed Future Learning Center be adjusted so as not to disrupt the existing main communications feed of (12) 4” and (2) 3” conduits that will feed the entire campus from the new NOC.

It is recommended that the location of the new proposed Instruction and Student Services Building P-3 be adjusted so as not to interfere with existing communication manholes #5 and #5A.

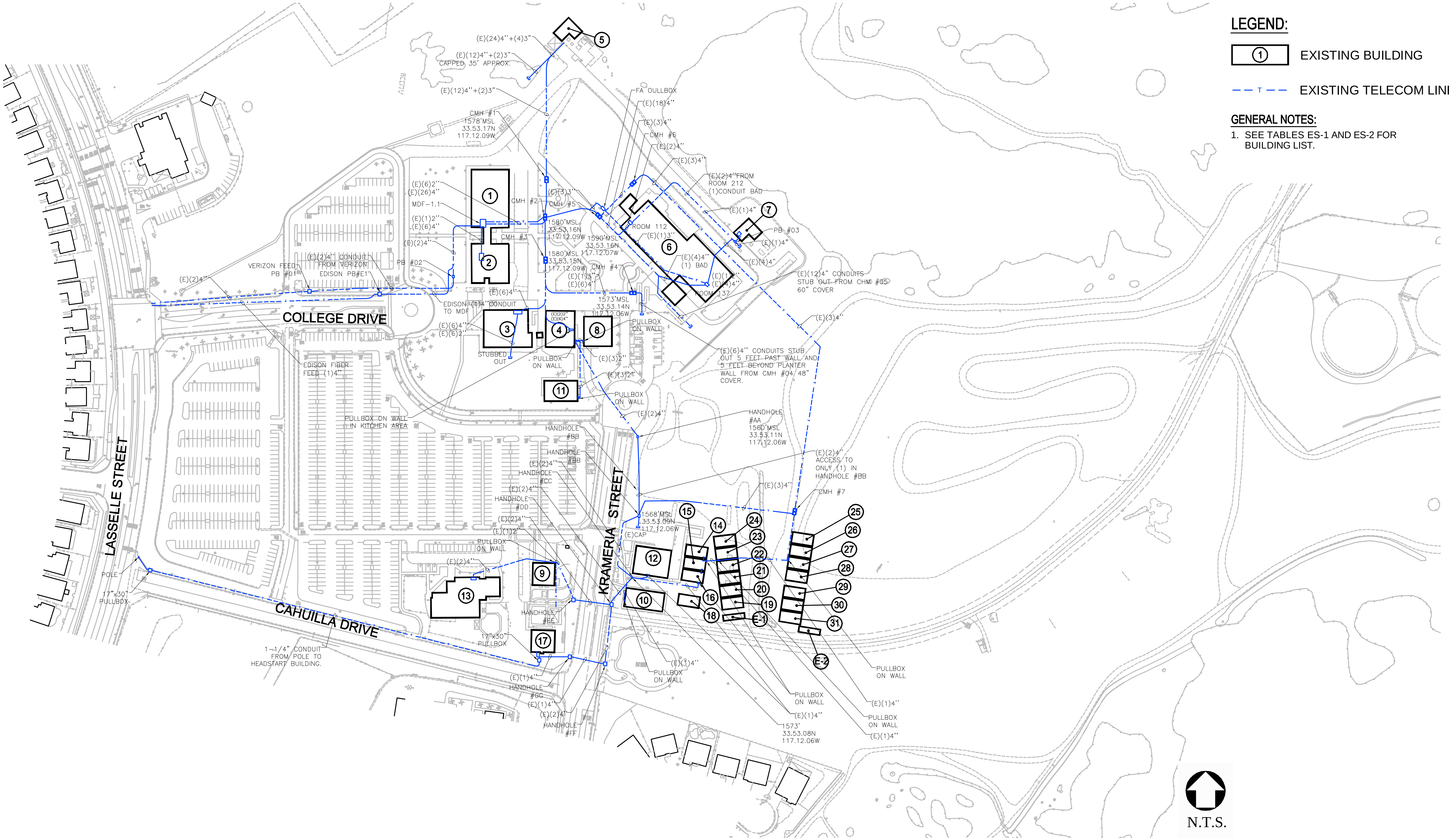


FIGURE 8a
EXISTING UTILITY MAP - TELECOMMUNICATIONS

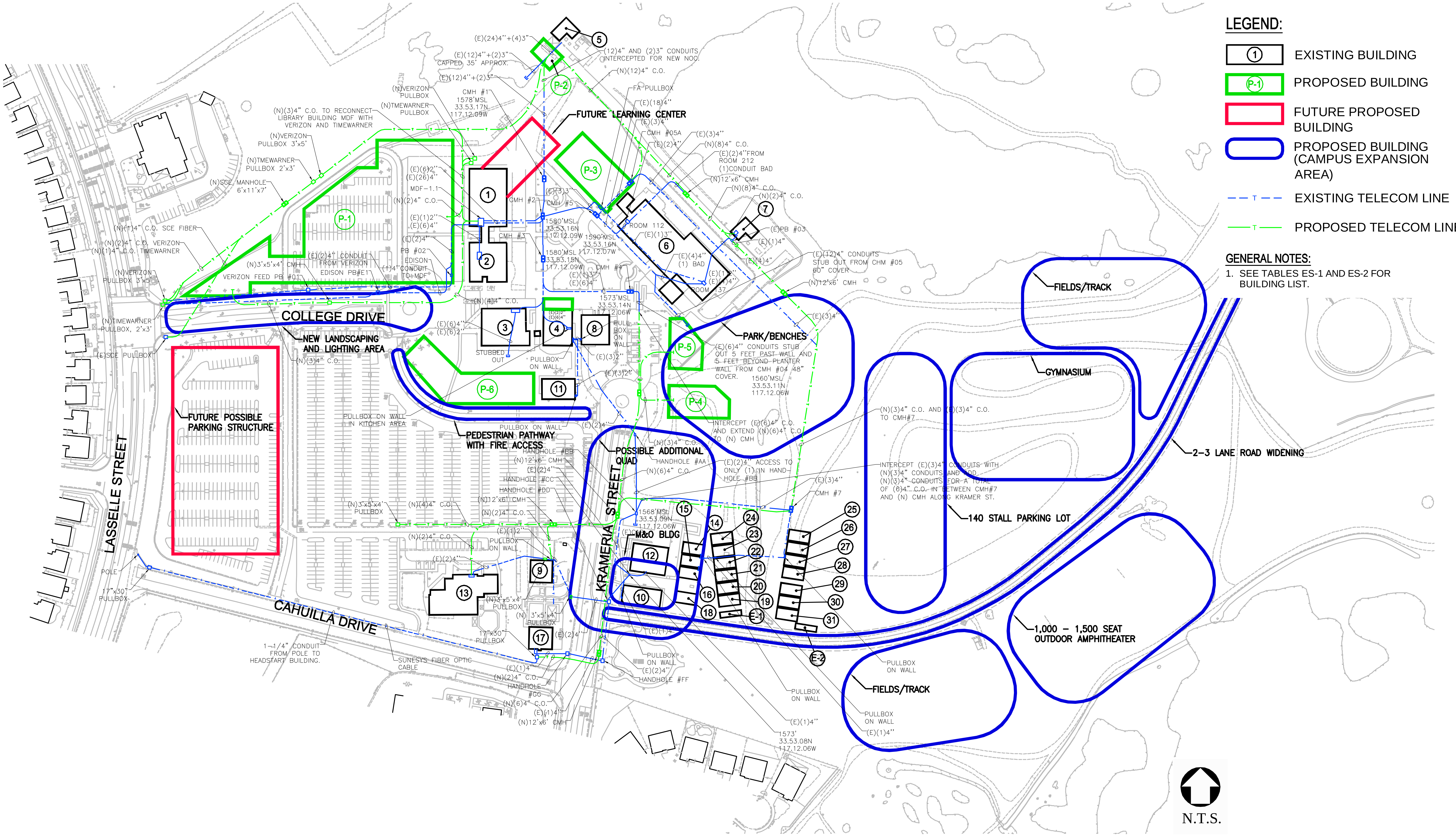


FIGURE 8b
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS

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NORCO COLLEGE

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PART A
ELECTRICAL UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG—TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

The campus primary 12,000 volt is served from Southern California Edison (SCE) transformers in the substation located on the North and Northwest end of the campus. Individual buildings are typically radial fed from the two campus owned distribution boards located in the facilities buildings on campus.

I. EXISTING CONDITIONS:

- Norco College is presently fed by Southern California Edison (SCE) from a single overhead pole line located on Mountain Avenue opposite the campus parking access road. This 12kV high voltage line feeds a 500 KVA transformer located adjacent to Facilities Building F1. Additionally, this high voltage line also feeds another 1000 KVA transformer located adjacent to Facilities Building F2. The SCE transformers then transform the 12KV primary voltage to a 480Y/277 Volt 3-phase, 4-wire system with a 3000 Amp main switchboard at each location. It should be noted that the two 3000 A mp 480/277 V switchboards were once each metered individually; however, these meters have been removed and a single new meter has been installed in a 12KV high voltage switch enclosure.
- The site is presently fed by Southern California Edison from a single overhead pole line located on Mountain Avenue opposite the campus parking access road. The 12KV conductors are then extended down the pole into an underground conduit. The underground 12kV XLP feeders and 5" conduit extend across 3rd Street and follows the curb line east to a high voltage manhole located approximately 80 feet west of Campus Drive. The 12KV XLP conductors are then extended underground through a 4" conduit and manhole located north of the rear access road to a Southern California Edison high voltage switch located adjacent to Central Plant F1. This 12kV high voltage switch then feeds a 500 KVA transformer located adjacent to Mechanical Building No.1. Additionally, this high voltage switch also protects a second 12 KV XLP underground feeder which extends through a 4" conduit and two SCE pull-boxes to a second 1000 KVA transformer located adjacent to Central Plant F2.
- The Head Start and Early Childhood Education Center is fed by a secondary 12kV XLP feeder in a 4" conduit that extends from the high voltage manhole on 3rd Street through a small pullbox to an SCE 150 KVA transformer located adjacent to the Head Start Building 1. The SCE transformers connect the primary voltage to a 208/120 Volt, 3-phase, 4-wire system with an 800 Amp main switchboard and separate SCE meter. The maximum peak demand for this meter in 2009 was 61 KW or 170 amps.

I. EXISTING CONDITIONS (CONT'D):

- The Southern California Edison transformer presently feeds a 3000 Amp main switchboard (designated as 'MSB') located at Central Plant F1. The main switchboard is protected by a 3000 Amp ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pull-boxes throughout the campus to various other buildings. These buildings are listed as follows:
  - The Science and Technology Building has a 300 Amp circuit breaker and feeder to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 300 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 63 Amps at the time of this report.
  - The Student Services Building has a 300 Amp circuit breaker and conductors feeding a 400 Amp, 480/277 V, secondary distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 300 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 44 Amps at the time of this report.
  - The Bookstore is fed with a single 100 Amp circuit breaker and 100 Amp conductors from the Humanities building. This single feeder is then provided with a 600 Volt disconnect switch which feeds a 75 KVA transformer and secondary 208/120 Volt panel at each building. It should be noted that this 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 15 Amps at the time of this report.
  - The Humanities building is fed with a 300 Amp circuit breaker and 400 Amp conductors to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that this 300 Amp circuit breaker indicated a maximum high leg conductor reading of 45 Amps at the time of this report.
  - The Theater building is fed with a 300 Amp circuit breaker and 400 Amp conductors to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that, although the building was unoccupied, this 300 Amp circuit breaker indicated a maximum high leg conductor reading of 16 Amps at the time of this report.
  - The two portable trailers (PA and PB) located adjacent to the Bookstore are fed with a 100 Amp circuit breaker and conductors at 480 Volts to a disconnect switch located on the portables. The 480 Volts is then transformed via a 37.5 KVA transformer to 120/208 Volts (phase, 4-wire) which then feeds each portable separately.

  - The new Industrial Technology buildings have a 1200 Amp circuit breaker and feeder to a 1200 Amp, 480/277V secondary distribution switchboard. It should be noted that this complex was originally supposed to be fed from the west campus switchboard with the 1000 KVA SCE transformer but is now fed from the east campus switchboard and the 500 KVA SCE transformer.
- The Southern California Edison transformer presently feeds a 3000 Amp main switchboard (designated as 'MSB2') located at Central Plant F2. The main switchboard is protected by a 3000 Amp ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pull-boxes to various other buildings. These buildings are listed as follows:
  - The Library is fed with an 800 Amp circuit breaker and feeder to an 800 Amp secondary distribution switchboard. The 480 Volts are then transformed to 120/208 Volts for secondary distribution. It should be noted that this 800 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 82 Amps at the time of this report.
  - The Applied Technology Building is fed with a 600 Amp circuit breaker and feeder to a 600 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 600 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 45 Amps at the time of this report.
  - The Soccer Field House is fed parallel to the West End Quad feeder. The West End Quad modular buildings are being fed from a 200 A circuit breaker to a 150 KVA weatherproof transformer to a 120/208 Volt, 3-phase, 4-wire distribution switchboard. This distribution switchboard also feeds the Activity Center. It should be noted that the 200 amp main circuit breaker has been tripping on hot days due to overloading.
  - The CACT Building is fed with a 600 Amp circuit breaker and feeder to a 600 Amp weatherproof distribution secondary distribution switchboard. The 480 Volts are transformed through a 225 KVA weatherproof transformer to 120/208 Volts for secondary distribution inside the building. The Activity Center was fed from a 100 amp circuit breaker that is now spare. The Activity Center is now being fed from the West End Quad feeder.

I. EXISTING CONDITIONS (CONT'D):

- Head Start /Early Childhood Education Center. The Southern California Edison transformer presently feeds an 800 Amp main switchboard and independent meter adjacent to the Head Start 1 Building. This main switchboard is fed at 120/208 Volts, 3-phase, 4-wire. This switchboard then back-feeds the old 600 Amp main switchboard feeding the Head Start 1 Building as well as feeding new distribution and secondary panels located in the Early Childhood Education Center.
- Underground Distribution Network. The secondary distribution network throughout the campus is by a series of duct banks with 4” and 5” conduits and manholes. There are spare conduits throughout the system.
- System Capacity Evaluation. The highest peak demand load for the campus recorded in September of 2009 for the Central Plant was 880 kilowatts. With a power factor of 0.85 the peak kVA is 1,035kVA. The total amps is low for the two 3000 amp distribution boards only 1246 amps, the two main switchboards are adequately sized to support the existing facilities at the campus. Together the two SCE transformers are well below their rated limit however dividing the load between the two transformers would put the 500 kVA transformer at or near its rated limit. The individual 500kVA SCE transformer at the Central Plant F1 could be over its rated limit with the new Industrial Technology Building and the Student Success Center coming on line. The 500 kVA transformer should be monitored before the peak demand months of August and September of 2010.
- The existing Edison substructure is in very good condition and is adequately sized for the campus’ present needs. The existing 15 KV conductors have the capability of feeding all major additions.
- The secondary distribution switchboards are all adequately sized for any additional loads, retrofits or remodels that may be required.

II. GOALS:

- Serve new buildings and major remodels with 480 volt service feeders from the two facilities buildings.
- Improve system reliability (b) provide 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) to provide adequate capacity of feeders 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.
- The campus however needs to have a complete redundant system to help isolate each building on campus and also be able to conduct maintenance on a feeder without affecting power service to each building on campus.
- Locate future buildings so they do not interfere with existing SC Edison feeder network.

III. HORIZON 1 IMPLEMENTATION:

- Extend 480 volt underground feeders to new buildings. Coordinate new loads with SCE for possible increase in transformer size.
- The campus has not opted to provide a new 12kV closed loop system at this time.
- Electrical switchboards shall be installed indoors and secondary transformers shall be dry type.
- Provide a minimum of one spare conduit into new buildings.

IV. LONG–TERM IMPLEMENTATION:

- Provide new 12kV closed loop system.
- Embark on a renewable power project aimed at reducing the greenhouse gas emissions at the campus. The renewable solar power will help the campus offset the campus greenhouse gas emissions and help the campus shield itself from the variation in the energy prices. The system would also help the campus offset its peak campus demands in the summer. Location to be determined.
- The total SCE Peak demand load for the campus it 880KW. This does not include the High school or the Early Childhood Center. Using a demand factor of .85 yields a maximum of 1035KVA of power being use at one time. The capacity of the two transformers is 1500 KVA and they are loaded to 70% of their combined capacity. The west campus buildings and the east campus buildings are evenly divided between the two transformers. Dividing the 1035kVA load evenly between the two transformers would put the east 500 kVA transformer at its rated capacity during peak demand in August and September.
- The available spare capacity of the main campus is 465 KVA. The existing campus distribution network is adequate to accommodate 66,000 square feet of expansion if it is placed on the west campus distribution board. SCE will need to replace their transformers with larger transformers prior to expanding more than 66,000 square feet. The existing mechanical yards at Central Plant F1 and F2 do not have enough capacity to handle any new buildings and additional electrical loads will be required to power any new mechanical equipment. See Part ... hydronic Energy Utilities.
- A primary loop system would be economical and will provide the campus with the ability to isolate faults easily without interrupting power to the entire campus as well as provide a reliable service.
- A primary closed loop system with isolating switches at each building offers improved system reliability and service continuity in comparison to a radial distribution system. In this system, power is supplied continuously from two sources at the ends of the loop. A properly designed loop quickly recovers from a single cable fault with no continuous loss of power to utilization equipment.

- A second important feature of the loop system is that a section of the cable may be isolated from the loop for repair or maintenance while other parts of the system are still functioning.
  - Primary closed loop system with new 15kV isolation switches at each building to enable isolation of feeders during a fault condition.
  - It is recommended that a new campus owned primary 15kV metering section and switchgear be installed.
  - A Short Circuit / Arc Flash study be conducted to coordinate the proposed system.
  - Conduct a coordination study of the proposed system to effectively coordinate all protective devices in the campus.
  - We recommend that SCE be notified every time a new load or building is added to the system.
  - Southern California Edison has a very good reputation for maintaining their networks. The weak point in the distribution system is the single 5” conduit feeding the entire campus from a single substation. However, there have been not serious outages during the last 14 years of service. It would appear that based upon possible additional new buildings being added to the north of the service access road, the entire Edison feeder network may have to be relocated to clear this expansion. We recommend that planned Buildings P2 and P3 on the north side of campus be relocated to avoid the 12kV underground utility line that serves the campus. See future site plan.
  - We recommended that Southern California Edison be requested to upgrade the 500KVA transformer. If any future loads are to be added to the east side of campus.
  - If additional capacity (above 66,000 square feet) is required, it is recommended that Southern California Edison be requested to upgrade the 1000KVA transformer.

IV. LONG–TERM IMPLEMENTATION (CONT'D):

- The existing Southern California Edison 15kV, 1/0, XLP conductor currently have a load of 50 amps and a capacity of 150 amps allowing for the campus to ore than double in size before new conductors are required. We recommend SCE be requested to change out the primary conductors the next time a transformer is replaced.
- We recommend the use of proper digging equipment for trenching any new electrical feeders as it is well known that the campus has a granite base. The amount of time and the rental of proper equipment should be included in the base bid of any job at Norco Campus where trenching is involved and not included in a change order as "discovery" after the fact.
- 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.
- 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.

Refer to:

Norco
Electrical Distribution Plan

March 6, 2007

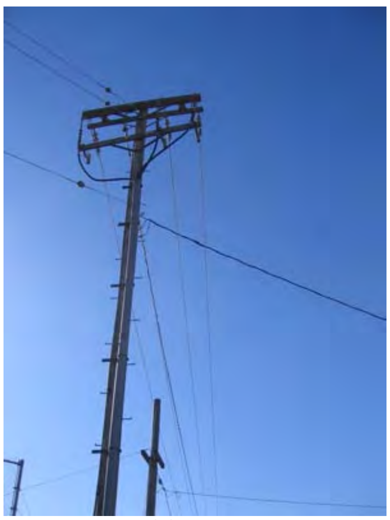
Riverside Community College District

Norco
Electrical Distribution Survey

March 6, 2007

P2S Engineering, Inc.


SCE HV Switch & Meter Enclosure


SCE Pole


SCE Manhole

Executive Summary

Background and Scope

Norco College, one of three colleges within the Riverside Community College District, is a two-year public community college situated in the suburban community of Norco, California. The campus was built in two phases and opened in 1991 with the majority of the buildings being built in phase one. The Norco campus is fast becoming the engineering and technology based education center of choice in the Inland Empire. Each semester more than 8,500 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 Southern California Edison via a 12kV high voltage primary distribution system. This power is then transformed down to low voltage where it is then metered and distributed throughout the site. P2S evaluated the existing power distribution system currently serving the existing Norco College campus.

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.

Methodology

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

-A critical aspect in the evaluation of the existing power distribution systems serving a facility is a detailed and accurate field investigation of the current systems. A detailed survey of the existing power distribution system that currently serves the facilities at Norco 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 as well as discussion with the Southern California Edison service representative.

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

Report Overview

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 in this survey submittal:

-Executive Summary

-High voltage system description and photographs of the existing equipment.

-Low voltage system description and photographs of the existing equipment.

-Review of the current power consumption including current electric rate structure, main meter demand peak chart and campus kVA demand chart as well as total electric consumption cost.

-Available spare electrical capacity including future building capacity.

-Existing manhole conditions and photos.

-Existing pull box conditions and photos.

-Existing handhole conditions and photos.

-AutoCAD drawings of the existing electrical site distribution system as well as single line drawings for both the north and south campus.

LV Switchboard DSBNP

Bookstore LV Transformer

LV Main Switchboard (Facilities 1)

High Voltage Switch


Padmounted Transformer #2


MSB2


Library 800A Switchboard


Multipurpose Bldg Pullbox

Summary of our Findings and Recommendations

Electrical Power Distribution

Findings

High Voltage Distribution

The site is presently fed by Southern California Edison from a single overhead pole line located on Mountain Ave. opposite the campus parking access road. The 12kV conductors are then extended down the pole into an underground conduit. The underground 12kV XLP feeders and 5” conduit extend across 3rd Street and follows the curb line east to a high voltage manhole located approximately 80 feet west of Campus Drive. The 12kV XLP conductors are then extended underground through a 4” conduit and manhole located north of the rear access road to a Southern California Edison high voltage switch located adjacent to Mechanical Building No. 1. This 12kV high voltage switch then feeds a 500 kVA transformer located adjacent to Mechanical Building No.1. Additionally, this high voltage switch also protects a second 12 kV XLP underground feeder which extends through a 4” conduit and two SCE pullboxes to a second 1000 kVA transformer located adjacent to Mechanical Building No.2. The SCE transformers then transform the 12kV primary voltage to a 480Y/277 Volt 3-phase, 4-wire system with a 3000 Amp main switchboard at each location.

It should be noted that the two 3000 A 480/277 V switchboards were once each metered individually, however these meters have been removed and a new meter has been installed in the 12kV high voltage switch enclosure. The present system provides for a combined load of 6000 Amps of secondary distribution at 480/277 V, 3-phase, 4-wire. The existing Southern California Edison 15kV, 1/0, XLP conductors have a capacity that far exceeds the size of the two 3000 Amp switchboards.

The Head Start and Early Childhood center is fed by a secondary 12kV XLP feeder in a 4” conduit that extends from the high voltage manhole on 3rd Street through a small pullbox to an SCE 150 kVA transformer located adjacent to the Head Start Building. The SCE transformers connect the primary voltage to a 208/120 Volt, 3-phase, 4-wire system with an 800 Amp main switchboard and separate SCE meter.


LV Switchboard DSBNL


Tiger's Den LV Panelboard


Multipurpose Bldg DPA

Low Voltage Distribution System

East Campus

The Southern California Edison transformer presently feeds a 3000 A main switchboard (designated as 'MSB') located at Mechanical Building No.1. The main switchboard is protected by a 3000 A ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pullboxes throughout the campus to various other buildings. These buildings are listed as follows:

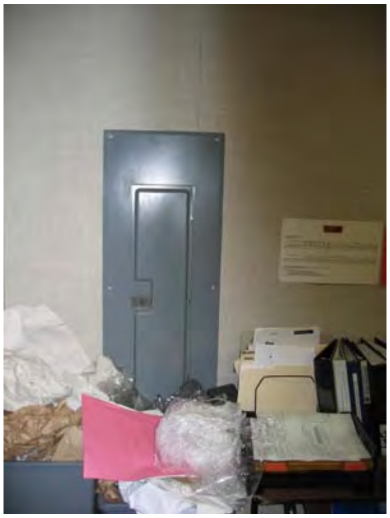
-The Science Tech Building has a 300 Amp circuit breaker and feeder to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 300 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 63 Amps at the time of this report.

-The Student Services Building has a 300 Amp circuit breaker and conductors feeding a 400 Amp, 480/277 V, secondary distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that the 300 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 44 Amps at the time of this report.

-The Bookstore is fed with a single 100 Amp circuit breaker and 100 Amp conductors from the Humanities building. This single feeder is then provided with a 600 Volt disconnect switch which feeds a 75 kVA transformer and secondary 208/120 Volt panel at each building. It should be noted that the 100 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 15 Amps at the time of this report.

-The Humanities building is fed with a 300 Amp circuit breaker and 400 Amp conductors to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that this 300 Amp circuit breaker indicated a maximum high leg conductor reading of 45 Amps at the time of this report.

-The Multi-purpose Auditorium building is fed with a 300 Amp circuit breaker and 400 Amp conductors to a 400 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed down to 208/120 Volts for secondary distribution. It should be noted that, although the building was unoccupied, this 300 Amp circuit breaker indicated a maximum high leg conductor reading of 16 Amps at the time of this report.


Bookstore LV Panelboard


Multipurpose Bldg Transformer "TH"


Humanities Switchboard

The two portable trailers located adjacent to the Bookstore are fed with a 100 Amp circuit breaker and conductors at 480 Volts to a disconnect switch located on the portables. The 480 Volts is then transformed via a 37.5 kVA transformer to 120/208 Volts (phase, 4-wire) which then feeds each portable separately.

Low Voltage Distribution System

West Campus

The Southern California Edison transformer presently feeds a 3000 A main switchboard (designated as 'MSB2') located at Mechanical Building No.2. The main switchboard is protected by a 3000 A ground fault interrupter main circuit breaker. The primary voltage of 480/277 V is used to feed the chillers and the mechanical equipment as well as extending via manholes and pullboxes to various other buildings. These buildings are listed as follows:

-The Library is fed with an 800 Amp circuit breaker and feeder to an 800 Amp secondary distribution switchboard. The 480 Volts are then transformed to 120/208 Volts for secondary distribution. It should be noted that this 800 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 82 Amps at the time of this report.

-The Tech Building is fed with a 600 Amp circuit breaker and feeder to a 600 Amp secondary 480/277 V distribution switchboard. The 480 Volts is then transformed to 120/208 for secondary distribution. It should be noted that this 600 Amp circuit breaker feeder indicated a maximum high leg conductor reading of 45 Amps at the time of this report.

-The CACT Building is fed with a 600 Amp circuit breaker and feeder to a 600 Amp weatherproof distribution secondary distribution switchboard. The 480 Volts are transformed through a 225 kVA weatherproof transformer to 120/208 Volts for secondary distribution inside the building. The 600 Amp weatherproof distribution switchboard also feeds a 100 Amp, 480 Volt feeder via (2) pullboxes to the Activity Center. The 480 Volts is then transformed with a 75 kVA weatherproof transformer to 120/208 secondary voltage which feeds a 120/208 Volt distribution switchboard and panel in the building. This also feeds a secondary panel in the adjacent portable building.

Headstart/Early Childhood Center

The Southern California Edison transformer presently feeds an 800 Amp main switchboard and independent meter adjacent to the Head Start Building. This main switchboard is fed at 120/208 Volts, 3-phase, 4-wire. This switchboard then backfeeds the old 600 Amp main switchboard feeding the Head Start Building as well as feeding new distribuition and secondary panels located in the Early Childhood Center.


Science Tech Elec Room

Underground Distribution Network

The secondary distribution network throughout the campus is by a series of duct banks with 4” and 5” conduits and manholes. There are spare conduits throughout the system (see separate section for manhole layouts and photographs).

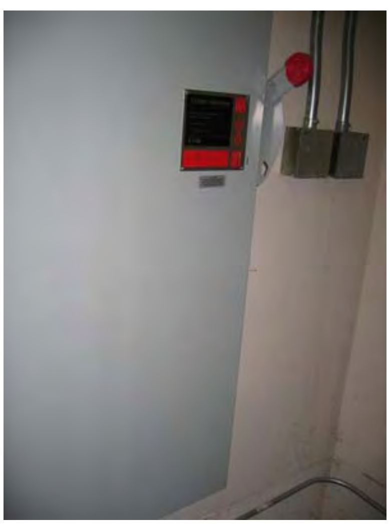
Conclusion

The existing Edison substructure is in very good condition and is adequately sized for the campus’ present needs. The existing 15 kV conductors have the capability of feeding all major additions. The Southern California Edison transformers have a combined capacity of 1500 kVA. Edison and all other utilities size their equipment for a 40% demand factor. At the present time there is 6000 Amps of capacity in the two main switchboards with a combined 12-month peak demand load of 744 kW on 893 Amps at 480 Volts, 3-phase.

Bookstore Feed (from Humanities)

Based upon a design load of 20 Watts per square foot, an additional 170,000 square feet of new building could be added to the two existing main switchboards, transformers, and primary feeder. This available spare capacity would accommodate any anticipated upgrades or renovations throughout the existing campus buildings.

The secondary distribution switchboards are all adequately sized for any additional loads, retrofits or remodels that may be required. The maximum connect load is 21% of the rated switchboard (This is for the Science Tech Building). All others are even more lightly loaded.


Multipurpose Disconnect

Recommendations

-The existing north campus distribution network is adequate to accommodate 170,000 square feet of expansion without modifying the system.

-If additional capacity (above 170,000 square feet) is required, it is recommended that Southern California Edison by requested to upgrade the 12kV feeder conductors. The 5” conduit system will allow them to drastically increase their available capacity.

-Southern California Edison has a very good reputation for maintaining their networks. The weak point in the distribution system is the single 5” conduit feeding the entire campus from a single substation. However, there have been not serious outages during the last 14 years of service. It would appear that based upon possible additional new buildings being added to the north of the service access road, the entire Edison feeder network ay have to be relocated to clear this expansion.

-It should be noted that power distribution manholes normally would only have electrical distribution conductors passing through them. However, electrical manhole (EMH) #2 has fiber optic telecommunication cables as well as fire alarm cables passing through it (see EMH #2 photos). It is not recommended that this be changed at this time, but if additional work is done in this manhole the communication and fire alarm cables should be relocated to the adjacent signal manhole.

NORCO CAMPUS SCE MANHOLES

EMH# 01

EMH# 02

EMH# 03

EMH# 04

Norco Campus Manholes & Pullboxes

EMH# 01

EMH# 02

Note: Fiber and fire alarm cables are also installed in this manhole

EMH # 03

PB # 01

PB# 03

PB # 04

PB # 04

PB # 05

PB # 05

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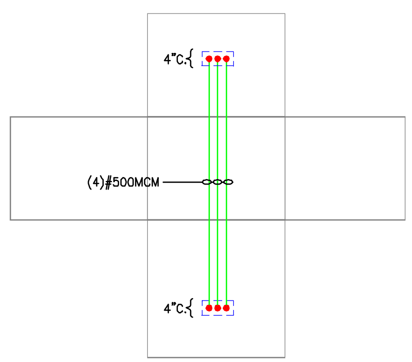
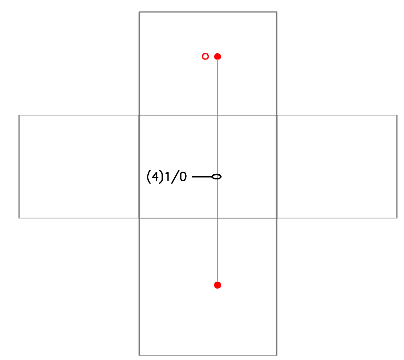


MANHOLE PLAN

PB #5
SCALE: NONE



MANHOLE PLAN

PB #3
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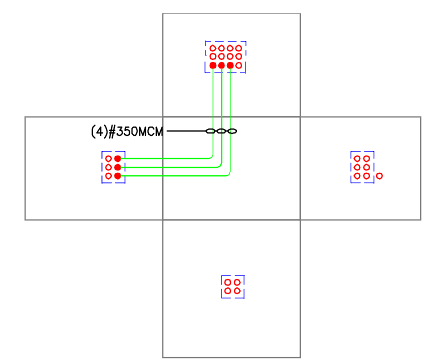

MANHOLE PLAN

EMH #3
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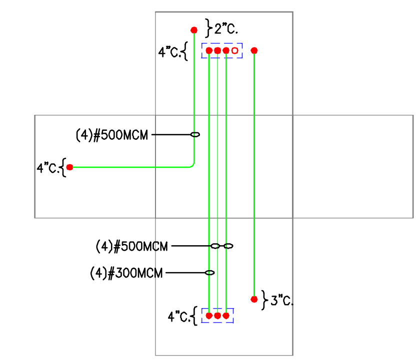
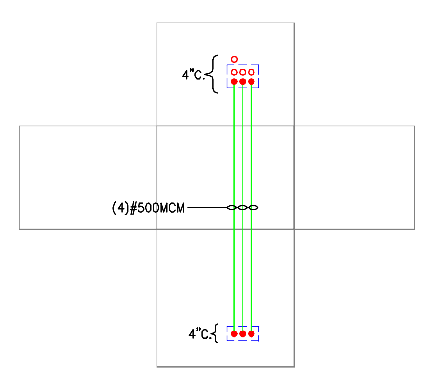


MANHOLE PLAN

EMH #1
SCALE: NONE

-

-
SCALE: NONE



MANHOLE PLAN

PB #4
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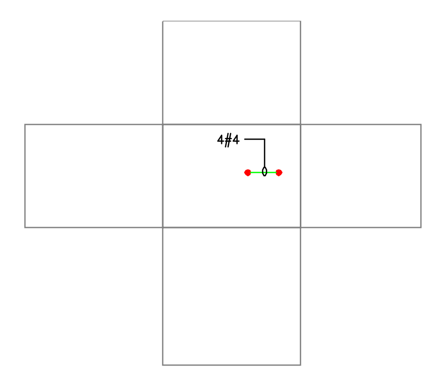
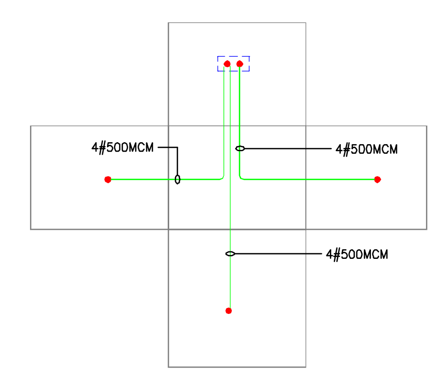


MANHOLE PLAN

PB #1
SCALE: NONE



MANHOLE PLAN

EMH #2
SCALE: NONE

P2S ENGINEERING

Consulting Engineers

Project Management
Telecommunications
Mechanical
Electrical
Controls

P2S Engineering, Inc.
5000 East Spring Street, 8th Floor
Long Beach, CA 90815–1275
Tel: 562.497.2999 Fax: 562.497.2990
Internet: www.p2seng.com

Consultant

Project Title

ELECTRICAL CAMPUS SURVEY NORCO

NORCO CAMPUS
2001 Third Street
Norco, CA 92860-2600

Revisions

Number	Description	Date
	CAMPUS SURVEY	03/05/07

Designed JL
Drawn JP
Checked JL
Approved

Date MARCH 06, 2007

Submittal CAMPUS SURVEY

Scale

Sheet Title

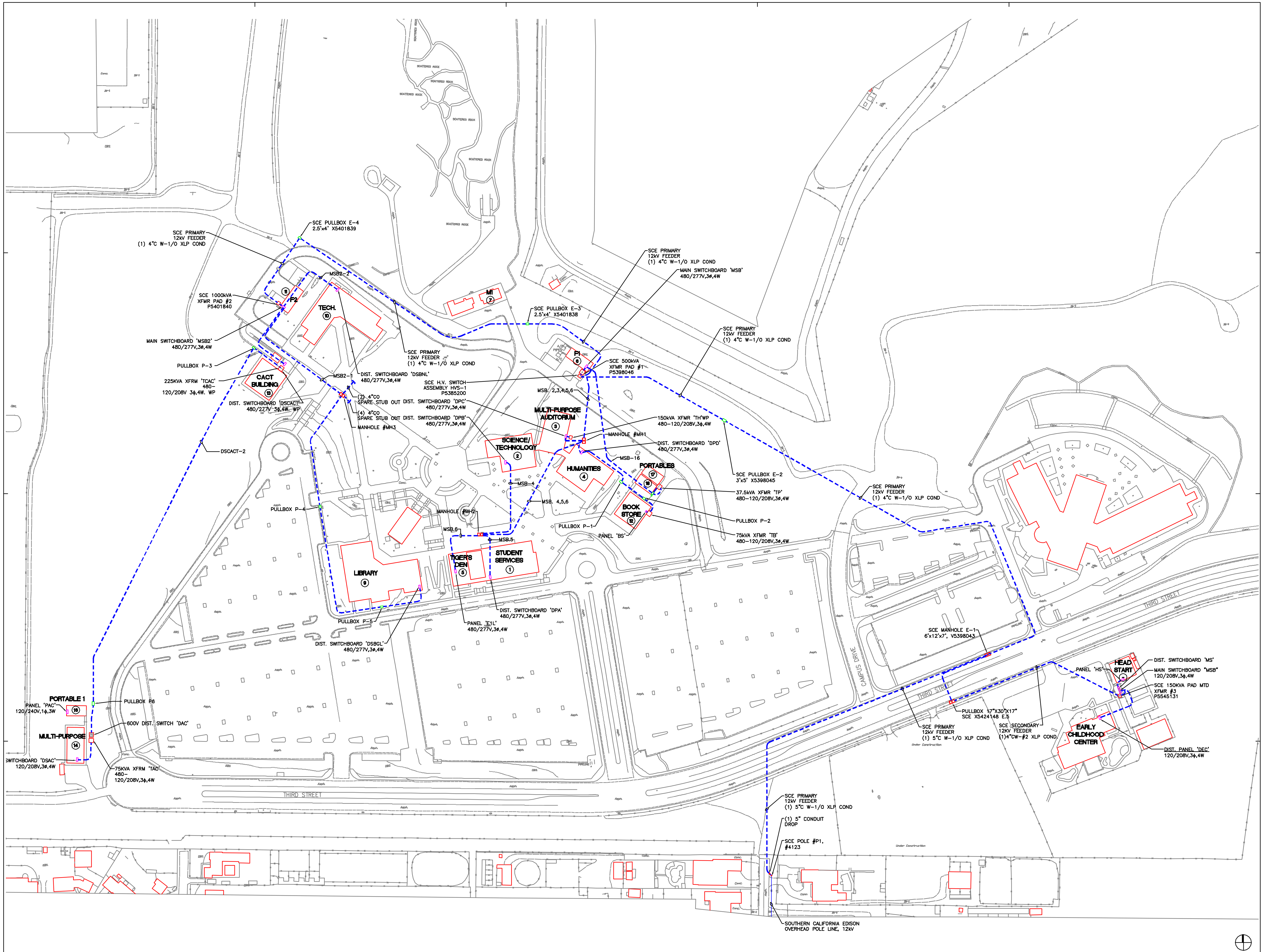
ELECTRICAL MANHOLES

Sheet Number

E-4.1

of

4817



SITE PLAN

CAMPUS

SCALE: 1"=80'

P2S ENGINEERING

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Mechanical
Electrical
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2001 Third Street
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Revisions

Number Description	Date
CAMPUS SURVEY	03/06/07

Designed	BL
Drawn	RM
Checked	BL
Approved	
Date	MARCH 06, 2007
Submittal	CAMPUS SURVEY
Scale	AS NOTED

Sheet Title

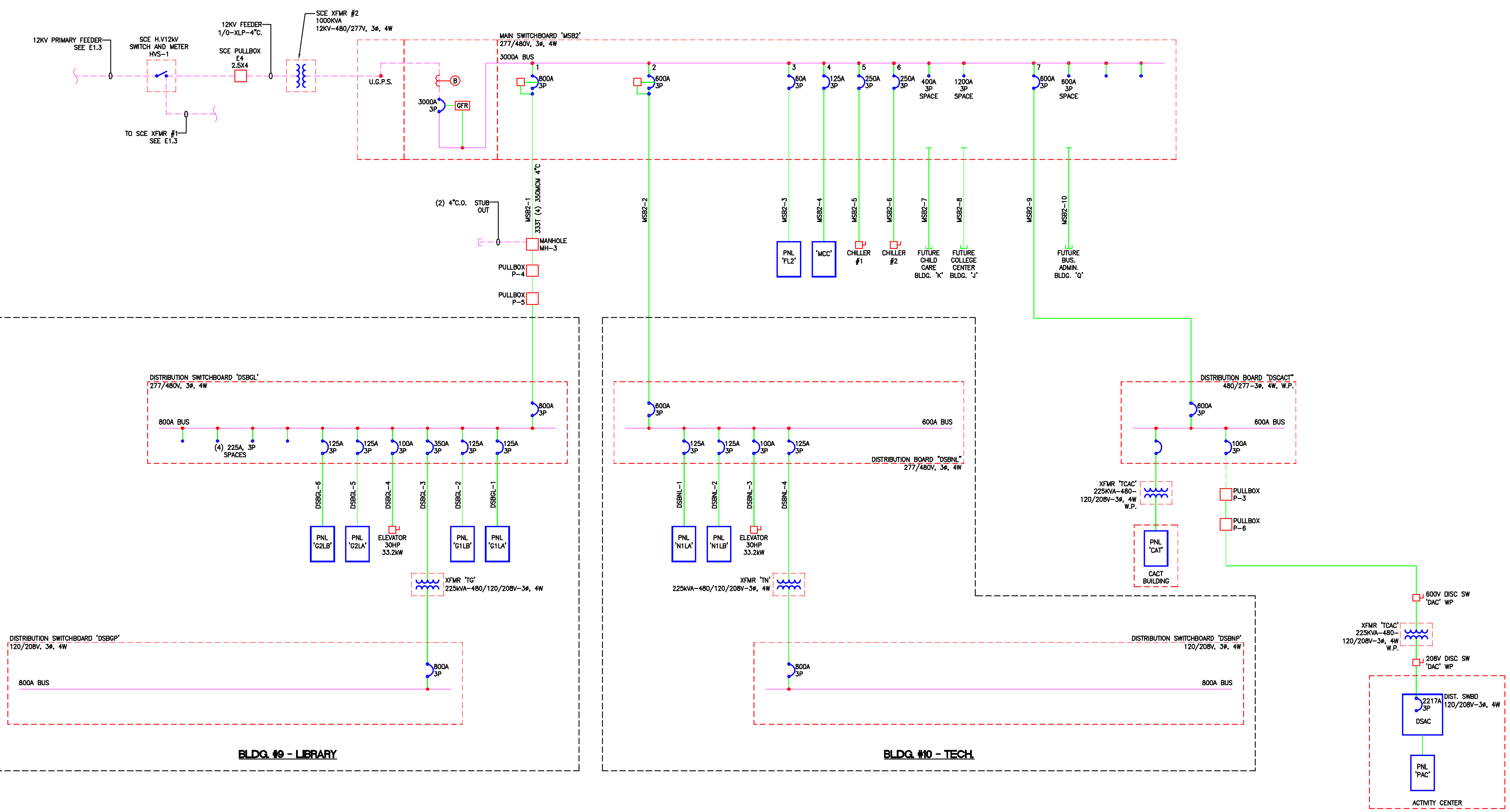
ELECTRICAL CAMPUS SITE PLAN

Sheet Number

E-1.1

of -

4817



P2S
ENGINEERING

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Project Title

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NORCO CAMPUS
2001 Third Street
Norco, CA 92860-2600

Revisions

Number	Description	Date
	CAMPUS SURVEY	03/05/07

Designed	JP
Drawn	FO
Checked	JP
Approved	
Date	MARCH 06, 2007
Submittal	CAMPUS SURVEY
Scale	

Sheet Title

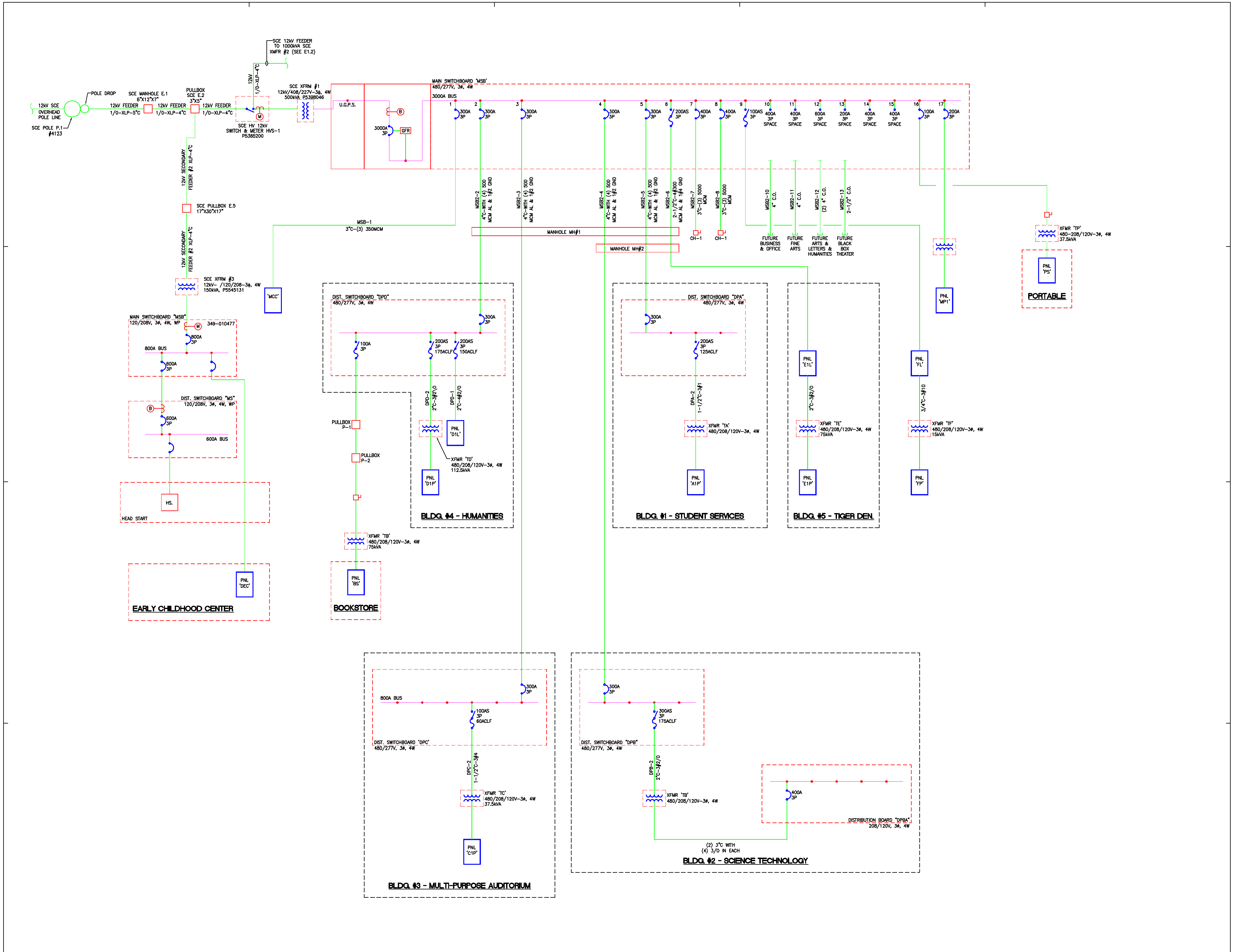
ELECTRICAL SINGLE LINE DIAGRAM WEST CAMPUS

Sheet Number

E-1.2

of

4817



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5000 East Spring Street, 8th Floor
Long Beach, CA 90815-1275
Tel: 562.497.2999 Fax: 562.497.2990
Internet: www.p2seng.com

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Project Title

ELECTRICAL CAMPUS SURVEY NORCO

NORCO CAMPUS
2001 Third Street
Norco, CA 92860-2600

Revisions

Number	Description	Date
	CAMPUS SURVEY	03/05/07

Designed JP
Drawn FO
Checked JP
Approved

Date MARCH 08, 2007

Submittal CAMPUS SURVEY

Scale

Sheet Title

ELECTRICAL SINGLE LINE DIAGRAM EAST CAMPUS

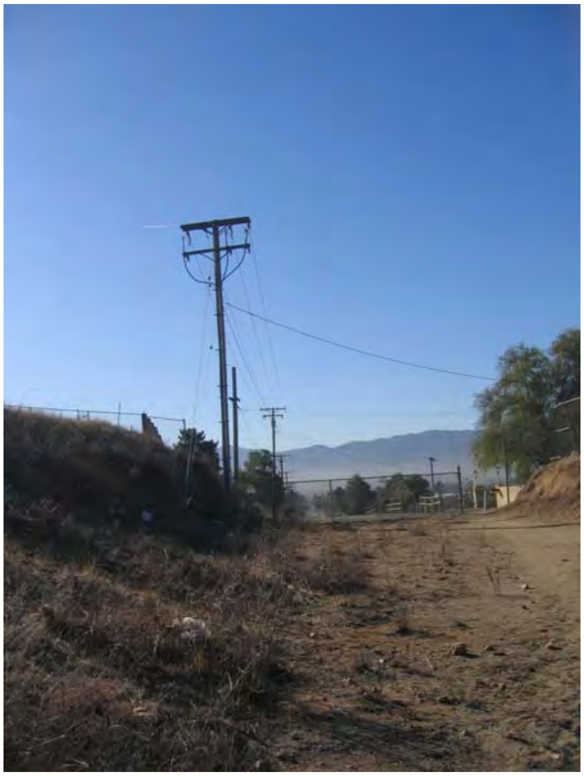
Sheet Number

E-1.3

of

4817

NORCO CAMPUS SCE EQUIPMENT



SCE Power Pole on Mountain Ave.

SCE HV Switch

SCE HV Switch

SCE Manhole on 3rd Street

NORCO CAMPUS LOW VOLTAGE EQUIPMENT

LV Switchboard DSBNP


LV Main Switchboard (Facilities 1)

Padmounted Transformer #2


Bookstore LV Transformer


MSB2


Library 800 Amp Switchboard

LV Switchboard DSBNL


Multipurpose Bldg Pullbox


Tiger's Den LV Panelboard

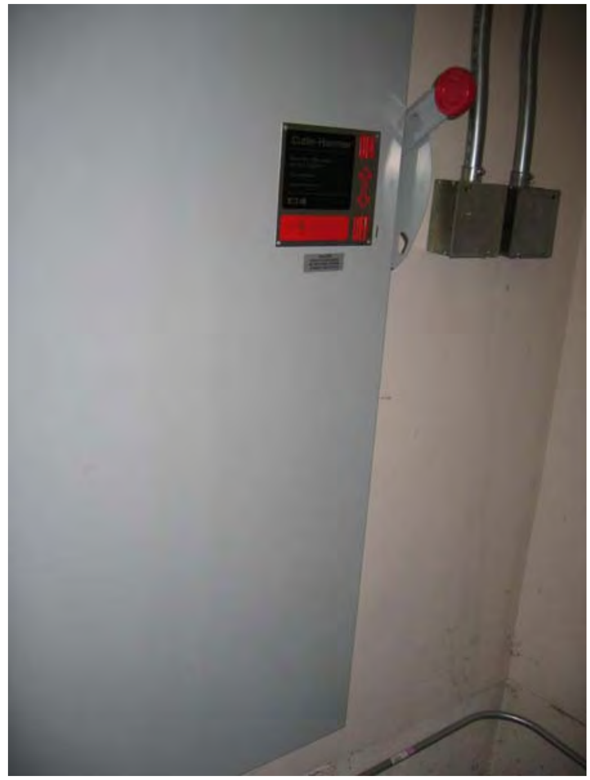
Multipurpose Bldg DPA


Bookstore LV Panelboard


Multipurpose Bldg Transformer "TH"

Humanities Switchboard

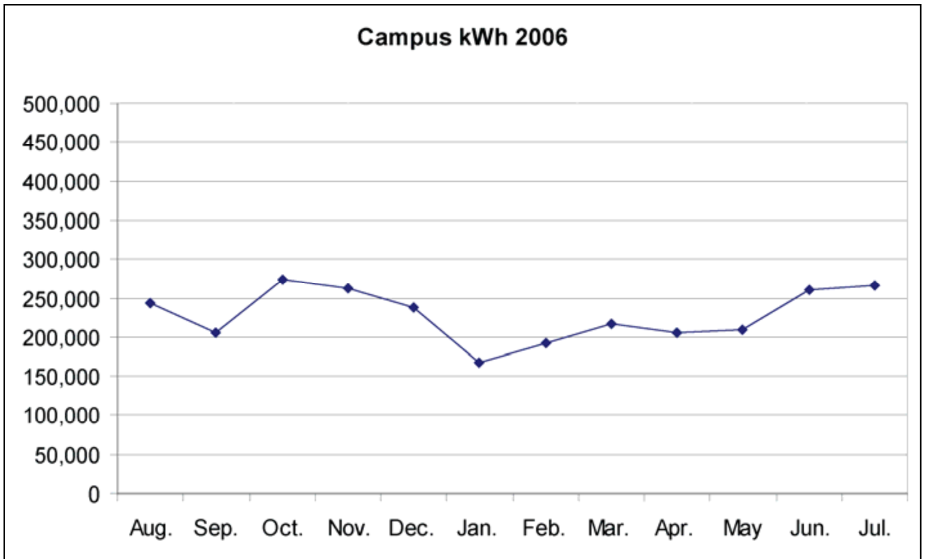
Science Tech Elec Room

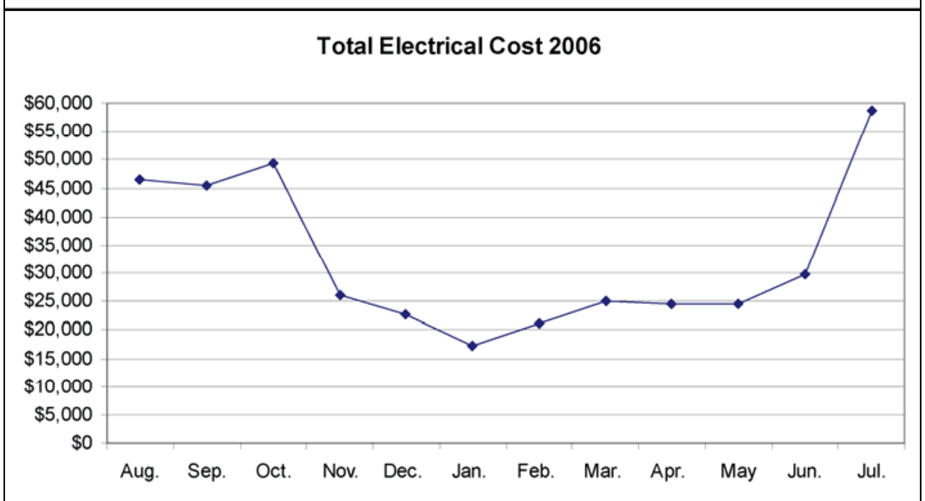


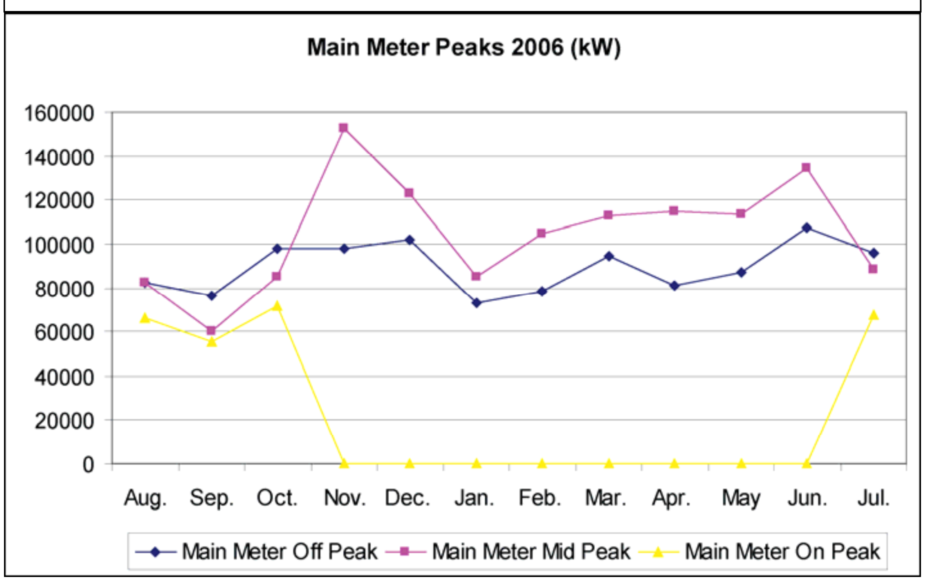
Multipurpose Disconnect

Bookstore Feed (from Humanities)

Norco Campus Energy Usage





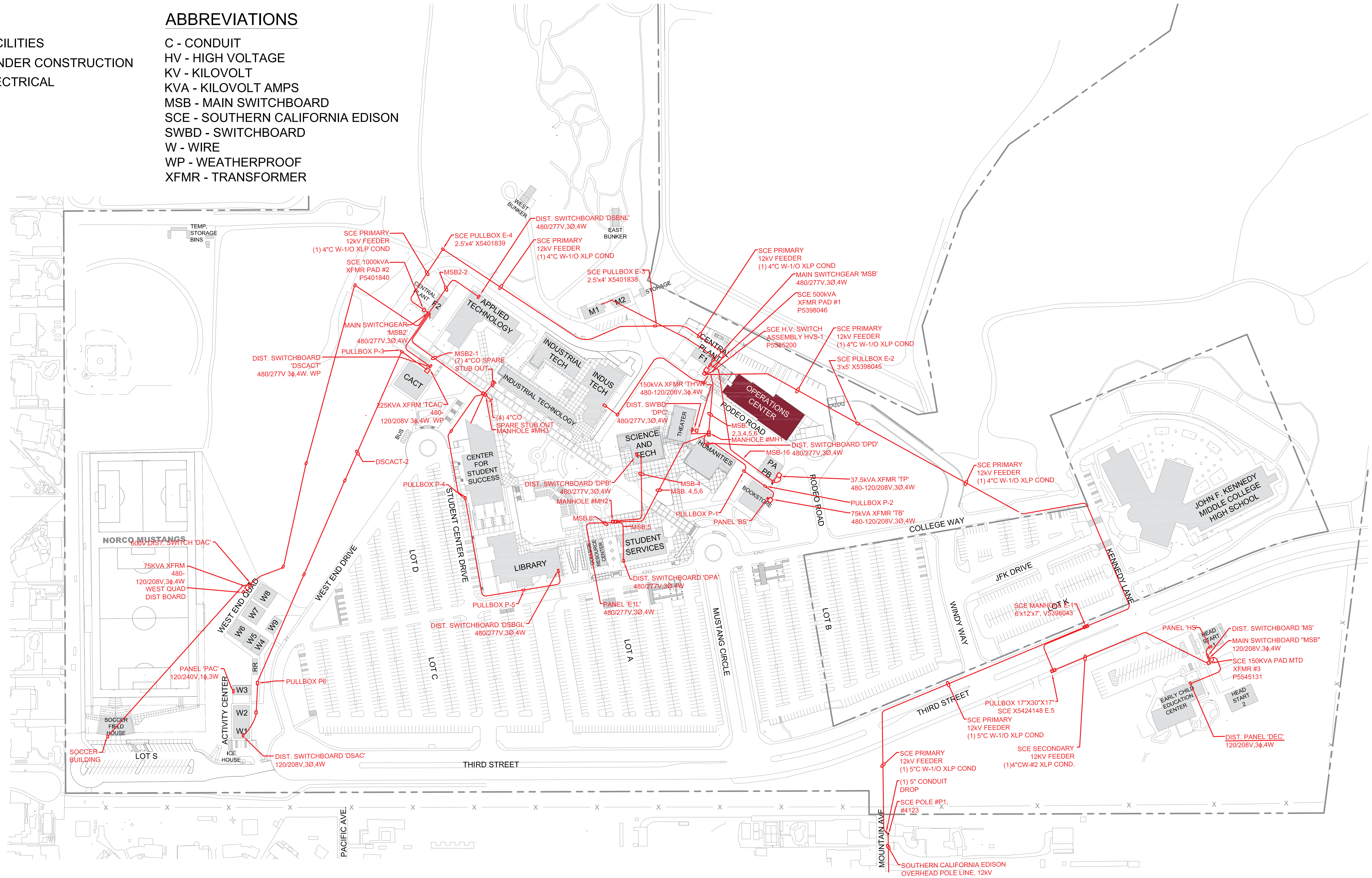


LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- EXISTING ELECTRICAL

ABBREVIATIONS

C - CONDUIT
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
MSB - MAIN SWITCHBOARD
SCE - SOUTHERN CALIFORNIA EDISON
SWBD - SWITCHBOARD
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER



0 ft 120 ft 240 ft

SCALE: 1" = 240'-0"

EXISTING ELECTRICAL SITE PLAN

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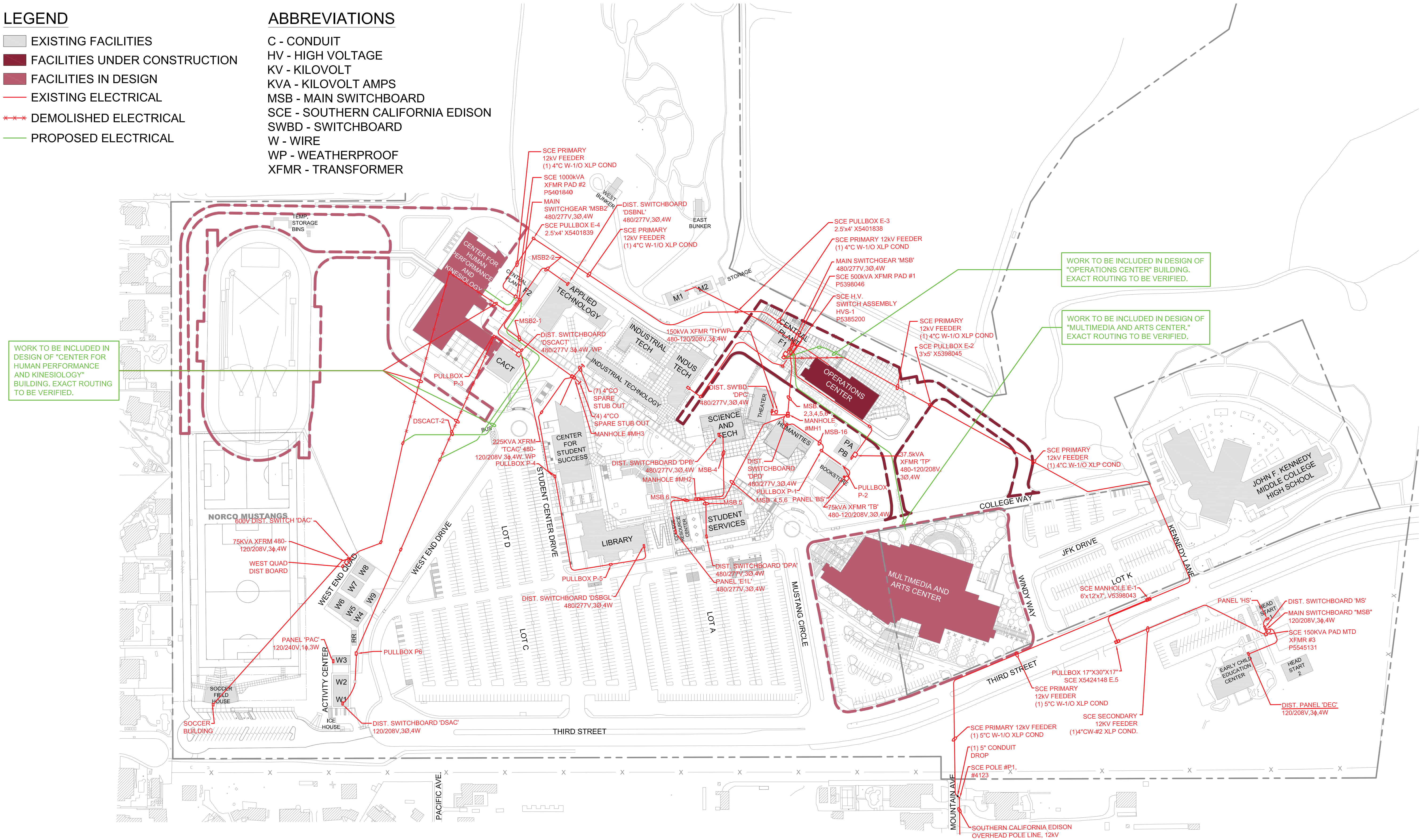
LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- FACILITIES IN DESIGN
- EXISTING ELECTRICAL
- DEMOLISHED ELECTRICAL
- PROPOSED ELECTRICAL

ABBREVIATIONS

C - CONDUIT
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
MSB - MAIN SWITCHBOARD
SCE - SOUTHERN CALIFORNIA EDISON
SWBD - SWITCHBOARD
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER



0 ft 120 ft 240 ft
SCALE: 1" = 240'-0"

HORIZON 1 ELECTRICAL SITE PLAN

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PART B

FUEL DISTRIBUTION UTILITIES

PART B FUEL DISTRIBUTION UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG—TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

I. EXISTING CONDITIONS:

- The Norco Campus is currently served from a single gas meter located on the south-west side of the F1 Central Plant building which serves the F2 Central Plant, Humanities and Science and Technology buildings. The meter is fed from a 3–inch high pressure line deriving its service from a 3-inch gas company high pressure main running along Third Street.
- The majority of the campus gas infrastructure was installed in the early 1990'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 such as the addition of the F2 Central Plant and the Center for Student Success. Gas mains are believed to be plastic pipe and range from 1/2-inch to 3-inches in diameter.
- Natural gas downstream of the meters are distributed at medium-pressure at approximately 5 psig throughout the campus. 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 domestic hot water needs at plumbing fixtures. Natural gas is used for domestic water heating and industrial hot water.
- The total estimated gas load demand for the existing system is approximately 12,190 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 12,190 CFH.

II. GOLAS:

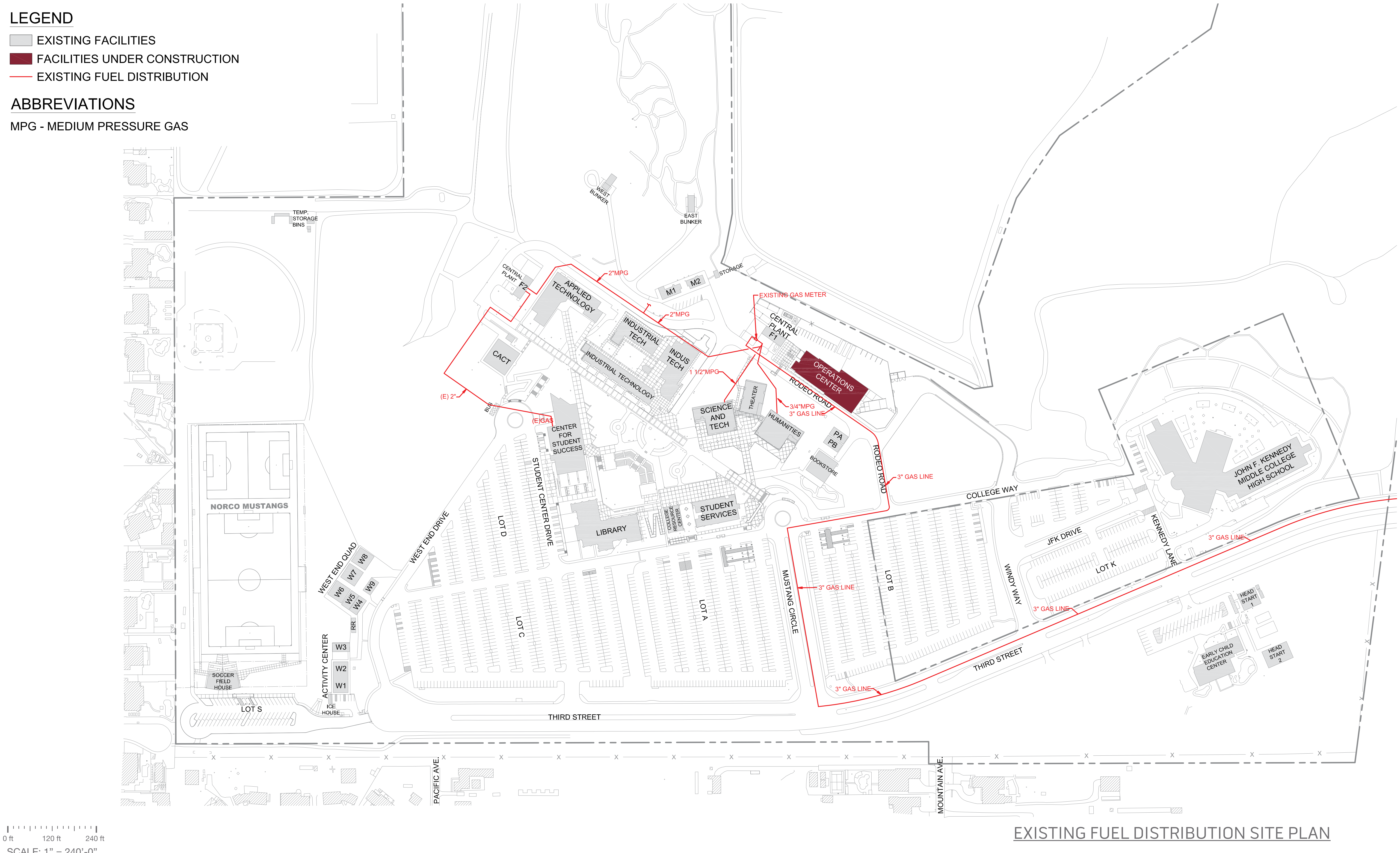
- Improve system reliability.
- Provide ease of maintenance and isolation of lines either during a failure or during a regular maintenance without interrupting gas supply to other buildings on campus.
- Provide adequate capacity service lines to accommodate existing loads and planned future loads resulting from new buildings addition as well as additions to existing buildings.

III. HORIZON 1 IMPLEMENTATION:

- Earthquake valves for emergency gas supply shut-off should be provided at each meter location on the downstream side of the regulator.
- Meter 1: Replace existing meter with a higher capacity meter having a max CFH output of no less than 20,000 CFH. Southern California Gas Company shall provide this service.
- Install new meter (#2) with a max. CFH output of no less than 20,000 CFH. Southern California Gas Company shall provide this service.
- 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.
- Use of proper digging equipment for trenching as it is well known that the campus has a granite base. The amount of time and the rental of proper equipment should be included in the base bid of any job at Norco Campus where trenching is involved and not included in a change order as “discovery” after the fact.

IV. LONG—TERM IMPLEMENTATION:

- The existing main medium pressure distribution lines are adequately sized to meet the demands of existing and future facilities on the campus; however the existing meter will require an upgrade to a higher capacity output meter. In addition, the installation of one additional meter will be required to serve most of the proposed buildings.



EXISTING FUEL DISTRIBUTION SITE PLAN

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LEGEND

- EXISTING FACILITIES
- FACILITIES UNDER CONSTRUCTION
- FACILITIES IN DESIGN
- EXISTING FUEL DISTRIBUTION
- DEMOLISHED ELECTRICAL
- PROPOSED FUEL DISTRIBUTION
- PROPOSED P.O.C. (POINT OF CONNECTION)
- PROPOSED P.O.D. (POINT OF DISCONNECTION)

ABBREVIATIONS

CFH - CUBIC FOOT PER HOUR
G - GAS
HPG - HIGH PRESSURE GAS
MPG - MEDIUM PRESSURE GAS

0 ft 120 ft 240 ft
SCALE: 1" = 240'-0"

HORIZON 1 FUEL DISTRIBUTION SITE PLAN

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PART C

HYDRONIC ENERGY UTILITIES

PART C HYDRONIC ENERGY UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG—TERM IMPLEMENTATION

V. DRAWINGS

- List of drawings

I. EXISTING CONDITIONS:

- The campus has two central plants which provide both chilled and hot water in underground piping to serve buildings throughout campus.
- Pumps in the central plant are sufficient to preclude the necessity of additional pumps in new buildings.
- The first chiller plant F1, has a nominal capacity of 440 tons. This plant serves the east side of campus as well as the Industrial Technology building.
- The second chiller plant F2, has a nominal capacity of 400 tons. This plant serves the Applied Technology building, Library, and new Center for Student Success. There are approximately 120 tons of spare capacity on F1 Centrall Plant and 185 tons of spare capacity on F2 Central Plant.
- All chillers and pumps use a constant flow rate scheme that is based on a relatively small temperature differential of 10 degrees F. The current distribution system is not an efficient strategy. Distribution piping is not tied together and piping carries chilled water to the building independently.
- The campus is currently served by two central heating and cooling plants. For cooling, each plant is equipped with two sets of two air cooled chillers. For heating, each plant is equipped with two sets of two boilers.
- The first set of chillers in building F1 has two Trane 140 ton air cooled chillers. The second set of chillers has two 100 ton York chillers. At building F2, the first set of chillers has two Carrier 100 ton chillers and the second set is two York 100 ton chillers
- There are two pairs of boilers at building F1. A pair of 1,200 mbh input boilers, and a pair of 735 mbh input boilers. At F2, there are two pairs of boilers. The first set is 1,125 mbh input, and the new set is not known at this time.
- The chillers and chilled water pumps use a high flow rate and low temperature difference approach. This is an energy inefficient distribution scheme. The second set of chillers at building F1 uses the same approach. Distribution piping carries chilled water and heating hot water to 11 of the buildings on the campus.
- A set of twelve inch chilled water supply and return pipes leave the F1 central plant for the first five east side buildings. They split up to 6” lines going south, and 10” lines going east. The 10 inch lines have plenty of capacity for future loads.
- The cluster of three new buildings in the center of the campus known as the Industrial Technology buildings are served by two new York 100 ton air-cooled chillers. They are also located in F1. The piping from these new chillers runs over to the new Industrial Technologies buildings independently. They are 6 inch lines.

I. EXISTING CONDITIONS (CONT'D):

- The west part of the campus is served by the central plant at F2. There are two 100 ton air-cooled Carrier chillers and two new 100 ton air-cooled York chillers. The Carrier chillers serve the Applied Technology building and the Library. The new York chillers serve the new Center for Student Success. The piping to the new Center for Student Success runs independently from the F2 central plant to the new building.
- The Center for Applied Competitive Technologies is served by four packaged rooftop units and is not connected to the central heating and cooling lines.

COOLING

- The campus is currently served by two central plant facilities.
- Each facility building is equipped with four air cooled chillers.
- The first plant in building F1 has two 140 ton Trane air cooled chillers.
  - This set of chillers serves the five buildings on the east side of campus.
- The second set of chillers at this facility are two 80 ton York chillers.
  - This set of chillers serves the group of three new buildings that is called the Industrial Technology complex.
- Central Plant F1 has a total of 440 nominal tons of cooling capacity.
  - These chillers are probably derated at peak load due to the high ambient temperatures. There is about 200 tons of cooling load on the Trane chillers and 120 tons of cooling load on the new York chillers.
  - There is plenty of spare capacity on these two chilled water systems.
- Central Plant F2, at the west side of campus has a set of 100 ton Carrier air-cooled chillers.
  - These chillers serve the Applied Technology building and the Library.
  - A second pair of 100 ton York air-cooled chillers at this plant serves the new Student Success Center.
  - There is a total of 400 tons of capacity at this plant.
  - The cooling load on the Carrier system is about 150 tons.
  - The cooling load on the York chillers is about 65 tons. Again there is plenty of spare capacity.
  - All of the chillers and pumps use a constant flow rate scheme that is based on a relatively small temperature differential of 10 degrees.
  - This is not an energy efficient pumping and distribution strategy.

    Distribution piping is not tied together, so piping carries chilled water to the buildings independently.

HEATING

- The campus is currently served by two central plant facilities.
  - Each facility building has two sets of boilers.
- The first heating system in F1 has two 1,200 mbh input boilers.
  - This set of boilers serves the east side of campus.
  - There are five existing buildings that have a heating load of about 900 mbh output, or 1,130 mbh input.
  - You can see that one boiler can handle the load and one is redundant. The second system has two 735 mbh input boilers.
  - This set of boilers serves the new group of buildings called the Industrial Technology Complex.

    These buildings have a heating load of 670 mbh output, or 835 mbh input. One boiler is close to handling the full load, but on days below 35 degrees, the second boiler may have to come on.
- The second building, F2, has one set of boilers at 1,150 mbh input each, or 920 mbh output.
  - This pair of boilers serves the Applied Technology Building and the Library.
  - The load for these two buildings is about 760 mbh. So, one boiler can handle the load, and the other boiler is redundant.
  - The second set of boilers is not known yet. It serves the new Center for Student Success.

- East Campus (phase 1)

  Twelve inch chilled water supply and return pipes leave the F1 central plant for the east campus. This pipe then splits up to 6” pipe that goes south and a 10” line that goes east. The south branch feeds the Science and Technology building and the Auditorium. It then continues south to the Student Services Building and the Corral. The east branch feeds the Humanities Building and stays 10” to feed future buildings. This will be important when we discuss the future plans. The main heating water lines from F1 are 6”. They split to 6” lines going east and 4” lines going south. The second set of heating water pipes that leave F1 is 3” that routes to the Industrial Technologies complex.

I. EXISTING CONDITIONS (CONT'D):

- West Campus (phase 2)
  The west campus is served by two 100 ton Carrier air-cooled chillers located at building F2. Two 4" chilled water branches provide service to PSOMAS Page 47 of 83 RIVERSIDE COMMUNITY COLLEGE DISTRICT– NORCO CAMPUS UTILITY PROGRAM JUNE 14, 2010 buildings "G" the Library, and building "N" the Applied Technology building respectively. The buildings are heated and cooled by 4 pipe fan coils and are designed for approximately 10°F differential on the chilled water supply temperatures. For a campus environment this is a low temperature differential that leads to larger pipe sizes and larger pumping requirements compared to a larger temperature differential design. The heating water piping from building F2 is 3" to the Library and 2 " to the Applied Technology Building. A site plan showing existing chilled water and heating water piping distribution is included at the end of this section. The main conclusion that we come away with is that all chilled water is produced by air-cooled chillers. In the desert climate, on hot days, this type of chiller can be using as much as 1.5 kW per ton. This is not efficient compared to water cooled equipment, or water-cooled equipment that is teamed up with thermal storage tanks and runs during off-peak hours when ambient air is cooler, and electric rates may be lower . The largest electrical load for the chiller at present is during the hottest part of the day, when the chiller is least efficient. It is also notable that the pumping is constant speed. Control valves at the fan coils are 3-way. There probably is no control scheme to reset supply water temperature during cooler weather.
- Each building is equipped with four air cooled chillers. The first plant in building F1 has two 140 ton Trane air cooled chillers. This set of chillers serves the five buildings on the east side of campus. The second set of chillers at this facility are two 80 ton York chillers. This set of chillers serves the group of three new buildings that is called the Industrial Technology complex.
- The second plant in F2, at the west side of campus has a set of 100 ton Carrier air-cooled chillers. These chillers serve the Applied Technology building and the Library. A second pair of 100 ton York air-cooled chillers at this plant serves the new Center foe Student Success.

- In addition to the chilled water plants there are some small split systems for telecom room and few specialized spaces. The far eastern part of the campus referred to as the Early Childhood Education Center (ECEC) is independent of the centralized campus chilled water systems. These buildings have packaged rooftop equipment. TheJohn F. Kennedy Middle College High School is also independent. The bookstore at the east edge of the main campus has packaged rooftop equipment. So does the Center for Applied Competitive Technology (CACT) on the west edge of the main campus. There are also some relocatable classrooms with wall hung air conditioning units at the far western side of the campus.
- East Campus
  Twelve inch chilled water supply and return pipes leave the F1 central plant. This pipe then splits up to 6" pipe that goes south and a 10" line that goes east. The south branch feeds the Science and Technology building and the Theater building. It then continues south to the Student Services Building and the College Resource Center. The east branch goes to feed the Humanities Building.
- West Campus
  Two 4" chilled water mains provide service to the Applied Technology and Library buildings. All chilled water is currectly produced by air-cooled chillers. In the desert climate, on hot days, this type of chiller can be using as much as 1.5 kW per ton. The largest electrical load for the chiller is during the hottest part of the day, when the chiller is least efficient. It is also notable that the pumping is constant speed. Control valves at the fan coils are 3-way. There probably is no control scheme to reset supply water temperature during cooler weather.
- The campus is currently served by two central utility buildings. Each Central Plant has two systems equipped with two boilers, each. The first plant in building F1 has two 80% efficient natural gas boilers. They are 1.2 million BTU input Raypak copper fin tube boilers. They serve the east side of the main campus. The pumps provide a constant flow rate based on a 40 degree temperature differential and are therefore energy inefficient with regards to distribution piping scheme. Distribution piping carries heating hot water to the five buildings at the east side of the campus. The second plant at building F1 has two 735 mbh input Ajax boilers and also uses the same approach of distribution. These boilers serve the three new Industrial Technology buildings.

I. EXISTING CONDITIONS (CONT'D):

- The heating plant at F1 serves the east side of the campus consists of five buildings. They are Student Services, the College Resource Center, Humanities, the Theater, and Science and Technology. There are two 1,200 mbh boilers. The heating hot water loop has a 6" main and 4" branches that go south and east. The Student Services Building is served by 2 1/2" heating hot water pipes that go south from the Science Building.
- The west side of the campus consists of the Applied Technology building and the Library. These buildings are served by two 1 million BTU 'Raypak' copper fin tube boilers for providing the heating hot water requirements. The boilers are housed in F2. The heating hot water loop has a 3" main and two 3" branches that feed these.
- The Industrial Technology buildings are served by the two new 735 mbh input Ajax boilers that were located in an expansion of F1. This piping runs independently to these buildings.
- The Center for Student Success is served by two new boilers that are housed in F2. This piping runs independently to the new building.
- When analyzing the heating water requirements of the five buildings of the east campus (phase 1), we see that the combined load of these buildings is about 900 mbh. Input for this heating load would be about 1,135 mbh. The boiler plant at F1 that serves these buildings has an input of 1,200 mbh each. So, one boiler can handle the load on a design day. The other boiler is 100% redundant.
- The heating water pumps for this system are capable of providing 168 gpm at 120 ft of head. The load for the five buildings is 45 gpm. The pumps have plenty of spare capacity. They could be running at lower flow.
- When analyzing the heating water requirement for the two buildings on the west side (phase 2), we see that the combined load is about 760 mbh. The input for this heating load would be 950 mbh. The boilers that serve these two buildings has an input of 1125 mbh each. So, one boiler can handle the load on a design day with about 18% to spare. The other boiler would be 100% redundant.
- One heating water pump has plenty of capacity. The other is a spare.
- When analyzing the heating load for the Industrial Technology buildings, only on a cold day, both boilers need to be firing.
- The capacity of the heating water pumps for this system are not known
- at this time. More investigation will need to be performed.
- When analyzing the heating load for the new Center for Student Success, the capacity of the two new boilers are not known at this time. More investigation will need to be performed. Information on the pumps is not known either.
- In addition to the heating water plants, the Norco campus is served by some small local gas-fired packaged systems. On the west edge of the campus there is the Center for Applied Competitive Technologies that also has gas-fired packaged rooftop equipment.

II. GOALS:

GENERAL

- Maximize efficiency of the Central Plants (F1 + F2).
  - Currently the two plants are being tied together.
- Maximize use of the Central Plants (F1 + F2) to provide tremendous savings for both energy and maintenance.
- Meter energy use at individual buildings to help identify energy saving opportunities or possible improper operation.

COOLING

- Tie all buildings, existing and new, into the Central Plants (F1 + F2) for chilled water cooling.
  - No buildings will be required to have chillers.
- Packaged air conditioning equipment will only be required for isolated situations.

HEATING

- Retain the existing heating water system as much as possible.
  - Some of the existing buildings that are connected to the central heating water system will remain connected.
  - There is no need to retrofit existing buildings that are connected to the existing central heating water system with new local heating water systems.
- Demolish or relocate some of the existing boilers to new buildings.
- Boiler redundancy should be reduced to 70 percent, instead of 100 per cent.
- Avoid extending or expanding current heating systems.
- Design future buildings to have independent local heating water systems housed within the building.
  - Boilers should be 84% to 92% efficient with at least four to one (4 to 1) turn down.
  - There is no benefit to have new buildings fed from a central heating system.
  - A local heating system is efficient without having heat loss from long runs of buried pipes and eliminates the cost of the long runs of buried piping.
- Existing remote buildings that have existing gas-fired heating equipment should remain as is.
  - They are smaller loads and will not make much difference to the overall campus natural gas usage.

III. HORIZON 1 IMPLEMENTATION:

- Evaluate the available chilled water capacities from the existing Central Plants (F1 + F2) for spare capacity and redundancy.
- Evaluate all new buildings for connection to the existing Cental Plants (F1 + F2).
  - Extend chilled water piping where it is not currently installed.
  - Relocate and upgrade chilled water piping to increase size and allow placement of future buildings over current pipe locations.
- Tie HVAC equipment into the existing Central Plants where existing plant capacity is available and redundancy is maintained and where existing piping infrastructure is in place.

IV. LONG—TERM IMPLEMENTATION:

- For energy efficiency reasons an evaporative cooled chilled water plant is proposed. For maximum energy savings, peak demand reduction and reduced carbon footprint, a chilled water Thermal Energy Storage (TES) tank is proposed. It would be located on the north side of the campus overlooking the campus. The TES can lower the required chiller capacity to about 1000 tons. During the peak cooling load of the day, cooling load can be partially or fully handled by the chilled water stored in the tank. The temperature of the chilled water in the tank will be lowered during off-peak hours when the ambient and wet bulb temperatures are lower, so the chillers operate more efficiently, and when electrical rates are lower.
- (Alternate Option) Existing air-cooled chillers could also be run at night in conjunction with the Thermal Storage Tanks when the ambient temperatures are lower and electric rates are lower. This would make the existing overall system efficiency better, but it would not be as efficient as water cooled state of the art chillers.
- The multiple heating systems of F1 and F2 could be crossconnected to create a single heating system, or the two heating systems at F1 could be combined and the two heating systems at F2 could be combined. This will make energy usage monitoring and control much easier and improve year round boiler plant efficiency.
- Existing buildings that will remain and are currently served by the present heating system should retain that heating system. There is no need to demolish that system and retrofit those buildings with an in-house system. Obviously, there is excess capacity. The College could demolish and relocate some of the existing boilers to new buildings.
- Retrofit existing large buildings that are served by chilled water with BTU monitoring capabilities.

- New buildings should be designed 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 essential for maximizing the cooling capacity of the chilled water TES tank while minimizing the size of the tank.
- New buildings should be provided with DDC controls for better monitoring and controlling energy usage.
- All new buildings should have BTU metering capabilities that tie into a central DDC system with robust energy management capabilities.
- For energy efficiency reasons an evaporative cooled chilled water plant is proposed.
- For maximum energy savings, peak demand reduction and reduced carbon footprint a chilled water Thermal Energy Storage (TES) tank is proposed. It would be located on the north side of the campus overlooking the campus. The TES can lower the required chiller capacity to about 1000 tons. During the peak cooling load of the day, cooling load can be partially or fully handled by the chilled water stored in the tank. The temperature of the chilled water in the tank will be lowered during off-peak hours when the ambient and wet bulb temperatures are lower, so the chillers operate more efficiently, and when electrical rates are lower.
- Existing air-cooled chillers could also be run at night in conjunction with the Storage Tanks when the ambient temperatures are lower and electric rates are lower. This would make the existing overall system efficiency better, but it would not be as efficient as water cooled state of the art chillers.
- Independent piping systems should be cross-connected and consolidated into a single piping system to take advantage of the thermal energy storage system sharing and shared pumping. Re-use as much of the existing buried piping as possible.
- Piping distribution system will need to be relocated and upgraded to increase size and allow placement of new buildings over current pipe locations per our proposed site plan.
- Piping distribution system will need to be expanded to new buildings per our proposed site plan. The expansion can be phased to coincide with the pace of new building construction.
- Cross connecting the existing heating water systems at each plant and possibly removing some pumps. There appears to be excess boiler and pumping capacity. The equipment should be tied together with DDC controls and an energy management system.

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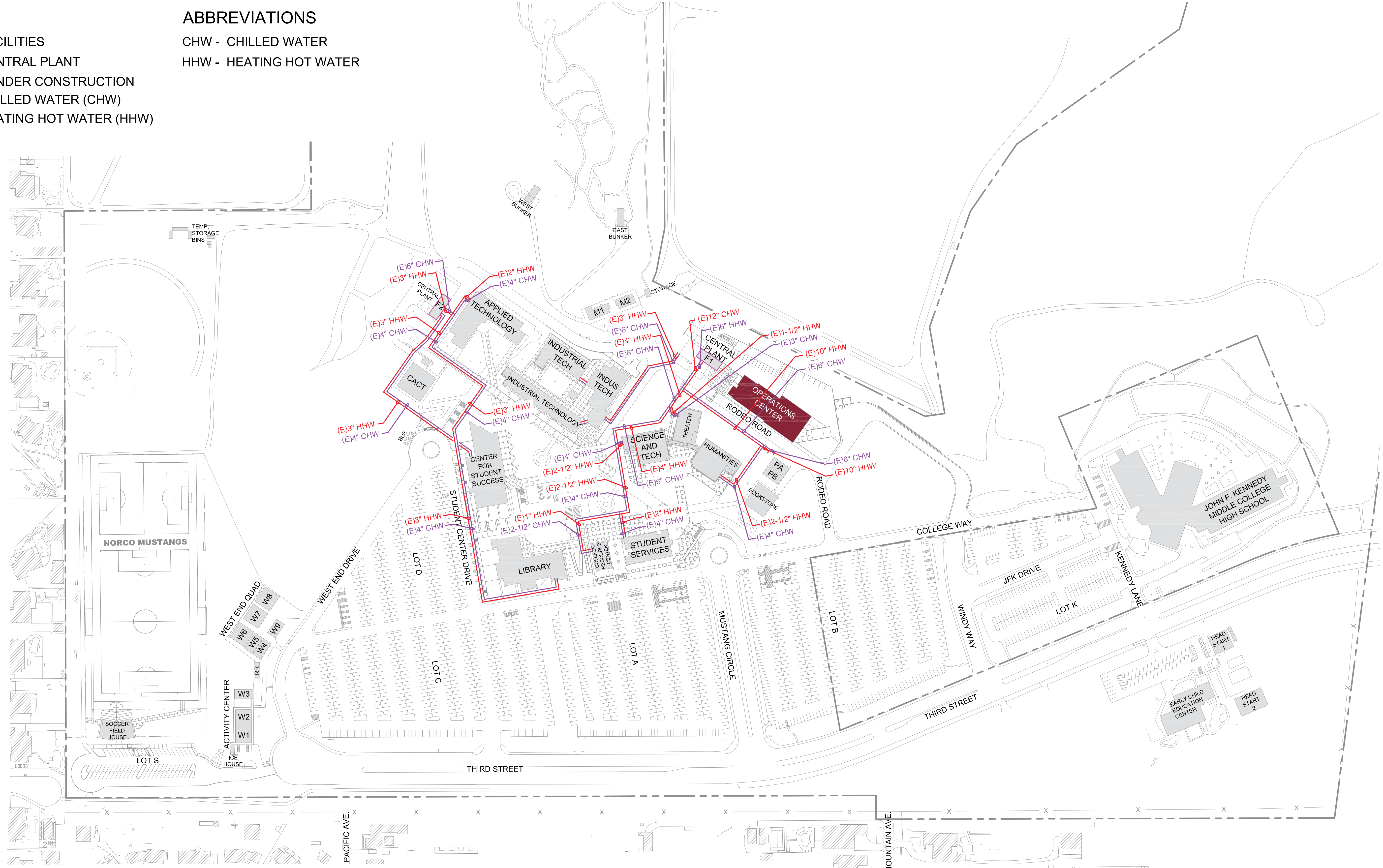
LEGEND

- EXISTING FACILITIES
- EXISTING CENTRAL PLANT
- FACILITIES UNDER CONSTRUCTION
- EXISTING CHILLED WATER (CHW)
- EXISTING HEATING HOT WATER (HHW)

ABBREVIATIONS

CHW - CHILLED WATER
HHW - HEATING HOT WATER



0 ft 120 ft 240 ft
SCALE: 1" = 240'-0"

EXISTING HYDRONIC SITE PLAN

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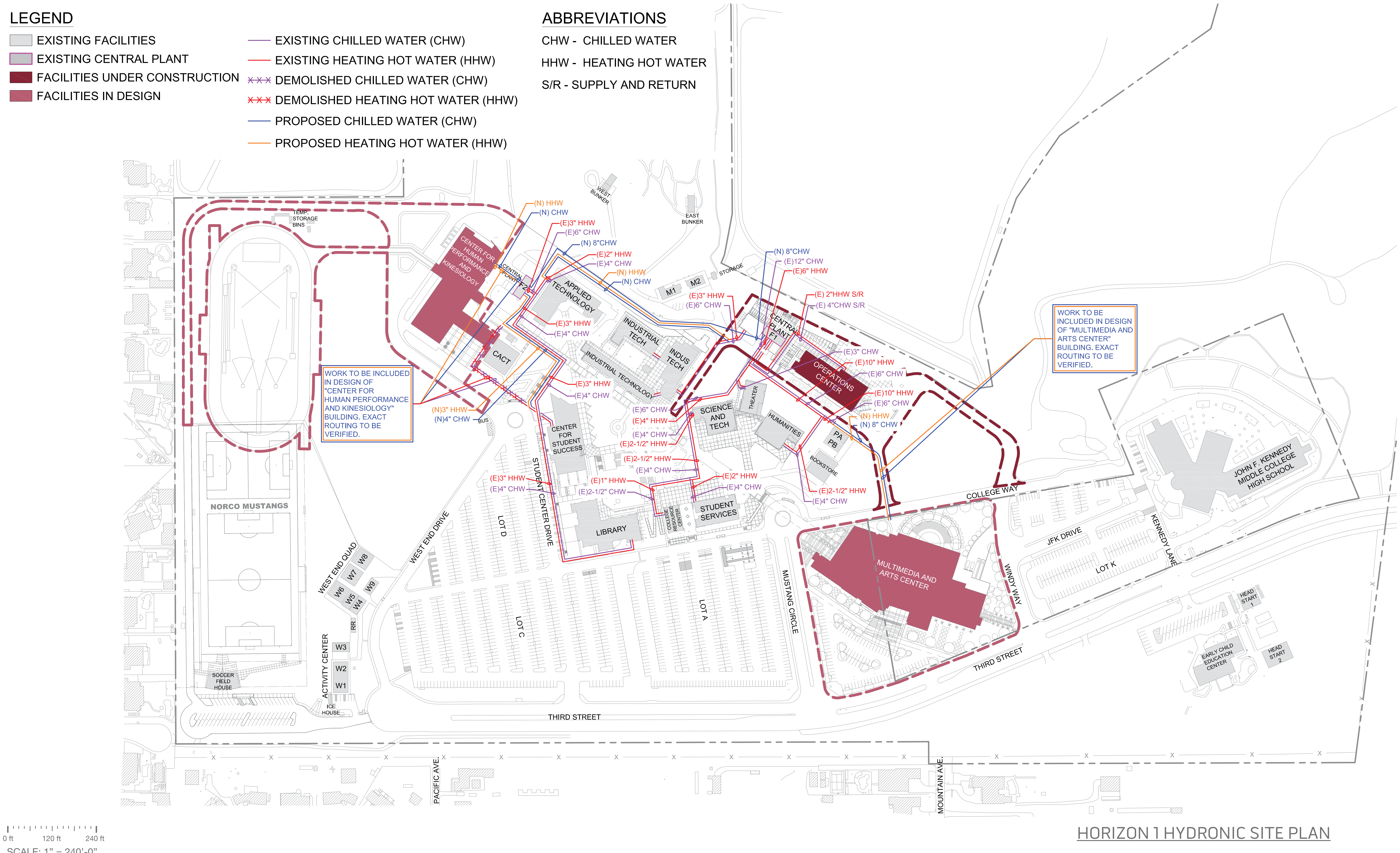

HORIZON 1 HYDRONIC SITE PLAN

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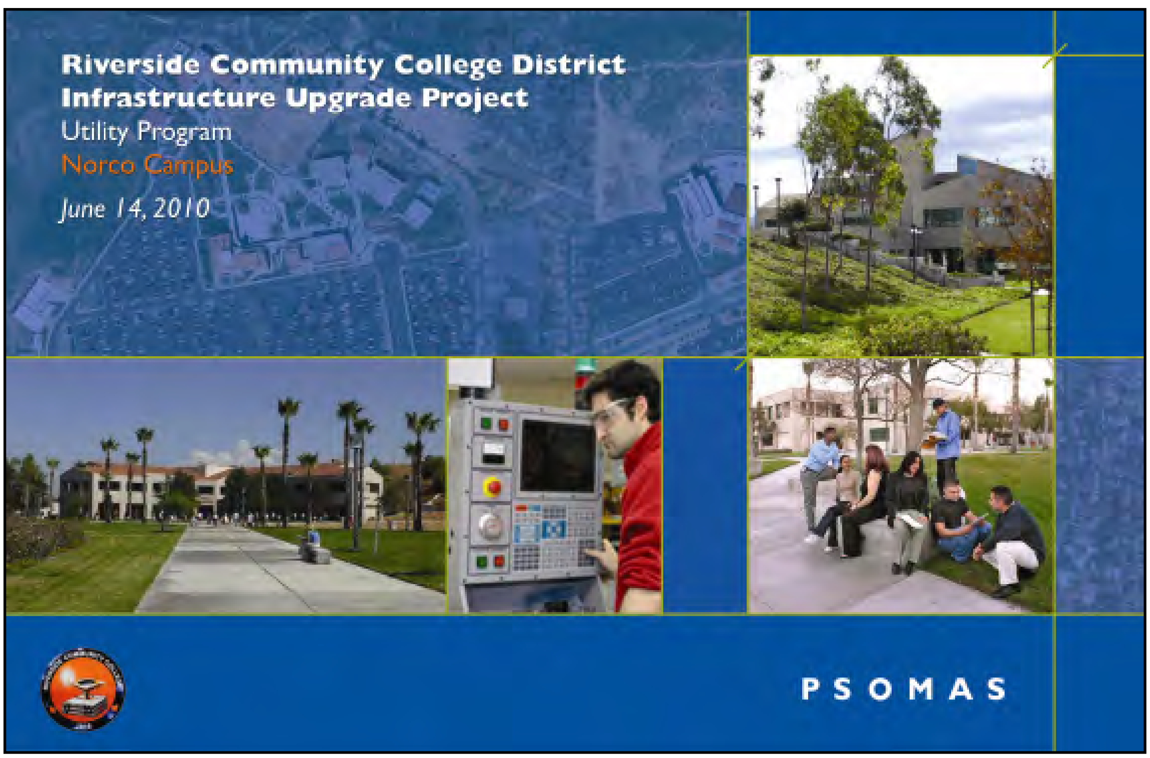
PART D
WATER UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Norco Campus

June 14, 2010

Section 2 - Water System



SECTION 2 – WATER SYSTEM

2.1 SYSTEM DESCRIPTION

The existing water distribution system serving the campus buildings operates as a separate domestic and fire water distribution system. The campus uses the domestic water system to supply water for landscape irrigation and is discussed in Section 3 – Irrigation Water System.

The City of Norco Water Department provides water to both the domestic and fire water distribution systems. The main campus domestic system is served by one meter and the fire water system is served by two meters.

1. The first existing domestic service enters the campus at the mid-point from Third Street, approximately 1200 feet east from the cul-de-sac. This 12-inch service originates at the 12-inch main in Third Street. After passing through a 12-inch meter and reduced pressure principle valve backflow preventer, the water is conveyed north to the campus distribution network via a 12-inch PVC pipe along the campus entry and through the Parking Lot.

2. The first existing fire service is located parallel to the 12-inch domestic water line (described above.) This 8-inch service originates off the same 12-inch main in Third Street. After passing through an 8-inch meter and double check backflow preventer, the water is conveyed north to the campus distribution network via an 8-inch PVC pipe.

3. The second existing fire service enters the campus at Campus Drive in front of the High School. This 10-inch fire line originates from the 12-inch water line in Third Street. After passing through a 10-inch meter and double check backflow preventer, the water is conveyed west to the campus distribution network via a 10-inch PVC pipe.

4. The Childcare complex south of Third Street is served by separate independent domestic and fire laterals directly from Third Street mainline.

Per the our recent Fire Flow Data (dated September 24, 2009), the Fire Hydrant located on Third Street and 1450 LF east of cul-de-sac indicate that the 12-inch service has a minimum static pressure of 100 psi. Individual pressure reducing valves are located at each building.

The campus domestic water distribution network consists almost entirely of (2) 6-inch PVC pipe loops. 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 almost entirely 8-inch PVC pipe loops. The existing fire water distribution system and locations of each connection are also shown on Figure 2A, 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.

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 also adequately support the demand for proposed buildings.

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. Install new 6-inch domestic water service loops to serve the future buildings, as needed. It is recommended that a second 12-inch domestic connection from the existing 12-inch water main in Third Street (near the cul-de-sac) be added during the next major expansion to provide redundancy and provide a secondary water source for maintenance or repair.

2. 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.

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

4. 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.

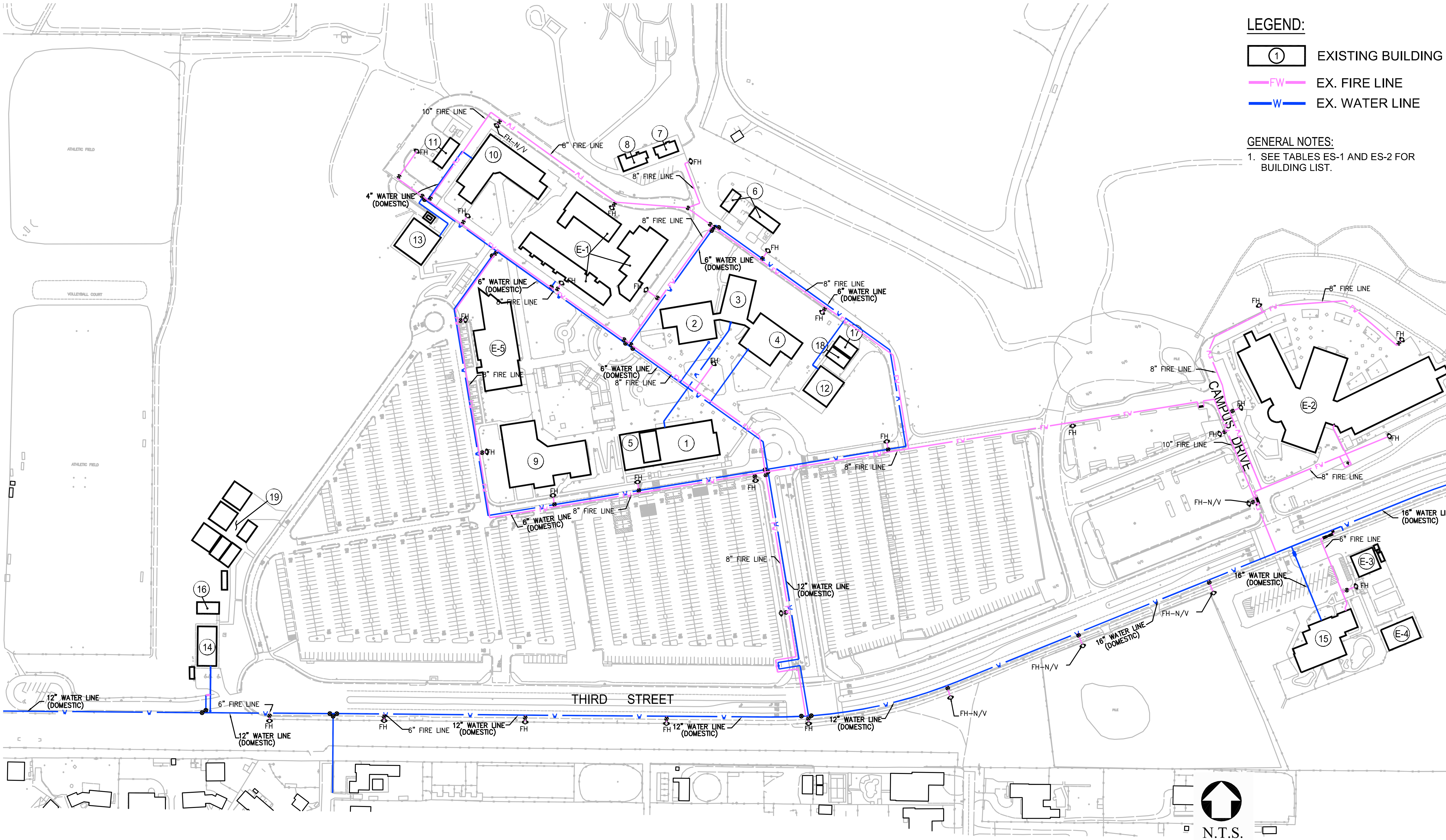


FIGURE 2A
EXISTING WATER DISTRIBUTION

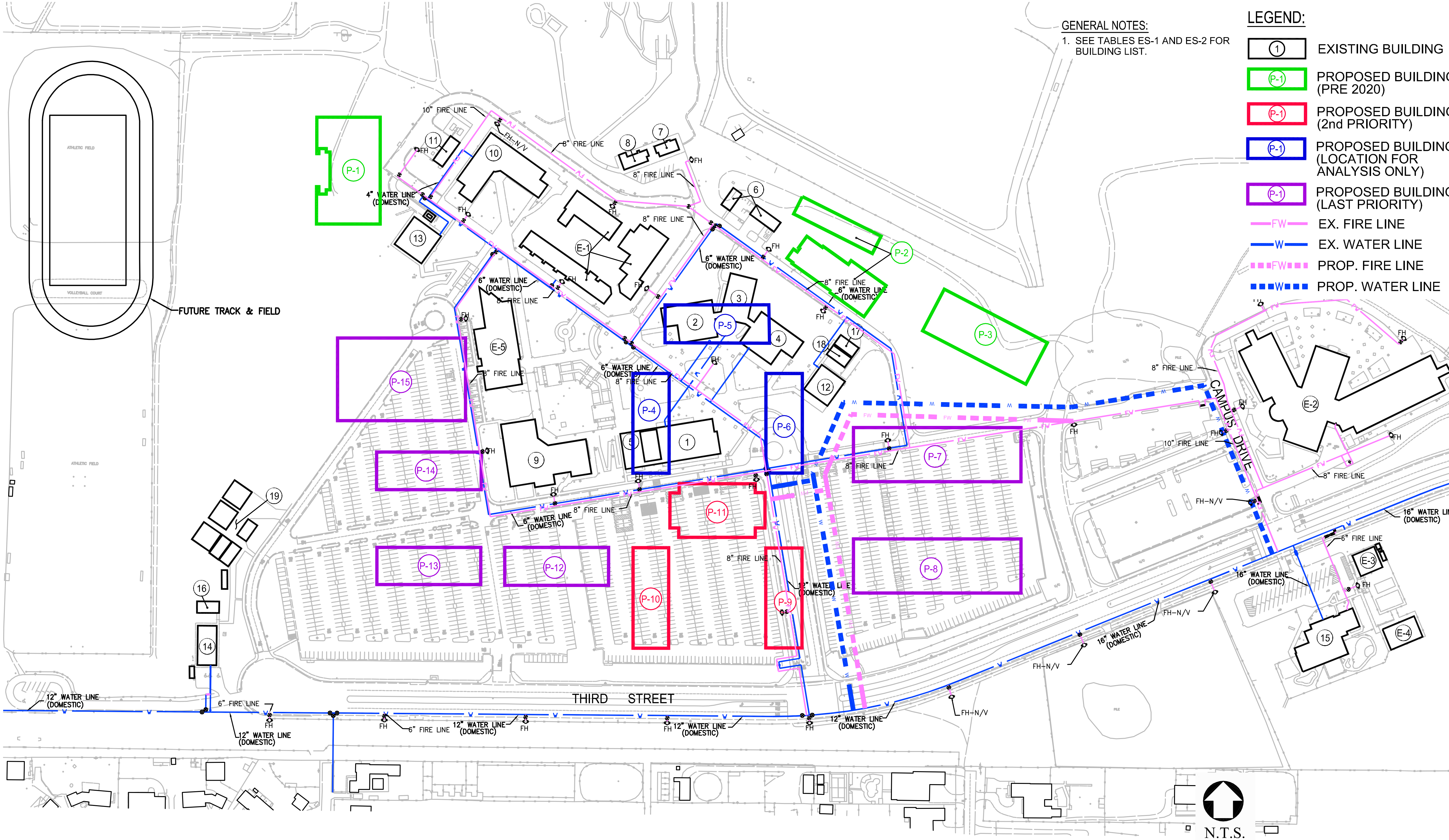


FIGURE 2B
PROPOSED WATER DISTRIBUTION

PART E

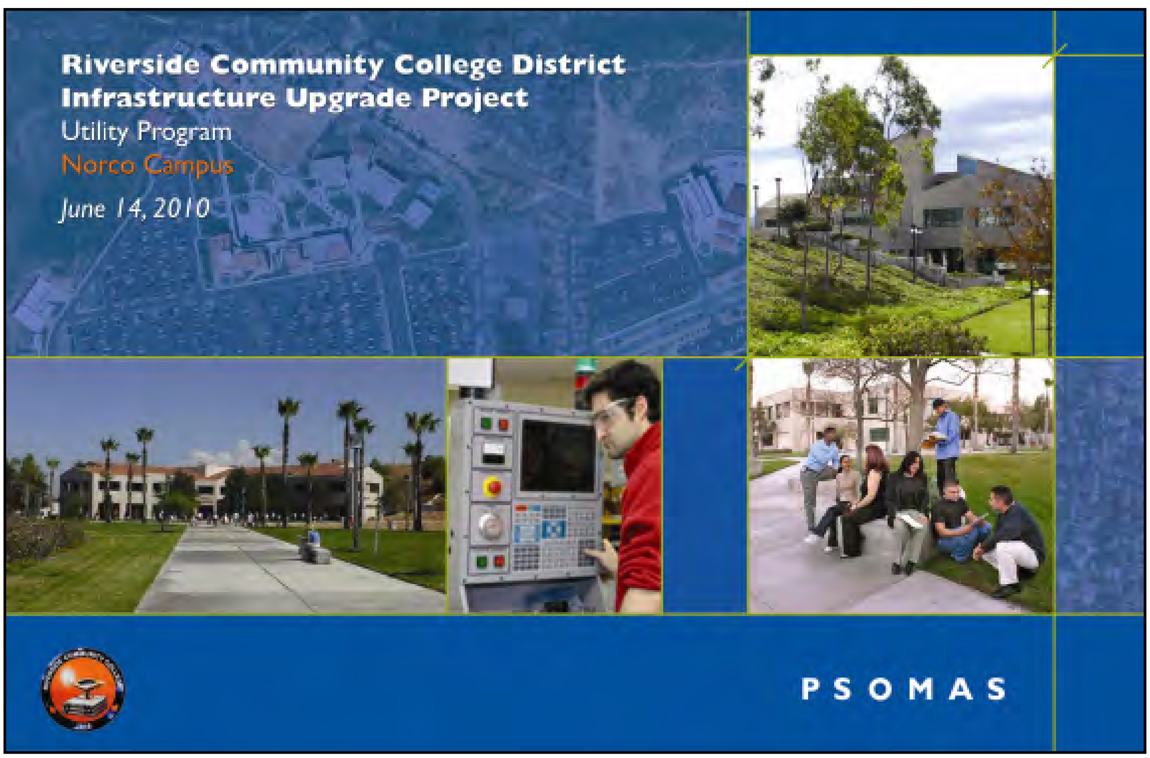
SANITARY SEWERAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Norco Campus

June 14, 2010

Section 1 - Sanitary Sewer System



SECTION 1 – SANITARY SEWER SYSTEM

1.1 SYSTEM DESCRIPTION

The existing campus is served by two separate sanitary sewer systems.

The first main system flows to the east in Third Street through a 10-inch sewer main. An 8-inch sewer main connects to the Third Street 10-inch main at Campus Drive (in front of the High School.) This 8-inch main line extends north and west through the campus and serves approximately 60% of the existing buildings.

The second main system flows south to Third Street. This system flows through an 8-inch sewer main located near the cul-de-sac at the end of Third Street. An 8-inch sewer main connects at Third Street approximately 400-ft from the cul-de-sac and extends north through the main parking lot and onto the campus. This 8-inch main line extends north through the campus and serves approximately 40% of the existing buildings.

The existing on-site sanitary sewer system mainline includes 8-inch PVC pipe with building laterals ranging between 4-inches and 6-inches in diameter. The (2) on-site sewer systems are independent and isolated and do not accept offsite upstream flows from other 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. $d/D \leq 0.50$), 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. At the few areas with minimum adequate line flushing velocities will increase once the proposed buildings are added to the system.

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 is maintained below the 50% maximum capacity.

- The existing segments between building 9 and 13 are currently at minimum velocity, but should increase with the addition of building P1.
- The City of Norco has recently approached the Campus to discuss a potential connection to the Campus from the North, between Bldgs 6 and 7. This will need to be analyzed before acceptance.

Recommendations

Since no historical sewer flow concerns were expressed by the campus representatives, and our analysis was favorable, 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:

1. Relocate existing mainline segment through the middle of campus for new Buildings P9, P10, and P11.
2. Extend the mainline in Third Street to serve the proposed building in the middle of the campus.
3. In order to provide a clear site for future development, remove the existing sanitary sewer mains currently serving any existing facilities to be demolished. Existing mainline systems can be cut and capped at the existing manholes.
4. Remove the existing 4-inch sanitary sewer service laterals currently serving any existing buildings to be demolished.
5. It is recommended that the college continue to further investigate the existing pipe condition and capacity to provide further recommendations for improvements as the campus expands.

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.

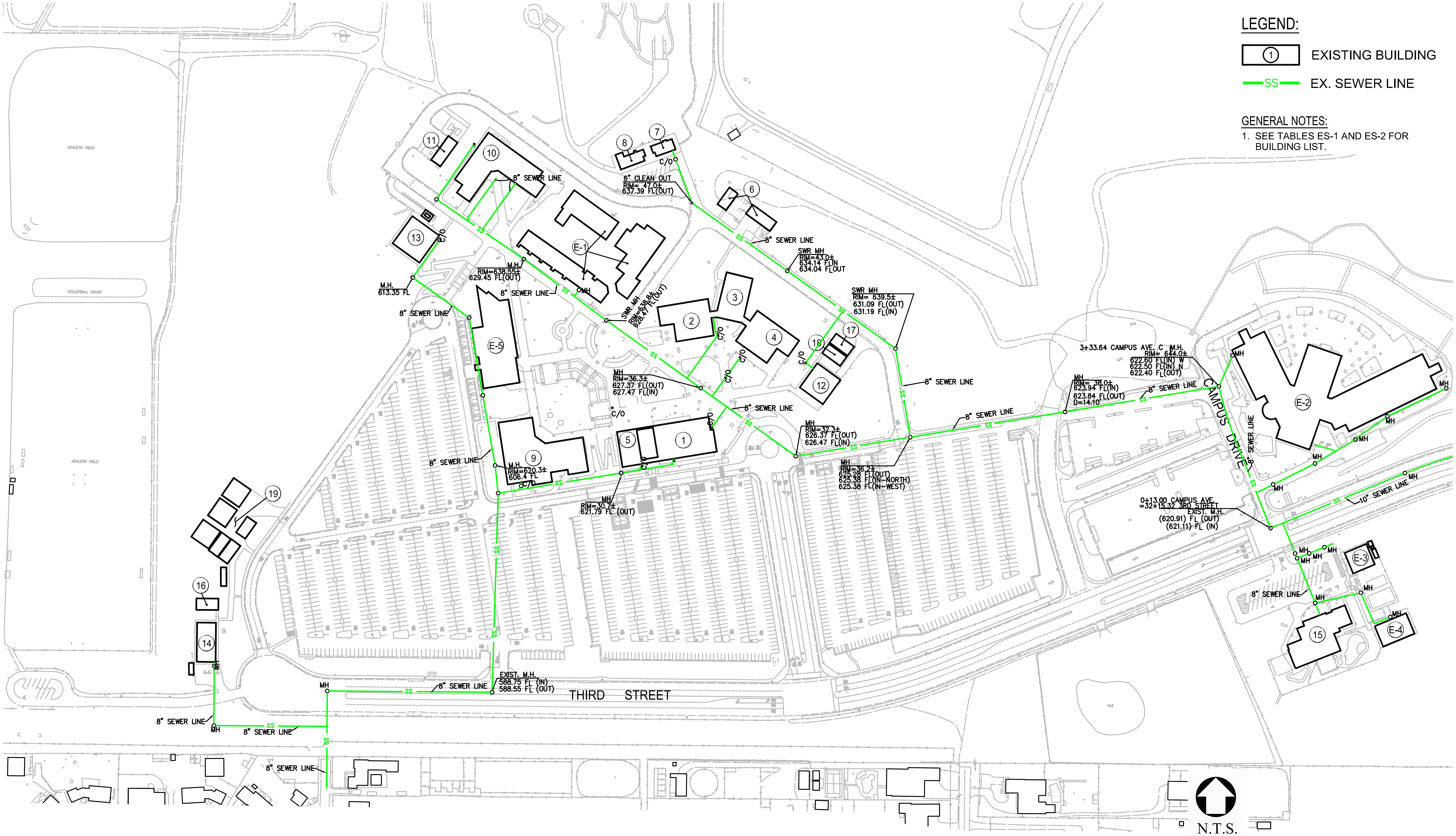


FIGURE 1A
EXISTING SANITARY SEWER SYSTEM

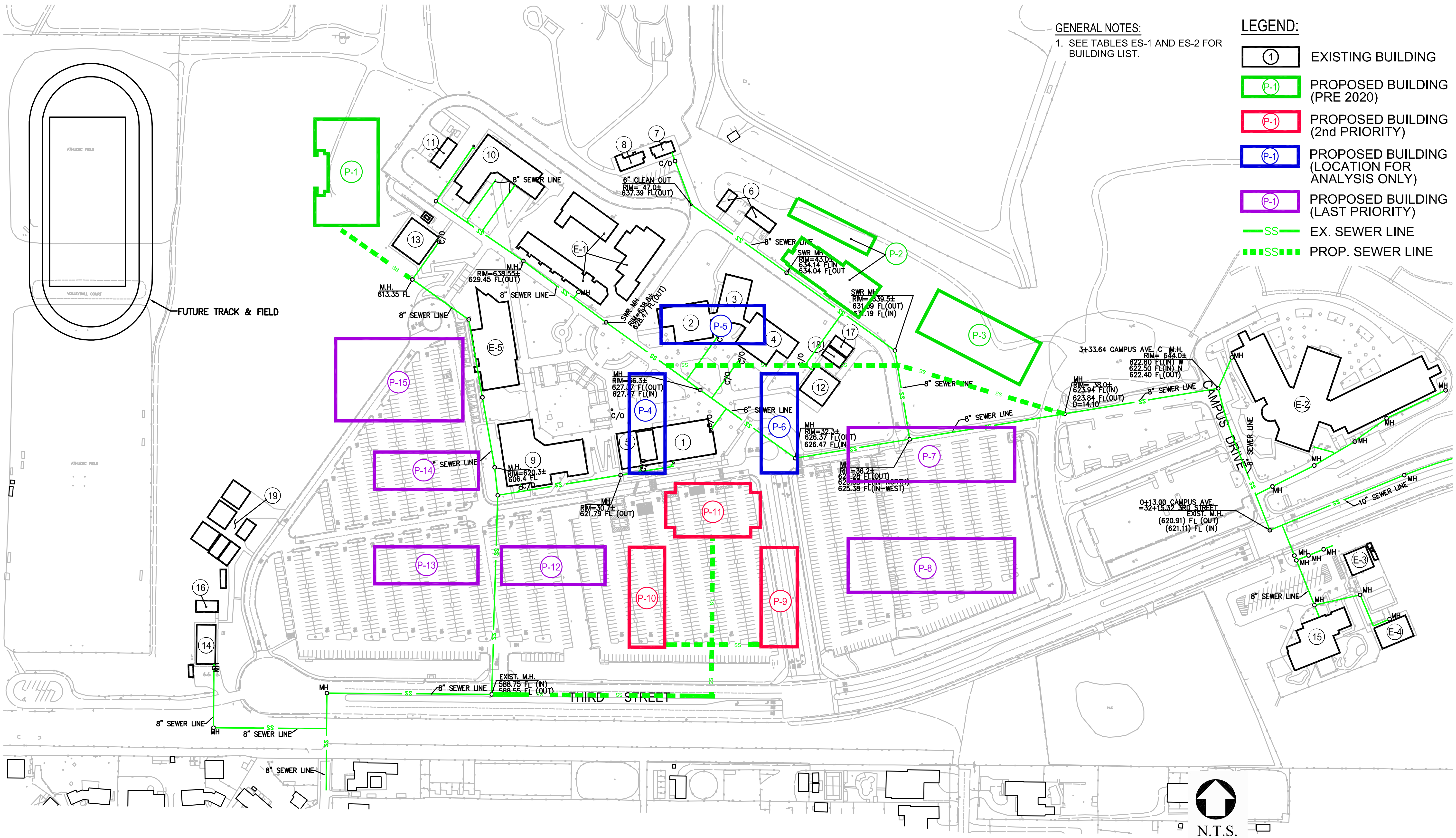


FIGURE 1B
PROPOSED SANITARY SEWER SYSTEM

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PART F

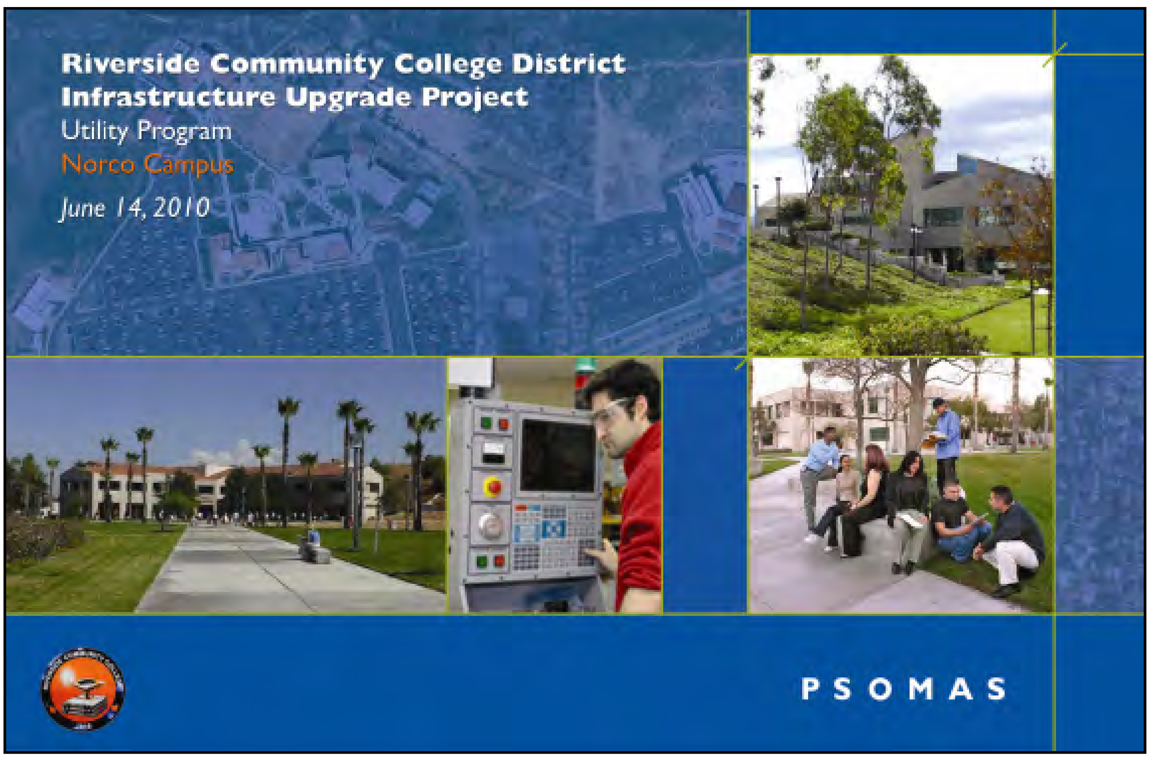
STORM DRAINAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Norco Campus

June 14, 2010

Section 4 - Storm Drain System



SECTION 4 – STORM DRAIN SYSTEM

4.1 SYSTEM DESCRIPTION

The existing campus storm drain mainline system consists of a Riverside County Flood Control District mainline (varies from 36-inch RCP to 72-inch RCP) made of reinforced concrete pipe.

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

- Off-site storm water from the north is captured upstream in a 42-inch County maintained main line and flows through the campus to a 72-inch outlet pipe and continues in a pipe into the adjacent downstream residential neighborhood.
- Off-site storm water from the northeast is captured upstream in a 36-inch County maintained main line and flows through the campus to a 72-inch outlet pipe and continues in a pipe into the adjacent downstream residential neighborhood.
- The campus 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.
- A series of low flow water quality swales are provided in landscaped areas between buildings to provide water quality opportunities.
- The existing parking lots sheet flow to catch basins and then into the Third Street storm drain mainline.
- While no large on-site storm water detention basins are provided on-site, small on-site detention is provided in the swale areas between buildings to treat roof drainage and storm water runoff. Treated storm water is recollected by areas drains and discharged into the County main line system.
- Large off-site detention basins exist upstream of the campus in two locations.

4.2 METHODOLOGY

The existing storm drain 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 primary drainage sub-areas for on-site and off-site tributary areas.
- Prepared existing condition hydrology model and estimated peak flow runoff rates for 100-year design storms.
- Verified on-site pipe capacity.

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.

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 water mainline system:

1. Relocation of the two mainlines from the confluence point (located at mid-campus), and upstream to each inlet point.
2. Extension of the existing storm drain mainline in Third Street to the east, to address proposed buildings.

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

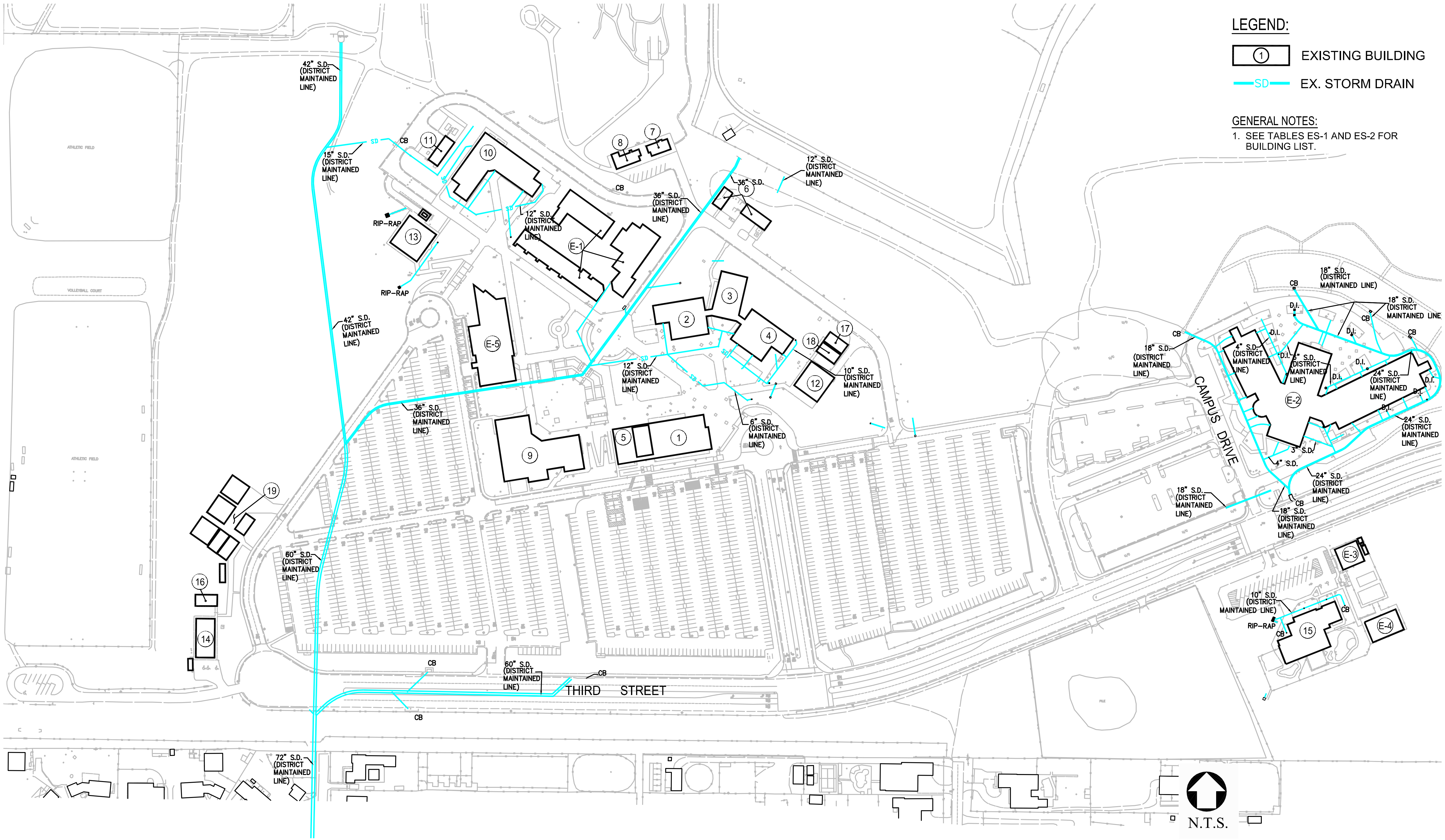


FIGURE 4A
EXISTING STORM DRAIN SYSTEM

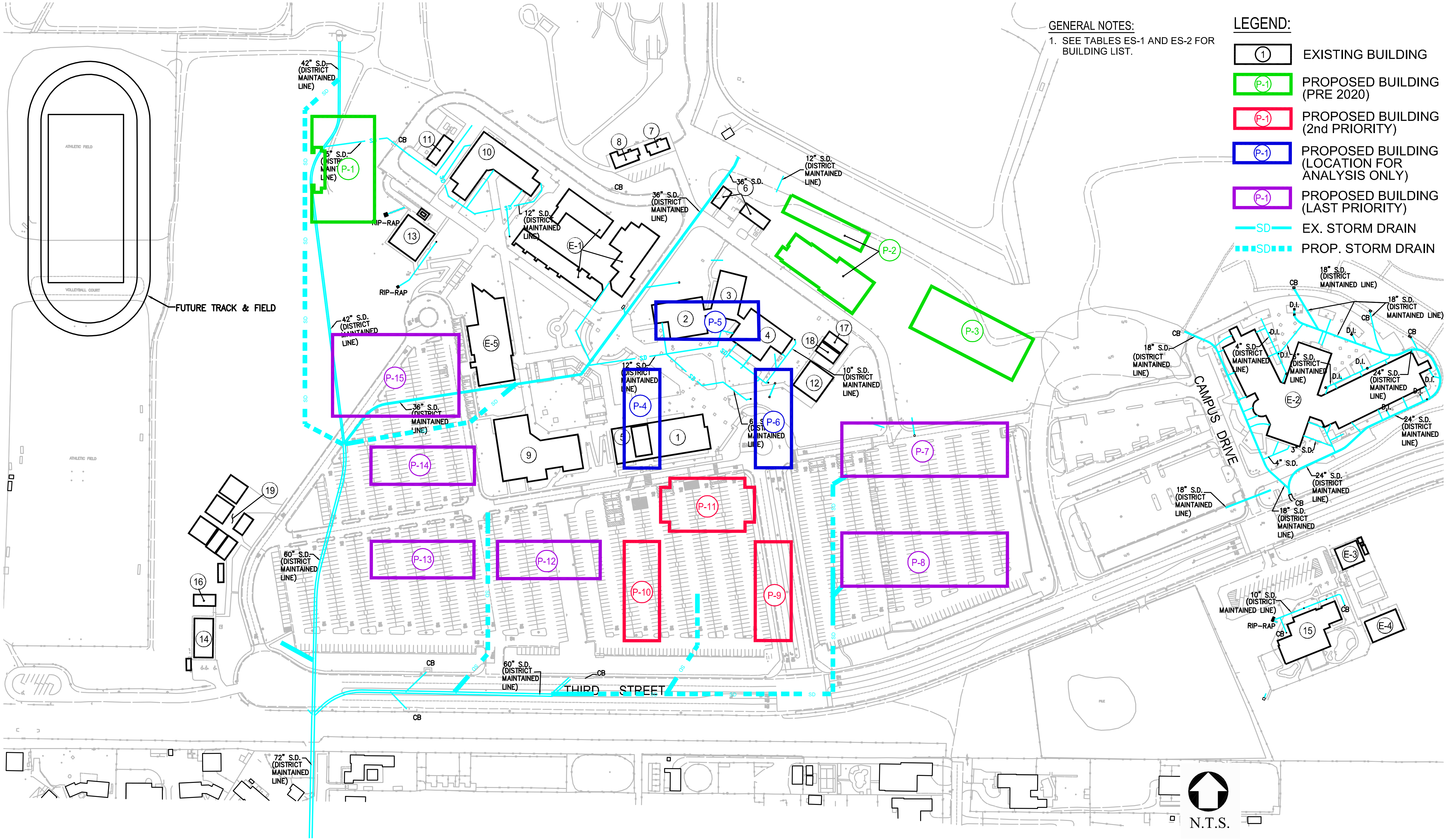


FIGURE 4B
PROPOSED STORM DRAIN SYSTEM

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PART G

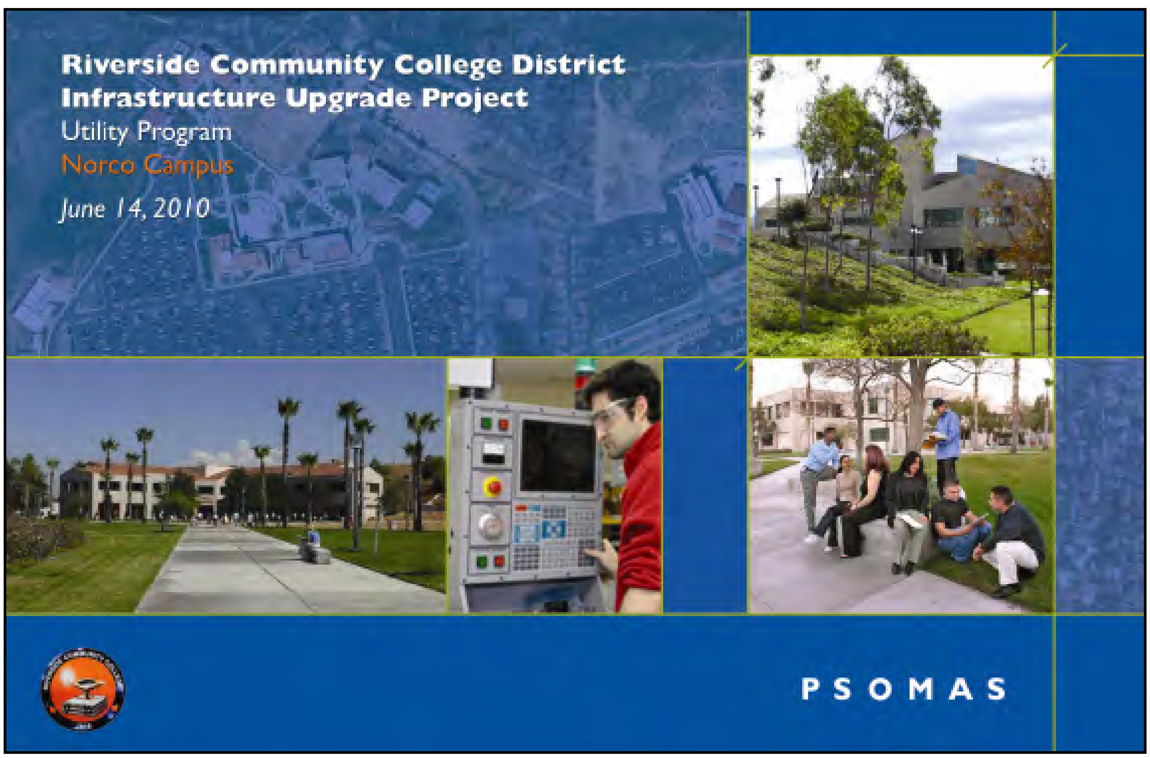
TELECOMMUNICATIONS UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Norco Campus

June 14, 2010

Section 8 - Telecommunications System



SECTION 8 – TELECOMMUNICATIONS

8.1 SYSTEM DESCRIPTION

The local telecommunication services are currently provided by AT&T who is the Local Exchange Carrier (LEC) for the voice network. The (LEC) provides a 200 pair copper cable terminated on 4488 protector blocks. The Norco Center voice network consists of a NEC 2400 PBX Voice Switch. The main distribution facility (MDF) is located in the Humanities Building on the first floor.

The fiber optic service is also provided by the AT&T. The fiber optic cable consists of 12 single-mode and is terminated in the Humanities Building MDF room. The AT&T services are terminated in its own DDM 2000 equipment cabinet.

The existing MDF that serves the campus is in fair condition however, it lacks a proper security system. The MDF 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 on the second floor of the Humanities building in room 207. This location is inadequate and a new NOC is being planned to provide for security and allow for expansion.

8.2 METHODOLOGY

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

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

A detailed survey of the existing telecommunications systems that currently serve the facilities at Norco 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 as well as discussion with the utility company representatives.

Alterations/upgrades/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 inter-building telecommunication pathways are found to be in fair condition for most existing buildings however, the Library building has no direct pathway to the MDF in the Humanities building. The Library building is severed by (6) 4 inch conduits from the Tigers Den.

The existing inter-building telecommunication pathways are found to be inadequate for the existing CACT building #13 and the Multi-Purpose building #14 at the west end of the campus. (1) four inch conduit feeds from the F2 building #11 to the CACT building via pull box CPB #02. The CACT provides both copper and fiber optic cables to the Multi-Purpose building #14.

The existing fiber optic cable backbone consists of traditional 12 strands of multi-mode 62.5mm fiber optic cables. Some of the inter-building fiber optic cables are rated of intra-building use and not recommended for outside use.

The Phase 3 construction projects are complete or under construction at time of field Investigation. The new Industrial Technology building has equated pathway backbone consisting of 4" conduits. The fiber optic backbone consists of 24MM/24SM cable and the copper backbone consist of a 200 pair copper cable terminated on the wall.

At the time of this survey there are plans for the construction of a new Network Operating Center (NOC) for the Voice, Data and Video Networks.

8.4 ANALYSIS OF FUTURE NEEDS

There is some consideration being made as to opening a new campus to the south of the Norco Campus. If a new campus is part of the overall master plan than future growth for the Norco campus will be limited. However there will continue to be more demand for wide area and local area networks that will require upgrades to the existing networks. As more and more systems (FA, EMS) merge on to the data backbone this will require upgrade to the fiber optic cabling.

8.5 FINDINGS AND RECOMMENDATIONS

1. Provide new fiber optic cables from the new MDF/NOC to each building. Recommend size to be 24 strands single mode and 24 strands of 50mu multi-mode fiber optic cable to all major building and 12 strands single mode and 12 strands of 50mu multi-mode fiber optic cable to the smaller buildings. Provide new copper cable from the new MDF/NOC to all new buildings the Copper cable to be sized per building requirements or minimum of 25 pair per building.

2. Provide fiber optic and copper tie cables from the new MDF/NOC to the existing MDF to allow for the use of the backbone cables feeding the existing building on campus.

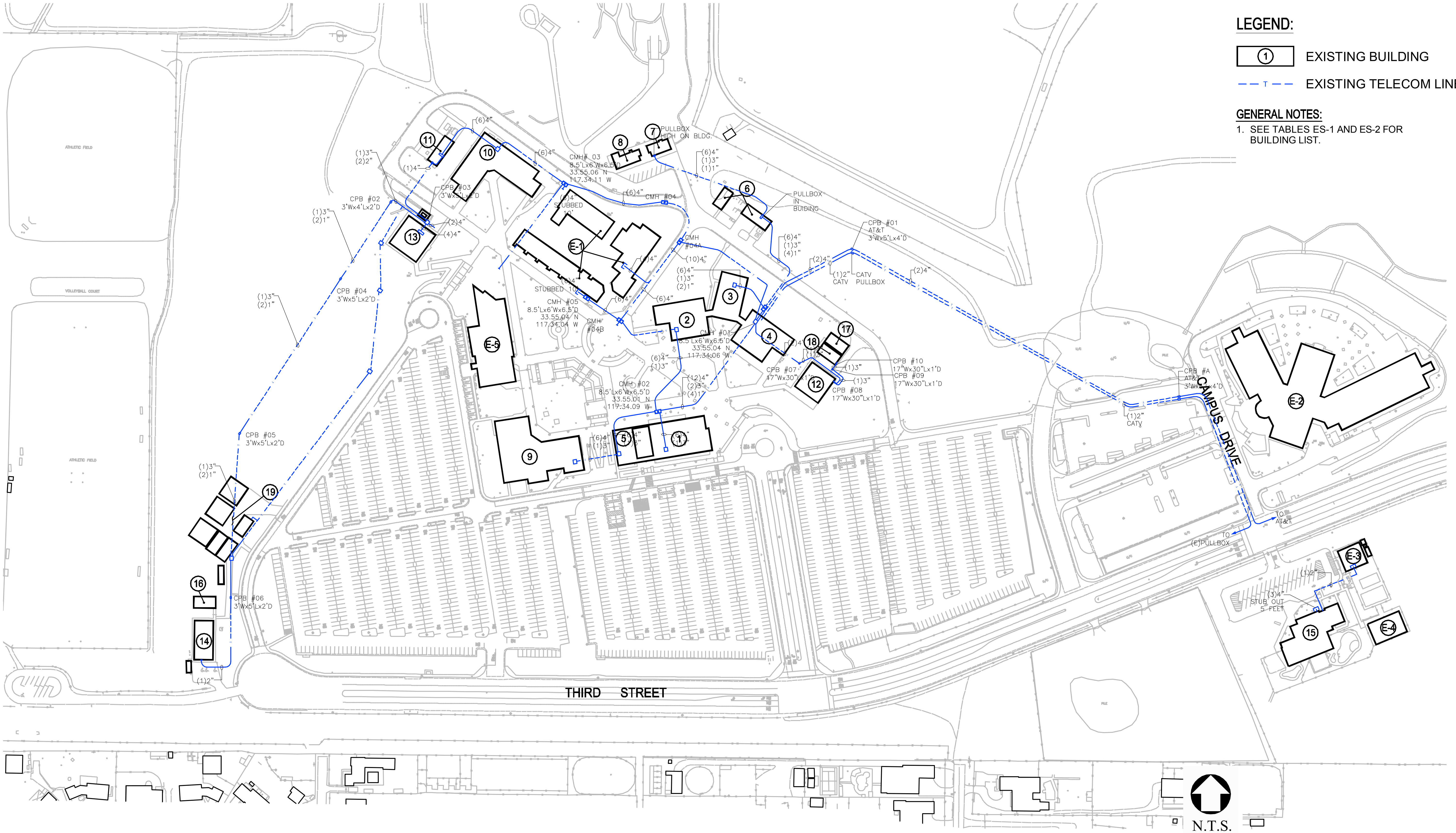


FIGURE 8a
EXISTING UTILITY MAP - TELECOMMUNICATIONS PLAN

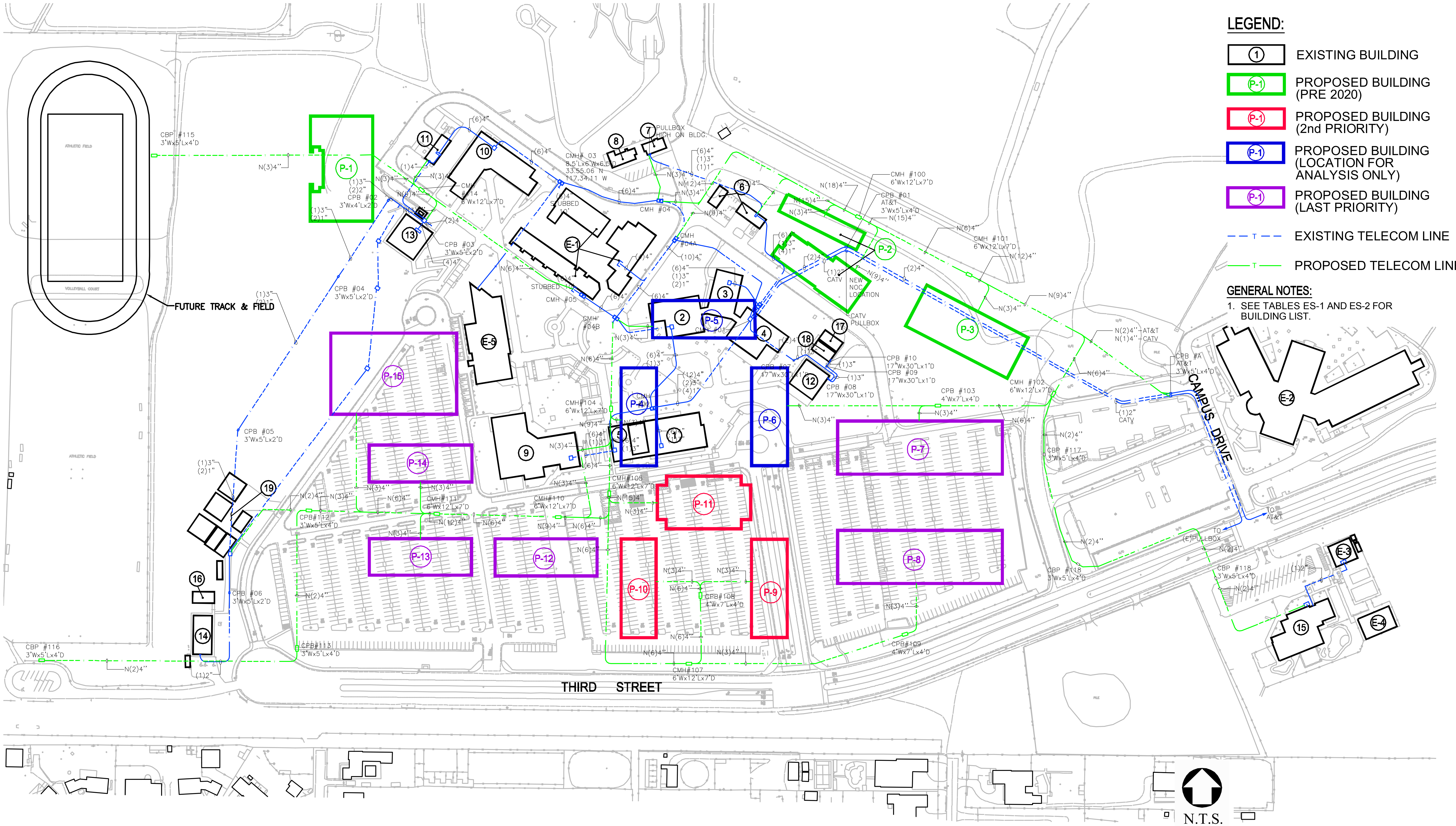


FIGURE 8b
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS CONDUIT PLAN

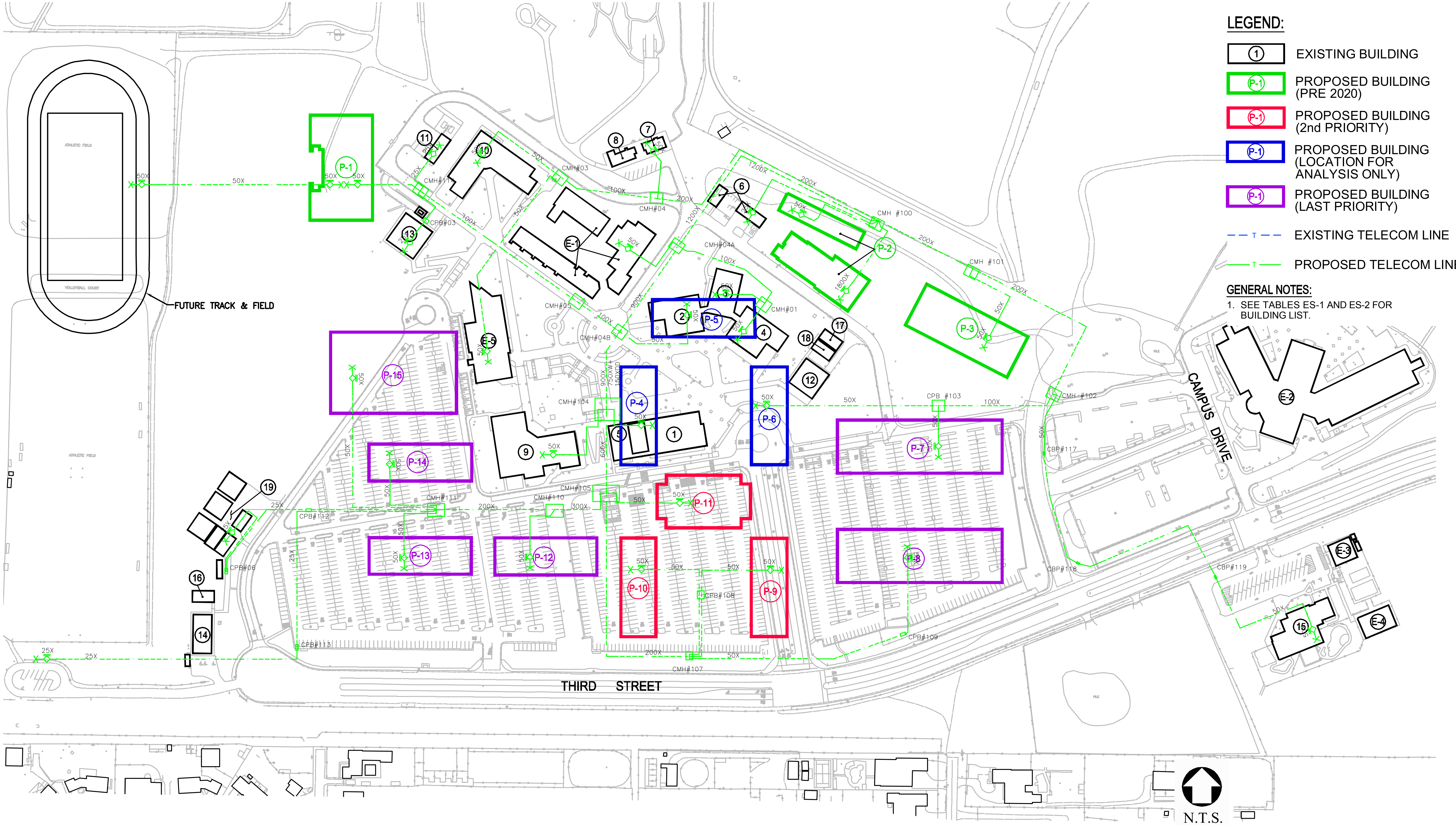


FIGURE 8c
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS COPPER PLAN

SECTION 3

RIVERSIDE CITY COLLEGE

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PART A
ELECTRICAL UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG-TERM IMPLEMENTATION

V. DRAWINGS
- Existing Electrical Site Plan
- Horizon 1 Electrical Site Plan

VI. 2007 ELECTRICAL DISTRIBUTION SURVEY

COORDINATE ALL TEXT
ON FOLLOWING PAGES
WITH JUNE 7, 2010 UTILITY
PROGRAM

I. EXISTING CONDITIONS:

- The Riverside College is currently served by Riverside Public Utility (RPU) 12kV system and serves individual meters around the perimeter of the campus. The interior of the campus is fed from an RPU 2500 kVA 4160V 3 phase system which is currently being upgraded to a 12kv-3 phase closed loop system owned by the Campus.

II. GOALS:

- Connect new buildings and major remodels to Campus owned 12kV system.
- Eliminate any remaining utilization of 4160V services and oil fused cutouts.
- Remove all individual RPU meters.

III. HORIZON 1 IMPLEMENTATION:

- Connect buildings to existing RPU 12kV system until the campus owned 12kV system is installed.
- The campus will designate source of 12 KV for each building or project.

The campus electrical distribution system is being upgraded to a 12kV closed loop system. The campus primary 12,000 volt system will be served from Riverside Public Utilities (RPU) in the main switchgear located on Ramona Ave. at the south end of the campus. The 12kV underground feeders will be installed in a duct bank and manhole/pull box system consisting of two main campus loops. Individual buildings will typically be radial fed from the 12KV loop via pad mounted selector switches.

- Distribution from 12KV into the buildings shall be underground.
- Substations shall be installed indoors and specified with dry type transformers.
- Provide a minimum of one spare conduit into new buildings.

IV. LONG-TERM IMPLEMENTATION:

PART **A** ELECTRICAL UTILITIES

The campus electrical distribution system is being upgraded to a 12kV closed loop system. The campus primary 12,000 volt system will be served from Riverside Public Utilities (RPU) in the main switchgear located on Ramona Ave. at the south end of the campus. The 12kV underground feeders will be installed in a duct bank and manhole/pull box system consisting of two main campus loops. Individual buildings will typically be radial fed from the 12KV loop via pad mounted selector switches.

- Distribution from 12KV into the buildings shall be underground.
- Substations shall be installed indoors and specified with dry type transformers.
- Provide a minimum of one spare conduit into new buildings.

PRODUCTS:

33 71 00 Electrical Utility Transmission and Distribution:

- Feeder cable for new work shall be 1/0 AWG (min) copper, type MV-105 133% insulation level, with 345 mil EPR insulation, copper tape shielding and an overall PVC or polyethylene jacket.
- Laterals between loop switches and transformers shall be 500MCM copper, type MV-105 similar to feeder cables.
- PR cable shall comply with the latest editions of ICEA/NEMA S-68-516, NEMA WC-8 and AEIC CS-6.
- Medium voltage cables, splices and terminations installed in vaults shall not obstruct access for switch operation (from grade) or access for transformer.

PRODUCTS (CONT'D):

33 71 19 Electrical Underground Ducts and Manholes:
Use concrete encased PVC conduit or concrete encased rigid steel conduit in duct banks.

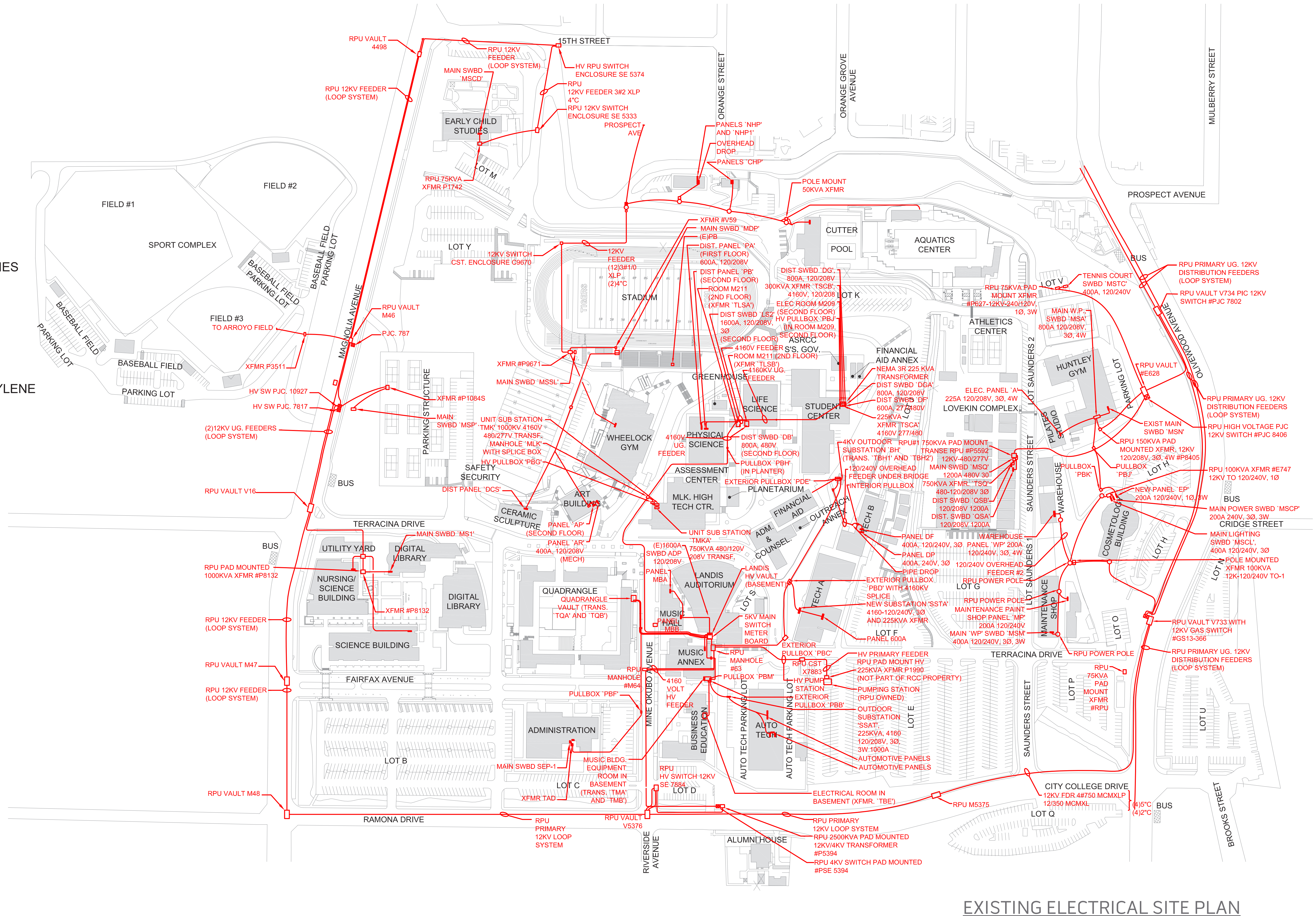
- Use minimum 12 foot radius sweeps.
- Install #4/0 bare copper ground conductor with all circuit conductors.
- Provide duct plugs in all unused ducts.
- Cable rack mounting equipment:
  - Heavy duty non-metallic cable rack channels.
  - 14-inch long arms with HDL arm locks and 3-inch saddle arms.
  - Use stainless steel fasteners in manholes.
- Cables shall be sized to carry the load as defined by demand load analysis plus at least 30 percent spare capacity for future.
- Apply fireproofing materials to new cables where exposed in manholes/pullboxes and vaults and to portions of existing cables exposed in manholes/pullboxes and vaults where splicing occurs during the work of this contract. Three phases and ground conductor of one feeder or lateral shall be fireproofed together except that cables shall be broken out and individually wrapped at splices and terminations. Apply in one layer, half-lapped except as recommended by the manufacturer. Binder tape shall be as recommended by the manufacturer.
- Where cables are spliced in manholes/ pullboxes, rack cables fully across all manhole/ pullbox walls, plus additional length, to continue to ductbank entrances. Install splices at locations within manholes/pullboxes to permit future replacement of splices by cutting and re-racking the affected cable along a shorter path through the manhole/ pullbox.
- Where cables pass through manholes/ pullboxes unspliced, rack along the longest route through the manhole/ pullbox.
- Coordinate pulling operations so that all phases and the ground conductor for each feeder or lateral are grouped tightly together and rest properly on cable support arms. Where cables are spliced, cut cable lengths such that the splices will occupy a minimum of space and such that cables and splices rest properly on cable support arms.

LEGEND

- EXISTING FACILITIES
- EXISTING ELECTRICAL

ABBREVIATIONS

A - AMPERES
DISC - DISCONNECT
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
MSB - MAIN SWITCHBOARD
NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
P - POLE
RPU - RIVERSIDE PUBLIC UTILITIES
SW - SWITCH
SWBD - SWITCHBOARD
UG - UNDERGROUND
V - VOLT
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER
XLP - CROSS-LINKED POLYETHYLENE



EXISTING ELECTRICAL SITE PLAN

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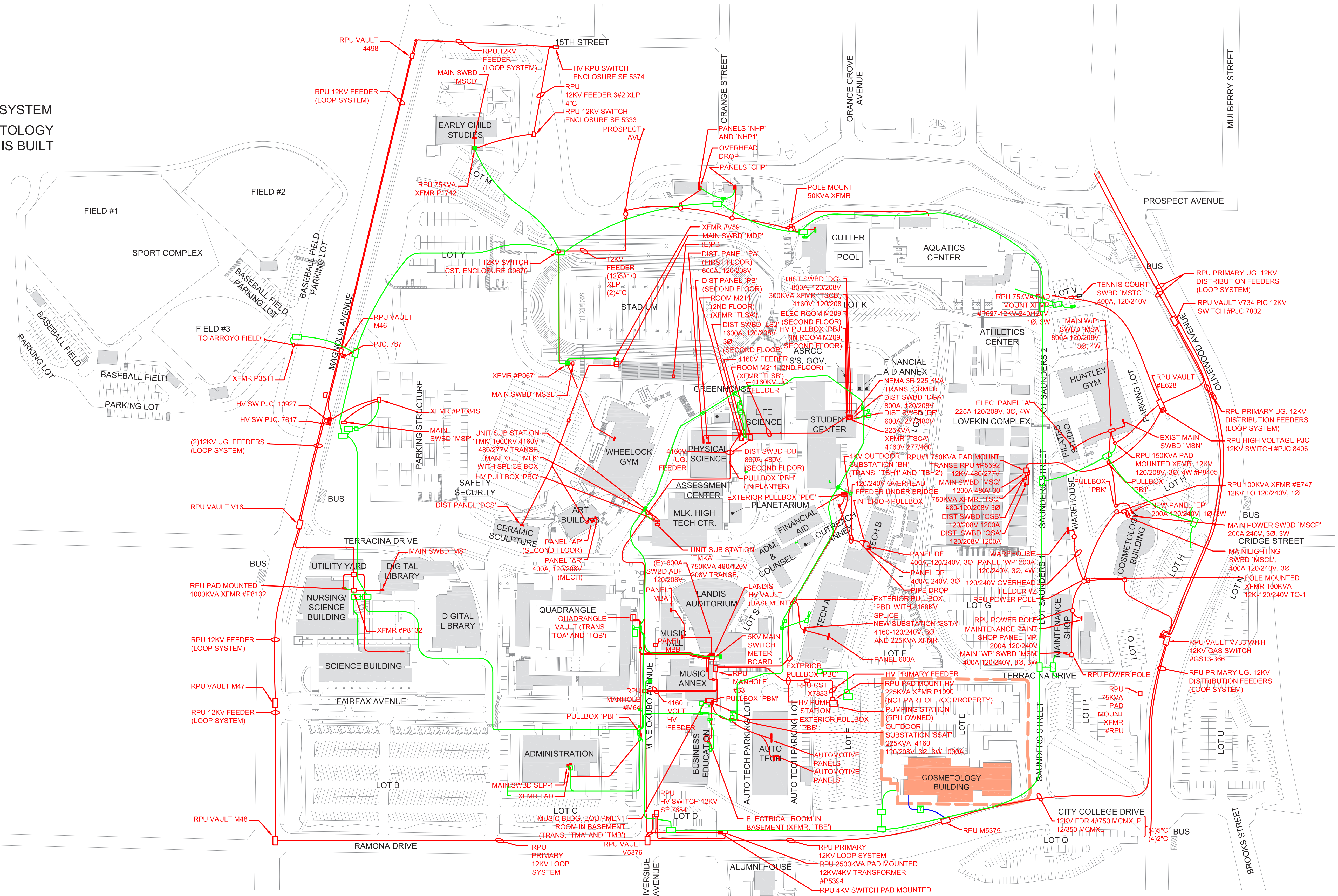
LEGEND

- EXISTING FACILITIES
- FACILITIES IN DESIGN
- EXISTING RPU ELECTRICAL
- PROPOSED ELECTRICAL 12kV SYSTEM
- NEW RPU SERVICE TO COSMETOLOGY BUILDING UNTIL 12kV SYSTEM IS BUILT
- MAIN TRANSFORMER

ABBREVIATIONS

A - AMPERES
DISC - DISCONNECT
EMH - ELECTRICAL MANHOLE
HV - HIGH VOLTAGE
KV - KILOVOLT
KVA - KILOVOLT AMPS
MSB - MAIN SWITCHBOARD
NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
P - POLE
RPU - RIVERSIDE PUBLIC UTILITIES
SS - SELECTOR SWITCH
SW - SWITCH
SWBD - SWITCHBOARD
UG - UNDERGROUND
V - VOLT
W - WIRE
WP - WEATHERPROOF
XFMR - TRANSFORMER
XLP - CROSS-LINKED POLYETHYLENE



0 ft 120 ft 240 ft

SCALE: 1" = 240'-0"

HORIZON 1 ELECTRICAL SITE PLAN

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Refer to:

Riverside
Electrical Distribution Plan

March 25, 2007

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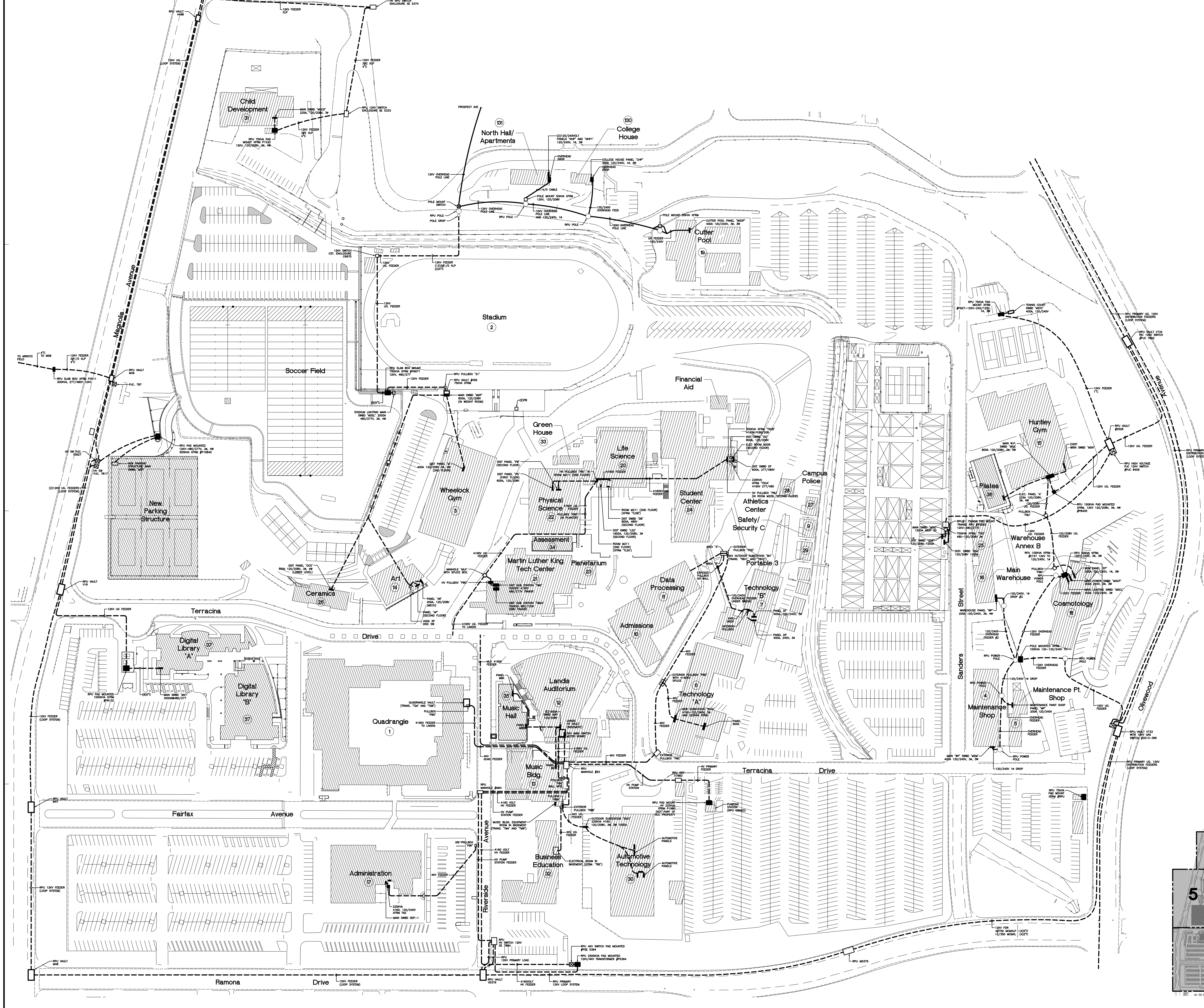

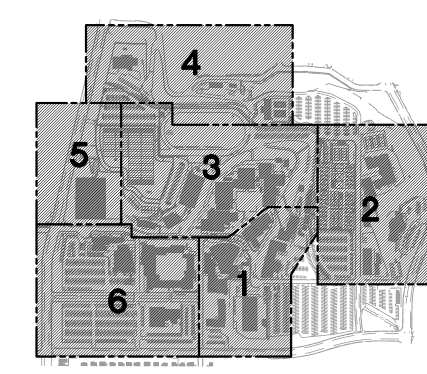

KEYPLAN

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. AUTOMOBILE TECHNOLOGY
31. CHILD DEVELOPMENT
32. BUSINESS EDUCATION
33. GREENHOUSE
34. ASSESSMENT/PLACEMENT
35. MUSIC HALL
36. PILATES
37. DIGITAL LIBRARY 'A' AND 'B'
130. COLLEGE HOUSE
131. NORTH HALL/APARTMENTS

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ELECTRICAL
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RIVERSIDE

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ELECTRICAL
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Sheet Number

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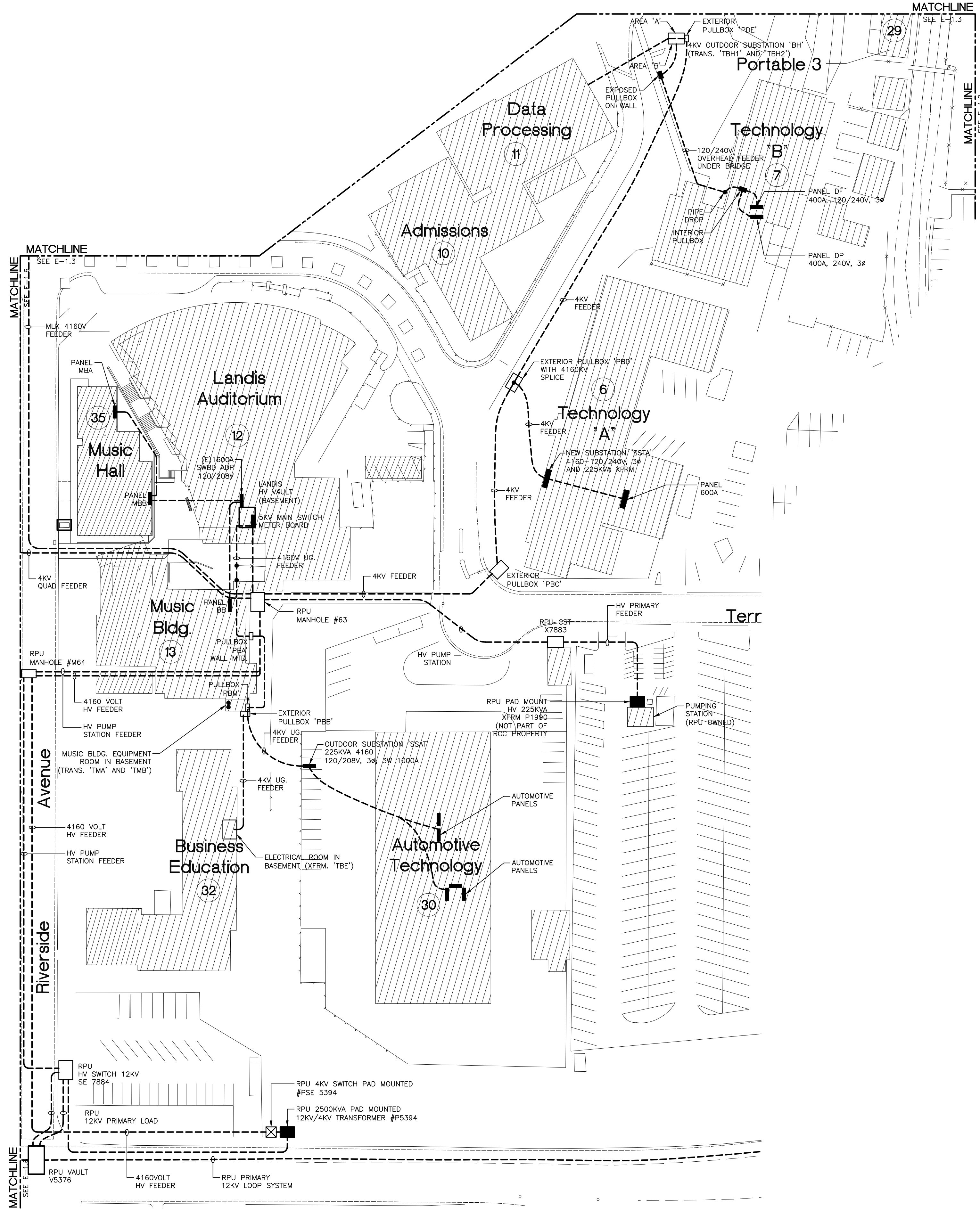

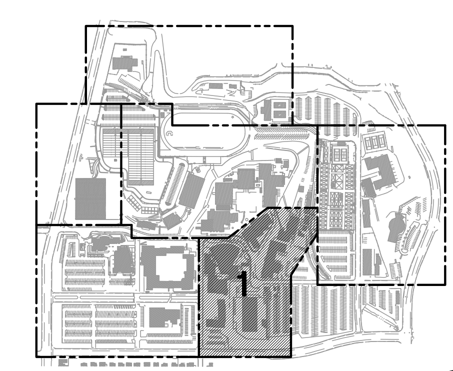

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AREA 1

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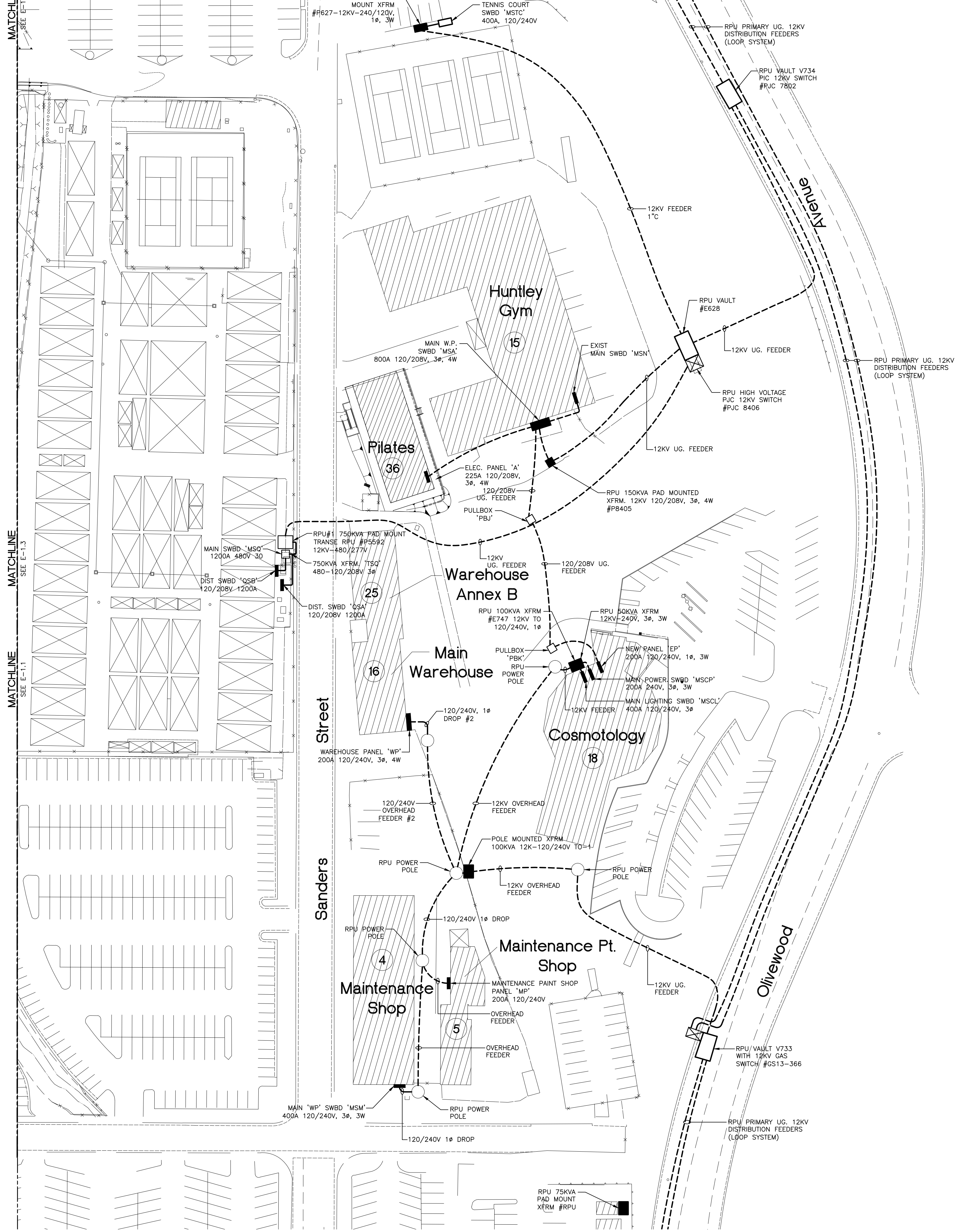

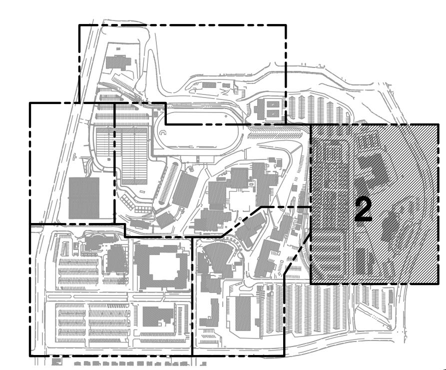

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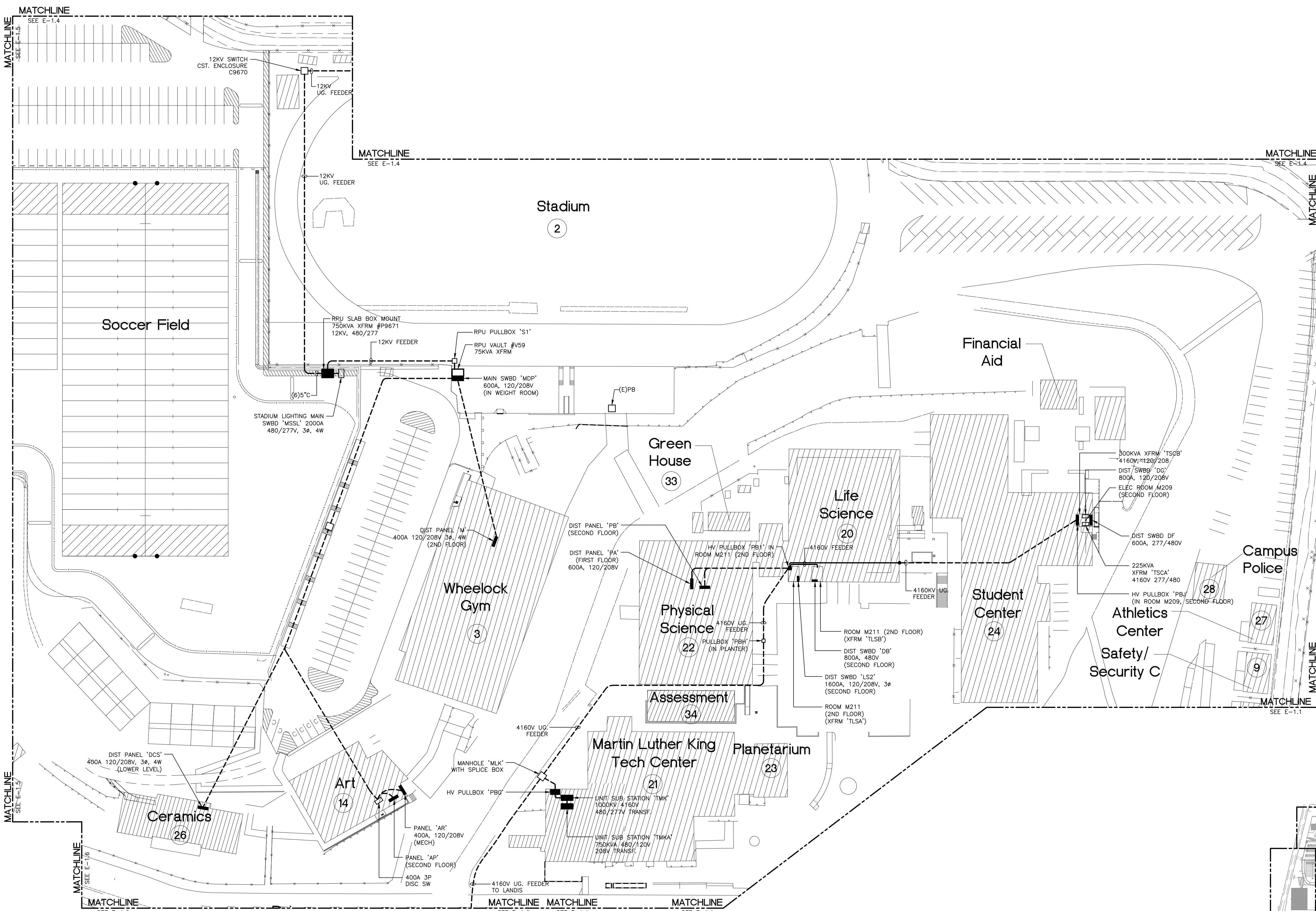

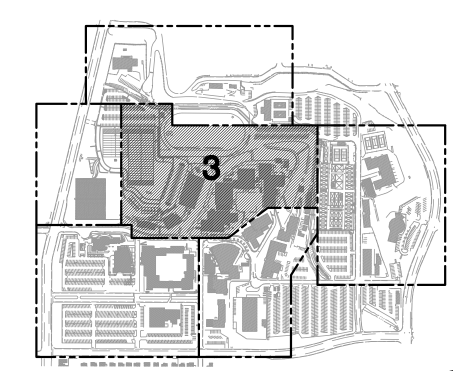

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AREA 3

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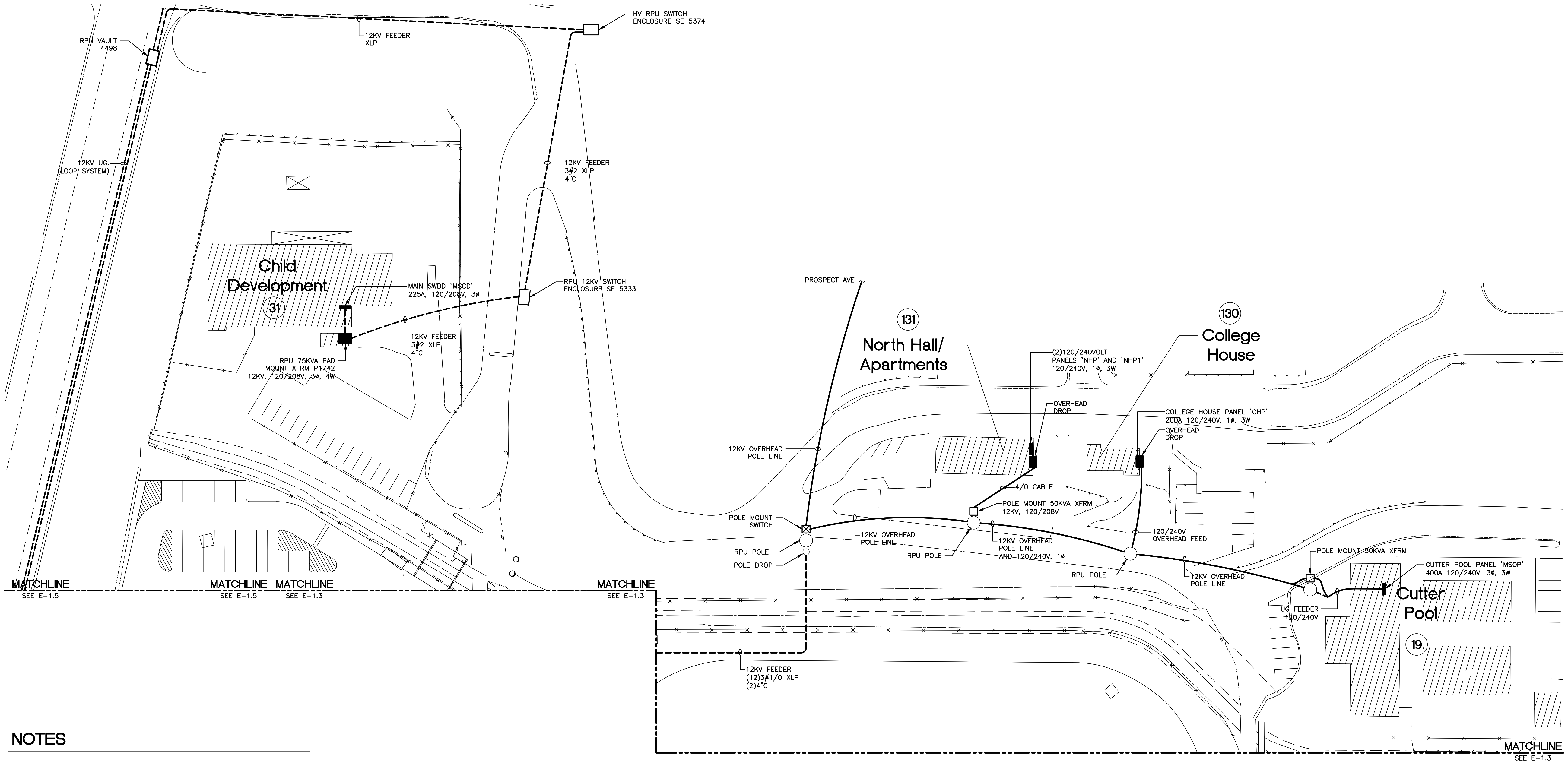

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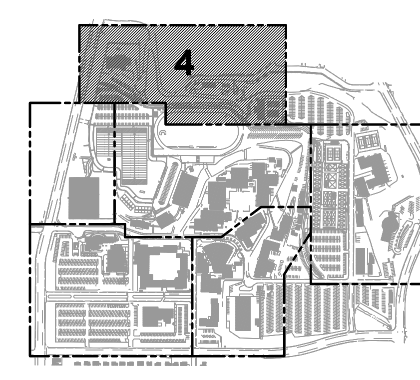

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AREA 4

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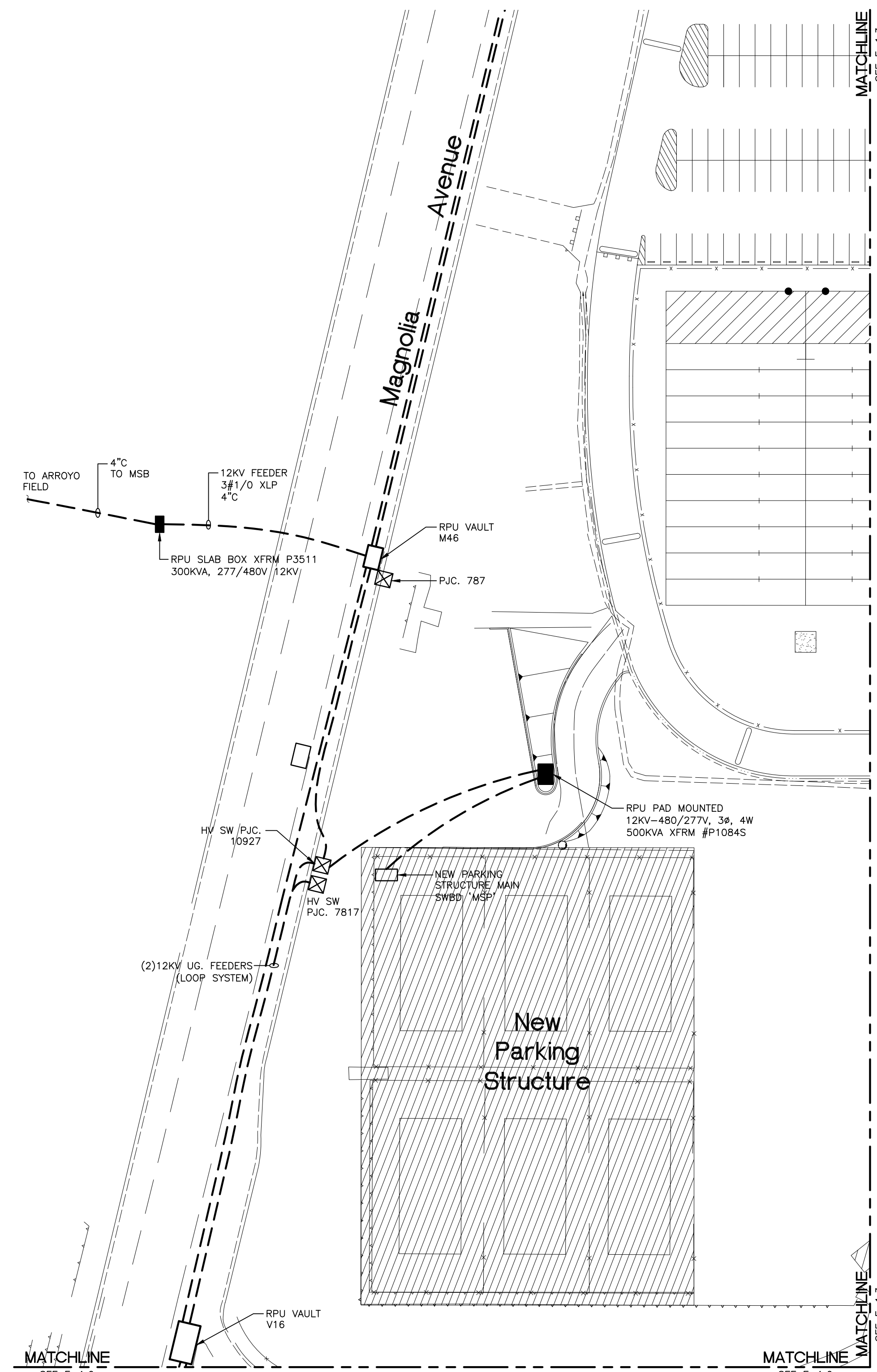

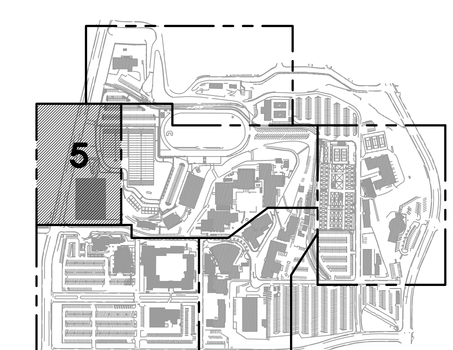

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AREA 5

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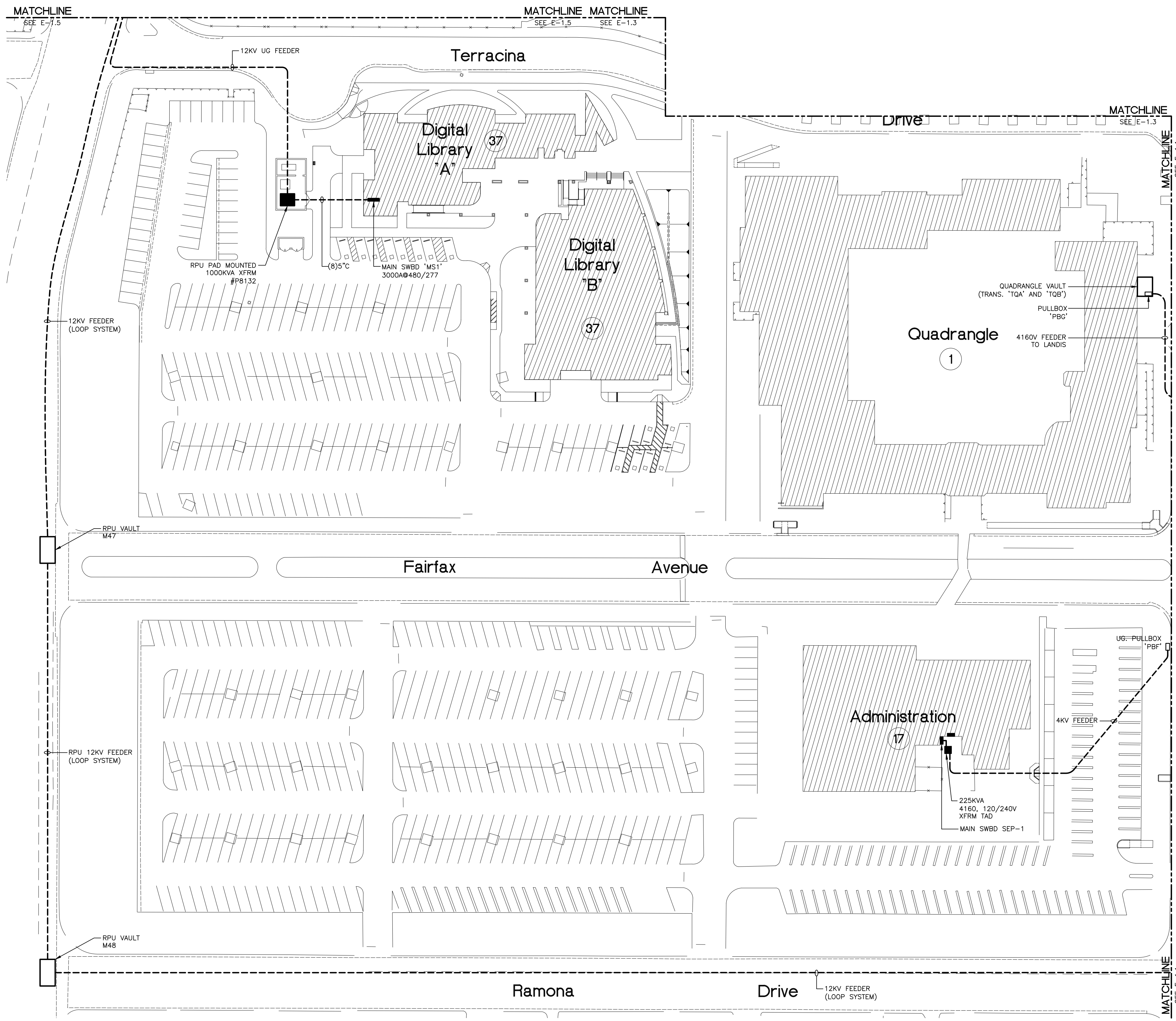

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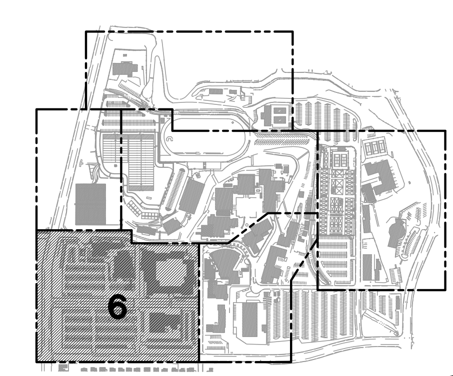
AREA 6



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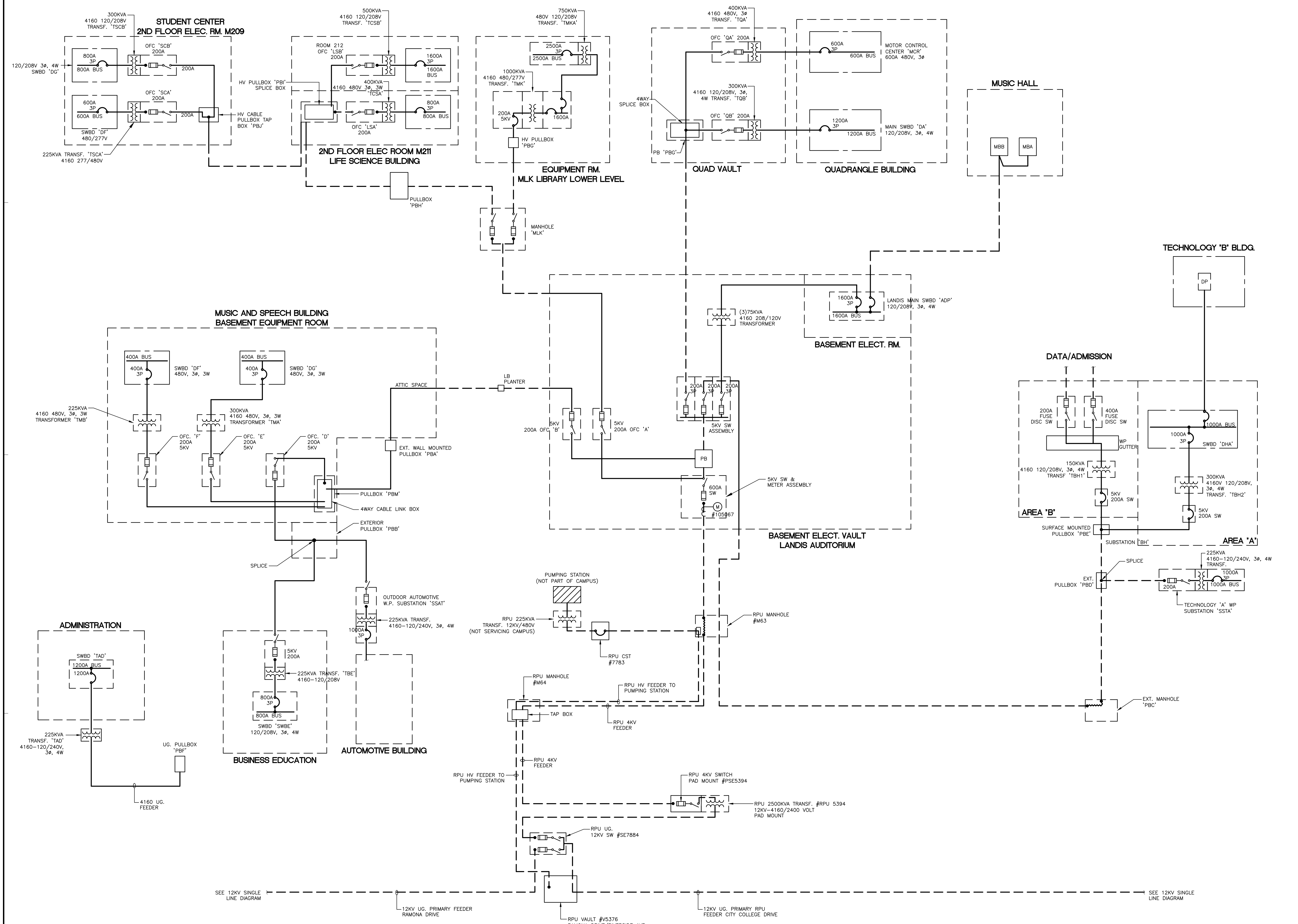

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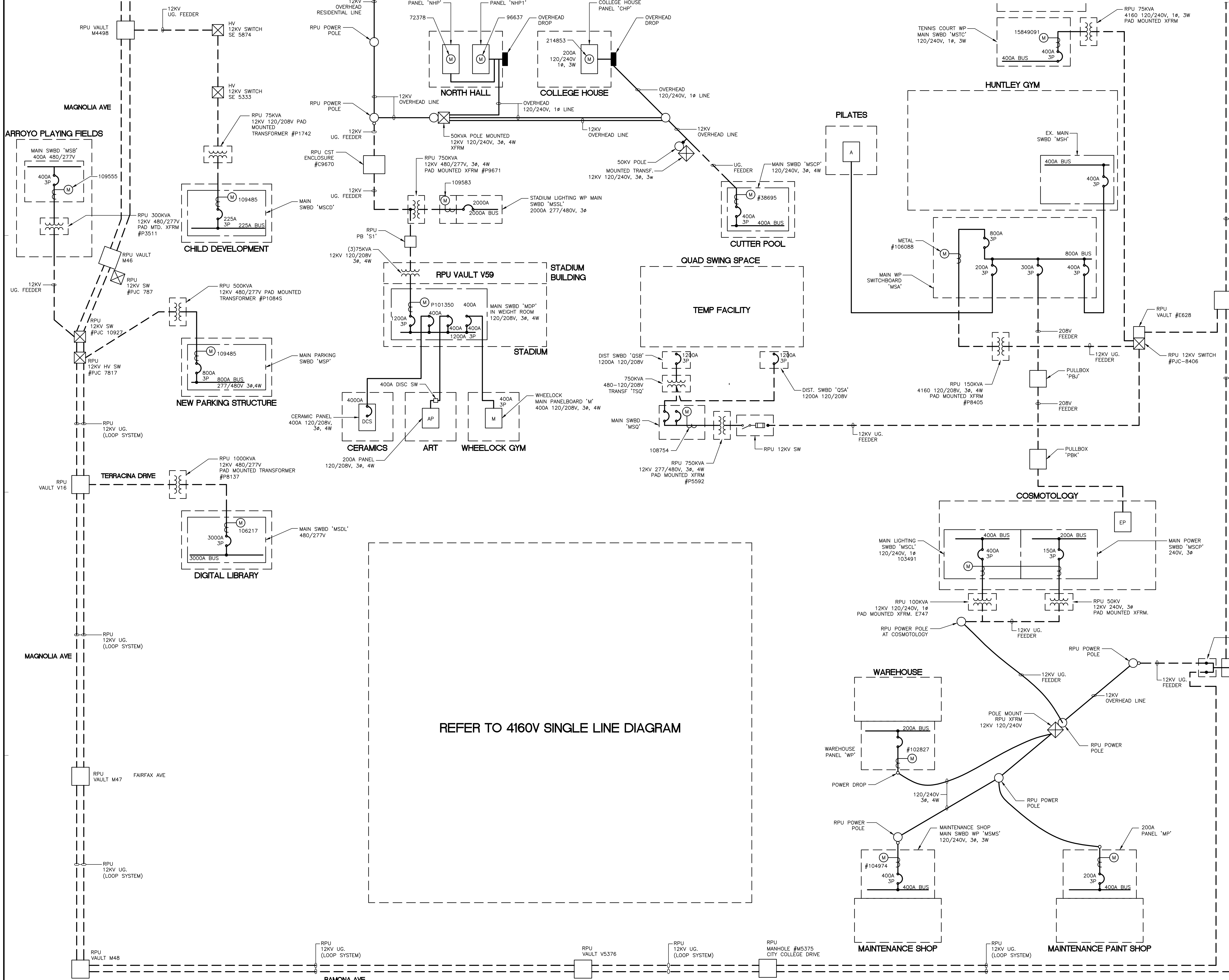

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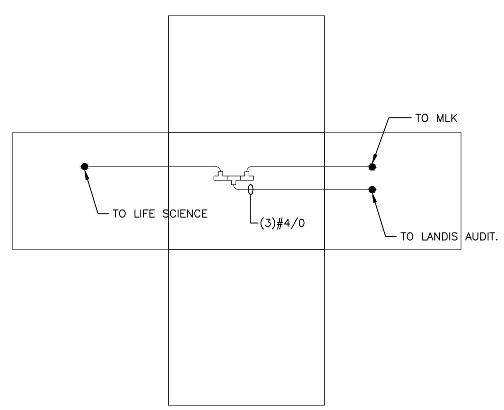

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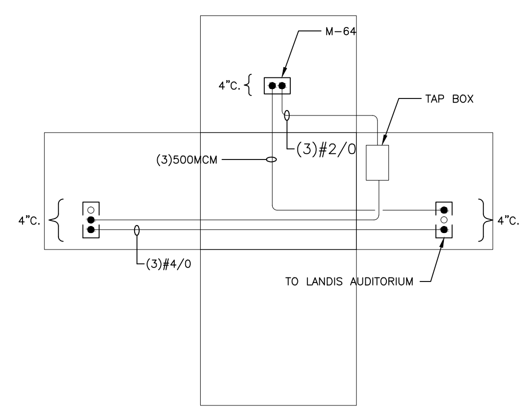

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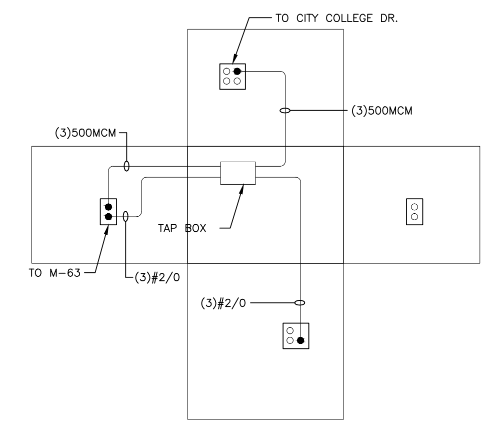

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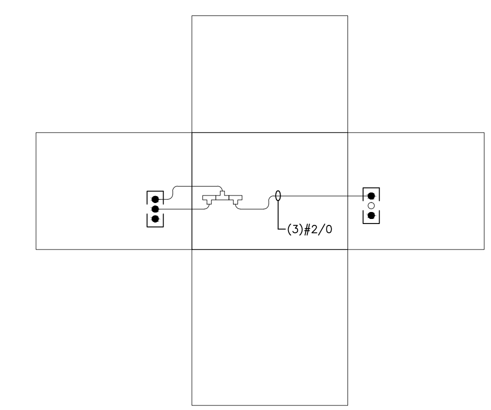

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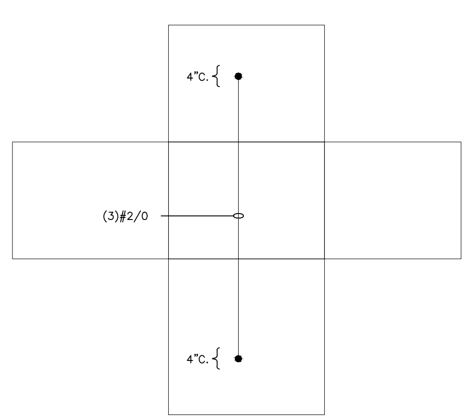

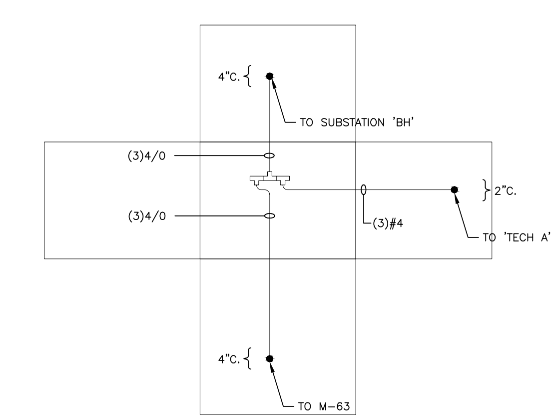

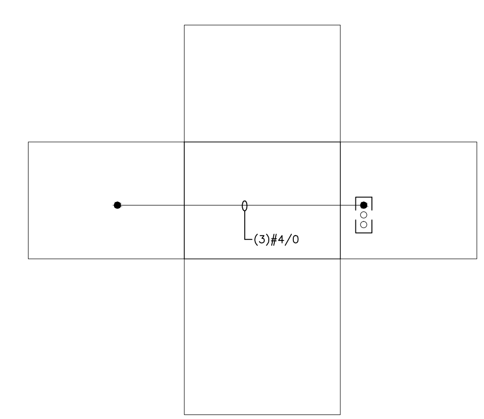

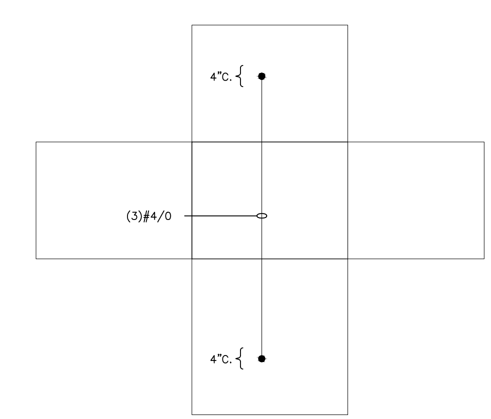

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STATE OF CALIFORNIA

Project Title

ELECTRICAL
CAMPUS SURVEY
RIVERSIDE

RIVERSIDE COMMUNITY COLLEGE
1916

Revisions

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Sheet Title

ELECTRICAL
MANHOLE
PROFILES

Sheet Number

PART B

FUEL DISTRIBUTION UTILITIES

FUEL DISTRIBUTION UTILITIES

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I. EXISTING CONDITIONS :

GENERAL

- The campus derives its natural gas service from the Southern California Gas Company high pressure system.
  - The natural gas is provided by high pressure service laterals leading into the campus.
- The majority of the campus gas infrastructure was installed in the mid 1920's and is in good standing condition.
- 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 ¾-inch to 4-inches in diameter.
  - Discussions with the campus facilities staff revealed that at some locations pipe runs have been replaced with polyvinyl chloride (PVC) pipe and some portions retrofitted with polyethylene (PE) or steel pipe.
    - » PVC pipe is not the recommended plastic pipe material to be used for a natural gas distribution system.
- At the time when the *2010 Infrastructure Upgrade Project: Utility Program* was published, the existing main medium pressure distribution lines are adequately sized to meet the demands of the existing and future facilities on the campus with the exception of the main line fed from meter #2

METERS

- The campus is currently served by thirteen gas meters located in various locations.
- 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 *Handbook*.

Meter 1

- Located on the south side of the Gymnasium (Catherine S. Huntley).
- Serves the Gymnasium (Catherine S. Huntley) and the Cosmetology building.
- Derives its gas service from the City of Riverside's 4" main line running along Olivewood Avenue.

Meter 2

- Located just north of Aquatics Complex.
- Serves the Aquatics Complex of buildings.
- Derives its gas service from the City of Riverside's main line running along Prospect Avenue.

Meter 3

- Located on the north side of the Digital Library + Learning Resource Center.
- Serves only the Digital Library + Learning Resource Center.
- Derives its gas service from the City of Riverside's 3" main line running along Terracina Drive.

Meter 4

- Located on the northeast corner of the Quadrangle (Arthur G. Paul) complex.
- Serve only the Quadrangle complex
- Derives its gas service from the City of Riverside's 3" main line running along Riverside Avenue.

Meter 5

- Located on the northwest side of the Ceramics building.
- Serves only the Ceramics building.
- Derives its service from the City of Riverside's 3" main line running along Terracina Drive.

Meter 6

- Located on the southwest corner of the Gymnasium (Arthur N. Wheelock).
- Serves the Gymnasium (Arthur N. Wheelock), the Stadium (Arthur N. Wheelock Field), and the Art building.
- It is unknown how this meter derives its gas service.

Meter 7

- Located on the west side of the Admissions + Counseling (Cesar E. Chavez) building.
- Serves the Assessment Center, Admissions + Counseling, Student Financial Services, Annex/Wells Fargo, Martin Luther King Jr. High Tech Center, Planetarium (Robert T. Dixon), Physical Science, Life Science, and the Student Center (Ralph H. Bradshaw) building.
- It is unknown how this meter derives its gas service.

Meter 8

- Located on the northwest side, behind the Technology A building.
- Serves Technology A, Technology B, and a portion of the Student Center (Ralph H. Bradshaw) building.
- Derives gas service from the City of Riverside's 4" main line running along Terracina Drive.

Meter 9

- Located on the northwest side of the Music building.
- Serves the Music building, Landis Performing Arts Center, and the Business Education (Alan D. Pauw) building.
- Derives its gas service from the City of Riverside's 3" main line running along Riverside Avenue.

Meter 10

- Located in an underground vault on the north side of the Administration (O.W. Noble) building.
- Serves only the Administration building.
- Derives its gas service from the City of Riverside's 2" main line running along Fairfax Avenue.

Meter 11

- Located on northeast corner of the Automotive Technology building.
- Serves only the Automotive building
- Derives its gas service from the City of Riverside's main line running along City College Drive.

Meter 12

- Located on the southeast corner, behind the Maintenance + Operations building.
- Serves only the Maintenance + Operations building.
- Derives its gas service from the City of Riverside's 4" main line running along Terracina Drive.

Meter 13

- Believed to be located on the north side of the campus, off Prospect Avenue.
- Serves the North Hall, the College House, and possibly the Early Childhood Studies complex.
- The exact location has not yet been confirmed and t is unknown how this meter derives its gas service.

MEDIUM-PRESSURE GAS

- Natural Gas downstream of the meters is distributed at medium pressure at approximately five (5) psig throughout the campus in most locations, with the exception of some metered systems running at low pressure.
- The medium-pressure gas (MPG) 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 domestic hot water needs to plumbing fixtures.
    - Natural gas is used for domestic water heating and industrial hot water.

GAS LOADS

- The *2010 Infrastructure Upgrade Project: Utility Program* for the campus estimated that the total 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.
- Table 10-1 (reproduced on the following pages) from the *2010 Infrastructure Upgrade Project: Utility Program* provides the 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)*

II. GOALS:

- Improve system reliability.
- Provide ease of maintenance and isolation of lines either during a failure or during regular maintenance without interrupting gas supply to other buildings on campus.
- Provide adequate capacity service lines to accommodate existing loads and planned future loads resulting from the construction of new buildings as well retrofits and additions to existing buildings.

III. HORIZON 1 IMPLEMENTATION:

- The existing low pressure system serving the Cutter pool buildings is not of adequate size to handle the additional load of the Riverside Aquatics Complex.
  - 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.
- Serve the new Cosmetology building by connecting to the existing 6-inch gas line connected to existing gas meter #11.

IV. LONG-TERM IMPLEMENTATION:

GENERAL

- Review the current and future facilities load demands and the reduction in load demand due demolished buildings to determine whether main distribution lines are adequately sized.
- Upgrade meters with higher capacity output where required.
- Provide earthquake valves for emergency gas supply shut-off at each meter location on the downstream side of the regulator.
- Monitor gas consumption at all buildings with sub-meters to 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.

IV. LONG-TERM IMPLEMENTATION (CONT'D):

METERS

- At the time when the *2010 Infrastructure Upgrade Project: Utility Program* was published, the following recommendations were made. These recommendations should be evaluated in relation to the current Facilities Master Plan under development.

Meter 1

- Replace existing meter with a higher capacity meter having a maximum cubic feet per hour (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-pressure supply 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 of Riverside 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 of Riverside 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 of Riverside 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 of Riverside 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 of Riverside 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 of Riverside 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 of Riverside 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 of Riverside owned distribution supply line should be capped.
  - Southern California Gas Company shall provide this service.
  - The meter and associated components shall also be removed.

IV. LONG-TERM IMPLEMENTATION (CONT'D):

METERS

Meter 13:

- Specifics of this meter are unknown; however, this meter shall have a maximum (CFH) output of no less than 5,000 CFH.

Meter 14:

- New service at future south parking structure with a maximum CFH output of no less than 10,000 CFH.

Meter 15:

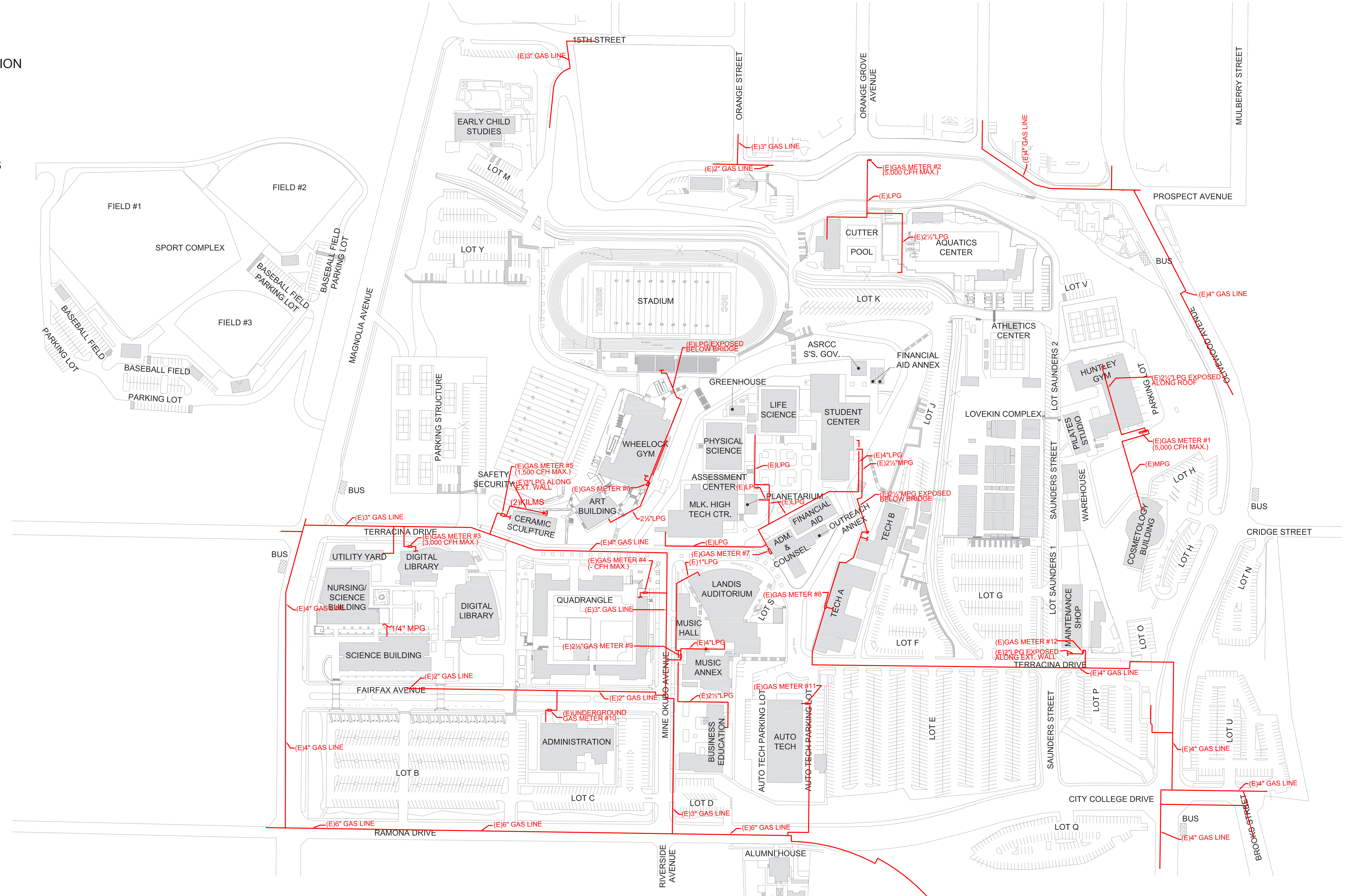
- New service adjacent to the Martin Luther King, Jr. High Tech Center with a maximum CFH output of no less than 13,000 CFH

LEGEND

- EXISTING FACILITIES
- EXISTING FUEL DISTRIBUTION

ABBREVIATIONS

CFH - CUBIC FEET PER HOUR
KILMS - KILOMETERS
LPG - LOW PRESSURE GAS
MPG - MEDIUM PRESSURE GAS



0 ft 120 ft 240 ft
SCALE: 1" = 240'-0"

EXISTING FUEL DISTRIBUTION SITE PLAN

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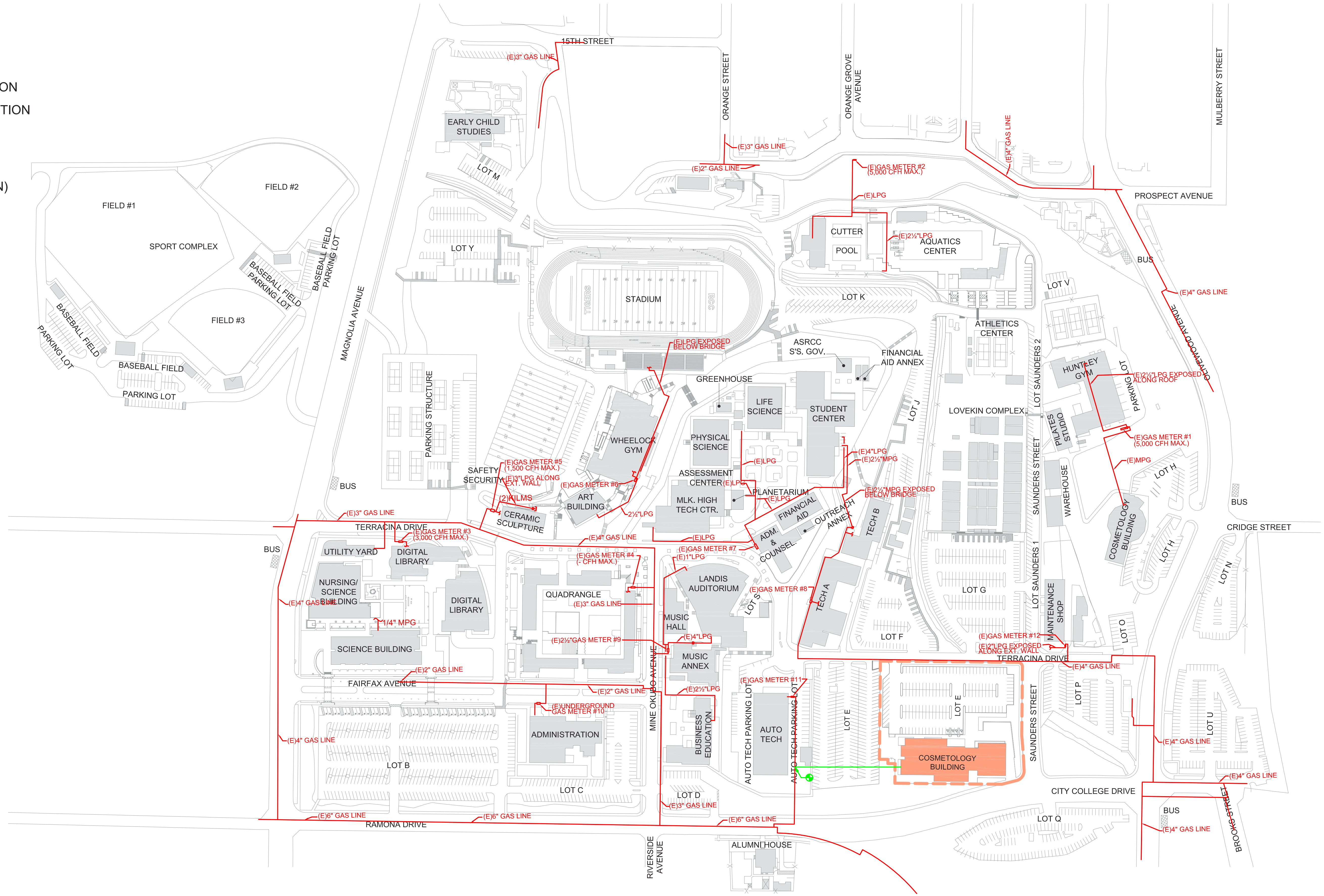
LEGEND

- EXISTING FACILITIES
- FACILITIES IN DESIGN
- EXISTING FUEL DISTRIBUTION
- PROPOSED FUEL DISTRIBUTION
- PROPOSED P.O.C. (POINT OF CONNECTION)
- PROPOSED P.O.D. (POINT OF DISCONNECTION)

ABBREVIATIONS

CFH - CUBIC FEET PER HOUR
G - GAS
KILMS - KILOMETERS
LPG - LOW PRESSURE GAS
MPG - MEDIUM PRESSURE GAS



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SCALE: 1" = 240'-0"

HORIZON 1 FUEL DISTRIBUTION SITE PLAN

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PART C

HYDRONIC ENERGY UTILITIES

CONTENTS

I. EXISTING CONDITIONS

II. GOALS

III. HORIZON 1 IMPLEMENTATION

IV. LONG-TERM IMPLEMENTATION

V. DRAWINGS

- Existing Hydronic Site Plan
- Horizon 1 Hydronic Site Plan

I. EXISTING CONDITIONS:

GENERAL

- The campus is geographically divided into an upper campus and a lower campus.
- 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.
    - 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.
    - Most of the buildings on campus have individual heating and cooling systems.
- Some buildings 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.

COOLING

- This campus does not have a central chilled water system.
  - It has a mix of some chilled water systems, and some direct-expansion (DX) cooling systems – split and packaged systems.
  - The systems are spread out serving individual buildings or small complexes.
- Several water-cooled chiller plants currently serve the campus.
  - The chillers and pumps use a high constant flow rate and low temperature difference distribution systems.
  - These are energy inefficient distribution schemes.
- The chilled water control valves are three way valves.
- The buildings are served by 4-pipe air-handlers, 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

I. EXISTING CONDITIONS (CONT'D):

HEATING

- This campus does not have a centralized heating system.
  - It has a mix of some local heating water systems, some gas-fired heating systems, and some electric heating systems on smaller units.
- Several heating water plans currently serve the campus.
  - The boilers and pumps use a high flow rate and low temperature difference distribution systems.
  - These are energy inefficient distribution schemes.

UPPER CAMPUS

BUILDING NAME	CHILLED WATER SYSTEM	HEATING WATER SYSTEM
Digital Library + Learning Resource Center	No chilled water. Cooled by three (3) packaged rooftop units and one (1) first floor split system DX air handler.	Heated by three (3) packaged rooftop units and one (1) first floor split system DX air handler with gas heating. Gas-fired?
Administration (O.W. Noble)	Cooled by two (2) split system DX air handlers.	Heated by two (2) split system DX air handlers with gas heating. Gas-fired?
Quadrangle (Arthur G. Paul)	Cooled by one (1) water-cooled chiller located in an outside pit.	Heated by one (1) boiler located in an outside pit.
Business Education (Alan D. Pauw)	Cooled by one (1) water-cooled system located in a basement. Where?	Heated by a common boiler system located in the basement of the Music building.
Music		
Music Hall (Richard M. Stover)		
Landis Performing Arts Center		
Music Annex		
Landis Annex		
Martin Luther King, Jr. High Tech Center	Cooled by one (1) water-cooled chilled located in the basement.	Heated by boilers located in the basement. How many?
Assessment Center	Cooled by one (1) packaged rooftop unit.	Heated by one (1) gas-fired packaged rooftop unit.
Planetarium	Cooled by one (1) packaged rooftop unit.	Heated by one (1) gas-fired packaged rooftop unit.
School of Nursing		
Math + Science Building		
Life Sciences Building	Cooled by one (1) common water-cooled chiller system.	Heated by a common boiler system.
Physical Sciences Building		
Student Center (Ralph H. Bradshaw)	Cooled by one (1) water-cooled chiller system.	
Outreach Center	Cooled by DX split system.	Heated by DX split system with electric heating.
ASRCC Student Government	Cooled by DX split system.	Heated by DX split system with electric heating.
Financial Aid Annex	Cooled by DX split system.	Heated by DX split system with electric heating.
Student Financial Services	Cooled by one (1) common DX split system.	Heated by one (1) common DX split system with electric heating.
Admissions + Counseling (Cesar E. Chavez)		
Outreach Portable	Cooled by one (1) split system unit. DX?	Heated by one (1) electric split system unit. DX?
Annex/Wells Fargo		

LOWER CAMPUS

BUILDING NAME	CHILLED WATER SYSTEM	HEATING WATER SYSTEM
Sports Complex (Samuel C. Evans)		
Early Childhood Studies	Cooled by DX split systems.	Heated by DX split systems with electric heating.
Ceramics	Cooled by packaged rooftop unit.	Heated by one (1) gas-fired packaged rooftop unit.
Art	Cooled by DX split systems.	Heated by DX split systems with electric heating.
Gymnasium (Arthur M. Wheelock)	Cooled by DX system.	Gas-fired heating.
Stadium (Arthur M. Wheelock Field)		
North Hall	Cooled by DX system.	Gas-fired heating.
College House	Cooled by DX system.	Gas-fired heating.
Riverside Aquatics Complex		
Technology B	Cooled by some rooftop units and some split systems.	Heated by some rooftop units with gas-fired heating and some split systems with electric heating.
Technology A	Cooled by some rooftop units and some split systems.	Heated by some rooftop units with gas-fired heating and some split systems with electric heating.
Automotive Technology	Cooled by some rooftop units and some split systems.	Heated by some rooftop units with gas-fired heating and some split systems with electric heating.
Lovekin Complex	Each portable building is cooled by an individual wall-hung DX system.	Each portable building is heated by an individual wall-hung DX system with electric heating.
Gymnasium (Catherine S. Huntley)	Cooled by DX system.	Gas heating. Gas-fired?
Pilates Studio (Eleanor H. Crabtree)	Cooled by DX system.	Gas heating. Gas-fired?
Maintenance + Operations	Cooled by DX system.	Heated by some gas-fired heating and some electric heating.
Cosmetology	Cooled by DX system.	Gas heating. Gas-fired?
Alumni House		
Parking Structure/Tennis Courts (Fran Bushman)		
Warehouses		No heat.

II. GOALS:

GENERAL

- Maximize efficiency.
- Maximize use of Central Plant(s) to provide tremendous savings for both energy and maintenance.
- Identify energy saving opportunities or possible improper operation by metering energy use at all individual buildings.
- Establish a timetable and develop a plan and a schedule to build a Central Plant(s) for providing chilled water to as many buildings as is practical.
  - Central chilled water plants can produce chilled water more efficiently than multiple smaller remotely located chillers.
  - Smaller chillers usually end up being air-cooled.

COOLING

- Design all new larger buildings to be cooled with chilled water produced at a Central Plant(s).
- Wherever practical, tie existing buildings in Central Plant(s) for chilled water-cooling.
  - No buildings will be required to have chillers.
- Install required packaged air conditioning equipment for isolated situations only.

HEATING

- Take advantage of higher temperature difference coils to allow for lower flows.
  - This provides pumping systems that are more efficient.
- Be economical.
  - Evaluate heating smaller buildings with packaged gas furnaces, rather than providing a boiler system.
    - » Study on a case-by-case basis.
  - Evaluate converting existing buildings using gas heat to hot water.
    - » Study on a case-by-case basis.

III. HORIZON 1 IMPLEMENTATION:

GENERAL

- ???

COOLING

- Evaluate the available chilled water capacities from the existing Central Plant(s) for spare capacity and redundancy.
- Evaluate all new buildings for connection to the existing Central Plants.
  - Where existing plant capacity is available, existing piping infrastructure is in place, and redundancy maintained tie HVAC equipment into the existing Central Plant(s).
  - Evaluate the extension of chilled water piping where piping is not currently installed.
- Design new buildings with air handlers instead of fan coils to make better use of air-side economizers and greater changes in temperature (delta T's) across the chilled water coils.
- Utilize high efficiency direct-expansion (DX) air handlers where existing campus central plant services are not available.
  - Currently the campus utilizes constant volume fan coils in a number of locations.

HEATING

- ???

IV. LONG-TERM IMPLEMENTATION:

GENERAL

- Design and install new distribution piping with stub-outs for each building on campus.
  - Install piping distribution system in roadways or parking areas to allow placement of new buildings without being located over the proposed pipe locations.
- Design and install Central Plants in preparation for conversion and connection of all campus buildings to these plants.
  - Combine some of the buildings into common systems where it makes geographical sense – divide into upper campus and lower campus Central Plants.
    - » Locate the upper campus Central Plant in a future parking structure where the chillers and pumps can be located on the lower floors of the structure and the cooling tower on the upper level. Refer to current Facilities Master Plan for appropriate location.
    - » Locate the lower campus Central Plant and TES tank near where the proposed location for the future Maintenance + Operations facilities and where current Cosmetology building is located. Refer to current Facilities Master Plan for appropriate location.
- Connect the upper and lower campus Central Plant systems.
  - The pipe would need to cross the flood control channel.
  - 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 can remain independent since the buildings are more spread out compared to the upper campus; however, this is energy inefficient.
- Introduce BTU metering capabilities that tie into a central direct digital control (DDC) system with strong energy management capabilities for all future buildings.
  - Retrofit existing buildings with new BTU monitoring capabilities.

IV. LONG-TERM IMPLEMENTATION (CONT'D):

COOLING

- Convert existing DX-cooled buildings to chilled water-cooling where practical and connect to stub-outs from the main Central Plant(s) distribution piping runs.
  - It may be more economical to leave some smaller buildings as they are and not connect them to the Central Plant(s) and distribution piping system.
    - Study on a case-by-case basis.
- Utilize water-cooled chillers, rather than air-cooled chillers, to improve overall system efficiency.
- Replace existing three-way valves with two-way valves at all cooling pumps to increase the efficiency of the pumping system.
  - Note: the existing pumps lack variable frequency drives (VFDs) to take full advantage of this retrofit.
- Utilize Thermal Energy Storage (TES) tanks in order to reduce overall chiller plant capacity and to improve overall plant efficiency.
  - TES 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.
  - Retrofit of the existing valves is essential for maximizing the capacity of the TES tanks.

HEATING

- Replace existing three-way valves with two-way valves at all heating water pumps so that reduced flow at part load conditions can further save pumping energy.
- Utilize variable frequency drives (VFDs) at all heating pumps.
  - Avoid VFDs below three horsepower (3 Hp) because they are not as economically beneficial.
- Design future buildings to have independent local heating water systems housed within the building.
  - Conversion to a centralized heating water system does not provide any efficiency or advantages.
    - Current SCAQMD regulations limit economical boiler sizing to less than 2.0 million BTU per boiler.
  - 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.
    - Heating water has better control over supply air temperature and space temperature and therefore is the preferred method of heating.
  - Where buildings are clustered, convert to a shared 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.
- Replace strip heat with heat pumps in smaller buildings with existing electric heat.
  - Heat pumps are three to four times more efficient than straight electric heat.

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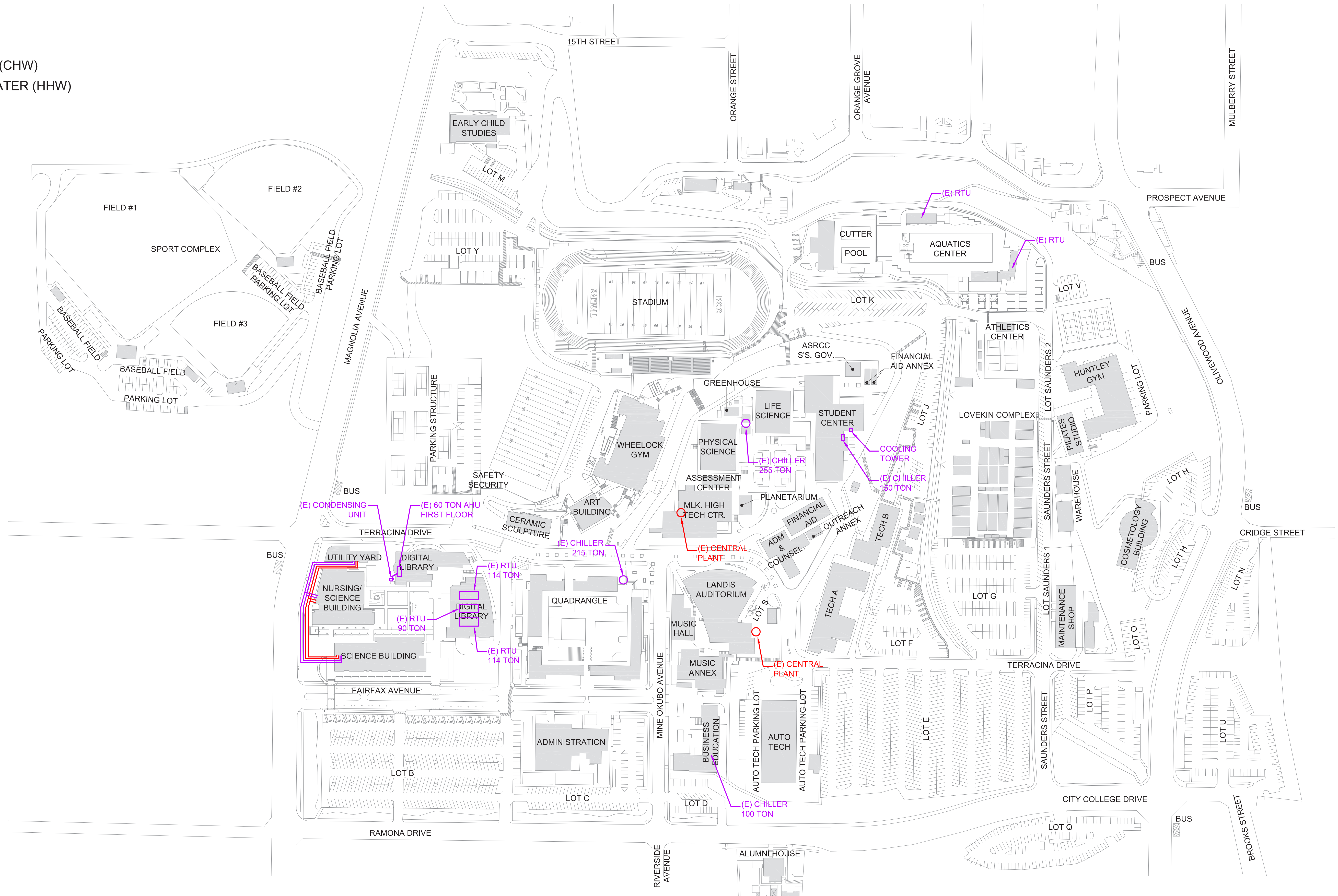
LEGEND

- EXISTING FACILITIES
- EXISTING CHILLED WATER (CHW)
- EXISTING HEATING HOT WATER (HHW)
- EXISTING CHILLER PLANT
- EXISTING CENTRAL PLANT

ABBREVIATIONS

AHU - AIR HANDLING UNIT
CHW - CHILLED WATER
HHW - HEATING HOT WATER
RTU - ROOF TOP UNIT



0 ft 120 ft 240 ft

SCALE: 1" = 240'-0"

EXISTING HYDRONIC SITE PLAN

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LEGEND

- EXISTING FACILITIES
- FACILITIES IN DESIGN
- EXISTING CHILLED WATER (CHW)
- EXISTING HEATING HOT WATER (HHW)
- EXISTING CHILLER PLANT
- EXISTING CENTRAL PLANT

ABBREVIATIONS

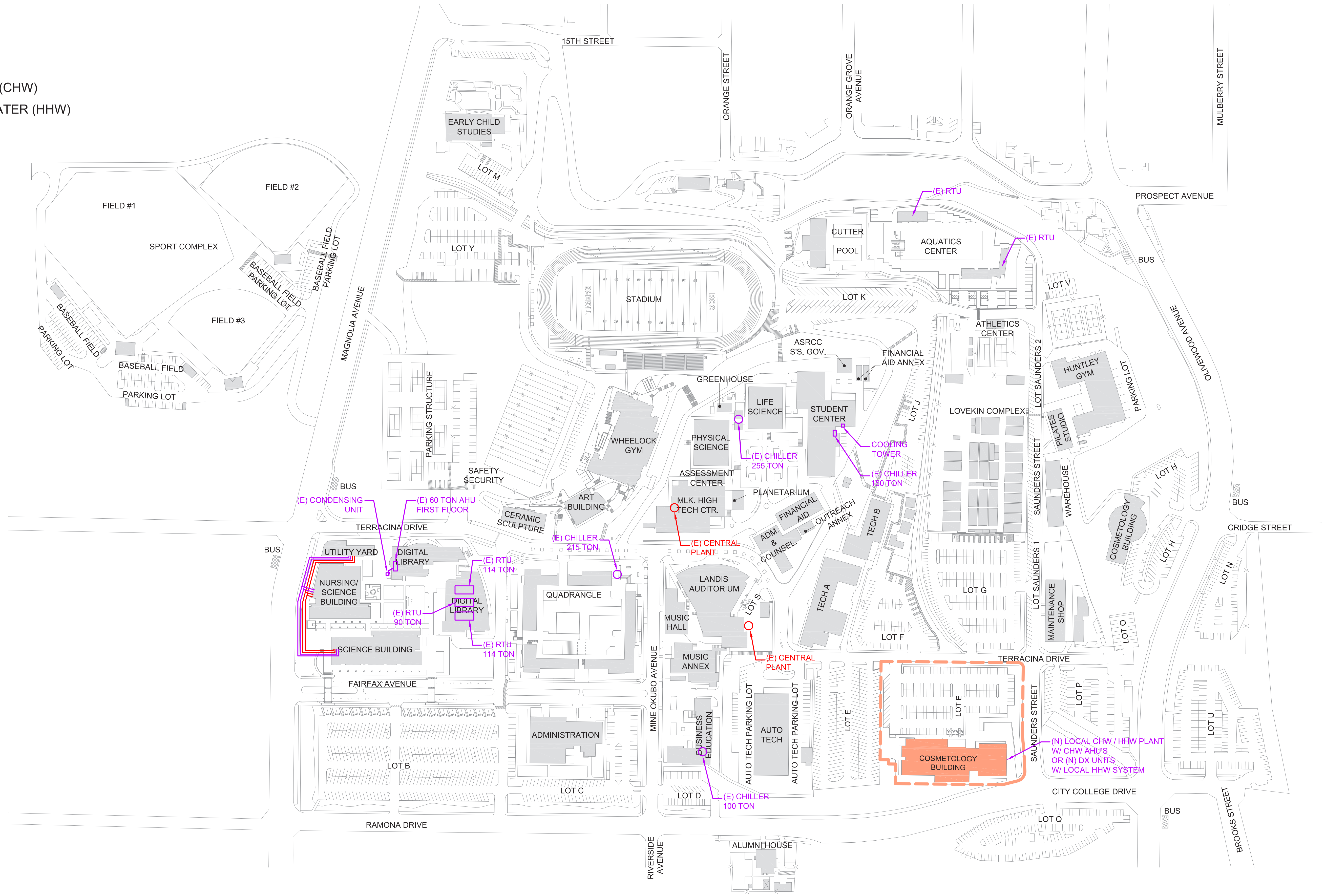
AHU - AIR HANDLING UNIT

CHW - CHILLED WATER

DX - DIRECT EXPANSION

HHW - HEATING HOT WATER

RTU - ROOF TOP UNIT



0 ft 120 ft 240 ft

SCALE: 1" = 240'-0"

HORIZON 1 HYDRONIC SITE PLAN

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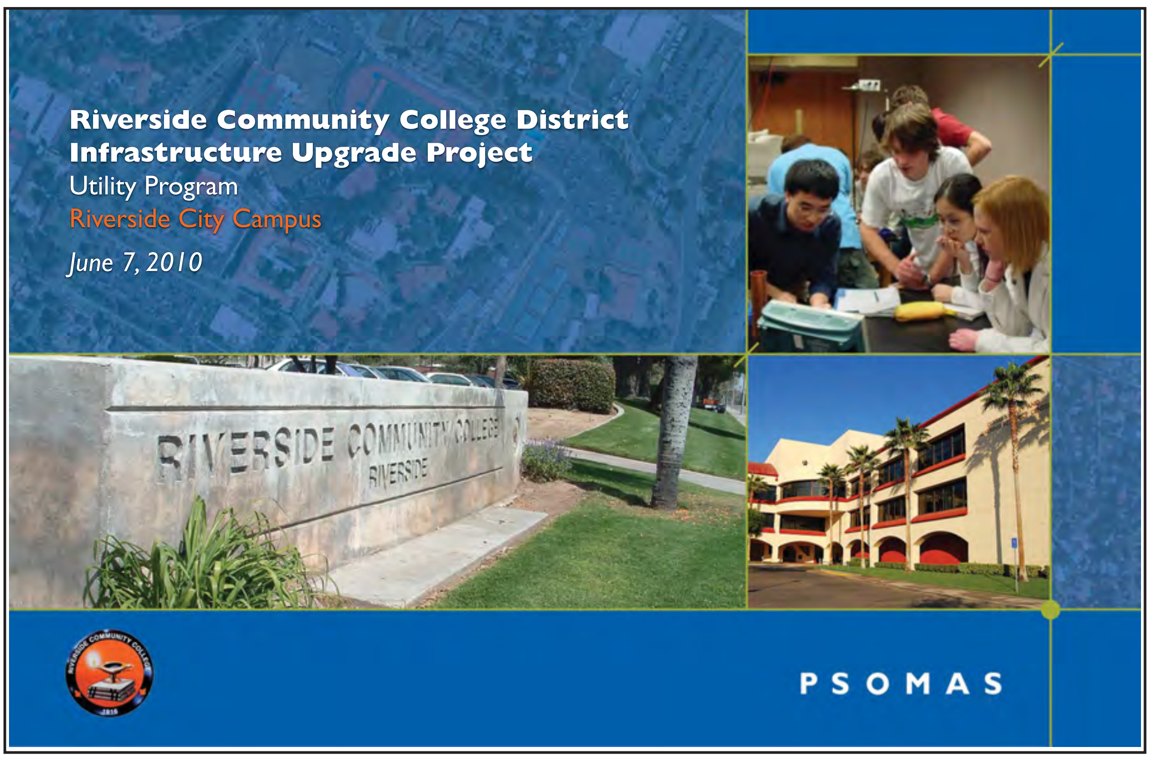
PART D
WATER UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Riverside City Campus

June 7, 2010

Section 2 - Water 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.

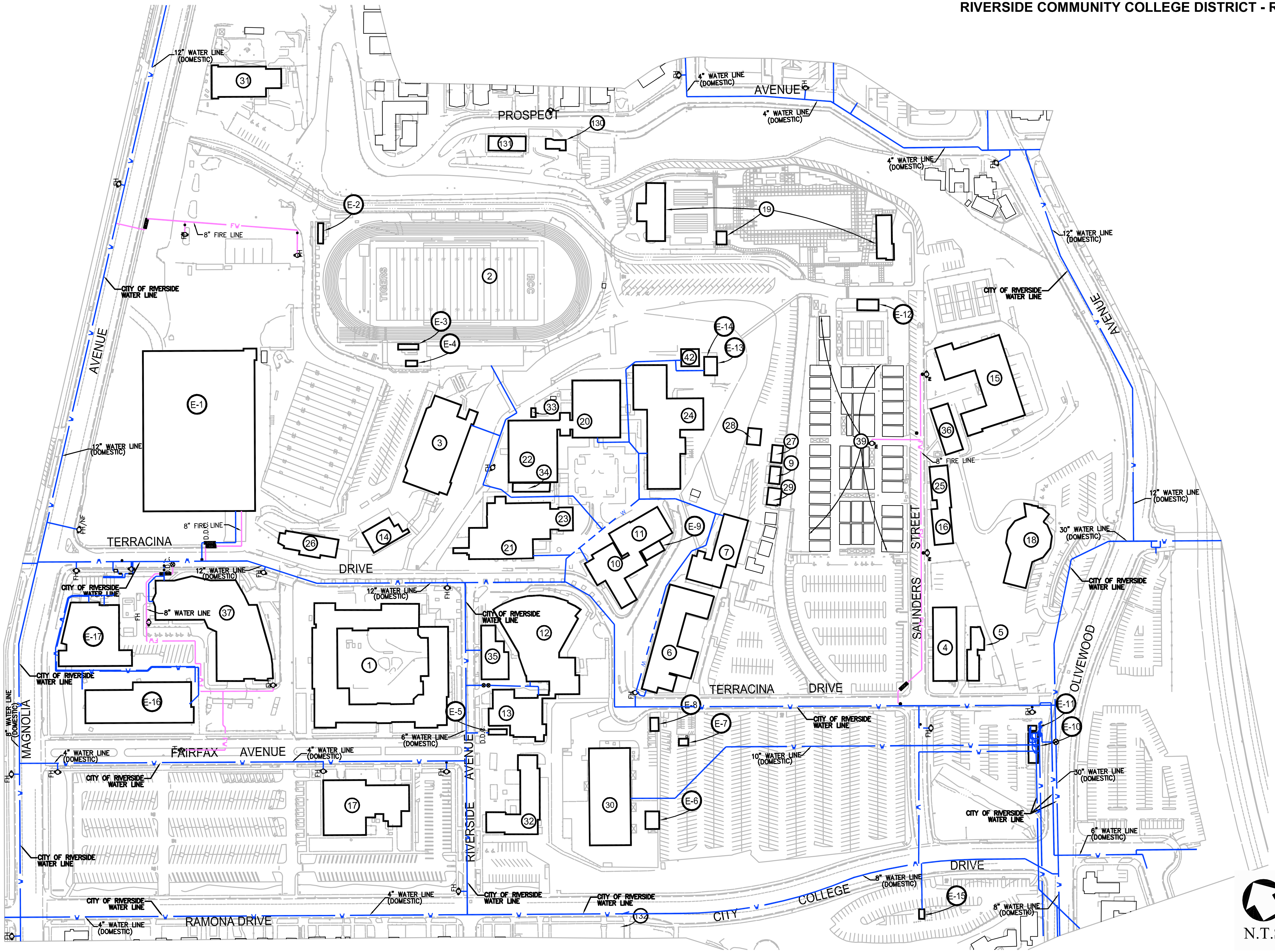
2. Relocate 30-inch transmission City of Riverside main into Olivewood Avenue to avoid the proposed Building P-5.

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.



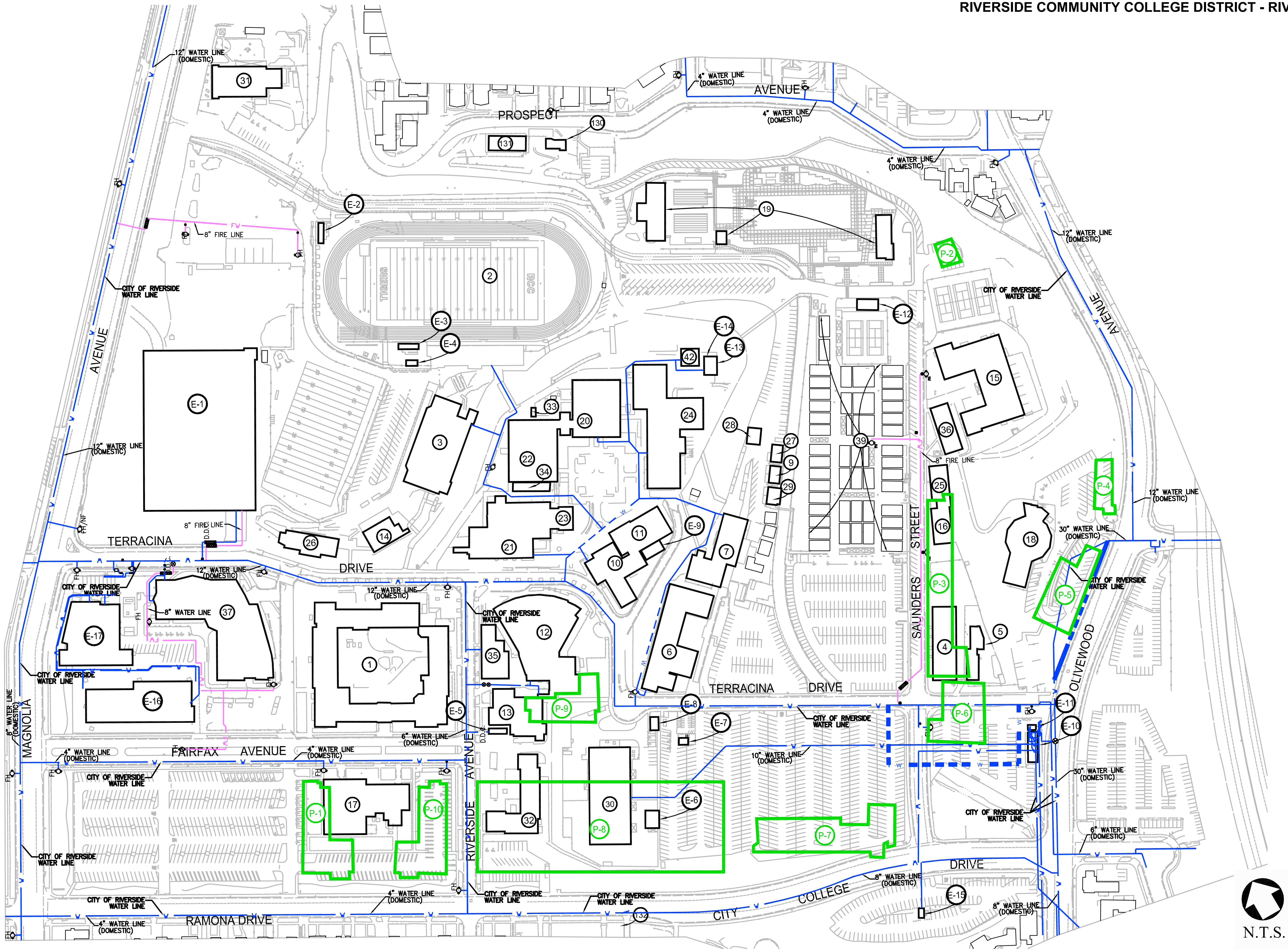
LEGEND:

- 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.

FIGURE 2B
PROPOSEDWATER DISTRIBUTION

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PART E

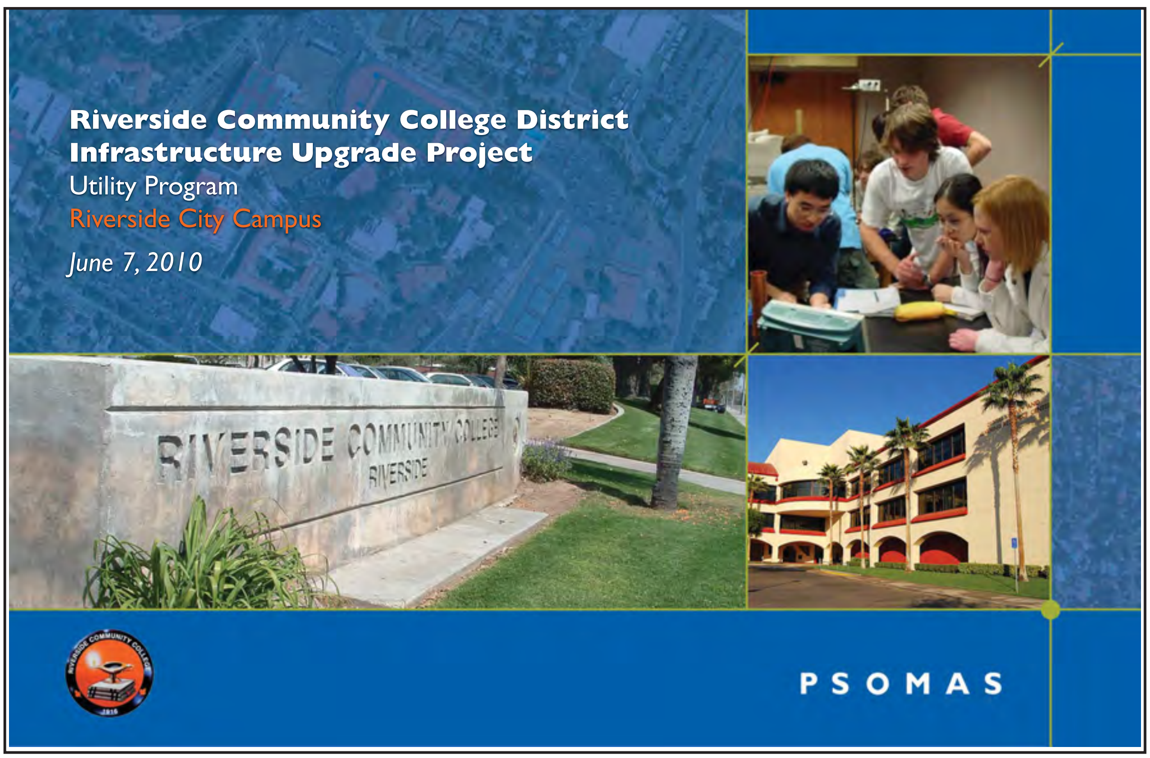
SANITARY SEWERAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Riverside City Campus

June 7, 2010

Section 1 - Sanitary Sewer System



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.

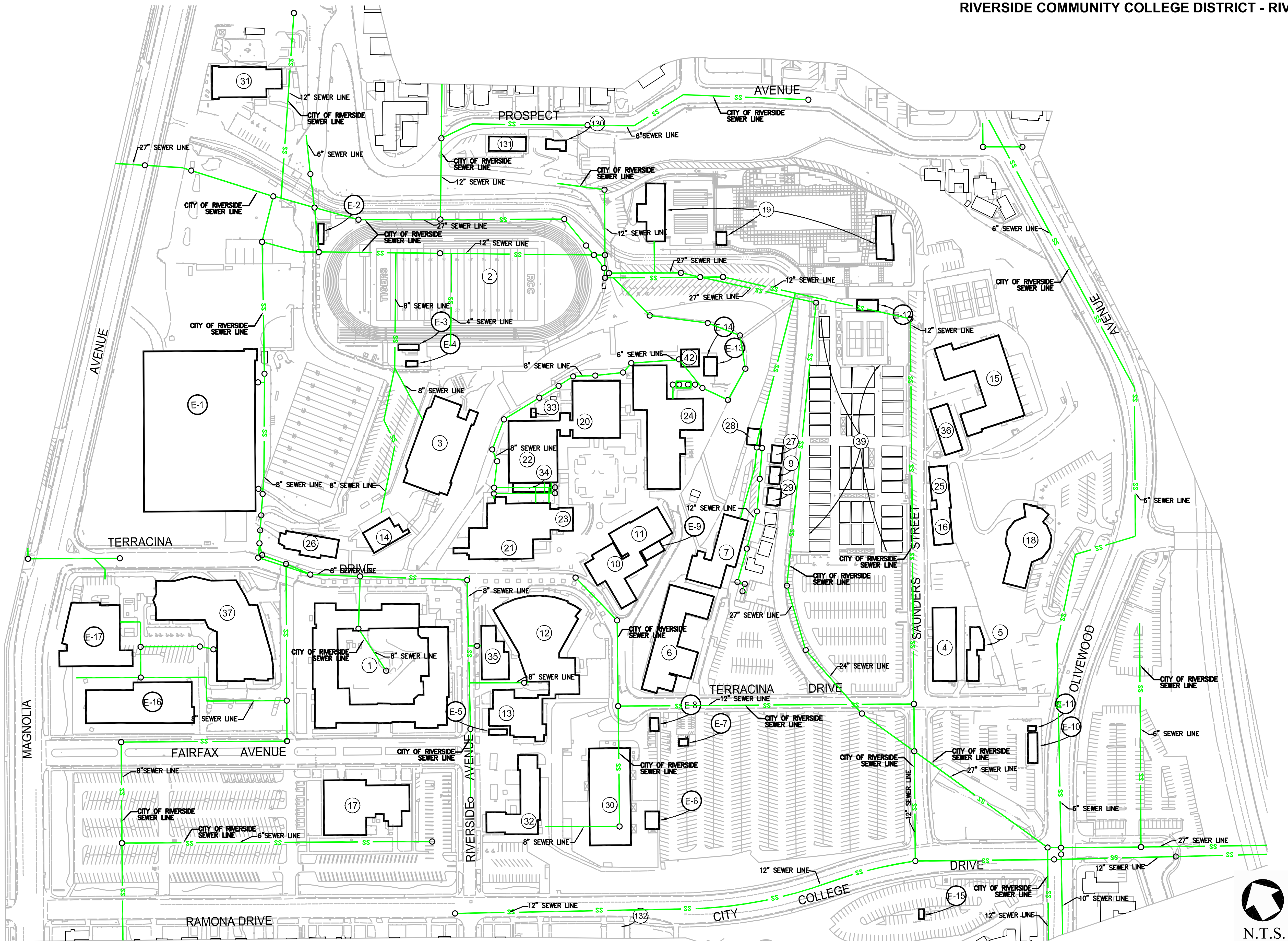
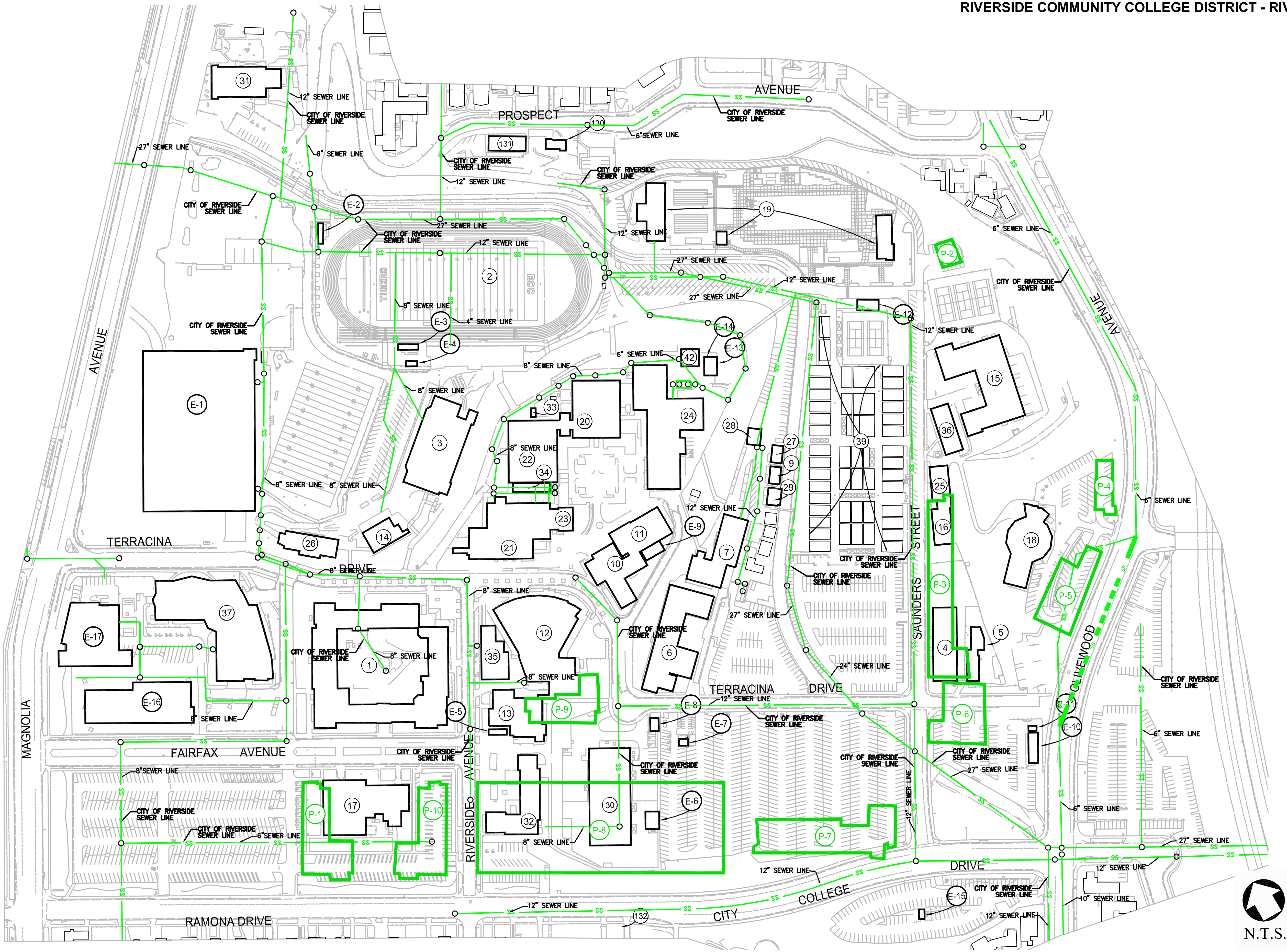


FIGURE 1A
EXISTING SANITARY SEWER SYSTEM



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

PART F

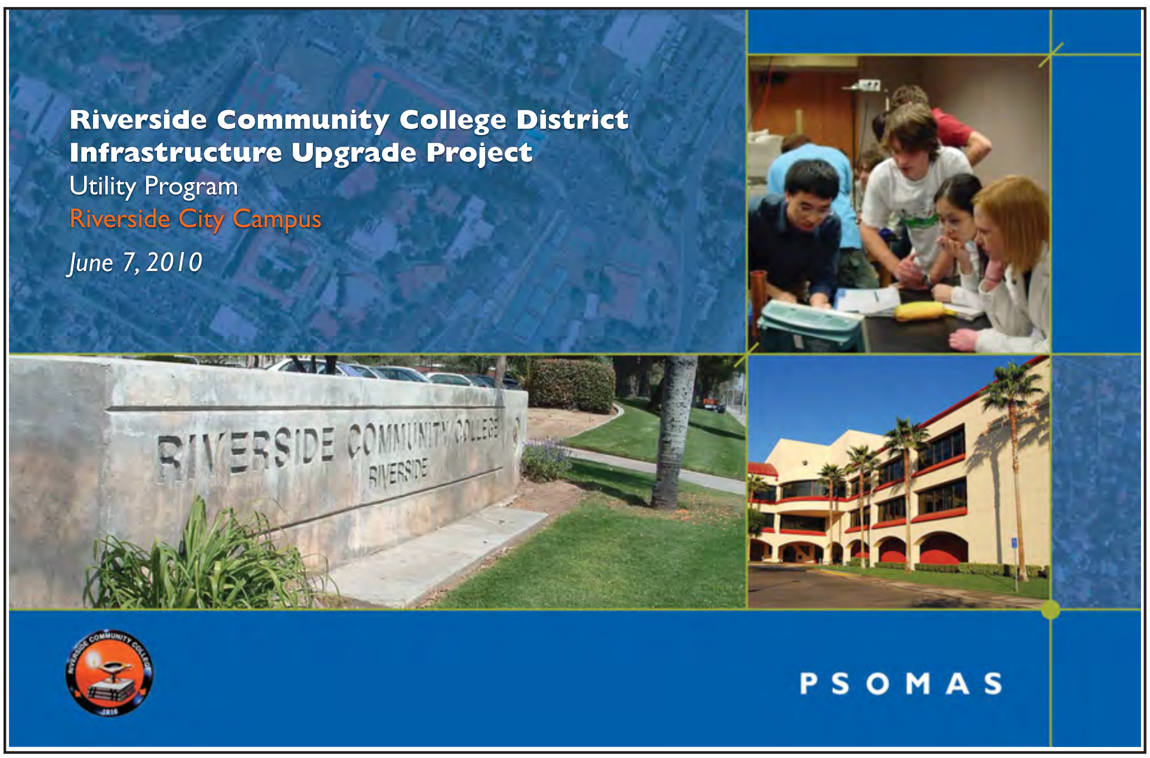
STORM DRAINAGE UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Riverside City Campus

June 7, 2010

Section 4 - Storm Drain System



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.

LEGEND:

① EXISTING BUILDING

SD EX. STORM DRAIN

GENERAL NOTES:

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

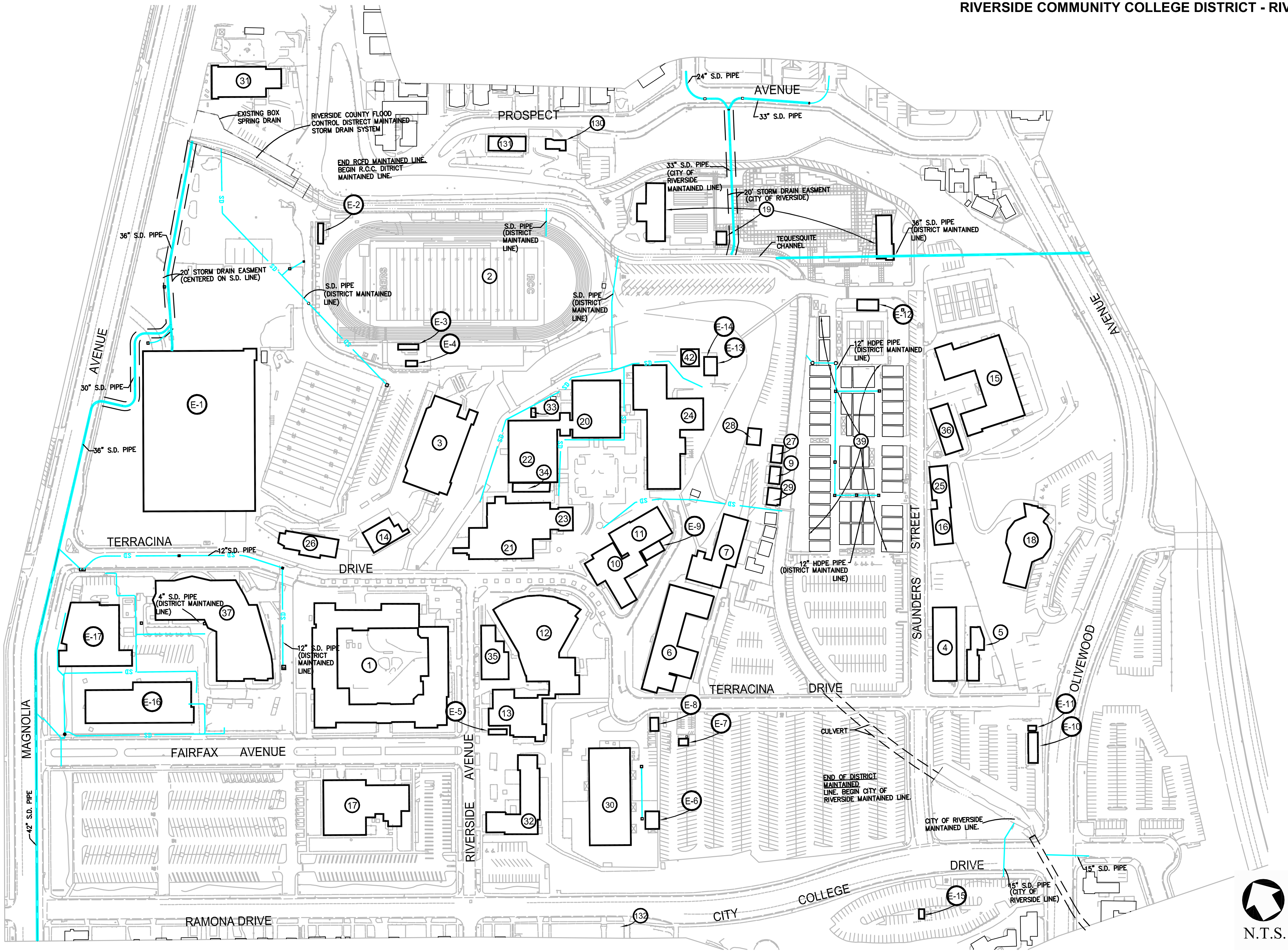
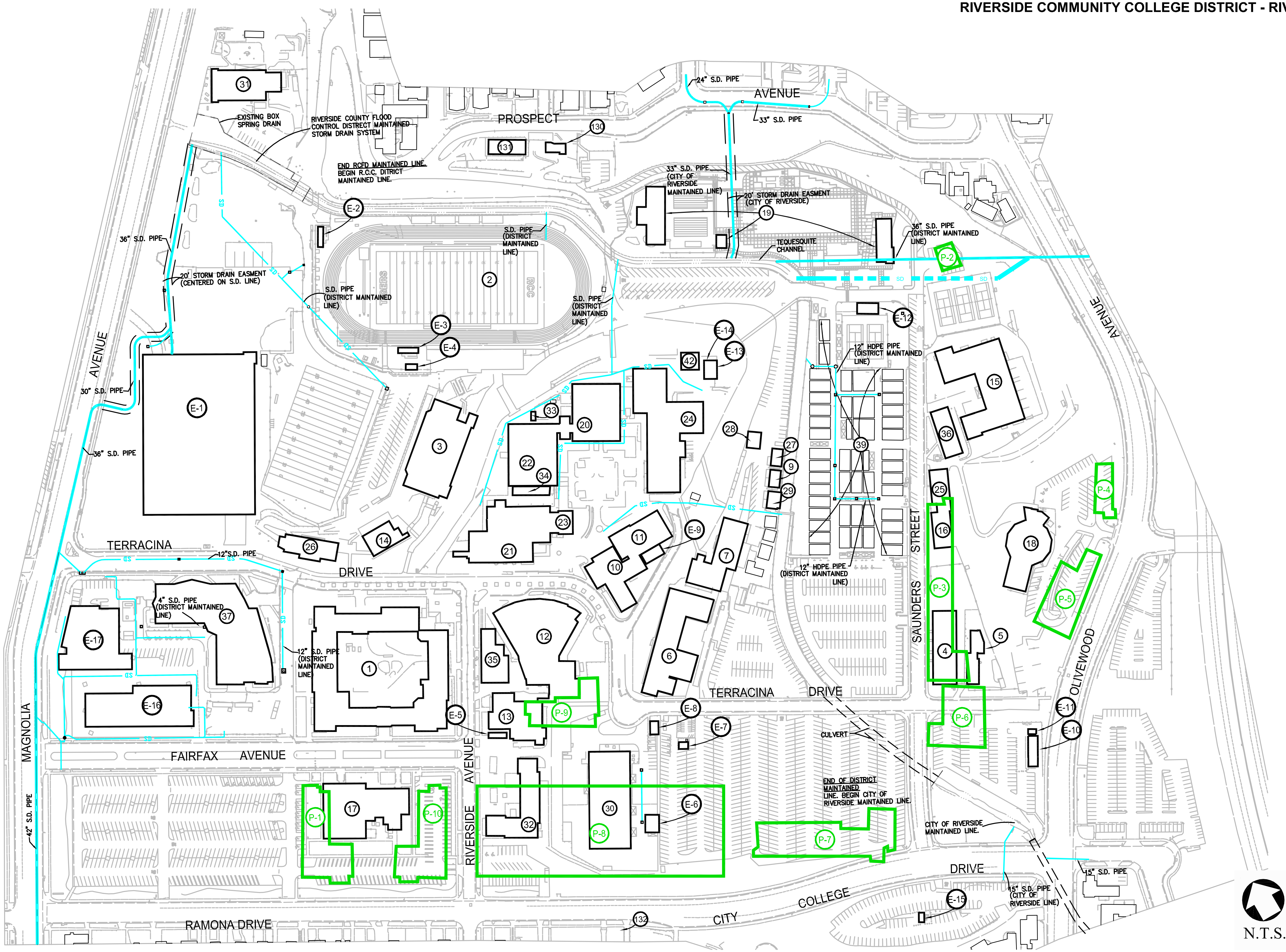


FIGURE 4A
EXISTING STORM DRAIN SYSTEM



LEGEND:

- ① EXISTING BUILDING
- P-1 PROPOSED BUILDING
- —SD— EX. STORM DRAIN
- ■■SD■■ PROP. STORM DRAIN

GENERAL NOTES:

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

FIGURE 4B
PROPOSED STORM DRAIN SYSTEM

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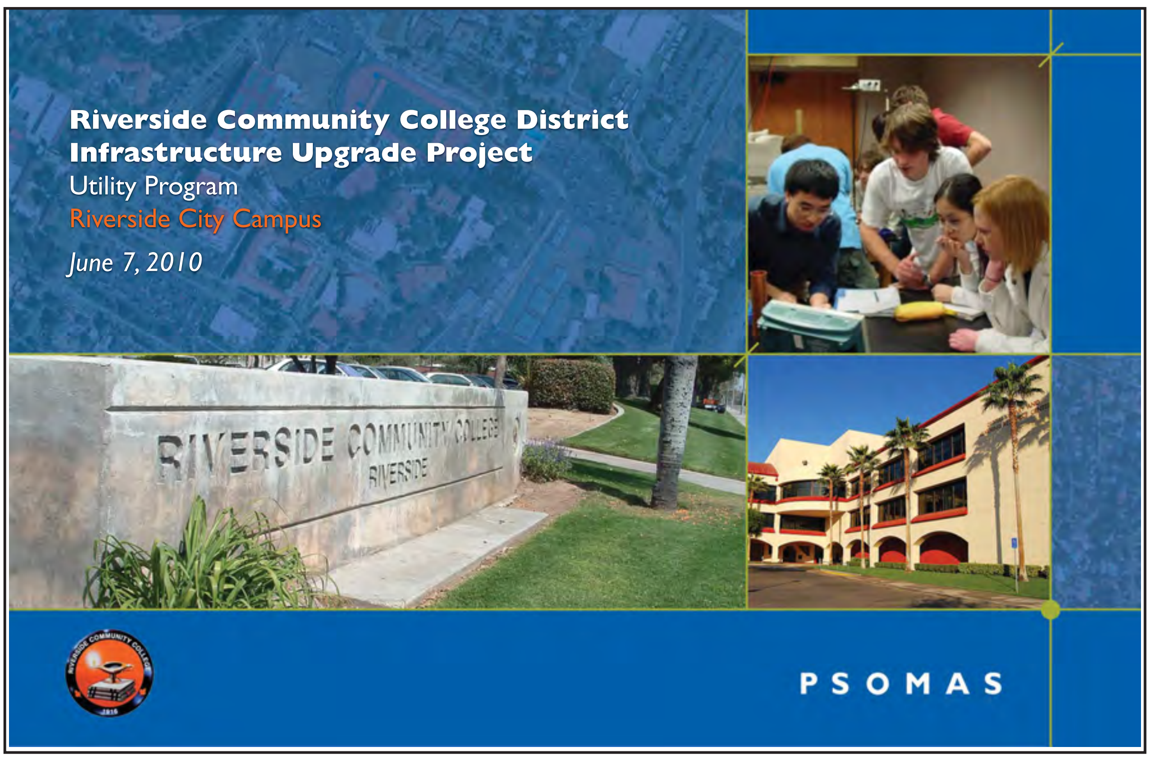
PART G
TELECOMMUNICATIONS UTILITIES

The following document has been excerpted from:

Riverside Community College District Infrastructure Upgrade Project
Utility Program
Riverside City Campus

June 7, 2010

Section 2 - Telecommunications



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.

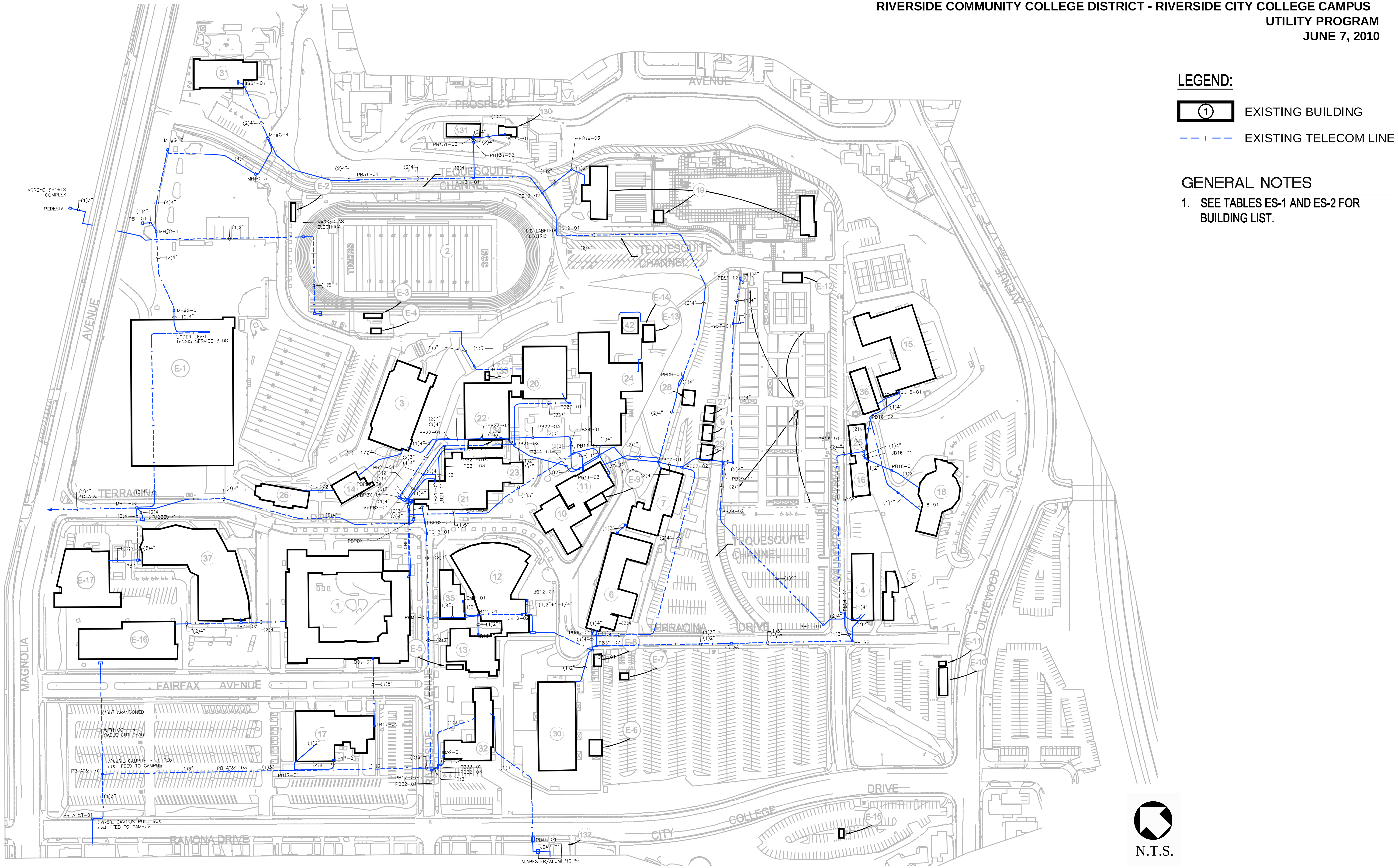
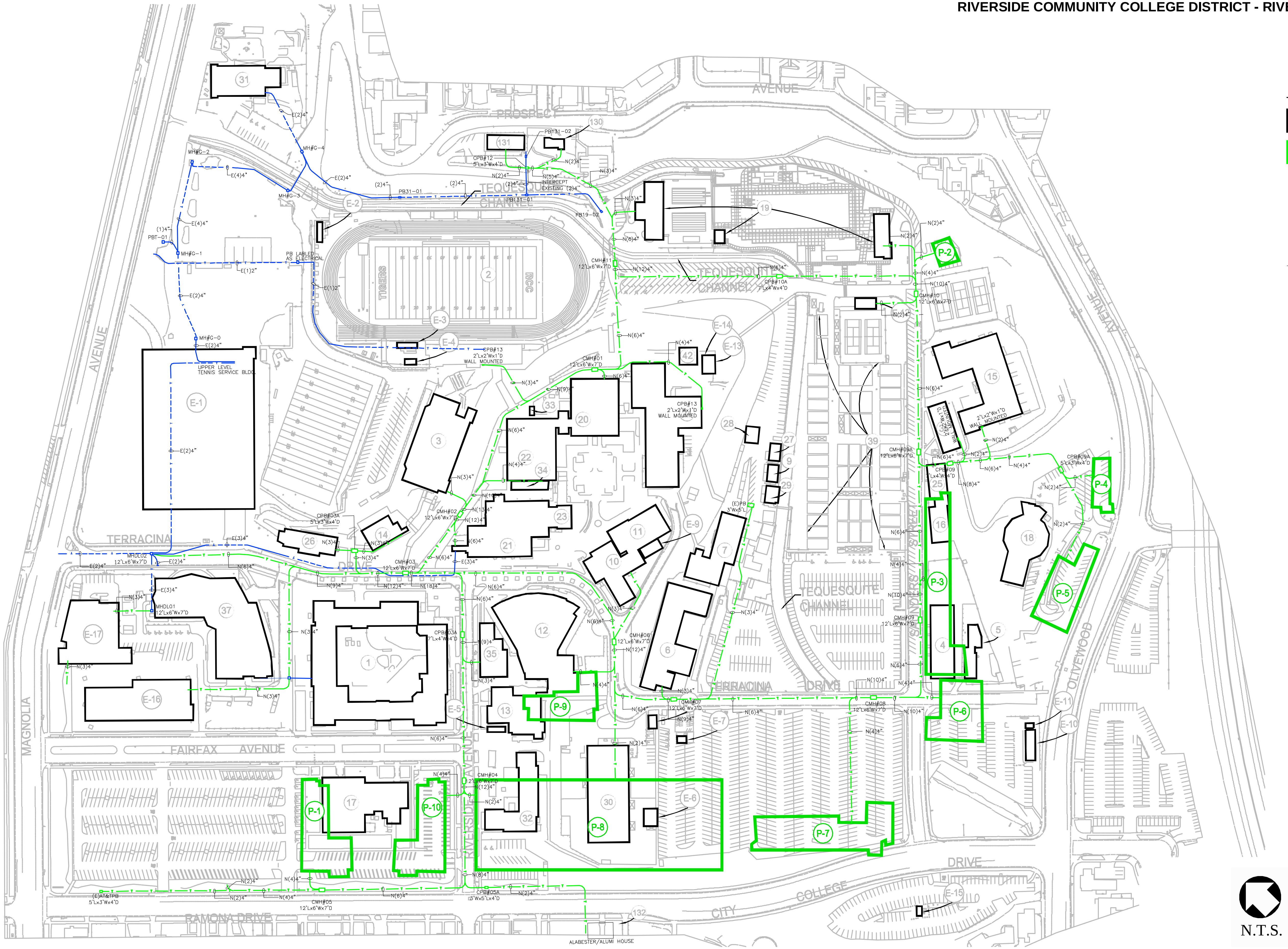


FIGURE 8a
EXISTING UTILITY MAP - TELECOMMUNICATIONS PLAN



LEGEND:

- EXISTING BUILDING
- 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

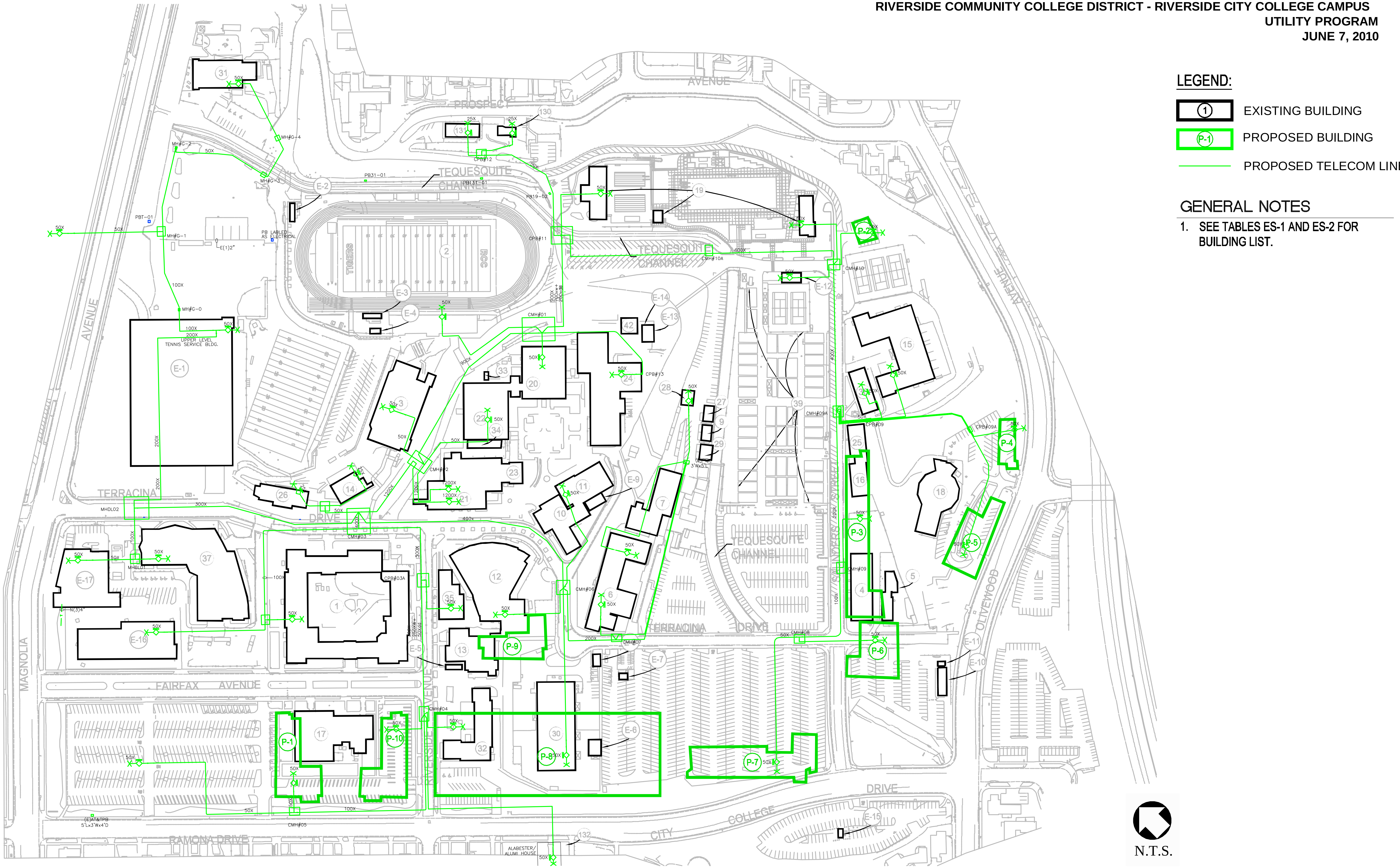


FIGURE 8c
FUTURE CONDITIONS UTILITY MAP - TELECOMMUNICATIONS COPPER PLAN

4 IRRIGATION

INTRODUCTION

Irrigation guidelines provide the irrigation design professional with the required information to design a complete irrigation system that is consistent within the District and whithin a particular campus. As a general approach, the irrigation guidelines focus on District standardization and high efficiency while adhering to current practices employed at the three campuses within the District.

The guidelines and specification in this section are intended to be used during design and construction of all irrigation systems on District property.

I. ANALYSIS OF EXISTING DISTRICT SYSTEMS

Questions / Item Descriptions	Moreno Valley	Norco	Riverside City
Drip Irrigation Used on Campus?	Yes	Yes	Yes
Drip Type(s) Used	Emitter	Emitter / Tubing	Tubing
Acceptance (Scale 1-10)	5	10	5
Reasons for Low Acceptance	RCW	N/A	Turf Use
Preferred Sprinkler Heads	Rain Bird 1800	Hunter Pro-Spray	Rain Bird 1800
Preferred Rotor Heads	Hunter PGP, I20, I40	Hunter I20, I40	Hunter I20, I40
MP Rotators Used on Campus?	Yes	Yes	No
Acceptance (Scale 1-10)	5	10	N/A
Reason for Low Acceptance	RCW	N/A	N/A
Swing Joints Preferred	PVC / Marlex	Pre-assembled	Pre-assembled
Backflow Devices Preferred	EMWD Approved	Wilkins 975	Febco 825-Y
Backflows in Enclosures?	Some	None	None
Master Valves on Campus?	Few	Few	Yes
Prefer Master Valves?	Yes	Yes	Yes
Type Preferred?	No Preference	Rain Bird N.C.	Griswold N.O.
Flow Sensors on Campus?	Few	Few	Some
Prefer Flow Sensors?	Yes	Yes	Yes
Adequate Gate Valves on Systems?	No	No	Yes
Type Preferred	No Preference	Bronze Gate	Bronze Gate & Ball
Quick Coupler Valves Preferred?	3/4” Acme for RCW	Rain Bird 3/4”	Rain Bird 3/4”
Installation	In Box	In Box	In Box
Swing Joint	PVC / Marlex	Pre-assembled	Pre-assembled

Questions / Item Descriptions	Moreno Valley	Norco	Riverside City
Control Valves on Campus	Rain Bird EFB-CP	Rain Bird EFB-CP	Superior 950
Preferred Control Valves	Rain Bird EFB-CP	Rain Bird PEB	Superior 950
Reasons for Preference	RCW used on Campus	External Tubing (EFB)	Standard
Valve Boxes	Plastic / T-Cover	Plastic / T-Cover	Plastic T-Cover
Preferred Piping for Mainline	Sch. 40 PVC	Sch. 40 PVC	Sch. 40 PVC
Preferred Mainline Pipe (>3" Size)	Cl. 200 B&G PVC	Cl. 200 B&G PVC	N/A
Large Mainline Fittings	Ductile Iron	Ductile Iron	N/A
HDPE Acceptable for Mainlines?	Yes	Yes	No
Preferred Piping for Lateral Lines	Sch. 40 PVC	Cl. 200 PVC	Sch. 40 PVC
Central Control on Campus?	No	No	No
Central Control Preferred?	Yes	Yes	No
Irrigation Supervisor Preference	Hunter IMMS	Hunter IMMS	N/A
RCCD Building Depart. Preference	**Rain Bird MaxiCom**		
Controller Preference	Rain Bird	Hunter ACC	Hunter
Two-Wire Preferred?	Yes	Yes	No
Controller Location	Building Exterior	Building Exterior	Building Exterior
Controller Enclosure	Stainless Steel	Stainless Steel	Stainless Steel

II. SUSTAINABILITY DISCUSSION

WATER CONSERVATION

Drip Irrigation should be encouraged. New California (AB 1881) rules require drip irrigation in many instances. The high efficiency of drip systems and reduced irrigation area contribute to water conservation.

Master valves and flow sensors should be required for all new systems. These components allow for early leak and broken equipment detection.

Weather based control systems should be used on all new systems and implemented on renovations. Weather based control systems adjust the irrigation schedules daily in response to local weather conditions as opposed to seasonal or monthly manual adjustments. AB 1881 requires the use of “smart controller” technology on all new irrigation systems.

A District-wide central control irrigation system should be implemented to allow for better control of the landscape irrigation system. A central control system puts control of the system at a single point on campus where the irrigation manager can review and respond to system issues quickly and without visiting each controller on the campus. Central control systems can be operated remotely from other locations to allow the manager to review the system when away from the office, or control can be granted to other campus supervisors when the irrigation manager is away from the campus.

Consideration should be given to the use of HDPE irrigation mainlines for future projects on the Moreno Valley and Norco campuses. HDPE mainlines provide a leak free system and can be installed with a 25 year warrantee against leaks. Leaking mainlines account for millions of gallons per year in water waste in irrigation systems.

RECYCLED WATER USE

Moreno Valley is the only campus currently operating with recycled water (RCW). The Norco campus may be connected to recycled water in the future. The Riverside City campus will probably never be connected to recycled water due to a lack of recycled water infrastructure in the area.

Whether the use of RCW for irrigation is a benefit to the campus is debatable. The Moreno Valley campus is extremely close to the Eastern Municipal Water District's RCW plant. The water leaving the plant has extremely high levels of chlorine that has proven to be a maintenance nightmare for the campus staff. Chlorine attacks the rubber components in irrigation equipment and leads to early failure of these components. Even using the special RCW valve components available, the staff must rebuild each and every remote control valve on campus every 18 months. The RCW also damages the rubber components in other valves and sprinkler heads leading to a reduced service life and increased maintenance costs. Recycled water is also higher in dissolved solids (salts) than potable water. Salts in irrigation water have a detrimental effect on plant and soil health. Many of the plants at the Moreno Valley campus appear to be suffering from the use of RCW.

The Eastern Municipal Water District has strict rules and regulations for the use of recycled water. They monitor the water use and methods of irrigation on campus. The District does frequent inspections, at short notice, and can shut off the RCW if leaks or overspray are detected. The campus staff has to be diligent in keeping the systems running within the EMWD regulations. All changes to the irrigation system, regardless of size, must be documented and submitted to the District for inclusion in the as-built record drawings. This has proven to be a great source of added maintenance expense to the campus. Even though the campus RCW supply line is protected with a backflow device, new systems are required to have an additional backflow device installed. This reduces the water pressure and can cause the need for pumping systems.

II. SUSTAINABILITY DISCUSSION (CONT'D)

REDUCING MAINTENANCE COSTS

Drip irrigation, properly designed and installed, contrary to popular assumptions requires much less maintenance attention than a conventional spray system. Other than leak detection and periodic filter cleaning the systems require little in the way of maintenance. Spray systems require constant adjustment to maintain the proper coverage and to eliminate overspray onto adjacent paving and un-irrigated areas.

Central control systems also reduce maintenance labor because the irrigation manager can review, control and adjust multiple controllers from a single computer location. System alerts, such as high flow detection, can be addressed quickly before greater damage occurs.

The proper location and design of irrigation mainline isolation valves, and isolation valves at the remote control valve locations, reduce the maintenance time to repair irrigation equipment. One of the greatest complaints by campus irrigation managers was that they must drain large portions of the mainline to repair a single control valve. This is a water waste, a time consumer, and can put large portions of the irrigation system “off line” while repairs are made.

The use of HDPE piping in irrigation mainlines creates a leak free system that is resistant to water hammer, pressure surges and ground subsidence. The repair of mainline leaks in PVC piping is time consuming and expensive. All PVC mainline systems will eventually leak and repairs will be necessary.

Irrigation standards create consistency in installation as well as allow for the stockpiling of replacement parts and components. This reduces system “down time” and facilitates maintenance and repairs.

CENTRAL CONTROL IRRIGATION SYSTEM

Given the description above of the benefits of a central control irrigation system, it is recommended that a single system be chosen and all future projects and renovations install compatible equipment. Both the Hunter IMMS and Rain Bird MaxiCom systems are well suited for the District's use. It does seem that there are more Hunter ACC controllers in place that might be able to be converted to satellite capability without replacing the controller. This would make the implementation of the central system less expensive that switching to another manufacturer. I believe that currently there is only one Rain Bird MaxiCom satellite controller in the District and it is at the Moreno Valley campus.

In my opinion the Hunter IMMS system is easier to use than the Rain Bird MaxiCom product. The MaxiCom product certainly has more features than IMMS, but many of the features are very specialized and add to the complexity of the system. Compared head to head, the Hunter system with ACC controllers and the IMMS software would be less expensive to install than the Rain Bird system. The Hunter system also offers a two-wire (decoder) controller with up to 99 stations available with the IMMS system; The largest MaxiCom controller is a 48 station unit and no two-wire controllers are available in the Rain Bird commercial lineup for use with MaxiCom software.

Given the campus irrigation managers at Moreno Valley and Norco have seen the Hunter IMMS system and that all three of the irrigation managers prefer the Hunter ACC controller, it seems like the Hunter system should be the chosen control system.

III. DESIGN STANDARDS

WATER EFFICIENT LANDSCAPE ORDINANCE (WELO):

Irrigation design should be based on the California Department of Water Resources State Model Water Efficient Landscape Ordinance (MWELO) and any local city, state, or water agency version of the MWELO. The irrigation design should also be based on the Irrigation Association's Turf + Landscape Irrigation Best Management Practices, current edition and tailored to the climate of each campus. The design documents shall include all required design techniques, calculations, and documentation required to satisfy the requirements of the Water Efficient Landscape Ordinance.

Moreno Valley Municipal Code: Title 9 Planning and Zoning Chapter 9.17: Landscape and Water Efficiency Requirements

City of Norco Municipal Code: Chapter 18.55: Water Efficient Landscaping

Riverside Municipal Code: Chapter 19.570: Water Efficient Landscaping and Irrigation

As a general approach, the goal for irrigation guidelines is focused on high efficiency while adhering to the current practices that each campus employs.

ZONING:

Irrigation design shall accommodate hydrozones accordingly. For example, separate zones are required for shrub beds and turf beds. Systems shall also be separated by sun exposure, i.e. north-east exposures versus south-west exposures. Systems irrigating the top of slopes should be separated from systems operating the bottom of slopes. Trees should be placed on a separate system to allow for deep root watering and continued irrigation should drought restrictions limit the overall irrigation water availability.

DRIP SYSTEMS:

Drip systems are encouraged in certain situations, due to the their high efficiency, but locations and use shall be approved by the campus Facilities Department and the District Facilities Planning and Development Department (FP+D). Areas that require drip irrigation in order to comply with the MWELO shall be irrigated with the drip irrigation best suited for the area, planting, and maintenance considerations.

CENTRAL CONTROL:

The District has set the irrigation central control system standard as the Hunter IMMS 3.0 system—see IV. District Equipment Standards. All new irrigation systems shall be designed to include the flow sensors and communication hardware required to connect to this system. In the event that a new system is installed prior to implementation of the District central control system, the irrigation design shall include a weather sensor to be connected to the irrigation controller to satisfy the MWELO “smart controller” requirement.

The irrigation design shall use the materials and components identified in the District Equipment Standards and the Campus Specific Equipment Standards. No substitutions shall be made without prior written campus and District approval.

RECLAIMED WATER:

Prior to the design or use of any recycled (reclaimed) water (RCW) from a local agency, a feasibility study shall be commissioned by the District to study the potential costs and benefits of the use of recycled water. The feasibility study shall include an analysis of the required design, construction, testing, conversion, maintenance, and horticultural costs and impacts on the campus. The feasibility study shall also include testing of the recycled water quality by an independent laboratory to identify potential chemicals present in the water and their potential harm.

All irrigation designs shall be plan checked by both the District Facilities Planning and Development Department (FP+D) representative as well as the irrigation supervisor for the specific campus. All documents pertaining to the review and acceptance of the installing irrigation contractor’s material submittals and shop drawings shall be provided to the District FP+D, as well as the irrigation supervisor for the specific campus.

CONSTRUCTION:

Construction observations shall be held during the installation of the irrigation system to insure compliance with the irrigation construction documents. At a minimum the observations shall include a mainline pressure test, a coverage test prior to planting operations, a pre-maintenance final observation, and a pre-turn-over final observation. Any issues identified during the site observation shall be noted in the field report and punch list. No further work on the irrigation system may take place until all outstanding issues are corrected to the satisfaction of the campus and District. The District FP+D representative and the irrigation supervisor shall attend all irrigation construction observations.

AS BUILTS:

All new irrigation systems shall have a Global Positioning System (GPS) as-built record drawing prepared prior to final acceptance of the project by the District. The GPS record drawing shall be prepared using Intuitrace Irrigation Mapping Software and mapping hardware as provided by Juniper Systems. It is critical that the data be compatible with the FUSION + GIS + ONUMA System—refer to Chapter 2: Part D.

The contractor shall provide the digital as-built map to the District in the format provided by Juniper Systems software. The as-built drawings shall include the following information:

- Mainline routing, mapped during open trench mainline pressure test.
- Point of connection (POC), backflow prevention device, booster pumps, master valve, and flow sensor.
- Controller location, electrical POC, weather sensors, and the location of the grounding rods.
- Mainline isolation valves.
- Quick coupler valves.
- Mainline air release valves.
- Remote control valves and drip remote control valves.
- Drip system flush and air release valves.
- The location of all large radius sprinkler heads on sports fields.
- The location of all synthetic turf cooling system heads.

IV. DISTRICT EQUIPMENT STANDARDS

DESCRIPTION	
1. Backflow Device Enclosure Refer to Campus Specific Equipment Standards	
2. Pressure Regulators Where the pressure at the irrigation water point of connection is 20 PSI or more higher than the required design pressure, a pressure regulator shall be installed on the downstream leg of the backflow assembly. The pressure regulator shall be a brass, *high-low range* unit capable of pressure settings between 10 PSI and 125 PSI. Manufacturer: Wilkins Model: 500HLR Sizes: 1" through 2" Website: http://zurn.com/operations/wilkins/pdfs/specsheets/REG-500.pdf	
3. Basket Strainers A basket strainer shall be installed on all irrigation water points of connection. The basket strainer shall be bronze with threaded ends and an 80 mesh stainless steel basket element. Basket strainer shall be installed on the downstream side of the backflow prevention assembly. Manufacturer: Eaton Hayward Model: 72 Simplex Sizes: 1" through 3" Website: http://www.eatonhaywardstrainers.com/model72.html	
4. Backflow Device Enclosures All backflow devices shall be installed inside of a vandal resistant enclosure. Enclosures shall be powder coated, cold rolled steel, and sized to fit the backflow device specified. Backflow enclosures shall be mounted on concrete pads per the manufacturer's recommendations Manufacturer: V.I.T. Products, Inc. Model: SBBC-CR Sizes: 22", 30", and 45" Website: http://www.vitproducts.com/pages/pricing5.html	

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
5. Booster Pumps If the water pressure on the project site is insufficient for operation of the irrigation system, a booster pump assembly shall be provided. The booster pump assembly shall be a packaged unit complete with pump, motor, variable frequency drive (VFD), control panel, flow sensors, pressure sensors, gauges, and enclosure. The pump system shall be specified to provide the flow and pressure required for the irrigation system using the available electrical power on the project site. Manufacturer: Barrett Engineered Pumps Model: Irriboost VFD Website: http://www.barrettpump.com/	
6. Master Control Valves Refer to Campus Specific Equipment Standards	
7. Flow Sensors A flow sensor shall be installed on all new irrigation water points of connection. The flow sensor shall be a PVC type with slip connections. The flow sensor shall be sized to accommodate the range of flow rates of the irrigation design. Flow sensors shall be installed below grade in a standard sized rectangular valve box Manufacturer: Creative Sensor Technology, Inc. Model: FSI-T Sizes: 1" through 2" Website: http://www.creativesensortechnology.com/downloads/pdf/flowsensor/Flow_Sensor_data_sheet_rT210.pdf	

DESCRIPTION	
8. Gate Valves Isolation valves for 3” and larger PVC irrigation mainlines shall be self restrained, resilient wedge, epoxy coated, ductile iron gate valves with bell and/or socket ends. Gate valves shall be installed below grade in a round valve box. Manufacturer: Leemco, Inc. Model: LMV Series Sizes: 3” through 6” Website: http://www.leemco.com/images/PDF/lmv_valve-brochure.pdf	
9. Ball Valves Isolation valves for 2-1/2” and smaller PVC irrigation mainlines, and for use on remote control valve assemblies, shall be a full port ball valve with a brass body, end cap and stem, and a chrome plated brass ball. Ball valves shall have a plated steel handle and threaded ends. Ball valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Nibco, Inc. Model: T-FP-600A Sizes: 1” through 2-1/2” Website: http://www.nibco.com/assets/TSFP600APV.pdf	
10. Quick Coupler valves Refer to Campus Specific Equipment Standards	
11. Quick Coupler Swing Joints Refer to Campus Specific Equipment Standards	

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
12. Air Release Valves Where mainline elevation changes exceed 10 vertical feet, an air release valve shall be installed at the high points of the mainline. The air release valve shall have a cast iron body, stainless steel float, and threaded ends. Remote control valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Crispin Multiplex Manufacturing Company Model: AL10/20 Sizes: 1" and 2" Website: http://www.crispinvalve.com/crispin%20web%20pdfs/airvacweb.pdff	
13. Remote Control Valves Remote control valves shall have a brass body and bonnet, Buna-N rubber internal parts, a 24VAC solenoid, and be a forward flow design. Remote control valves shall be sized per the flow rate of the irrigation zones, not to exceed 3.0 PSI loss through the valve. Each remote control valve shall be installed with a brass ball valve immediately upstream as part of the valve assembly (see standard Ball Valves on previous page). Remote control valves shall be installed with brass nipples and two unions sized to match the valve size. Remote control valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Buckner/Superior Model: 950 Sizes: 3/4" through 3" Website: http://www.bucknersuperior.com/Professionals/Products/InLineValves/950.aspx	

<table>
<tr><th>DESCRIPTION</th><th></th></tr>
<tr><td>14. Drip Remote Control Valves
Remote control valves used with drip systems shall be the same manufacturer, model, and type indicated as the Remote Control Valve standard, with the addition of a Disc Type Wye Filter and an Inline Pressure Regulator. Drip remote control valves shall be installed below grade in a “jumbo” sized rectangular valve box.

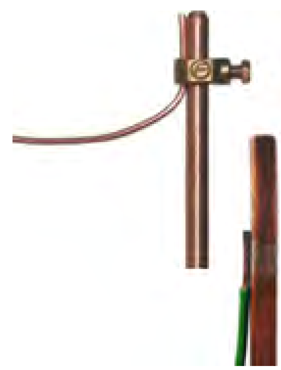
15. Disc Type Wye Filter
All drip remote control valves shall be equipped with a disc type wye filter immediately downstream of the control valve assembly. The wye filter shall be constructed of heavy duty plastic and have a 150 mesh disc type filter element. Filters shall be sized per the remote control valve and to accommodate the flow rate of the drip zone.

Manufacturer: Toro
Model: T-ALFDXX150-L
Sizes: 3/4” through 1-1/2”
Website: http://www.caddetails.com/1997/docs/065/065-196.pdf</td><td></td></tr>
<tr><td>16. Inline Pressure Regulator
All drip remote control valves shall be equipped with an inline pressure regulator immediately downstream of the wye filter. The pressure regulator shall be a fixed, pre-set pressure type, constructed of heavy duty plastic and stainless steel. Pressure regulators shall be sized to accommodate the flow rate and operating pressure of the drip zone.
Manufacturer: Senninger Irrigation, Inc.
Model: / Sizes:
PRL - Low Flow: 3/4” Inlet/Outlet
PMR-MF - Medium Flow: 3/4” - 1” Inlet/Outlet
PR-HF - High Flow: 1” - 1-1/4” Inlet/Outlet
Website: http://www.senninger.com/senninger-products/pressure-regulators/</td><td></td></tr>
</table>

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
17. Valve Boxes All equipment installed below grade shall be installed inside a plastic valve box. Valve boxes shall have green colored, "T-Cover" bolt down lids. One valve or valve assembly shall be installed in each box. Manufacturer: Carson - Oldcastle Model: Sizes: Std. Rectangular L-1419-12 17" L x 12" W x 12" D Jumbo Rectangular L-1324-12 25" L x 16" W x 12" D Round L-910 10" Dia. x 10.25" D Round L-708 6.25" Dia. x 9" D Website: http://www.oldcastleprecast.com/ plants/Enclosures/products/irrigation/ Pages/ specgrageplastics. aspx	
18. Central Control System The central control system for the Riverside Community College District is the IMMS 3.0 as manufactured by Hunter Industries. All new irrigation projects must be designed to be compatible with this central system. Controllers must have the required hardware to communicate with the central system. Evapotranspiration (ET) weather stations shall be installed where requested by the District. Flow sensors shall be designed for all new points of connection and wired to the satellite controller. Manufacturer: Hunter Industries Model: IMMS 3.0 Website: http://www.hunterindustries.com/ product/central-control/imms-30	

DESCRIPTION	
19. Satellite Controller Refer to Campus Specific Equipment Standards	
20. Decoders Refer to Campus Specific Equipment Standards	
21. Evapotransportation Sensor Refer to Campus Specific Equipment Standards	
22. Weather Sensor Refer to Campus Specific Equipment Standards	
23. Controller Enclosure The satellite irrigation controller shall be installed on the exterior of the project building and in the landscaped area whenever possible. The controller shall be installed inside a top entry, stainless steel controller enclosure. Manufacturer: V.I.T. Products, Inc. Model: SB-22SS Sizes: 24” W, 38” H, 15.5” D Website: http://www.vitproducts.com/pages/pricing0.html	

DESCRIPTION	
24. Controller Enclosure Mounting Pad All controller enclosures shall be mounted on an enclosure mounting pad in lieu of any concrete footings. The mounting pad shall have a plastic box base which is buried in the ground and filled with pea gravel to provide a stable mounting platform. A preformed and drilled, powder coated aluminum "base pad" is attached to the base and the controller mounted onto the pad. Manufacturer: V.I.T. Products, Inc. Model: QP-22 Sizes: 28.5" W, 28.5" D Website: http://www.vitproducts.com/pages/pricing2.html	
25. Controller Grounding Each controller shall be grounded as recommended by the manufacturer and as required by local building codes. 5/8" x 8 foot long, copper clad grounding rods shall be used for controller grounding. Ground wire shall be bare, solid copper wire, #6 AWG minimum gage, and connected to the ground rod with a copper clamp. Manufacturer: Paige Electric Company Model: Sizes: 182000 5/8" Dia. x 96" L 160635 #6 AWG (Solid, Bare) 182005 5/8" (Clamp) Website: http://www.paigewire.com/specs/P7345D.htm	

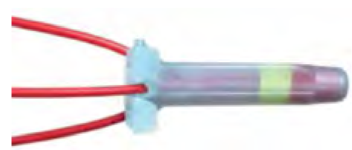
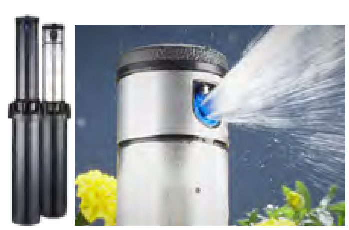
DESCRIPTION	
26. Two-Wire Path Grounding The two-wire path shall be grounded periodically along the wire path as recommended by the manufacturer to maintain the factory warranty on the equipment. Grounding plates and #10 AWG green colored PVC insulated wire shall be used. Manufacturer: Paige Electric Company Model: 182201IC Sizes: 4” W x 36” L #10 AWG (Solid, Green Insulation) Website: http://www.paigewire.com/specs/P7345D.htm	
27. Mainline Pipe The pipe for pressure mainlines sized at less than 3” shall be Schedule 40 (ASTM D1785), solvent weld PVC pipe installed 18” below finished grade. The pipe for pressure mainlines sized at 3” and larger shall be Class 200 (ASTM D2241), bell + gasket PVC pipe installed 24” below finished grade. Manufacturer: As Approved Model: Sizes: Schedule 40, Solvent Weld 2” through 2-1/2” Class 200, Bell & Gasket 3” through 6” Website: http://www.astm.org/Standards/plastic-pipe-standards.html	
28. Ductile Iron Fittings All mainline pipe sized 3” and larger shall use ductile iron push-on fittings at all directional changes and service tees. Mechanical pipe-to-fitting restraints shall be installed on all ends of the ductile iron fittings. Mechanical pipe-to-pipe restraints shall be installed on all belled pipe connections located within 50 feet of a directional change equal to or greater than 45 degrees. Manufacturer: Leemco, Inc. Model: IPS Sizes: 3” through 6” Website: http://www.leemco.com/images/PDF/leemco_ips_price_list-march_2012_web.pdf	

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
29. Lateral Line Pipe Refer to Campus Specific Equipment Standards	
30. PVC Fittings Refer to Campus Specific Equipment Standards	
31. PVC Solvent Welding The joining of PVC pipes shall be accomplished using a two step, primer and solvent cement, process for both mainlines and lateral lines (ASTM D2855). Primers shall have purple pigment included in the mixture (ASTM F656). Solvent cements shall be chosen based on the size and class of the pipe (ASTM D2564). Manufacturer: IPS Corporation (Weld•On) or Approved Equal Model: Primer: P-70 (Purple Color) Solvent Cement: 711 (Grey Color) for Mainline Pipe 705 (Grey Color) for Lateral Line Pipe Website: http://www.astm.org/Standards/plastic-pipe-standards.html http://www.ipscorp.com/weldon	

<table>
<tr><th>DESCRIPTION</th><th></th></tr>
<tr><td>32. Sleeve Pipe
The pipe for all sleeves under pavement shall be Schedule 40 (ASTM D1785), solvent weld PVC pipe installed 36” below vehicular paving and 24” below non-vehicular paving.
Manufacturer: As Approved
Model: Schedule 40, Solvent weld
Sizes: 2” through 12”
Website: http://www.astm.org/Standards/plastic-pipe-standards.html</td><td></td></tr>
<tr><td>33. Electrical Conduit
The low voltage irrigation control wires, the two-wire path, shall be installed inside a Schedule40 (ASTM F512), grey, solvent weld PVC conduit installed with the irrigation mainline. Minimum conduit size shall be 1-1/4”. Conduits shall be UL 651 rated for underground use. Conduits shall sweep into and out of valve boxes using long sweeps.
Manufacturer: As Approved
Model: Grey, Schedule. 40, Solvent weld
Sizes: 1-1/4” through 3”
Website: http://www.astm.org/Standards/plastic-pipe-standards.html</td><td></td></tr>
<tr><td>34. Control Wire
The two-wire path shall be a twisted pair of polyethylene insulated (one blue and one red) #14 AWG solid copper wires. The twisted pair shall be enclosed inside a 0.035” high density polyethylene jacket.
Manufacturer: Paige Electric Company
Model: P7354D
Sizes: 2 - #14 AWG
Website: http://www.paigewire.com/specs/p7354D.htm</td><td></td></tr>
</table>

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
35. Waterproof Wire Connections All wire connections for the irrigation system shall be made using waterproof wire connectors. The wire connector shall include a twist-on wire nut and a gel filled tube. The waterproof wire connectors shall be UL 486D rated for direct burial. Manufacturer: Paige Electric Company Model: DBR/Y-6 Website: http://www.paigewire.com/specs/P7364D.htm	
36. Large Radius Gear Driven Rotor Sprinklers Sprinkler heads for large turf and sports turf irrigation shall be 6" pop-up gear driven rotors. The sprinkler shall be constructed of heavy duty plastic and stainless steel parts. The sprinkler shall have a three port nozzle, a non-strippable drive, a thick rubber cover, and a 1" bottom inlet. Manufacturer: Hunter Industries Model: I-40-06-SS Sizes: 44 foot through 69 foot Radius Website: http://www.hunterindustries.com/product/rotors/i-40	
37. Medium Radius Gear Driven Rotor Sprinklers Sprinkler heads for medium turf and shrub/ground cover irrigation shall be 6" or 12" pop-up gear driven rotors. The sprinkler shall be constructed of heavy duty plastic and stainless steel parts. The sprinkler shall have a single port nozzle, a non-strippable drive, and a 3/4" bottom inlet. Manufacturer: Hunter Industries Model: Sizes: I-20-06-SS 17 foot through 46 foot Radius I0-20-12 17 foot through 46 foot Radius Website: http://www.hunterindustries.com/product/rotors/i-20	

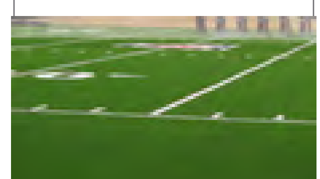
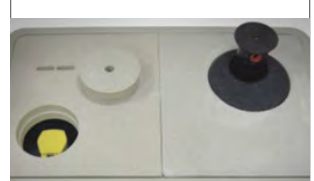
DESCRIPTION	
38. Small Radius Rotating Sprinklers Sprinkler heads for small to medium turf and shrub / ground cover irrigation shall be 6” or 12” pop-up, multiple stream, multiple trajectory stream rotors. The rotating nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance. Manufacturer: Hunter Industries Model: Sizes: MP1000/2000/3000 10-foot through 30-foot Radius PROS-06-PRS40 6” Height + 40 PSI PROS-12-PRS40 12-foot Height + 40 PSI Website: http://www.hunterindustries.com/product/nozzles/mp-rotator http://www.hunterindustries.com/product/pop-bodies/pro-spray-prs40	
39. Fixed Arc Spray Sprinkler Refer to Campus Specific Equipment Standards	
40. Bubbler Sprinkler Refer to Campus Specific Equipment Standards	
41. Large Sprinkler Swing Joints Refer to Campus Specific Equipment Standards	
42. Small Sprinkler Swing Joints Refer to Campus Specific Equipment Standards	

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
43. Subsurface Drip Tubing Subsurface drip tubing may be used for turf and shrub/ground cover areas. The subsurface drip tubing for turf areas shall have emitters protected against root intrusion with a non-chemical technique that shall have a minimum duty life of 10 years. Non-turf applications are not required to have root intrusion protection. Drip tubing shall have 17mm diameter, flexible plastic tubing with pressure compensating emitters factory installed inside the tubing at a regular spacing. The distance between the tubing rows and the depth below grade shall be coordinated with the District FP+ D representative. Drip tubing systems shall use 17mm insert fittings of the same manufacturer as the drip tubing. Manufacturer: Rain Bird Model: Sizes: XFS-06-12 (Turf) 17mm with 0.61 GPH emitters 12" O.C. XFD-06-12 17mm with 0.61 GPH emitters 12" O.C. XF Series Fittings 17mm Website: http://www.rainbird.com/landscape/products/dripline/XFS.htm http://www.rainbird.com/landscape/products/dripline/XFseriesDripline.htm http://www.rainbird.com/landscape/products/dripDistribution/XFdriplineInsertFittings.htm	 

DESCRIPTION	
44. Drip Emitters Drip emitter irrigation may be used for shrub/ground cover planting areas where suitable. Each plant in the landscaped area shall receive a minimum of two drip emitters to provide even coverage of the root ball. Actual numbers of emitters required shall be based on the soil type, emitter flow rate, and the mature size of the plant. The drip irrigation design shall allow for a minimum of 50% of the ground under the canopy of the mature shrub to be “wetted” by the drip emitters. Drip emitters shall be installed on PVC lateral line piping with a 1/2” MIPT x polyflex riser. The poly flex riser shall extend to the finished soil grade and the emitter shall be installed on top of the riser. The drip emitter shall have a be installed 1” above finished grade. Manufacturer: Rain Bird Model: Sizes: XB-05/10/20-1032 0.5, 1.0 and 2.0 GPH PFR-FRA 1/2” x 12” L Website: http://www.rainbird.com/landscape/products/dripEmission/XeriBugEmitters.htm http://www.rainbird.com/landscape/products/dripDistribution/PolyflexRisersAdapters.htm	
45. Drip System Air Relief Valves All subsurface drip tubing systems shall have air/vacuum relief valves installed to allow air to escape the tubing and prevent suction of debris into the drip emitter as water evacuates the tubing upon shut down. The number of air relief valves required per zone shall be determined by the design and flow rate of the drip tubing zones. The ARV shall be installed below grade and inside a 6” round valve box. Manufacturer: Rain Bird Model: ARV50	

IV. EQUIPMENT STANDARDS (CONT'D)

DESCRIPTION	
46. Drip flush Valves All drip tubing and emitter systems shall have manual flush valves installed to allow for maintenance and post repair cleaning and flushing of the lines to remove debris. The flush valves shall be located at the ends of the drip zones to allow for the maximum flushing of the lines. The number of flush valves required per zone shall be determined by the design and flow rate of the drip zones. The flush valve shall be a 3/4", Schedule 40 PVC ball valve with threaded ends. The flush valve shall be installed vertically and below grade and inside a 6" round valve box. Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: V08591N Sizes: 3/4" Website: http://www.colonialengineering.com/pdf/CV_MIPValve.pdf	
47. Synthetic Turf Cooling Systems All synthetic turf fields shall receive automatic sprinkler cooling systems. Cooling systems shall include the very large radius sprinkler head, valve, quick coupler valve, and installation vault. No cooling system sprinkler assemblies shall be allowed inside the area of play without written District approval and review of design considerations. Manufacturer: Hunter Industries Model: Sizes: STK-1 / STK-2 75-80 GPM at 103 foot to 115 Radius STK-5 / STK-6 96-286 GPM at 107 foot to 160 foot Radius Website: http://www.hunterindustries.com/product/stk-12/stk-12 http://www.hunterindustries.com/product/st-system/stk-5-stk-6	  

SECTION 4
MORENO VALLEY COLLEGE

PART A
EXISTING CONDITIONS

MEETING DATE: December 16, 2011

SITE REPRESENTATIVES: Dale Barajas (DB), Facilities Director
Johnny Rubalcaba (JR), Irrigation Supervisor

I. IRRIGATION METHODS:

2. Does the College have any landscaped areas using drip irrigation?
    - Yes. Earlier systems with individual drip emitters on riser were prone to failure and were removed and replaced with stream bubbler heads. Some new systems have been added (Lion's Lot - parking lot). The concern is that the recycled water being used on the campus is dirty and causes clogging. JR states that he is open to the use of drip irrigation, but it must be designed to contend with the recycled water problems.

3. What type of drip systems are being used? (Individual drip emitters, multiple outlet drip emitters, drip tubing).
    - Earlier drip emitters, single outlet installed on ½" Schedule 80 risers, were being used. New project uses Toro recycled water DL 2000 drip tubing.

4. How successful has the use of drip irrigation been on the campus?
    - Limited success due to dirty recycled water.

5. Given that the state has new water efficient landscape rules that encourage the use of drip irrigation, is it something that should be considered for future campus projects?
    - JR is very open to the use of drip irrigation as long as it is designed with the use of recycled water in mind.

6. What type of spray heads are used on the campus? What manufacturers?
    - Rain Bird 1800 series pop-up heads and nozzles. 2-foot through 15-foot radius heads, fixed arc nozzles, as well as VAN nozzles where necessary.

7. What type of rotor heads are used on the campus? What manufacturers?
    - Hunter PGP, I-20, and I-40 rotor heads are used on campus.

I. IRRIGATION METHODS (CONT'D):

7. Have you used MP Rotators on campus? If yes, how successful has their use been?
   - Yes, some success, but JR describes them as hard to adjust accurately and prone to clogging with the recycled water.

8. What type of sprinkler swing joints do you prefer? Contractor assembled or pre-manufactured? Manufacturer?
   - JR prefers the use of PVC and Marlex swing joints. He states that broken sprinklers are easier to repair when assembled swing joints are used as they require less of a hole be excavated to access the repairs. He also notes that with assembled swing joints he can replace individual components rather than replacing the entire swing joint.

9. What type of sprinkler swing joints do you prefer? Contractor assembled or pre-manufactured? Manufacturer?
   - JR prefers the use of PVC and Marlex swing joints. He states that broken sprinklers are easier to repair when assembled swing joints are used as they require less of a hole be excavated to access the repairs. He also notes that with assembled swing joints he can replace individual components rather than replacing the entire swing joint.

II. VALVES AND OTHER EQUIPMENT:

1. What type of reduced pressure backflow devices are preferred?
   - No preference as long as they are approved by Eastern Municipal Water District (EMWD) for use on their recycled water system. Backflows are required to be painted purple per EMWD code.

2. Are your backflow devices in enclosures? What type? (stainless steel, expanded metal, cold rolled steel, aluminum, “smooth touch”). Do you use freeze protection blankets or warming devices? Is there a need for these?
   - Most are not in enclosures, but the new Lion’s Lot has a cold rolled steel, painted green, smooth touch enclosure. JR liked the assembly and the fact that it did not provide soft edges that could cut fingers.

3. We recommend master valves and flow sensors on every system. Do any of the systems on campus have these devices? Are the master valves “normally open” or “normally closed” type?
   - None of the existing systems have these components, but the new Lion’s Lot has both a master valve and a flow sensor. JR welcomes this new technology as it gives him more access to good information for maintenance.

4. What type of isolation valves are preferred? (Gate, Butterfly, brass ball, or PVC ball type) Manufacturers?
   - Unfortunately few are existing on the campus. Some that are on campus have never been “exercised” so they have frozen in an open position. JR does not have a preference for the type of isolation valve to be used, but wants them to be accessible and have a long service life. The new Lion’s Lot has Schedule 80 PVC ball valves with the slow-close feature to prevent fast closing of the ball valve. Current lack of isolation valves causes long delays in repairs to Remote Control Valves (RCV’s) as the entire mainline must be drained to shut off water to the valve assemblies.

II. VALVES AND OTHER EQUIPMENT (CONT'D):

5. Are quick couplers commonly used after installation or are they necessary? What size is preferred? (3/4” or 1”)? Do you prefer them below grade in a box, or surface mounted? What type of swing joint materials do you prefer?
   - These are required by Eastern Municipal Water District (EMWD) and need to be the units with acme style threads, ¾” size preferred.
   - Below grade box installation preferred. JR states that he prefers a similar PVC and Marlex swing joint assembly.

6. What components do you prefer to be included on control valves? (plastic versus brass bodies, pressure regulating, dirty water valves, unions, etc). Manufacturers?
   - JR prefers brass valves. Current campus standard is Rain Bird EFB-CP valve. JR feels that if a brass valve is used, no unions are required as the valve can be completely overhauled in the valve box without it being necessary to remove. JR agrees that unions would be helpful if the valve does require removal and would prefer if used with plastic valves. JR mentions that, due to the use of the highly chlorinated recycled water, the Remote Control Valves (RCV's) must be completely rebuilt every two years. This is due to the breakdown of the rubber components inside the valves. Prior to the use of the recycled water components available for the valves, the RCV's would routinely fail in under six months time. Pressure regulation and dirty water valves would be preferred. A shut off valve on each valve or on a manifold of valves off the mainline would be preferred to allow for rebuilding and repairs without draining the entire mainline.

7. What type of valve boxes do you prefer? (Plastic, concrete, t-cover plastic lids, cast iron lids, concrete lids, locking lids, bolt down lids)? Do you prefer the boxes be installed in shrub areas or turf areas?
   - Plastic valves with T-covers and bolt down lids preferred. All valve boxes must be purple in color and conform to the EMWD recycled water requirements. No preference to valve box location.

8. Please list any other components that you can foresee needing for projects on your campus.
   - None.

III. PIPING:

1. What type of pipe do you prefer for mainlines of 3” size and over? Class 315, Class 200, or some other class/type? Solvent welded PVC fittings, push-on PVC fittings, or ductile iron push-on fittings? Thrust blocks or mechanical restraints on mainlines?
   - Currently campus is all Schedule 40 PVC pipe for mainlines of all sizes. Pipe class change by size to utilize the large wall thickness (Schedule 40 for less than 2” size and Class 315 for over 2” size) is acceptable. The use of Class 200 PVC, with ductile iron fittings and restraints, for pipe sizes over 3” is also acceptable. Currently most mainlines on campus have thrust blocking on directional changes. All piping is required to be purple color coded per EMWD code.

2. What type of pipe do you prefer for mainlines of 1-½” through 2-½”? Schedule 40, Class 315, Class 200? Fittings shall be solvent weld PVC, what Schedule is preferred? (Schedule 40 or Schedule 80)?
   - See above. Schedule. 80 PVC fittings on mainline would be preferred, but current mainlines all have Schedule 40 fittings.

3. What type of pipe do you prefer for lateral lines of ¾” through 3”?
   - Schedule 40, Class 315, Class 200? JR prefers Schedule. 40 PVC pipe for lateral lines. All piping is required to be purple color coded per EMWD code.

4. Have you considered the use of High Density Polyethylene (HDPE) pipe for mainlines and/or lateral lines? Would you like to discuss the benefits and costs for future consideration?
   - JR has no experience with the use of HDPE pipe, but would be interested in using it based on the benefits of the system.

III. PIPING (CONT'D):

5. What depth of cover do you prefer for mainlines and lateral lines?
   - 18” over mainlines 2-½” and smaller, 24” over mainlines 3” and larger. 12” over all lateral lines.

6. What type of pipe would you prefer for sleeving under paving? What depth under paving is preferred?
   - Schedule 40 PVC preferred.

7. Do you use detectable warning tapes or tracer wires over your mainline piping? Would this be a benefit?
   - Yes, EMWD standards require a marking tape. A detectable version would be preferred.

8. Any other piping concerns?
   - None.

IV. CONTROL SYSTEMS:

1. Does your campus have a central control system? Is one being planned? What type?
   - None as of yet. JR states that he prefers the Hunter ACC controllers and would like to see a Hunter IMMS central installed. But, through the design of the Lion's Lot, a Rain Bird MaxiCom system seems to have been selected by the District.

2. Do you prefer an onsite weather station, satellite provided evapotranspiration (ET) data or soil moisture sensors? Does your campus utilize any of these?
   - JR feels that some sort of local weather or climate device is necessary because they are in a specific micro climate on campus. The campus is on a hill quite a bit higher than the rest of the valley and on a west facing slope. Their weather would be much different than the areas a few miles away in the middle of the valley.

3. What type(s) of communication does your central control system utilize?
   - N/A

4. Controllers located inside buildings or on building exterior? Enclosure type preferred? (Top entry, front entry, stainless steel, cold rolled steel)
   - All controllers should be on the exterior of the building and inside of stainless steel enclosures.

5. Have you considered using a two-wire or decoder style controller in place of conventional controllers?
   - Yes, the campus does not have any at this time, but they have battled with control wire damage for years. Contractors from non-landscape trades have broken wires and not informed the staff. The result is that JR and his staff have spent hundreds of hours trying to piece together broken wires. A two-wire system would reduce this problem and allow for phasing of projects from a single control point.

6. What wire type preferred? Should the control wires be direct burial or in conduit?
   - Direct burial is fine.

V. CONTROL SYSTEMS (CONT'D):

7. Type of waterproof connectors preferred?
    - JR prefers grease filled wire nuts because he often has to remove them when servicing valves.

8. Do you have a radio remote control device for your controllers? What type and manufacturer?
    - Yes, a Hunter remote.

9. Have you used a VIT Quick Pad for any controller enclosure installation?
    - No, but JR sees the advantage as they have some controllers that are tilted.

10 .Do you use rain sensors, freeze sensors, flow sensors, or moisture sensors?
    - Currently use rain sensors and can see the need for flow and freeze sensors as well.

11. Would allowing the campus Building Management System (BMS) to have access to the irrigation central control system be advantageous?
    - No.

VI. OTHER CONCERNS:

1. Does your site use recycled water (RCW)? Do you foresee using recycled water in the future?
   - Yes. Currently the use of recycled water is a big issue on campus. The water is dirty and high in chlorine. The high chlorine levels are probably due to the close proximity to the processing plant. The high chlorine levels are destroying the rubber components on the valves and other components. Constant maintenance is required.
   - Eastern Municipal Water District (EMWD) is hard to deal with and requires constant updating of as-built drawings to reflect any changes to the system. Water cannot land outside of planted areas or EMWD will shut off the water to the project. Frequent inspections by EMWD staff cause manpower problems and cost the campus money. The watering window is restrictive and very highly enforced.

2. Do you have any alternative water sources used for irrigation? Rainwater harvesting, A/C condensate recovery, grey water, cooling tower blown down water? Do you foresee the use of any of these in the future?
   - None and none are planned. JR would be interested in hearing more about this as he is concerned about water conservation.

3. Does your campus have or are they considering any synthetic turf fields? Would these have cooling systems?
   - No.

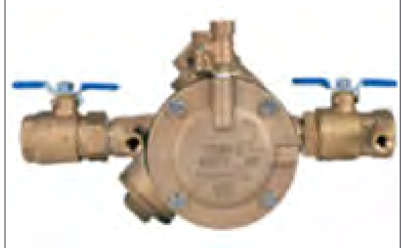
4. Are you familiar with the California Water Efficient Landscape Ordinance (AB 1881) and your local agencies ordinance?
   - Yes.

5. Do you have any booster pumps on the campus? What brand and/or type do you prefer?
   - One for the soccer field at the high point in the system. In the design of the Lion's Lot we were told that there is a campus wide booster pump that is not functional and has not worked in years. I heard of this after the meeting and have not been able to confirm it.

6. Any other irrigation concerns?
   - Better communication between building teams and maintenance.
   - Maintenance teams should have some say in what is being used and where.
   - All designs should be compatible with recycled water and be compliant with EMWD rules.
   - No sprinkler run-off, ever!
   - Pop-up heads in small shrub areas should be 6" high and not the 12" heights often installed. This leads to overspray.

PART B

CAMPUS EQUIPMENT STANDARDS

DESCRIPTION	
1. Backflow Prevention Devices Where required for connections to new irrigation water supplies, a *reduced pressure principle* backflow prevention device shall be installed. Backflow devices shall be installed above grade, to local codes, and have assemblies constructed of brass fittings, unions, and nipples sized to match the size of the device. Manufacturer: FEBCO Model: 825Y Sizes: 1” through 2” Website: http://www.febcoonline.com/Products/825Y	
6. Master Control Valves A master control valve shall be installed on all new irrigation water points of connection. The master valve shall have an epoxy-fused, cast iron body, with a bronze bonnet, and be a normally open type. Master control valves shall be installed with brass nipples and two unions sized to match the valve size. Master control valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Griswold Controls Model: 2160-E Sizes: 1” through 3” Website: http://www.griswoldcontrols.com/pdfs/F-2667.pdf	

DESCRIPTION	
10. Quick Coupler Valves Quick coupler valves shall be installed at a spacing of 100 feet on center along the length of the mainline. Quick coupler valves shall have a two piece brass body, a double track key lug, and a yellow rubber cover. Quick couplers shall be 3/4" size and have a threaded inlet. Quick coupler valves shall be installed below grade in a round valve box. Manufacturer: Rain Bird, Inc. Model: 33-DRC Sizes: 3/4" Website: http://www.rainbird.com/landscape/products/valves/quickCouplingValves.htm	
11. Quick Coupler Swing Joints Quick couplers shall be installed with a factory assembled, o-ringed, PVC swing joint with a 1" MIPT inlet and a 3/4" brass MIPT outlet. The swing joint shall have a 12" lay length and incorporate a Snaplok™ stabilizer assembly on the outlet (QCV) end. Manufacturer: Lasco Fittings, Inc. Model: G13T-212 Sizes: 1" x 3/4" Website: http://www.lascofittings.com/default.asp	

<table>
<tr><th>DESCRIPTION</th><th></th></tr>
<tr><td>19. Satellite Controller
The irrigation controller shall be a satellite controller capable of connection to the District’s standard irrigation central control system. The controller shall be equipped with the appropriate communications module (hardwire/radio, dial-up telephone, or cellular telephone) for the project site. The satellite controller shall be a two-wire (decoder) type that uses a two-wire path to connect all of the control valves served by the satellite controller.
Manufacturer: Hunter Industries
Model: ACC-99D
Sizes: 1 through 99 Stations
Website: http://www.hunterindustries.com/sites/default/files/BR_ACCD_dom.pdf</td><td></td></tr>
<tr><td>20. Decoders
Each master control valve and remote control valve shall be installed with a decoder to connect the valve to the two-wire path and to communicate with the satellite controller. Decoders are available in single, two, four, and six station models so that one decoder may serve multiple valves. A sensor decoder shall be installed with the flow sensor. The decoders shall be wired to the valve and the two-wire path as recommended by the manufacturer.
Manufacturer: Hunter Industries
Model: ICD-100/200/400/600 & ICD-SEN
Website: http://www.hunterindustries.com/product/controllers/acc-99d-decoder</td><td></td></tr>
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DESCRIPTION	
21. Evapotranspiration Sensor Where requested by the District, an evapotranspiration (ET) sensor shall be installed with the satellite controller. The evapotranspiration sensor shall collect onsite weather data, including wind data, and calculate the local evapotranspiration factors. The sensor shall be wired to the controller to disseminate the ET data to the central control system. The evapotranspiration sensor shall be pole mounted and within the manufacturer's recommendations for sensor/controller distance and location. Manufacturer: Hunter Industries Model: ET-SENSOR/ET-Wind Website: http://ww.hunterindustries.com/product/sensors/et-system	
22. Weather Sensor When a controller is installed as a stand-alone unit and cannot be connected to the District's central control system, a controller specific weather station shall be installed to provide real time weather data and rain sensing functions to the controller. The weather sensor shall be mounted on the controller enclosure and wired to the controller. Manufacturer: Hunter Industries Model: SOLAR-SYNC-SEN Website: http://www.hunterindustries.com/product/sensors/solar-sync	

DESCRIPTION	
29. Lateral Line Pipe The pipe for all non-pressure lateral lines shall be Schedule 40 (ASTM D1785), solvent weld PVC pipe installed 12” below finished grade. Manufacturer: As Approved Model: Schedule 40, Solvent weld Sizes: 3/4” through 3” Website: http://www.astm.org/Standards/plastic-pipe-standards.html	
30. PVC Fittings All solvent weld and threaded fittings for use on PVC pipe shall be Schedule 40 (ASTM D2466). All threaded PVC nipples shall be Schedule 80 (ASTM D2464). Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: Sizes: Schedule 40, Solvent weld 3/4” through 3” Schedule 80, Threaded 1/2” through 3” Website: http://www.astm.org/Standards/plastic-pipe-standards.html http://www.lascofittings.com/Products/pricelst/xls/PDF/sched40.xls.pdf http://www.lascofittings.com/Products/pricelst/xls/PDF/nipples.xls.pdf	

DESCRIPTION	
39. Fixed Arc Spray Sprinklers Sprinkler heads for small to medium turf and shrub/ground cover irrigation shall be 6” or 12” pop-up, fixed arc spray heads. The fixed arc spray nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance. Manufacturer: Rain Bird Model: Sizes: U Series Nozzles 8-foot through 15-foot Radius 1806-SAM-PRS 6” Height + 30 PSI 1812-SAM-PRS 12-foot Height + 30 PSI Website: http://www.rainbird.com/landscape/products/sprayNozzles/UseriesNozzles.htm http://www.rainbird.com/landscape/products/sprayBodies/1800.htm	
40. Bubbler Sprinklers Bubbler heads for trees and small shrub/ground cover irrigation shall be 6” pop-up, fixed arc stream bubbler heads. The fixed arc bubbler nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance. Manufacturer: Rain Bird Model: Sizes: 5-B Series Nozzles 5-foot Radius 1806-SAM-PRS 6” Height + 30 PSI Website: http://www.rainbird.com/landscape/products/sprayNozzles/MPRseriesNozzles.htm http://www.rainbird.com/landscape/products/sprayBodies/1800.htm	

DESCRIPTION	
41. Large Sprinkler Swing Joints All large radius gear driven rotor heads shall be installed with a factory assembled, o-ringed, PVC, triple swing joint. The swing joint shall have a 1" MIPT inlet and outlet and a 12" lay length. Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: T932-212 Sizes: 1" x 12" L Website: http://www.lascofittings.com/SupportCenter/overview.asp	
42. Small Sprinkler Swing Joints All medium and small radius rotor heads and spray heads shall be installed with factory assembled, poly tubing and an ABS plastic, triple swing joint. The swing joint shall have either a 1/2" or 3/4" MIPT inlet and outlet (to match the sprinkler head specified) and a 12" lay length. Swing joints shall have a 150 PSI pressure rating. Manufacturer: Hunter Industries Model: Sizes: SJ-512 1/2" x 12" L SJ-712 3/4" x 12" L Website: http://www.hunterindustries.com/product/micro-irrigation/sj-swing-joint	

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SECTION 4
NORCO COLLEGE

PART A
EXISTING CONDITIONS

MEETING DATE: December 14, 2011

SITE REPRESENTATIVES: Steve Monsanto (SM), Facilities Director
Hector Ramirez (HR), Irrigation Supervisor

I. IRRIGATION METHODS:

1. Does the College have any landscaped areas using drip irrigation?
   - Yes. HR states that he is open to the use of drip irrigation.

2. What type of drip systems are being used? (Individual drip emitters, multiple outlet drip emitters, drip tubing)
   - The campus has areas of individual drip emitters watering shrubs. I was able to see the area and it appears to have two Rain Bird drip emitters installed per shrub plant. The emitters are installed on poly-flex risers. HR says that they have had water pressure problems with the system. I believe the pressure problems stem from the use of “drip control zone kits” at a flow volume above their rated volume. At high flows, even within the rated volume, the pressure losses are very high in these units.

3. How successful has the use of drip irrigation been on the campus?
   - Successful in some areas, not so successful in others (see above). HR also speaks of some early systems that used multiple outlet emitters that were difficult to maintain and often failed.

4. Given that the state has new water efficient landscape rules that encourage the use of drip irrigation is it something that should be considered for future campus projects?
   - HR is very open to the use of drip irrigation as long as it is designed well.

5. What type of spray heads are used on the campus? What manufacturers?
   - Rain Bird 1800 series pop-up heads and nozzles are the primary spray heads on the campus. HR states that he prefers the Hunter Pro-Spray heads as he has had problems with cap-to-body leakage on the Rain Bird heads.

I. IRRIGATION METHODS (CONT'D):

6. What type of rotor heads are used on the campus? What manufacturers?
   - Hunter I-20 and I-40 rotor heads and Rain Bird 5000 Series rotor heads are currently used on campus. The Rain Bird rotors are used on the soccer field and the softball field. HR states that they are easily broken and he would not use them again.

7. Have you used MP Rotators on campus? If yes, how successful has their use been?
   - Yes, HR states that he likes these heads and would suggest that they be used more often.

8. Does the College keep a stock pile of replacement heads on campus?
   - Yes. Individual sprinkler heads are replaced with the same brand, model, and nozzle as was originally in place. Where there is a large renovation and all heads require replacement, HR is using Hunter heads as the replacement head.

9. What type of sprinkler swing joints do you prefer? Contractor assembled or pre-manufactured? Manufacturer?
   - HR prefers pre-assembled swing joints either Hunter SJ or Rain Bird SA series. When making repairs, he tends to use Marlex street ells and PVC nipples.

II. VALVES AND OTHER EQUIPMENT:

1. What type of reduced pressure backflow devices are preferred?
    - Wikins 975 reduced pressure principle.

2. Are your backflow devices in enclosures? What type? (stainless steel, expanded metal, cold rolled steel, aluminum, “smooth touch”). Do you use freeze protection blankets or warming devices? Is there a need for these?
    - None are in enclosures and none have freeze protection. HR states that they have not had any vandalism issues.

3. We recommend master valves and flow sensors on every system. Do any of the systems on campus have these devices? Are the master valves “normally open” or “normally closed” type?
    - Most do not have these. One newer project does have both a master valve and a flow sensor. HR would prefer that all new irrigation systems be equipped with both devices.

4. What type of isolation valves are preferred? (Gate, Butterfly, brass ball, or PVC ball type) Manufacturers?
    - HR prefers resilient wedge gate valves for large mainlines and ball valves for smaller mainlines.

5. Are quick couplers commonly used after installation or are they necessary? What size is preferred? (3/4” or 1”)? Do you prefer them below grade in a box, or surface mounted? What type of swing joint materials do you prefer?
    - Rain Bird ¾” size preferred. Below grade box installation preferred. HR states that he prefers a preassembled (PVC and brass) swing joint assembly. He also states that in future designs the spacing on Quick Coupler Valves (QCVs) should be 100 feet on center and each one should have a manual shut off valve on the upstream side of the valve.

II. VALVES AND OTHER EQUIPMENT (CONT'D):

6. What components do you prefer to be included on control valves? (plastic versus brass bodies, pressure regulating, dirty water valves, unions, etc). Manufacturers?
    - The campus has primarily Rain Bird brass control valves (RFB Series). On future projects he would prefer either Rain Bird plastic valves (PEB) or Hunter plastic valves (ICV). He would suggest that all valves be "dirty water" valves, be equipped with a pressure regulator, and be installed with two unions. He would also prefer a manual shut off valve on the upstream side of the control valve.

7. What type of valve boxes do you prefer? (Plastic, concrete, t-cover plastic lids, cast iron lids, concrete lids, locking lids, bolt down lids)? Do you prefer the boxes be installed in shrub areas or turf areas?
    - Plastic valves with t-covers and bolt down lids preferred. No preference to valve box location. Valve boxes should be branded with the controller number and there should also be a valve ID tag indicating the valve number.

8. Please list any other components that you can foresee needing for projects on your campus.
    - HR suggests that due to the hilly terrain, air relief valves on the mainline should be used. He also feels that mainlines need more isolation valves and drain valves at the ends of the mainline for draining during maintenance.

III. PIPING:

1. What type of pipe do you prefer for mainlines of 3” size and over? Class 315, Class 200, or some other class/type? Solvent welded PVC fittings, push-on PVC fittings, or ductile iron push-on fittings? Thrust blocks or mechanical restraints on mainlines?
    - Currently campus uses Schedule 40 PVC pipe for mainlines less than 2” size and Class. 315 PVC for mainline over 2” size. The use of Class 200 PVC, with ductile iron fittings and restraints, for pipe sizes over 3” is also acceptable. Currently most mainlines on campus do not have thrust blocking on directional changes.

2. What type of pipe do you prefer for mainlines of 1-½” through 2-½”? Schedule 40, Class 315, Class 200? Fittings shall be solvent weld PVC, what Schedule is preferred? (Schedule 40 or Schedule 80)?
    - See above. Schedule 80 PVC fittings on mainline would be preferred, but current mainlines all have Schedule 40 fittings.

3. What type of pipe do you prefer for lateral lines of ¾” through 3”?
    - HR suggests that the minimum pipe size for laterals should be ¾” and that Class 200 is acceptable for lateral lines.

4. Have you considered the use of High Density Polyethylene (HDPE) pipe for mainlines and/or lateral lines? Would you like to discuss the benefits and costs for future consideration?
    - HR has no experience with the use of HDPE pipe, but would be interested in using it based on the benefits of the system.

III. PIPING (CONT'D):

5. What depth of cover do you prefer for mainlines and lateral lines?
    - 24" over mainlines 2-½" and smaller, 30" over mainlines 3" and larger. 12" over all lateral lines.

6. What type of pipe would you prefer for sleeving under paving? What depth under paving is preferred?
    - Schedule 40 PVC preferred. Sleeves should be twice the diameter of the pipe carried.

7. Do you use detectable warning tapes or tracer wires over your mainline piping? Would this be a benefit?
    - Not currently, but HR feels that a detectable tape would be a good idea on future projects.

8. Any other piping concerns?
    - None.

IV. CONTROL SYSTEMS:

1. Does your campus have a central control system? Is one being planned? What type?
    - None as of yet. HR states that he prefers the Hunter ACC controllers and would like to see a Hunter IMMS central installed. Currently they have controllers from Hunter (ICC, ACC, I-Core) and Rainmaster (Eagle).

2. Do you prefer an onsite weather station, satellite provided evapotranspiration (ET) data or soil moisture sensors? Does your campus utilize any of these?
    - There is one controller currently connected to a Hunter “Solar-sync” ET sensor. HR feels that a weather station for their campus would be welcomed.

3. What type(s) of communication does your central control system utilize?
    - N/A

4. Controllers located inside buildings or on building exterior? Enclosure type preferred? (Top entry, front entry, stainless steel, cold rolled steel)
    - All controllers should be on the exterior of the building and inside of stainless steel, top entry enclosures.

5. Have you considered using a two-wire or decoder style controller in place of conventional controllers?
    - Yes, but the campus does not have any at this time.

6. What wire type preferred? Should the control wires be direct burial or in conduit?
    - Direct burial is fine for conventional wired systems, but if a two-wire system is used it should be inside a conduit.

IV. CONTROL SYSTEMS (CONT'D):

7. Type of waterproof connectors preferred?
   - DBY/R-6 connectors are preferred.

8. Do you have a radio remote control device for your controllers? What type and manufacturer?
   - Yes, both a Rainmaster Pro-Max and a Hunter remote are currently used on campus.

9. Have you used a VIT Quick Pad for any controller enclosure installation?
   - This would be preferred on new installations as they have had problems with "leaning" enclosures.

10. Do you use rain sensors, freeze sensors, flow sensors, or moisture sensors?
    - Currently all existing controllers have a rain sensor. HR would like to see flow sensors on all future systems.

11. Would allowing the campus Building Management System (BMS) to have access to the irrigation central control system be advantageous?
    - No.

V. OTHER CONCERNS:

1. Does your site use recycled water (RCW)? Do you foresee using recycled water in the future?
    - No, but there has been talk about RCW becoming available. Based on talk between the District and staff at the other colleges, they are very leery of being forced to use RCW. HR feels that the run time restrictions would be a big problem for them as they often need to run longer than what they would be allowed to run on a RCW system.

2. Do you have any alternative water sources used for irrigation? Rainwater harvesting, A/C condensate recovery, grey water, cooling tower blown down water? Do you foresee the use of any of these in the future?
    - None and none are planned.

3. Does your campus have or are they considering any synthetic turf fields? Would these have cooling systems?
    - Yes. The soccer field is a synthetic field and it has a cooling system for summer use. The heads are the large radius Mirage sprinklers.

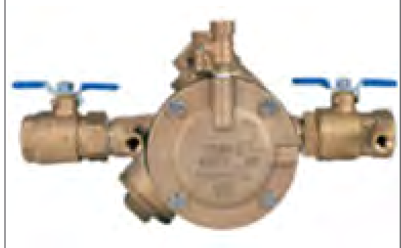
4. Are you familiar with the California Water Efficient Landscape Ordinance (AB 1881) and your local agencies ordinance?
    - Yes.

5. Do you have any booster pumps on the campus? What brand and/or type do you prefer?
    - One for the soccer field because it runs the cooling system and because it is at the high point in the campus.

6. Any other irrigation concerns?
    - Better communication between building teams and maintenance.
    - Maintenance teams should have some say in what is being used and where.
    - As-built drawings are never provided, even though the installing contractor is supposed to provide them before final close-out.

PART B

CAMPUS EQUIPMENT STANDARDS

DESCRIPTION	
1. Backflow Prevention Devices Where required for connections to new irrigation water supplies, a *reduced pressure principle* backflow prevention device shall be installed. Backflow devices shall be installed above grade, to local codes, and have assemblies constructed of brass fittings, unions, and nipples sized to match the size of the device. Manufacturer: FEBCO Model: 825Y Sizes: 1" through 2" Website: http://www.febcoonline.com/Products/825Y	
6. Master Control Valves A master control valve shall be installed on all new irrigation water points of connection. The master valve shall have an epoxy-fused, cast iron body, with a bronze bonnet, and be a normally open type. Master control valves shall be installed with brass nipples and two unions sized to match the valve size. Master control valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Griswold Controls Model: 2160-E Sizes: 1" through 3" Website: http://www.griswoldcontrols.com/pdfs/F-2667.pdf	

DESCRIPTION	
10. Quick Coupler Valves Quick coupler valves shall be installed at a spacing of 100 feet on center along the length of the mainline. Quick coupler valves shall have a two piece brass body, a double track key lug, and a yellow rubber cover. Quick couplers shall be 3/4" size and have a threaded inlet. Quick coupler valves shall be installed below grade in a round valve box. Manufacturer: Rain Bird, Inc. Model: 33-DRC Sizes: 3/4" Website: http://www.rainbird.com/landscape/products/valves/quickCouplingValves.htm	
11. Quick Coupler Swing Joints Quick couplers shall be installed with a factory assembled, o-ringed, PVC swing joint with a 1" MIPT inlet and a 3/4" brass MIPT outlet. The swing joint shall have a 12" lay length and incorporate a Snaplok™ stabilizer assembly on the outlet (QCV) end. Manufacturer: Lasco Fittings, Inc. Model: G13T-212 Sizes: 1" x 3/4" Website: http://www.lascofittings.com/default.asp	

DESCRIPTION	
19. Satellite Controller The irrigation controller shall be a satellite controller capable of connection to the District's standard irrigation central control system. The controller shall be equipped with the appropriate communications module (hardwire/radio, dial-up telephone, or cellular telephone) for the project site. The satellite controller shall be a two-wire (decoder) type that uses a two-wire path to connect all of the control valves served by the satellite controller. Manufacturer: Hunter Industries Model: ACC-99D Sizes: 1 through 99 Stations Website: http://www.hunterindustries.com/sites/default/files/BR_ACCD_dom.pdf	
20. Decoders Each master control valve and remote control valve shall be installed with a decoder to connect the valve to the two-wire path and to communicate with the satellite controller. Decoders are available in single, two, four, and six station models so that one decoder may serve multiple valves. A sensor decoder shall be installed with the flow sensor. The decoders shall be wired to the valve and the two-wire path as recommended by the manufacturer. Manufacturer: Hunter Industries Model: ICD-100/200/400/600 & ICD-SEN Website: http://www.hunterindustries.com/product/controllers/acc-99d-decoder	

DESCRIPTION	
21. Evapotranspiration Sensor Where requested by the District, an evapotranspiration (ET) sensor shall be installed with the satellite controller. The evapotranspiration sensor shall collect onsite weather data, including wind data, and calculate the local evapotranspiration factors. The sensor shall be wired to the controller to disseminate the ET data to the central control system. The evapotranspiration sensor shall be pole mounted and within the manufacturer's recommendations for sensor/controller distance and location. Manufacturer: Hunter Industries Model: ET-SENSOR/ET-Wind Website: http://ww.hunterindustries.com/product/sensors/et-system	
22. Weather Sensor When a controller is installed as a stand-alone unit and cannot be connected to the District's central control system, a controller specific weather station shall be installed to provide real time weather data and rain sensing functions to the controller. The weather sensor shall be mounted on the controller enclosure and wired to the controller. Manufacturer: Hunter Industries Model: SOLAR-SYNC-SEN Website: http://www.hunterindustries.com/product/sensors/solar-sync	

DESCRIPTION	
29. Lateral Line Pipe The pipe for all non-pressure lateral lines shall be Schedule 40 (ASTM D1785), solvent weld PVC pipe installed 12” below finished grade. Manufacturer: As Approved Model: Schedule 40, Solvent weld Sizes: 3/4” through 3” Website: http://www.astm.org/Standards/plastic-pipe-standards.html	
30. PVC Fittings All solvent weld and threaded fittings for use on PVC pipe shall be Schedule 40 (ASTM D2466). All threaded PVC nipples shall be Schedule 80 (ASTM D2464). Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: Sizes: Schedule 40, Solvent weld 3/4” through 3” Schedule 80, Threaded 1/2” through 3” Website: http://www.astm.org/Standards/plastic-pipe-standards.html http://www.lascofittings.com/Products/pricelst/xls/PDF/sched40.xls.pdf http://www.lascofittings.com/Products/pricelst/xls/PDF/nipples.xls.pdf	

DESCRIPTION	
39. Fixed Arc Spray Sprinklers Sprinkler heads for small to medium turf and shrub/ground cover irrigation shall be 6" or 12" pop-up, fixed arc spray heads. The fixed arc spray nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance. Manufacturer: Rain Bird Model: Sizes: U Series Nozzles 8-foot through 15-foot Radius 1806-SAM-PRS 6" Height + 30 PSI 1812-SAM-PRS 12-foot Height + 30 PSI Website: http://www.rainbird.com/landscape/products/sprayNozzles/UseriesNozzles.htm http://www.rainbird.com/landscape/products/sprayBodies/1800.htm	
40. Bubbler Sprinklers Bubbler heads for trees and small shrub/ground cover irrigation shall be 6" pop-up, fixed arc stream bubbler heads. The fixed arc bubbler nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance. Manufacturer: Rain Bird Model: Sizes: 5-B Series Nozzles 5-foot Radius 1806-SAM-PRS 6" Height + 30 PSI Website: http://www.rainbird.com/landscape/products/sprayNozzles/MPRseriesNozzles.htm http://www.rainbird.com/landscape/products/sprayBodies/1800.htm	

DESCRIPTION	
41. Large Sprinkler Swing Joints All large radius gear driven rotor heads shall be installed with a factory assembled, o-ringed, PVC, triple swing joint. The swing joint shall have a 1” MIPT inlet and outlet and a 12” lay length. Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: T932-212 Sizes: 1” x 12” L Website: http://www.lascofittings.com/SupportCenter/overview.asp	
42. Small Sprinkler Swing Joints All medium and small radius rotor heads and spray heads shall be installed with factory assembled, poly tubing and an ABS plastic, triple swing joint. The swing joint shall have either a 1/2” or 3/4” MIPT inlet and outlet (to match the sprinkler head specified) and a 12” lay length. Swing joints shall have a 150 PSI pressure rating. Manufacturer: Hunter Industries Model: Sizes: SJ-512 1/2” x 12” L SJ-712 3/4” x 12” L Website: http://www.hunterindustries.com/product/micro-irrigation/sj-swing-joint	

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SECTION 4

RIVERSIDE CITY COLLEGE

PART A
EXISTING CONDITIONS

MEETING DATE: February 1, 2011

SITE REPRESENTATIVES: Mike Byrd (MB), Facilities Director
Scott Zwart (SZ), Assistant Facilities Director

I. IRRIGATION METHODS:

1. Does the College have any landscaped areas using drip irrigation?
   - Yes. Drip has been used on some of the newer projects on campus. There is some concern as to the quality of the installation and whether the system will last.

2. What type of drip systems are being used? (Individual drip emitters, multiple outlet drip emitters, drip tubing)
   - Subsurface drip has been installed on the new Nursing/Science Building. There is concern that students posting signs and the routine dethatching will damage the shallow tubing.

3. How successful has the use of drip irrigation been on the campus?
   - See above. This is relatively new on campus.

4. Given that the state has new water efficient landscape rules that encourage the use of drip irrigation is it something that should be considered for future campus projects?
   - They are very open to the use of drip irrigation as long as it is designed well and appropriate for the site conditions.

5. What type of spray heads are used on the campus? What manufacturers?
   - Rain Bird 1800 series pop-up heads and nozzles are the standard for the campus.

I. IRRIGATION METHODS (CONT'D):

6. What type of rotor heads are used on the campus? What manufacturers?
   - Hunter rotors are the standard for the campus.

7. Have you used MP Rotators on campus? If yes, how successful has their use been?
   - Not as of yet. They did receive some as part of a water conservation program by the water district, but have not yet installed them.

8. Does the college keep a stock pile of replacement heads on campus?
   - Yes.

9. What type of sprinkler swing joints do you prefer? Contractor assembled or pre-manufactured? Manufacturer?
   - They prefer a pre-assembled swing joint.

II. VALVES AND OTHER EQUIPMENT:

1. What type of reduced pressure backflow devices are preferred?
   - SepCo E-25-Y is the campus standard. I am unfamiliar with this device and could not locate the manufacturer online. I am thinking that the product may be a Febco 825-Y.

2. Are your backflow devices in enclosures? What type? (stainless steel, expanded metal, cold rolled steel, aluminum, “smooth touch”). Do you use freeze protection blankets or warming devices? Is there a need for these?
   - None are in enclosures and none have freeze protection.

3. We recommend master valves and flow sensors on every system. Do any of the systems on campus have these devices? Are the master valves “normally open” or “normally closed” type?
   - Griswold 2000 series “normally open” master valves are the campus standard.

4. What type of isolation valves are preferred? (Gate, Butterfly, brass ball, or PVC ball type) Manufacturers?
   - Nibco brass gate valves and Superior brass ball valves are the campus standard for isolation valves.

5. Are quick couplers commonly used after installation or are they necessary? What size is preferred? (3/4” or 1”)? Do you prefer them below grade in a box, or surface mounted? What type of swing joint materials do you prefer?
   - Rain Bird ¾” size preferred. Below grade box installation preferred.

6. What components do you prefer to be included on control valves? (plastic versus brass bodies, pressure regulating, dirty water valves, unions, etc). Manufacturers?
   - Superior brass control valves, with pressure regulation, are the standard for the campus.

7. What type of valve boxes do you prefer? (Plastic, concrete, t-cover plastic lids, cast iron lids, concrete lids, locking lids, bolt down lids) Do you prefer the boxes be installed in shrub areas or turf areas?
   - Plastic valves with T-covers and bolt down lids preferred. Boxes should be located in the shrub areas.

8. Please list any other components that you can foresee needing for projects on your campus.
   - None.

III. PIPING:

1. What type of pipe do you prefer for mainlines of 3” size and over? Class 315, Class 200, or some other class/type? Solvent welded PVC fittings, push-on PVC fittings, or ductile iron push-on fittings? Thrust blocks or mechanical restraints on mainlines?
    - Large mainline not normally used due to the size of the campus projects.

2. What type of pipe do you prefer for mainlines of 1-½” through 2-½”? Schedule 40, Class 315, Class 200? Fittings shall be solvent weld PVC, what Schedule is preferred? (Schedule 40 or Schedule 80)?
    - Schedule 40 PVC pipe is the campus standard. Solvent welded with Schedule 40 fittings.

3. What type of pipe do you prefer for lateral lines of ¾” through 3”? Schedule 40, Class 315, Class 200?
    - Schedule 40 PVC pipe is the campus standard. Solvent welded with Schedule 40 fittings.

4. Have you considered the use of High Density Polyethylene (HDPE) pipe for mainlines and/or lateral lines? Would you like to discuss the benefits and costs for future consideration?
    - No. They feel that adding a new type of pipe would not be a good idea.

5. What depth of cover do you prefer for mainlines and lateral lines?
    - 24” over mainlines and 12” over all lateral lines.

6. What type of pipe would you prefer for sleeving under paving? What depth under paving is preferred?
    - 3” Schedule 40 PVC buried 24” below paving.

7. Do you use detectable warning tapes or tracer wires over your mainline piping? Would this be a benefit?
    - Not currently, but they feel that a detectable tape would be a good idea on future projects.

8. Any other piping concerns?
    - None.

IV. CONTROL SYSTEMS:

1. Does your campus have a central control system? Is one being planned? What type?
   - None on campus and they feel that a central control system would not be desired or practical. The high cost of these systems given the current budget would not be cost effective.

2. Do you prefer an onsite weather station, satellite provided evapotransportation (ET) data or soil moisture sensors? Does your campus utilize any of these?
   - There is an ET sensor on the controller at the new Nursing/Science Building.

3. What type(s) of communication does your central Control System utilize?
   - N/A

4. Controllers located inside buildings or on building exterior? Enclosure type preferred? (Top entry, front entry, stainless steel, cold rolled steel)
   - All controllers should be on the exterior of the building and inside of stainless steel, front entry enclosures.

5. Have you considered using a two-wire or decoder style controller in place of conventional controllers?
   - No.

6. What wire type preferred? Should the control wires be direct burial or in conduit?
   - Direct burial is fine for conventional wired systems.

IV. CONTROL SYSTEMS (CONT'D):

7. Type of waterproof connectors preferred?
   - Dryconn connectors are preferred. I am unfamiliar with this product and could not locate the manufacturer online. I am thinking that the product may be a Dri-Splice.

8. Do you have a radio remote control device for your controllers? What type and manufacturer?
   - Yes, a Hunter remote is currently used on campus.

9. Have you used a VIT Quick Pad for any controller enclosure installation?
   - No. Either concrete base or quick-pad is fine.

10. Do you use rain sensors, freeze sensors, flow sensors, or moisture sensors?
    - No. No objection for their use is required.

11. Would allowing the campus Building Management System (BMS) to have access to the irrigation central control system
    be advantageous?
    - No.

V. OTHER CONCERNS:

1. Does your site use recycled water (RCW)? Do you foresee using recycled water in the future?
   - No, and no foreseeable need to use RCW due to location in the older part of the city and far from connection points to RCW.

2. Do you have any alternative water sources used for irrigation? Rainwater harvesting, A/C condensate recovery, grey water, cooling tower blown down water? Do you foresee the use of any of these in the future?
   - None and none are planned.

3. Does your campus have or are they considering any synthetic turf fields? Would these have cooling systems?
   - Yes. The Wheelock Stadium and Aquatics Center have synthetic turf with cooling systems.

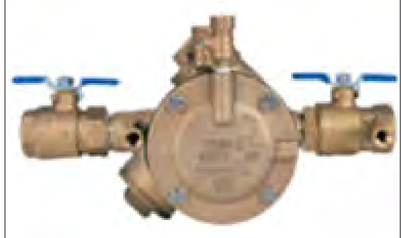
4. Are you familiar with the California Water Efficient Landscape Ordinance (AB 1881) and your local agencies ordinance?
   - No.

5. Do you have any booster pumps on the campus? What brand and/or type do you prefer?
   - Barrett Engineered Pumps are the campus standard for pump systems.

6. Any other irrigation concerns?
   - Maintenance budgets are being cut and the irrigation systems need to be low maintenance and cost effective.
   - Replacement of damaged equipment can strain the already tight budget.

PART B

CAMPUS EQUIPMENT STANDARDS

DESCRIPTION	
1. Backflow Prevention Devices Where required for connections to new irrigation water supplies, a *reduced pressure principle* backflow prevention device shall be installed. Backflow devices shall be installed above grade, to local codes, and have assemblies constructed of brass fittings, unions, and nipples sized to match the size of the device. Manufacturer: FEBCO Model: 825Y Sizes: 1” through 2” Website: http://www.febcoonline.com/Products/825Y	
6. Master Control Valves A master control valve shall be installed on all new irrigation water points of connection. The master valve shall have an epoxy-fused, cast iron body, with a bronze bonnet, and be a normally open type. Master control valves shall be installed with brass nipples and two unions sized to match the valve size. Master control valves shall be installed below grade in a standard sized rectangular valve box. Manufacturer: Griswold Controls Model: 2160-E Sizes: 1” through 3” Website: http://www.griswoldcontrols.com/pdfs/F-2667.pdf	

DESCRIPTION	
10. Quick Coupler Valves Quick coupler valves shall be installed at a spacing of 100 feet on center along the length of the mainline. Quick coupler valves shall have a two piece brass body, a double track key lug, and a yellow rubber cover. Quick couplers shall be 3/4" size and have a threaded inlet. Quick coupler valves shall be installed below grade in a round valve box. Manufacturer: Rain Bird, Inc. Model: 33-DRC Sizes: 3/4" Website: http://www.rainbird.com/landscape/products/valves/quickCouplingValves.htm	
11. Quick Coupler Swing Joints Quick couplers shall be installed with a factory assembled, o-ringed, PVC swing joint with a 1" MIPT inlet and a 3/4" brass MIPT outlet. The swing joint shall have a 12" lay length and incorporate a Snaplok™ stabilizer assembly on the outlet (QCV) end. Manufacturer: Lasco Fittings, Inc. Model: G13T-212 Sizes: 1" x 3/4" Website: http://www.lascofittings.com/default.asp	

DESCRIPTION	
19. Satellite Controller The irrigation controller shall be a satellite controller capable of connection to the District's standard irrigation central control system. The controller shall be equipped with the appropriate communications module (hardwire/radio, dial-up telephone, or cellular telephone) for the project site. The satellite controller shall be a two-wire (decoder) type that uses a two-wire path to connect all of the control valves served by the satellite controller. Manufacturer: Hunter Industries Model: ACC-99D Sizes: 1 through 99 Stations Website: http://www.hunterindustries.com/sites/default/files/BR_ACCD_dom.pdf	
20. Decoders Each master control valve and remote control valve shall be installed with a decoder to connect the valve to the two-wire path and to communicate with the satellite controller. Decoders are available in single, two, four, and six station models so that one decoder may serve multiple valves. A sensor decoder shall be installed with the flow sensor. The decoders shall be wired to the valve and the two-wire path as recommended by the manufacturer. Manufacturer: Hunter Industries Model: ICD-100/200/400/600 & ICD-SEN Website: http://www.hunterindustries.com/product/controllers/acc-99d-decoder	

DESCRIPTION	
21. Evapotranspiration Sensor Where requested by the District, an evapotranspiration (ET) sensor shall be installed with the satellite controller. The evapotranspiration sensor shall collect onsite weather data, including wind data, and calculate the local evapotranspiration factors. The sensor shall be wired to the controller to disseminate the ET data to the central control system. The evapotranspiration sensor shall be pole mounted and within the manufacturer's recommendations for sensor/controller distance and location. Manufacturer: Hunter Industries Model: ET-SENSOR/ET-Wind Website: http://ww.hunterindustries.com/product/sensors/et-system	
22. Weather Sensor When a controller is installed as a stand-alone unit and cannot be connected to the District's central control system, a controller specific weather station shall be installed to provide real time weather data and rain sensing functions to the controller. The weather sensor shall be mounted on the controller enclosure and wired to the controller. Manufacturer: Hunter Industries Model: SOLAR-SYNC-SEN Website: http://www.hunterindustries.com/product/sensors/solar-sync	

DESCRIPTION	
29. Lateral Line Pipe The pipe for all non-pressure lateral lines shall be Schedule 40 (ASTM D1785), solvent weld PVC pipe installed 12" below finished grade. Manufacturer: As Approved Model: Schedule 40, Solvent weld Sizes: 3/4" through 3" Website: http://www.astm.org/Standards/plastic-pipe-standards.html	
30. PVC Fittings All solvent weld and threaded fittings for use on PVC pipe shall be Schedule 40 (ASTM D2466). All threaded PVC nipples shall be Schedule 80 (ASTM D2464). Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: Sizes: Schedule 40, Solvent weld 3/4" through 3" Schedule 80, Threaded 1/2" through 3" Website: http://www.astm.org/Standards/plastic-pipe-standards.html http://www.lascofittings.com/Products/pricelst/xls/PDF/sched40.xls.pdf http://www.lascofittings.com/Products/pricelst/xls/PDF/nipples.xls.pdf	

<table>
<tr><th>DESCRIPTION</th><th></th></tr>
<tr><td>39. Fixed Arc Spray Sprinklers
Sprinkler heads for small to medium turf and shrub/ground cover irrigation shall be 6” or 12” pop-up, fixed arc spray heads. The fixed arc spray nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance.
Manufacturer: Rain Bird
Model: Sizes:
U Series Nozzles 8-foot through 15-foot Radius
1806-SAM-PRS 6” Height + 30 PSI
1812-SAM-PRS 12-foot Height + 30 PSI
Website: http://www.rainbird.com/landscape/products/sprayNozzles/UseriesNozzles.htm
http://www.rainbird.com/landscape/products/sprayBodies/1800.htm</td><td></td></tr>
<tr><td>40. Bubbler Sprinklers
Bubbler heads for trees and small shrub/ground cover irrigation shall be 6” pop-up, fixed arc stream bubbler heads. The fixed arc bubbler nozzle shall be installed onto a pressure regulating pop-up sprinkler body designed specifically to provide the correct water pressure for optimal performance.
Manufacturer: Rain Bird
Model: Sizes:
5-B Series Nozzles 5-foot Radius
1806-SAM-PRS 6” Height + 30 PSI
Website: http://www.rainbird.com/landscape/products/sprayNozzles/MPRseriesNozzles.htm
http://www.rainbird.com/landscape/products/sprayBodies/1800.htm</td><td></td></tr>
</table>

DESCRIPTION	
41. Large Sprinkler Swing Joints All large radius gear driven rotor heads shall be installed with a factory assembled, o-ringed, PVC, triple swing joint. The swing joint shall have a 1" MIPT inlet and outlet and a 12" lay length. Manufacturer: Lasco Fittings, Inc. or Approved Equal Model: T932-212 Sizes: 1" x 12" L Website: http://www.lascofittings.com/SupportCenter/overview.asp	
42. Small Sprinkler Swing Joints All medium and small radius rotor heads and spray heads shall be installed with factory assembled, poly tubing and an ABS plastic, triple swing joint. The swing joint shall have either a 1/2" or 3/4" MIPT inlet and outlet (to match the sprinkler head specified) and a 12" lay length. Swing joints shall have a 150 PSI pressure rating. Manufacturer: Hunter Industries Model: Sizes: SJ-512 1/2" x 12" L SJ-712 3/4" x 12" L Website: http://www.hunterindustries.com/product/micro-irrigation/sj-swing-joint	

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SITE DESIGN GUIDELINES

INTRODUCTION

The main purpose of establishing site design guidelines is to develop a coherent system that integrates existing and future buildings with their context. Furthermore, as Stefanos Polyzoides has said, the American campus-making tradition has a long history of understanding landscape as a language equal and parallel to the language of architecture.

The goal is to promote a campus where buildings are optimized for their locality and purpose, including site infrastructure, hardscape, landscape, circulation, and spatial hierarchy on campus.

Creating a strong and unifying framework and site identity unique to each college within the Riverside Community College District will allow for an eclectic, yet harmonious, integration of site functions and aesthetics, and will eventually foster a better learning environment at each campus.

Note: the current scope of this *Handbook* does not include development of comprehensive site design guidelines. In the future, it is highly recommended that this section be completed.

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SECTION 5

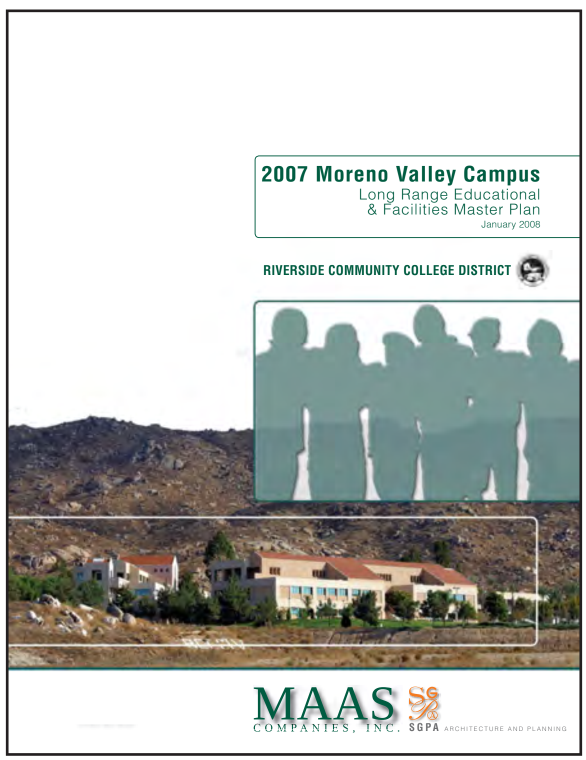
MORENO VALLEY COLLEGE

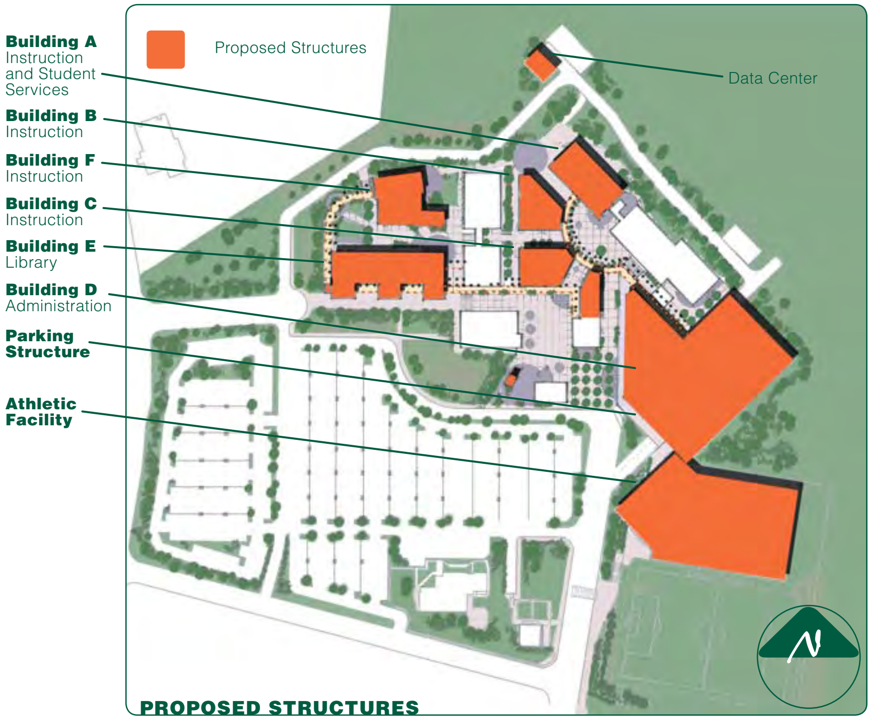
The following document has been excerpted from:

2007 Moreno Valley Campus Long Range Educational & Facilities Master Plan

January 2008

Refer to Master Plan Section





While much of the campus consists of relatively new construction, the full campus build-out is anticipated to conclude 20 years from the time of publication. Therefore, there will be sufficient time to necessitate the maintenance and upgrade of many of the campus' existing structures.

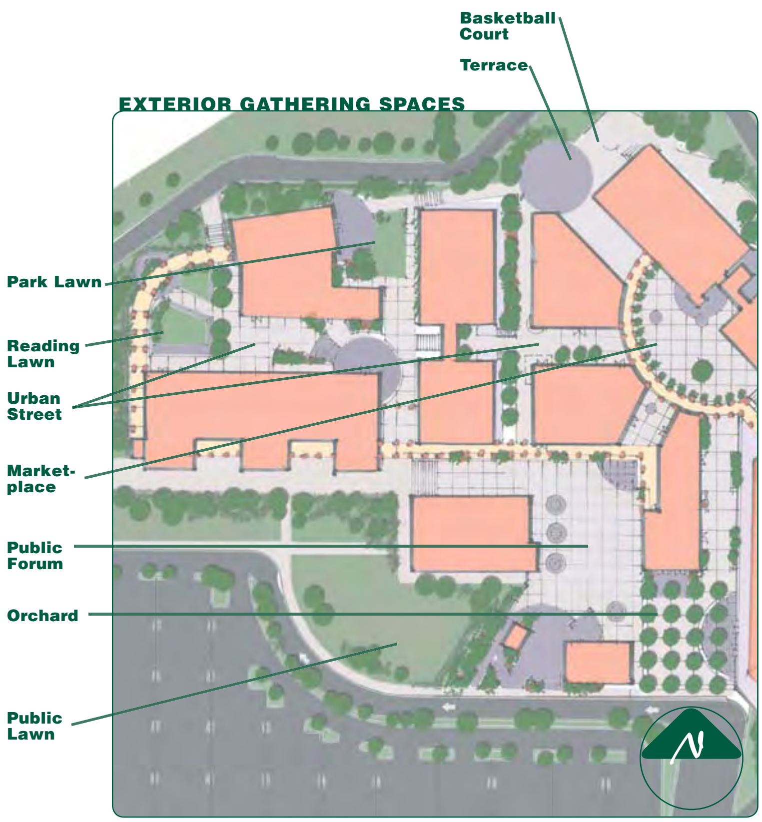
The following structures, systems, and scopes are planned for renovation:

Bldg. 1 and 2	**Library and Student Services**
Scope:	Interior space renovation and remodel to a singular student services occupancy.
Building 8	**Bookstore**
Scope:	Full exterior and interior renovation and inclusion into adjacent proposed structure.
Building 11	**Student Student Activity Center**
Scope:	Exterior cosmetic renovation, included in plaza hardscape renovation.

NEW CONSTRUCTION

New Construction scope, cost, and phasing are outlined at the end of the document.

EXTERIOR GATHERING SPACES



MARKETPLACE: a classical space to see and be seen. Activities include small gatherings, eating, sitting, watching. Adjacencies include a lecture hall at the tower base, food services, multiple building entry points, and colonnades/terraces.

URBAN STREET: pathway for pausing. The urban street will move through the campus, repeatedly changing elevation, passing through gateways, narrowing, widening, providing places for students to interact, watch, and move through campus.

PUBLIC FORUM: provides a space for the college to engage the public. Its classical form allows large-scale gatherings such as job fairs, graduations, demonstrations, and rallies. It adjoins to campus administration and student government facilities.

ACCESS AND CIRCULATION

Isolating vehicular traffic from pedestrian flow will be instrumental in establishing hospitable places for pedestrians on campus. In order to foster this

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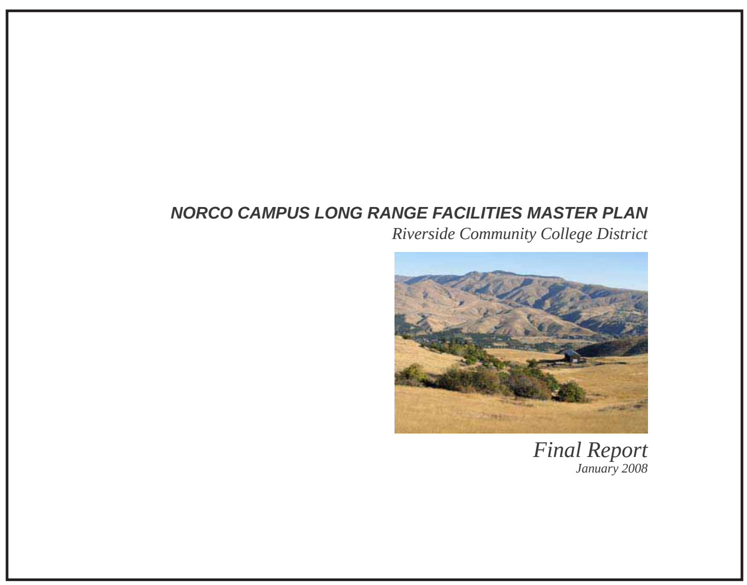
SECTION 5
NORCO COLLEGE

The following document has been excerpted from:

Norco Campus Long Range Facilities Master Plan - Final Report

January 2008

Refer to Design Guidelines Section



NORCO CAMPUS LONG RANGE FACILITIES MASTER PLAN

Riverside Community College District

Final Report

January 2008

Authentic Landscape in a Semi-Arid Mediterranean Climate

The scarcity of water and potentially inhospitable heat and arid winds of the eastern San Gabriel Valley environment are forces with which to contend, but also opportunities for the creation of a unique campus environment. The contrast of a bright green lawn imported from the American campus tradition sparingly and judiciously arranged within a more indigenous landscape of palms, lupine and lavender, blooming ground covers, oaks, olives and sycamores is amazing in its potential. Properly composed it will create an almost magical feeling one associates with romantic images with arid parts of the Mediterranean landscape.

Characteristics of Landscape in a Semi-Arid Mediterranean Climate

- Oaks, olives & sycamores
- Multi-colored,variegeated grasses & wild flowers
- Massive palm canopies
- Blooming ground covers
- Bougainvillea, wisteria & climbing roses
- Sparingly used brilliant green lawn
- Silver and gray greens
- Springs, Spouts & Pools

Landscape & Open Space of a Coachella Valley Campus. *Opportunities range from the indigenous desert landscape of the native Coachella Valley, to the cultivated agricultural fabric of the early California tradition, groves of date palms and intimate lush courtyards and the shade of a tree.*

Typologies of Open Space and Landscape

The landscape and open space plan consists of four principle typologies:

- Linear and meandering arrangements of trees
- Traditional quadrangles with grass and trees
- Native, drought tolerant riparian gardens.
- Shaded, paved courts

Each type serves a purpose and has its placed in a fully intergrated hierarchy of open spaces interconnected and interrelated across the core campus.

Long Range Campus Landscape Plan

Southern California Native Drought Tolerant Gardens

lazas and Courts

Quadrangles and Yards

Linear and Meandering Arrangements of Trees

Large canopy trees and palms are arranged along principal vehicular and pedestrian axes to provide drama and dignity at the perimeter of campus and along approaches to it. Double rows of trees are established where possible along pedestrian paths to provide shade, clarity and order in the overall campus environment. Specimen trees are recommended for the southwest slopes of the mesa where will be established the riparian garden. Primary locations include:

- 3rd Street
- North-south drive
- East quadrangle
- Visual and performing arts fore courts.

Trees in Linear Composition to Create Allees , Visual Axes and Formal Promenades

Trees in Free Form Composition to Create Shaded Open Space and Informal Promenades

Shaded Paved Courts

Pedestrian and auto oriented paved courts provide gracious points of entry and outdoor gathering spaces. Principal among these is the learning commons situated between the student center, faculty and staff development center and library. This space is flexible, generous in size and the focal point of the core campus. Daily activities currently staged on the concrete expanse north of the existing Student Services building will be relocated here. Other courts are placed at the perimeter of campus to provide proper thresholds for entry to campus. Primary locations include:

- Learning Commons
- Visual and Performing Arts
- Early Childhood Education
- Student Center
- South Quadrangle
- West Quadrangle
- Physical Education Center

Paved Piazza or Plaza

Paved Piazza or Plaza with Daily Activity

Traditional Grass and Trees

Four major spaces arranged in the manner of the quadrangle found ubiquitously throughout the American tradition of the college campus are located in key locations at the heart of the core campus. These spaces are rendered in grass and shaded with generously scaled large canopy trees. Pedestrian paths criss cross them linking them together and with outlying areas of campus. Included as a luxury within a climate that is semi-arid with minimal annual rainfall these spaces are like oases in providing relief from the heat and wind of the surrounding natural landscape. They are limited in number and extent in respect for the reality of the limits on the supply of water in this part of the world. Primary locations include:

- South Quadrangle
- North Quadrangle
- West Quadrangle
- East Quadrangle
- Student Center East and West

Quadrangle or Yard with Grass and Trees and Paths

Quadrangle or Yard with Grass and Trees and Paths

Riparian Gardens

Two areas of campus are rendered in a native, drought tolerant palette of plant materials and specimen trees. The amphitheater is to be converted into a kind of naturally occurring bowl set into the side of the mesa, most of its concrete surfaces replaced with native California vegetation. Extending northwest of the amphitheater along the southwest flanks of the upper mesa meandering paths thread through and along a riparian garden rendered to replicate naturally occurring landscapes of western Riverside County. A similar landscape is to be established along 3rd Street just west of the South Quadrangle as a kind of front yard to campus that makes visual connection to the naturally occurring landscapes found south of the 3rd Street. Major locations for riparian gardens include:

- Southwest slopes of the upper mesa
- Front yard along 3rd Street west of the south quadrangle.
- Student Center East and West

Southern California Native, Drought Tolerant Indigenous Landscapes

Southern California Native, Drought Tolerant Indigenous Landscapes

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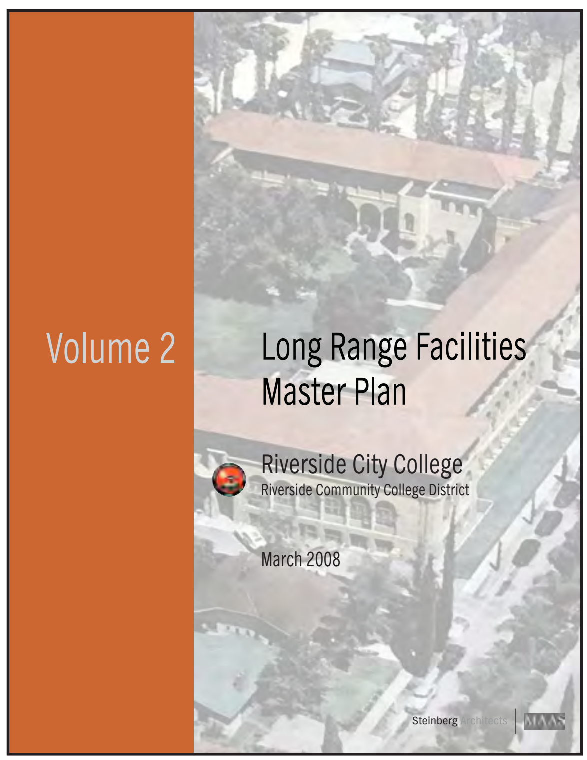
SECTION 5
RIVERSIDE CITY COLLEGE

The following document has been excerpted from:

Riverside City College Long Range Facilities Master Plan

March 2008

Refer to Chapter 4 - Guidelines



LANDSCAPE SUMMARY

The role of Landscape Master Plan Design Guidelines is to set the stage for a clear identity about the overall campus through the use of certain materials, and a specific approach to technology that will define Riverside City College over the life of the Master Plan development.

The City of Riverside is considered the City of Trees because of its rich tree canopy structure that is prevalent throughout the urban landscape. Riverside City College follows that character throughout the campus. The Master Plan Design Guidelines creates a comprehensive list of species that are currently succeeding on the campus and looks to add species that fall under the category of regionally native, drought tolerant and appropriate for the difficult climate of Riverside. Additionally, it is important that each of the species respects requirements set forth by the Maintenance and Operations group at Riverside City Collge, as successful campus master planning understands that landscape is a function of the ability to maintain. As a general approach the goal for irrigation guidelines is focused on high efficiency while adhering to the current practices that the campus Maintenance and Operations crew employs. In an evaluation of hardscape and site furnishing, the Landscape Master Plan suggests materials that will withstand the daily activities of campus life, assure overall health and safety and in many cases reflect the overall commitment to sustainability through the use of recycled materials.

The Landscape Master Plan Design Guidelines are organized to create a series of elements that will work together with the Campus Master Plan to make Riverside City College a model campus as it undergoes development and renovation over the next twenty five years.

CALIFORNIA POPPY, ARROYO SECO/ PASADENA, CA

LANDSCAPE FORMS, 'GRETCHEN' SERIES

UNIVERSITY OF SAN FRANCISCO PLAZA, USF/ SAN FRANCISCO, CA

LANDSCAPE

PLANTING

GENERAL NOTES
- Climate appropriate approach
- Drought tolerant
- Primarily native
- Seasonal interest
- Maintenance sensitive

1. CEREMONIAL ENTRY
- Create dramatic entrance with flowering trees and shrubs
- Imply formal nature with strong lines and intricate textures

2. THE LAWN
- Frame views with tree groves
- Provide seasonal color accents
- Maintain pedestrian scale plantings
- Create lawn area

3. COURTYARDS
- Create green canopy with shade trees
- Build upon existing courtyard landscapes
- Create pedestrian interest through rich fragrances, colors and textures
- Convey the sense of privacy and inner thought

4. SLOPESCAPE
- Build on existing slope plantings
- Create canopy for shade retreats
- Include identifiable deep green foliage
- Contrast to the arroyo landscape

5. ARROYO
- Expand overall bright-green swath of foliage
- Include large leaf tree specimens for shading students and cars
- Select runoff cleansing grasses and shrubs for areas near parking
- Provide seasonal color accents

6. RIPARIAN WALK
- Overall bright green, small leaf foliage
- Provide continuous loop of seasonal color accents
- Include grass-like, riparian (creek side) understory
- Structure to absorb interpretive experiences and educational studies

7. CAMPUS PROMENADE
- Infuse existing fan palm row with new species to create strong axis
- Saturate edges of the corridor with colorful groundcovers and shrubs
- Provide shade alcoves for students

8. ALLEES
- Provide shade for pedestrians
- Allow for a colorful, low growing understory
- Create directional lines with planting to clarify circulation

9. ATHLETIC LANDSCAPE
- Provide shade for buildings and retreats for athletes
- Encourage low maintenance accents at important entrances
- Create lawn areas for sports related activities

10. ADJACENT STREETSCAPE
- Build upon existing landscape
- Provide strong architectural trees to shade sidewalks and street
- Minimize understory to maintain views into campus
- Focus on low maintenance plantings with seasonal accents

LANDSCAPE
PLANTING

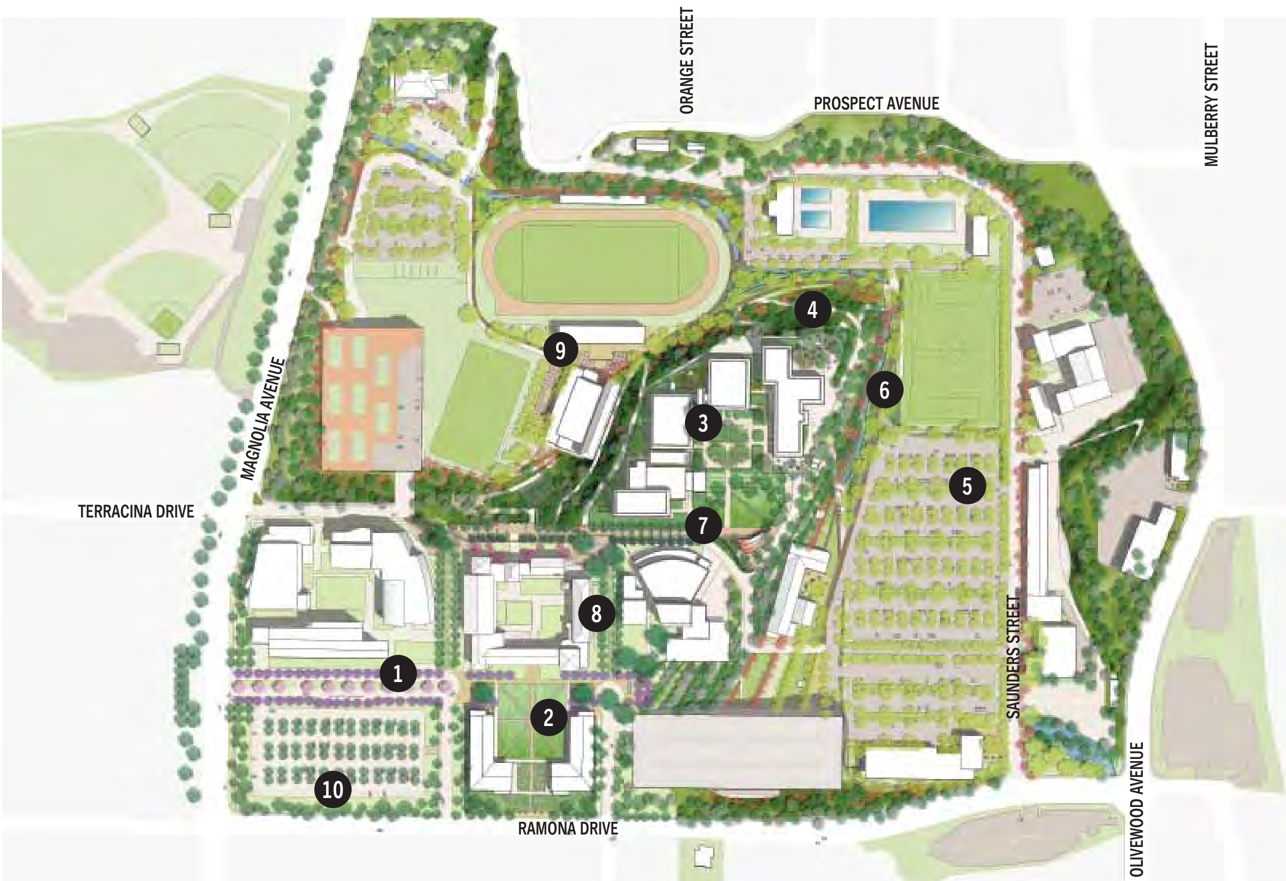


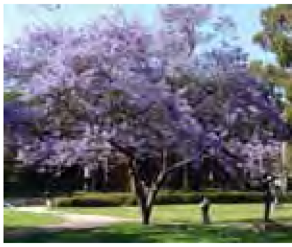
FIGURE 4-3. Horizon 1 planting diagram illustrates the ten landscape typologies

LANDSCAPE PLACES

1	CEREMONIAL ENTRY
2	THE LAWN
3	COURTYARDS
4	SLOPESCAPE
5	ARROYO
6	RIPARIAN WALK
7	CAMPUS PROMENADE
8	ALLEES
9	ATHLETIC LANDSCAPE
10	ADJACENT STREETSCAPE

0' 250' 500'

LANDSCAPE
1 | CEREMONIAL ENTRY



Deciduous Tree
JACARANDA
Jacaranda mimosifolia

Deciduous Tree
DESERT WILLOW
Chilopsis linearis 'Burgundy'

Perennial Shrub
WHITE SAGE
Salvia apiana

Evergreen Shrub
CANYON GREY SAGEBRUSH
Artemisia californica 'Cayon Grey'

Evergreen Shrub
ISLAND CEANOTHUS
Ceanothus griesus 'Yankee Point'

LANDSCAPE

2 | THE LAWN

Evergreen Tree

CA BAY LAUREL
Umbellularia californica

Evergreen Shrub

TOYON
Heteromeles arbutifolia

Perennial Grass

DEER GRASS
Muhlenbergia rigens

Perennial Shrub

CA FUCHSIA
Zauschneria californica

Perennial Vine

CA HONEYSUCKLE
Lonicera hispidula

LANDSCAPE
3 | COURTYARDS

Evergreen Tree
CAMPHOR
Cinnamomum camphora

Deciduous Tree
WESTERN REDBUD
Cercis occidentalis

Perennial Shrub
SPANISH LAVENDER
Lavandula stoechas

Perennial Shrub
HUMMINGBIRD SAGE
Salvia spathacea

Deciduous Vine
DESERT WILD GRAPE
Vitis girdiana 'Rodger's Red'

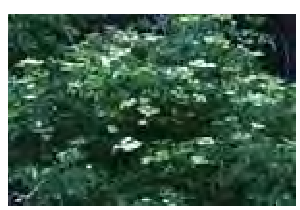
LANDSCAPE

4 | SLOPESCAPE

Evergreen Tree
COAST LIVE OAK
Quercus agrifolia

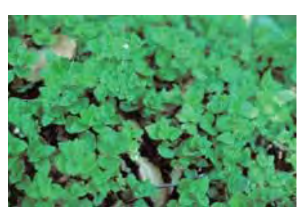
Evergreen Tree
FOOTHILL PINE
Pinus sabiniana

Evergreen Tree
BIG BERRY MANZANITA
Arcto staphylos glaucus



Evergreen Shrub
BLUE ELDERBERRY
Sambucus mexicana

Evergreen Shrub
Coffeeberry
Rhamnus californica



Evergreen Vine
YERBA BUENA
Satureja douglasii

LANDSCAPE

5 | ARROYO

Deciduous Tree

CALIFORNIA SYCAMORE
Plantanus racemosa

Deciduous Tree

BLACK BIRCH
Betula nigra 'Dura-Heat'

Perennial Grass

DWARF PURPLE FOUNTAIN GRASS
Pennisetum setaceum 'Rubrum Dwarf'

Perennial Shrub

DOUGLAS IRIS
Iris douglasiana

LANDSCAPE

6 | RIPARIAN WALK

Deciduous Tree

WHITE ALDER
Alnus rhombifolia

Deciduous Tree

ARROYO WILLOW
Salix lasiolepis

Perennial Grass

BLUE LYME GRASS
Leymus arenarius

Perennial Grass

BULLRUSH
Juncus patens

LANDSCAPE

7 | CAMPUS PROMENADE

Deciduous Tree

BIG LEAF MAPLE
Accer macrophyllum

Evergreen Shrub

DWARF COYOTE BRUSH
Baccharis pilularis 'Twin Peaks'

Evergreen Shrub

CA GREY SAGEBRUSH
Artemisia california 'Canyon Grey'

Perennial Grass

DEER GRASS
Muhlenbergia rigens

Perennial Groundcover

SENECIO
Senecio mandraliscae

Annual Groundcover

CALIFORNIA POPPY
Eschscholzia californica

LANDSCAPE
8| ALLEES

Evergreen Tree
COAST LIVE OAK
Querus agrifolia

Evergreen Shrub
MOUNTAIN LILAC
Ceanothus griesus

Evergreen Shrub
MONKEY FLOWER
Mimulus aurantiacus

Perennial Shrub
ALUM ROOT
Heuchera maxima

LANDSCAPE

9 | ATHLETIC LANDSCAPE

Deciduous Tree

EVERGREEN PEAR
Pyrus kawakamii

Evergreen Tree

ORANGE TREE
Citrus 'Valencia'

Evergreen Shrub

DWARF COYOTE BRUSH
Baccharis piularis 'Twin Peaks'

Evergreen Shrub

BEARBERRY COTONEASTER
Cotoneaster dammeri

Perennial Grass

DEER GRASS
Muhlenbergia rigens

Evergreen Groundcover

SENECIO
Senecio mandraliscae

LANDSCAPE

10| ADJACENT STREETSCAPE

Evergreen Tree

COAST LIVE OAK
Quercus agrifolia

Evergreen Tree

STRAWBERRY TREE
Arbutus unedo

Evergreen Tree

HOLLY LEAF CHERRY
Prunus illicifolia

Perennial Grass

NEW ZEALAND FLAX
Phormium tenax

Perennial Groundcover

SENECIO
Senecio mandraliscae

Perennial Grass

DEER GRASS
Muhlenbergia rigens

LANDSCAPE

COMPREHENSIVE PLANT LIST

	BOTANICAL NAME	COMMON NAME	PLANT TYPE
1. CEREMONIAL ENTRY	*Chilopsis linearis 'Burgundy'*	Desert Willow	Deciduous Tree
	Jacaranda mimosifolia	Jacaranda	Deciduous Tree
	Ceanothus griesus horizontalis 'Yankee Point'	Island Ceanothus Carmel Creeper	Evergreen Shrub
	Salvia apiana	White Sage	Evergreen Shrub
	Artemisia californica 'Canyon Grey'	Canyon Grey Sagebrush	Evergreen Shrub
2. THE LAWNS	*Umbellularia californica*	CA Bay Laurel	Evergreen Tree
	Heteromeles arbutifolia	Toyon	Evergreen Shrub
	Muhlenbergia rigens	Deer Grass	Perennial Grass
	Zauschneria californica 'Orange Carpet'	CA Fuchsia	Perennial Shrub
	Festuca arundinacea	Tall Fescue	Perennial Grass
	Cynodon dactylon	Hybrid Bermuda Grass	Perennial Grass
3. COURTYARDS	*Cinnamomum camphora*	Camphor Tree	Evergreen Tree
	Cercis occidentalis	Western Redbud	Deciduous Tree
	Ceanothus griseus horizontalis	Mountain Lilac	Evergreen Shrub
	Salvia apiana	White Sage	Perennial Shrub
	Salvia spathacea	Hummingbird Sage	Perennial Shrub
	Rosmarinus officinalis'Prostratus'	Rosemary	Perennial Shrub
	Lavandula stoechas	Spanish Lavender	Perennial Shrub
	Festuca glauca 'Elijah Blue'	Blue Fescue	Perennial Grass
	Vitis girdiana 'Rodger's Red'	Desert Wild Grape	Evergreen Vine
4. SLOPESCAPE	*Quercus agrifolia*	Coast Live Oak	Evergreen Tree
	Quercus chrysolepis	Canyon Oak	Evergreen Tree
	Juglans californica	CA Walnut	Deciduous Tree
	Juniperus occidentalis	Western Juniper	Evergreen Tree
	Pinus sabiniana	Foothill Pine	Evergreen Tree
	Metasequoia glypstroboides	Coast Redwood	Evergreen Tree
	Quercus virginiana	Southern Live Oak	Evergreen Tree
	Quercus kelloggii	Kellogg Oak	Evergreen Tree
	Quercus velutina	Black Oak	Evergreen Tree
	Arctostaphylos glaucus	Big Berry Manzanita	Evergreen Tree
	Ceanothus griseus horizontalis 'Yankee Point'	Carmel Creeper CA Lilac	Evergreen Shrub
	Sambucus mexicana	Blue Elderberry	Evergreen Shrub/Tree
	Ribes sanguineum glutinosum	Pink Flowered Currant	Deciduous Shrub
	Rhus integrifolia	Lemonade Berry	Evergreen Shrub
	Ribes viburnifolium	Catalina Perfume	Evergreen Shrub
	Rhamnus californica	Coffeeberry	Evergreen Shrub
	Lonicera subspicata denudata	Southern Honeysuckle	Evergreen Vine
	Satureja douglasii	Yerba Buena	Evergreen Vine
5. ARROYO	*Platanus racemosa*	CA Sycamore	Deciduous Tree
	Alnus rhombifolia	White Alder	Deciduous Tree
	Betula nigra'Dura-Heat'	Black Birch	Deciduous Tree
	Betula platyphylla japonica 'Whitespire'	Whitespire Birch	Deciduous Tree
	Platanus acerfolia	London Plane Tree	Deciduous Tree
	Iris douglasiana	Douglas Iris	Perennial Shrub
	Salvia clevelandii	Cleveland Sage	Perennial Shrub
	Pennisetum setaceum "Rubrum Dwarf"	Dwarf Purple Fountain Grass	Evergreen Shrub
6. RIPARIAN WALK	*Salix lasiolepis*	Arroyo Willow	Deciduous Tree
	Alnus rhombifolia	White Alder	Deciduous Tree
	Cercis occidentalis	Western Redbud	Deciduous Tree
	Chilopsis linearis 'Burgundy'	Desert Willow	Deciduous Tree
	Muhlenbergia rigens	Deer Grass	Perennial Grass
	Leymus arenarius	Lyme Grass	Perennial Grass
	Sisrinchium bellum	Blue- eyed Grass	Perennial Grass
	Juncus patens	CA Gray Rush	Perennial Grass
	Festuca glauca 'Elijah Blue'	Blue Fescue	Perennial Grass

LANDSCAPE

COMPREHENSIVE PLANT LIST

	BOTANICAL NAME	COMMON NAME	PLANT TYPE
7. CAMPUS PROMENADE	*Washingtonia filifera*	CA Fan Palm	Evergreen Tree
	Acer macrophyllum	Big Leaf Maple	Deciduous Tree
	Ginkgo biloba	Ginkgo	Deciduous Tree
	Muhlenbergia rigens	Deer Grass	Perennial Grass
	Baccharis pilularis'Twin Peaks'	Dwarf Coyote Brush	Perennial Shrub
	Artemisia californica 'Canyon Grey'	Canyon Grey Sagebrush	Evergreen Shrub
	Eriogonum fasciculatum	CA Buckwheat	Perennial Shrub
	Eschscholzia californica	CA Poppy	Perennial Groundcover
	Senecio mandraliscae	Senecio	Evergreen Groundcover
8. ALLEES	*Quercus agrifolia*	Coast Live Oak	Evergreen Tree
	Iris douglasiana	Douglas Iris	Perennial Shrub
	Ceanothus griseus horizontalis 'Yankee Point'	Mountain Lilac	Evergreen Shrub
	Mimulus (Diplacus) aurantiacus	Sticky Monkeyflower	Perennial Shrub
	Heuchera maxima, micrantha	Alum Root	Perennial Shrub
9. ATHLETIC LANDSCAPE	*Pyrus kawakamii*	Evergreen Pear	Deciduous Tree
	Baccharis pilularis'Twin Peaks'	Dwarf Coyote Brush	Perennial Shrub
	Cotoneaster dammeri	Bearberry Cotoneaster	Evergreen Shrub
	Muhlenbergia rigens	Deer Grass	Perennial Grass
	Senecio mandraliscae	Senecio	Evergreen Groundcover
10. ADJACENT STREETSCAPE	*Prunus illicifolia*	Hollyleaf Cherry	Deciduous Tree
	Arbutus unedo	Strawberry Tree	Evergreen Tree
	Quercus agrifolia	Coast Live Oak	Evergreen Tree
	Phormium tenax'Atropurpureum Compactum'	New Zealand Flax	Background Grass
	Muhlenbergia rigens	Deer Grass	Perennial Grass

References:
Riverside MWD, Western's Waterwise 140, Recommended Plant List
California Green Solutions, Common California Native and Naturalized Plants
Las Pilitas, Planting Under Oak Trees Guide
Southern California MWD, Plants for Southern California Homes
Susent, Western Garden, 2007
UCR Botanical Garden Natives Plant List, www.gardens.ucr.edu/gardens/siteplants.html

* Plant with ample space in between plant, site furnishing and other site amenities to avoid crowding.

LANDSCAPE

COMPREHENSIVE PLANT LIST NOTES

1. When not specified, use a single variety of the species listed throughout the project to maintain consistency.

2. Avoid materials with limited distribution. Plant materials that are only distributed by a single grower may become unavailable or available only at a premium cost.

3. All trees to be inspected and approved by the client or client's representative. Purchase of trees to be verified by receipt at time of delivery.

4. All plant material coming from Red Fire Ant (RFA) regions must be accompanied by RFA free certificate. All plant material and sources must be approved by client or client's representative. Plant material must be inspected and may be rejected by client or client's representative at time of delivery.

5. Avoid placement of trees with significant fruit or flower drop over walkways, seating, or parking.

6. Identify current pest and diseease issues for each plant species. Review plant list at each Horizon to determine if substitutions are necessary to avoid species decimation from pest and/or disease.

7. Trees to be preserved in place must be protected and maintained during construction activites. The area 20% to 40% beyond the dripline of the tree must not be used for any purposes during construction including lunch and breaks for workers, storage, or for parking. Contractor is responsible for providing trees with deep irrigation and managing resultant runoff during construction.

8. Identify the feeding field of all trees to be preserved. Make sure impervious surfaces to be installed are not built over feeding fields.

9. Design drawings to include plant material and irrigation as-builds. To protect the integrity of the designer's intent though the life cycle of the project, designers should also include a maintenance manual describing the critical procedures for sustaining the intended planting scheme.

10. Soil amendment will be based recommendation of reputable soil label. Soil lab will take multiple representative soil samples for each landscape site. Soil amendments are to be purchased from agreed upon sources and verified with presentation of receipts at time of delivery (or).

11. Test all tree wells and planting pits for adequate drainage using standard methods.

12. Install geotextile weed barriers and 2" to 4" of mulch for all tree wells and planting beds.

13. Make sure tree wells for trees to be planted in turf areas are sized adequately. Tree wells in turf areas should be mulched and irrigated by a sub-surface irrigation system separate from the system intended for turf irrigation. The placement of rotors for turf irrigation should take into consideration the location of both existing and proposed tree wells to avoid water sprays from hitting tree trunks and to avoid over watering.

14. Where trees are to be planted in close proximity to sidewalks, provide root barriers along sidewalks to prevent sidewalk lift.

15. Banners and ornamental lighting should not be applied to trees until the trees have situated themselves and are strong enough to sustain additional weight. Consult Maintenance and Operations before application.

LANDSCAPE

SITE FURNISHING

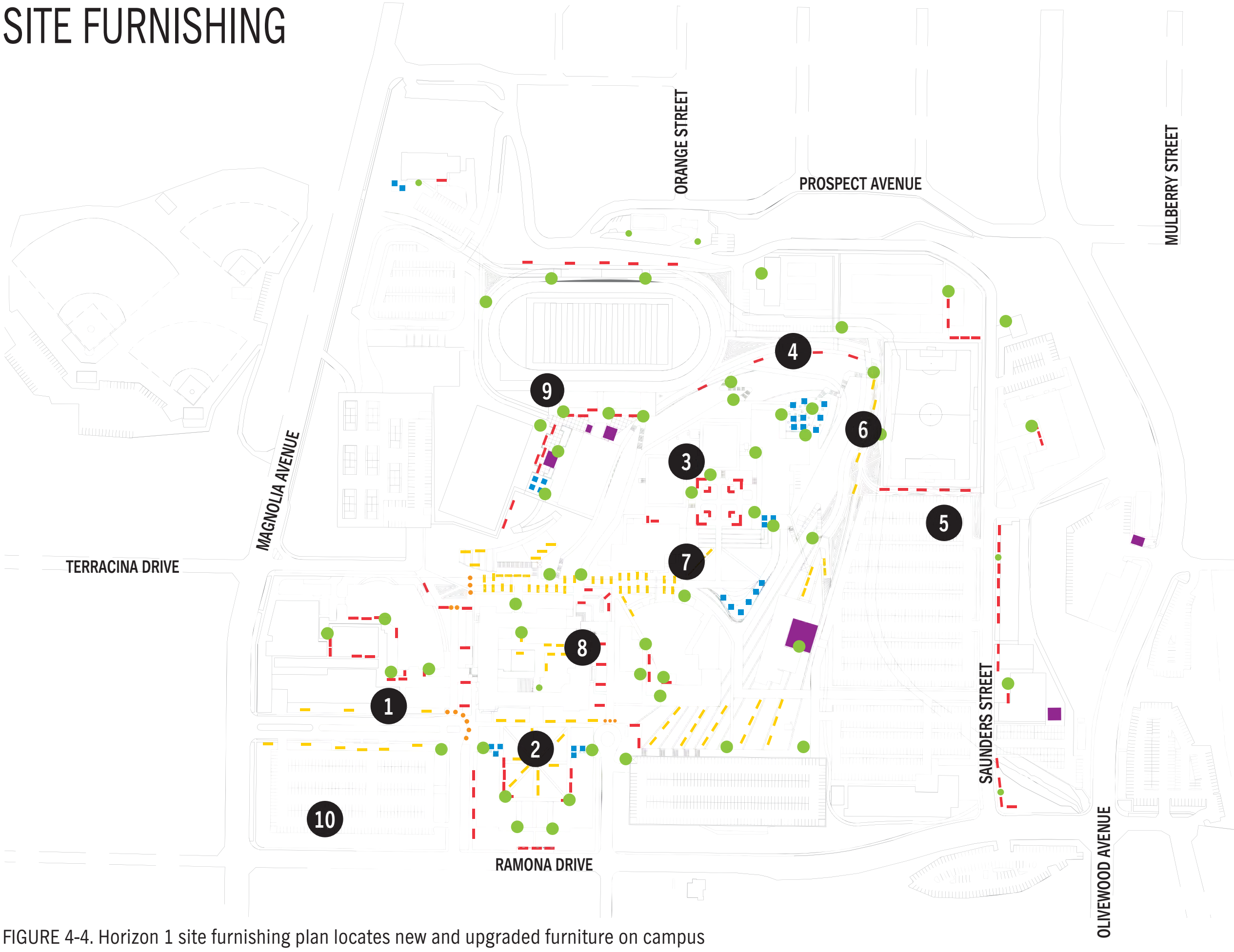


FIGURE 4-4. Horizon 1 site furnishing plan locates new and upgraded furniture on campus

LEGEND

- CONCRETE BENCH FIXED
- ACCENT BENCH FIXED
- TABLES + SEATING FIXED
- COMBINATION BENCHES + TABLES AND SEATING
- WASTE RECEPTACLES
- BOLLARDS

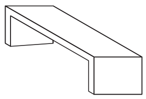
LANDSCAPE PLACES

1	CEREMONIAL ENTRY
2	THE LAWN
3	COURTYARDS
4	SLOPESCAPE
5	ARROYO
6	RIPARIAN WALK
7	CAMPUS PROMENADE
8	ALLEES
9	ATHLETIC LANDSCAPE
10	ADJACENT STREETSCAPE

0' 250' 500'

LANDSCAPE

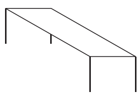
SITE FURNISHING



STANDARD BENCH
FIXED CONCRETE

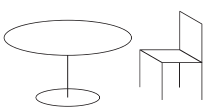
PRE-CAST CONCRETE

QUICK CRETE
'HOLLYWOOD' #Q2HD60B*'
http://www.quickcrete.com



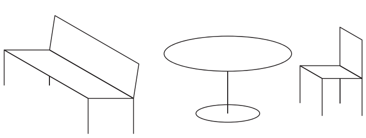
ACCENT BENCH
RECYCLED POLYSITE+METAL

LANDSCAPEFORMS
'GRETCHEN'
http://www.landscapeforms.com

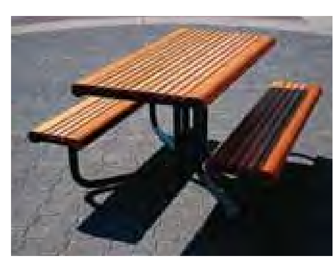


TABLES +SEATING
FIXED

LANDSCAPEFORMS
'GRETCHEN'
http://www.landscapeforms.com



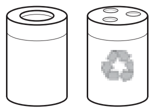
COMBINATION
BENCHES / TABLES+SEATING



[SAME AS ACCENT BENCH ABOVE]

LANDSCAPE

SITE FURNISHING



WASTE RECEPTACLES

RECYCYCLED POLYSITE AND METAL

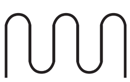
‘CONCRETE LITTER CONTAINER
W/CONVEX SPUN LID’
http://www.parkequipmentpro.com

[OR MATCH EXISTING WITH CONCRETE
WASTE RECEPTACLES]

WASTE RECEPTACLES

POWDER-COATED STEEL
COLOR: SILVER

LANDSCAPEFORMS
‘CHASE PARK’*, ‘PETOSKEY’*, OR
‘SCARBOROUGH’*
http://www.landscapeforms.com



BIKE RACK
FIXED

GALVANIZED STEEL
COLOR: SILVER

[AS NEEDED]

BOLLARDS

LANDSCAPE FORMS
‘ANNAPOLIS’
REMOVABLE BOLLARD WITH SOLAR LIGHTING

*OR SIMILAR TO BE APPROVED BY CLIENT.

LANDSCAPE

HARDSCAPE

STAMPED CONCRETE AND ASPHAULT




CONCRETE UNIT PAVERS

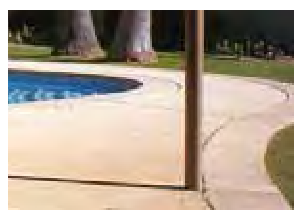



COLORED CONCRETE




GLARE REDUCED CONCRETE






DECOMPOSED GRANITE AND GRAVEL




Note: Not to be used for primary pathways.

INNOVATIVE MATERIALS


RECYCLED RUBBER TIRE PATH


SUSTAINABLY HARVESTED IPE WOOD


PERVIOUS CONCRETE & ASPHAULT


TURF BLOCK PAVERS

HARDSCAPE

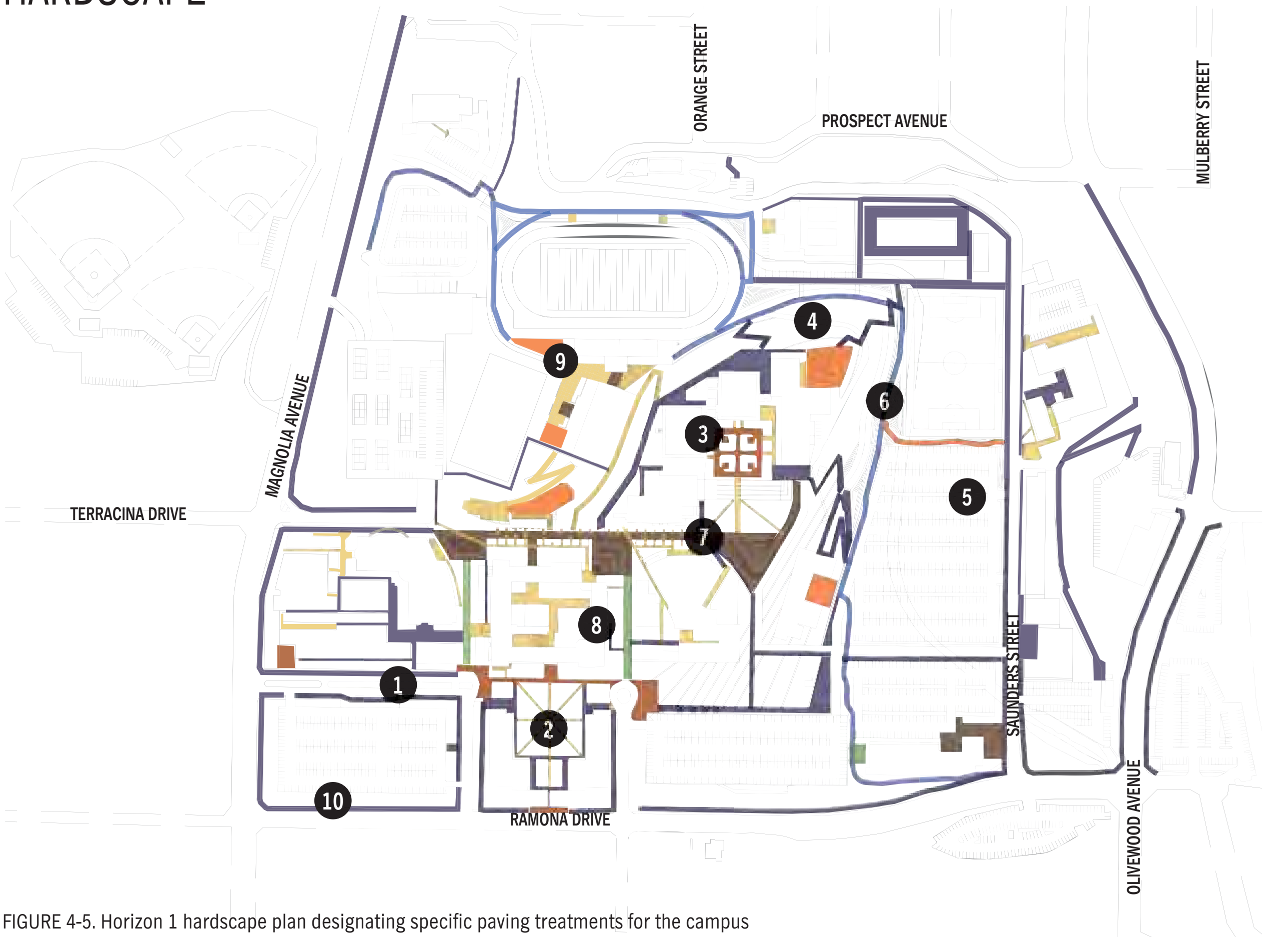


FIGURE 4-5. Horizon 1 hardscape plan designating specific paving treatments for the campus

LEGEND

- CONCRETE UNIT PAVERS
  MAIN PLAZAS / SPECIAL USE AREAS
- STAMPED CONCRETE
  COURTYARDS / ENTRY PLAZAS / DROP-OFFS
- DECOMPOSED GRANITE
  SECONDARY COURTYARDS /PARKING ADJACENT PLAZAS
- COLORED CONCRETE
  MAJOR PATHWAYS
- GLARE REDUCED CONCRETE
  HIGH TRAFFIC AREAS / HIGH VOLUME USE
- TURF BLOCK PAVERS
  PATHS REQUIRING VEHICULAR ACCESS
- RECYCLED RUBBER PATH
  EXERCISE LOOP

LANDSCAPE PLACES

1	CEREMONIAL ENTRY
2	THE LAWN
3	COURTYARDS
4	SLOPESCAPE
5	ARROYO
6	RIPARIAN WALK
7	CAMPUS PROMENADE
8	ALLEES
9	ATHLETIC LANDSCAPE
10	ADJACENT STREETSCAPE

0' 250' 500'

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6 SIGNAGE + WAYFINDING

RIVERSIDE COMMUNITY COLLEGE DISTRICT - DISTRICT STANDARDS + CAMPUS GUIDELINES HANDBOOK

INTRODUCTION

A comprehensive wayfinding program that is integrated with the RCCD District Standards + Campus Guidelines will provide a positive user experience on the three Riverside Community College District (RCCD) campuses. From the edges and entries of the campus, to the paths and places, a successful wayfinding and identity system enables visitors, students, and faculty to navigate their way through campus streets and sidewalks to their desired destination. The campus Signage + Wayfinding guidelines take into consideration existing and future campus conditions to create an uniquely branded and functional solution.

Design and construction of the gateway signage at each campus will follow the project process outlined in Section 1 to ensure that each College's strategic planning and approval process is incorporated.

I. WAYFINDING OBJECTIVES

Four overall design objectives have been identified for wayfinding at the three Riverside Community College District campuses.

1. **Establish design guidelines for permanent exterior signage:**
   - Campus entries + parking identification
   - Vehicular + pedestrian wayfinding
   - Pedestrian direction + information signs

2. **Develop a functional + visually cohesive sign system:**
   - Consistent color, typography, and graphic elements
   - Clear nomenclature message hierarchy
   - Reinforce the college brand identity

3. **Deliver an executable sign system:**
   - Cost effective + maintainable
   - Ease of fabrication + installation
   - Ease of changeability
   - Durable materials

4. **Provide an integrated sign system:**
   - Cohesive with master plan vision
   - Works with existing + new building conditions
   - Integrates with landscape + lighting
   - Addresses sign code requirements

5. **Incorporate Best Practices:**
   - Provide 70% minimum contrast
   - Consider lines of sight when location signs
   - Use sustainable materials for fabrication
   - Maximize letter height to increase legibility

II. DESIGN APPROACH

A “kit-of-parts” approach base on the following will insure a consistent wayfinding system throughout the RCCD campuses while providing a unique brand look and feel for each.

1. **Materials:**
   - Utilize materials that are unique to each college environment and regional context.

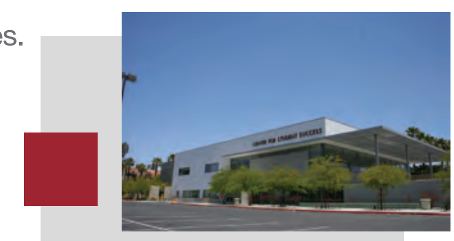
2. **Form:**
   - Provide continuity of the physical sign elements.

3. **Brand:**
   - Treat brand elements for each college consistently.

4. **Typography:**
   - Use one typeface for all wayfinding information.

5. **Color:**
   - Use college brand colors as accents.
   - Sign panel colors to be the same for each campus.

6. **Nomenclature + Symbols:**
   - Establish guidelines for the consistent uses of messages.
   - Provide a selection of universal symbols.
   - Consistent use of type, fonts, symbols, and layouts.



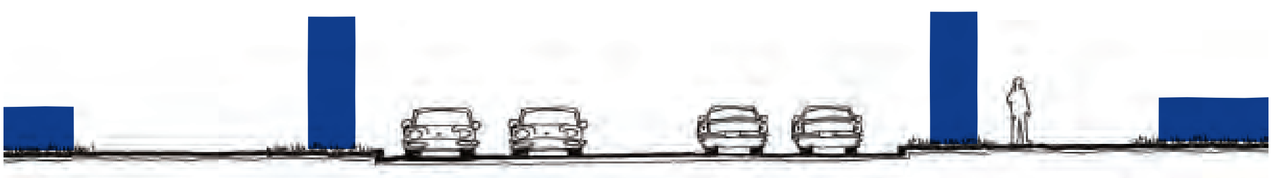
III. BRAND STANDARDS

Existing brand standards exist for both the District and the three colleges. The unique college identity is integrated into each college wayfinding system.

IV. SIGN TYPES

GATEWAY SIGNS (DIAGRAMS - NOT FOR DESIGN)

Gateways and identity along the edges identify the boundaries and entry points to campus. Typically a campus will have one ceremonial entry gateway and several secondary/functional gateway entries. These signs communicate the brand and express college pride to all those that encounter the campus edges.



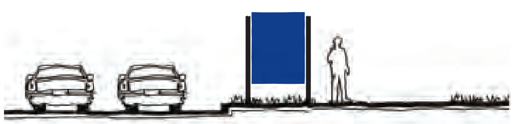
S1 PRIMARY GATEWAY

S2 SECONDARY GATEWAY OR CORNER IDENTITY (MAY INCORPORATE DIGITAL SIGNAGE)

IV. SIGN TYPES (CONT'D)

VEHICULAR SIGNS (DIAGRAMS - NOT FOR DESIGN)

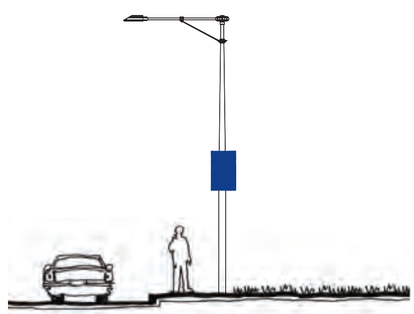
Vehicular circulation is greatly enhanced with the proper placement and scale of vehicular wayfinding signs. The primary objective of vehicular traffic on campus is to find parking in relative proximity to one's destination. A consistent design language used throughout these signs will reinforce the campus image and increase functionality. Minimal messages and proper placement of such signs are critical to ensure enough time to read and comprehend the information.



S3 PRIMARY VEHICULAR DIRECTION

S4 SECONDARY VEHICULAR DIRECTION

S5 PARKING ENTRY

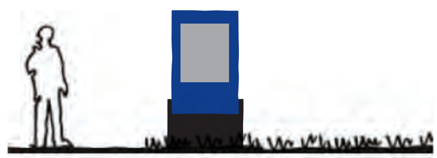


S6 PARKING LOT ID

PEDESTRIAN SIGNS (DIAGRAMS - NOT FOR DESIGN)

Pedestrian sign types are smaller in size and are read from close proximity. Pedestrians typically arrive at campus via automobile or public transportation. From the point of arrival, pedestrians look for information to help guide them to their destination on campus. These signs should be clear and concise with placement and messages.

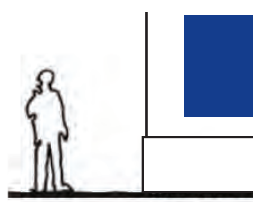
S7 KIOSK



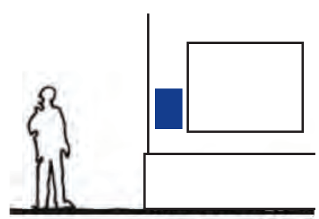
S8 CAMPUS DIRECTORY

S9 PEDESTRIAN DIRECTION

S10 GENERAL INFORMATION



S1 BUILDING ID



S12 BUILDING ENTRY ID

S13 ACCESSIBLE ROUTE

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END OF SECTION 6

SECTION 6
MORENO VALLEY COLLEGE

PART A

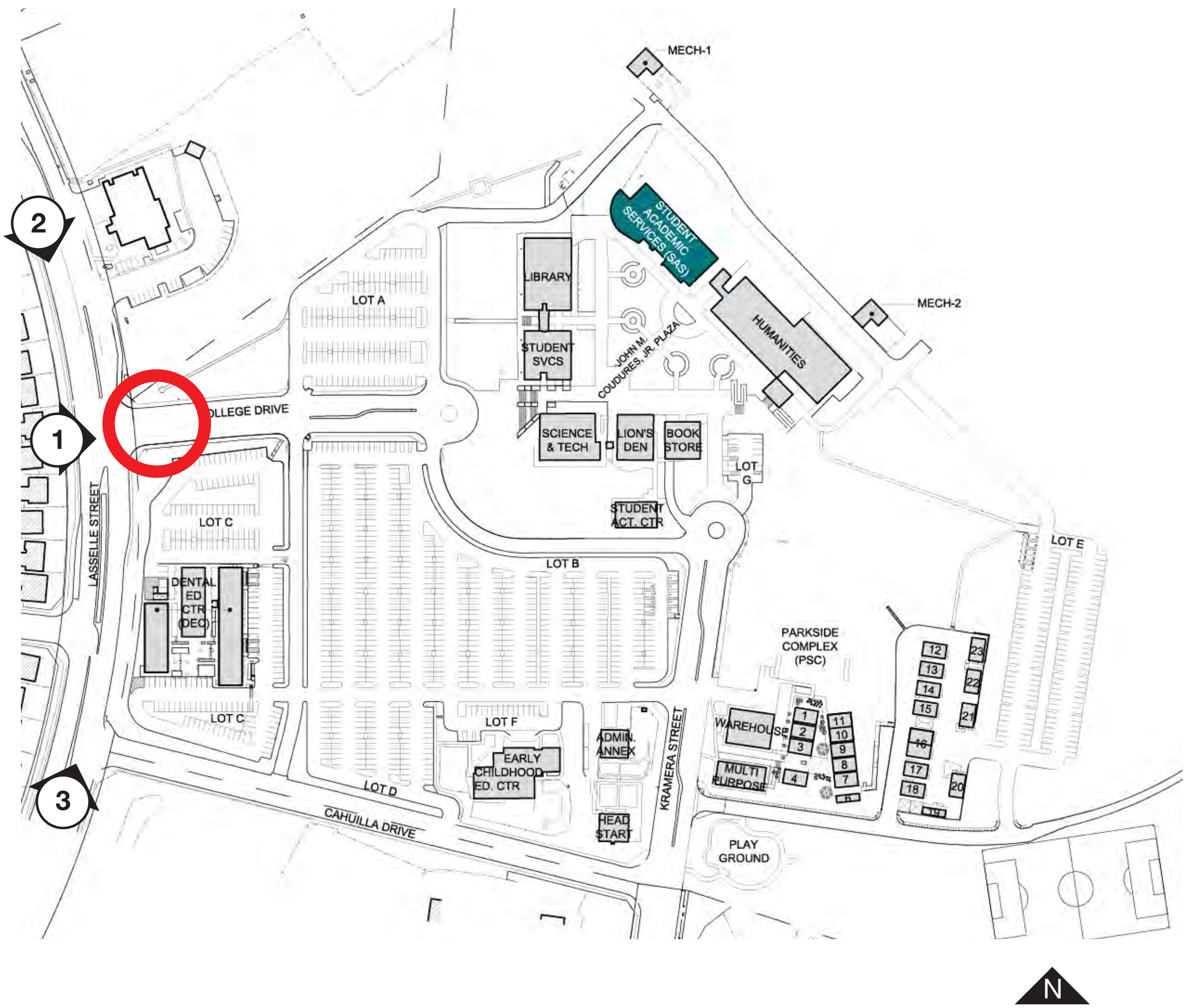
EXISTING CONDITIONS

I. GENERAL REVIEW + PHOTO DOCUMENTATION

The existing Moreno Valley College (MVC) campus edges and entries lack a branded arrival experience. The campus wayfinding signage is outdated and inconsistent while not representative of the new MVC graphic standards. It is apparent that a variety of signs have been implemented over the years in response to specific needs and campus development.

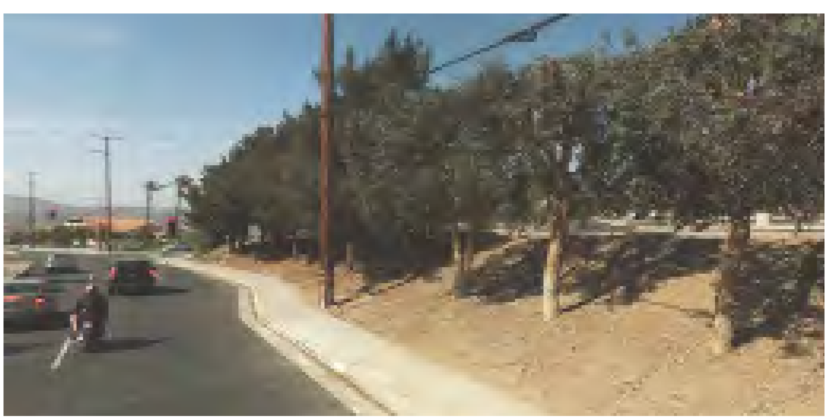
I. ARRIVAL: PRIMARY GATEWAY (CEREMONIAL + FUNCTIONAL)

The primary entrance to MVC is College Avenue via Lasselle Street. It is currently identified by a concrete monument sign on the south side of the drive. This entry is the first impression that most first time guests experience when visiting the College.



1. Center Drive

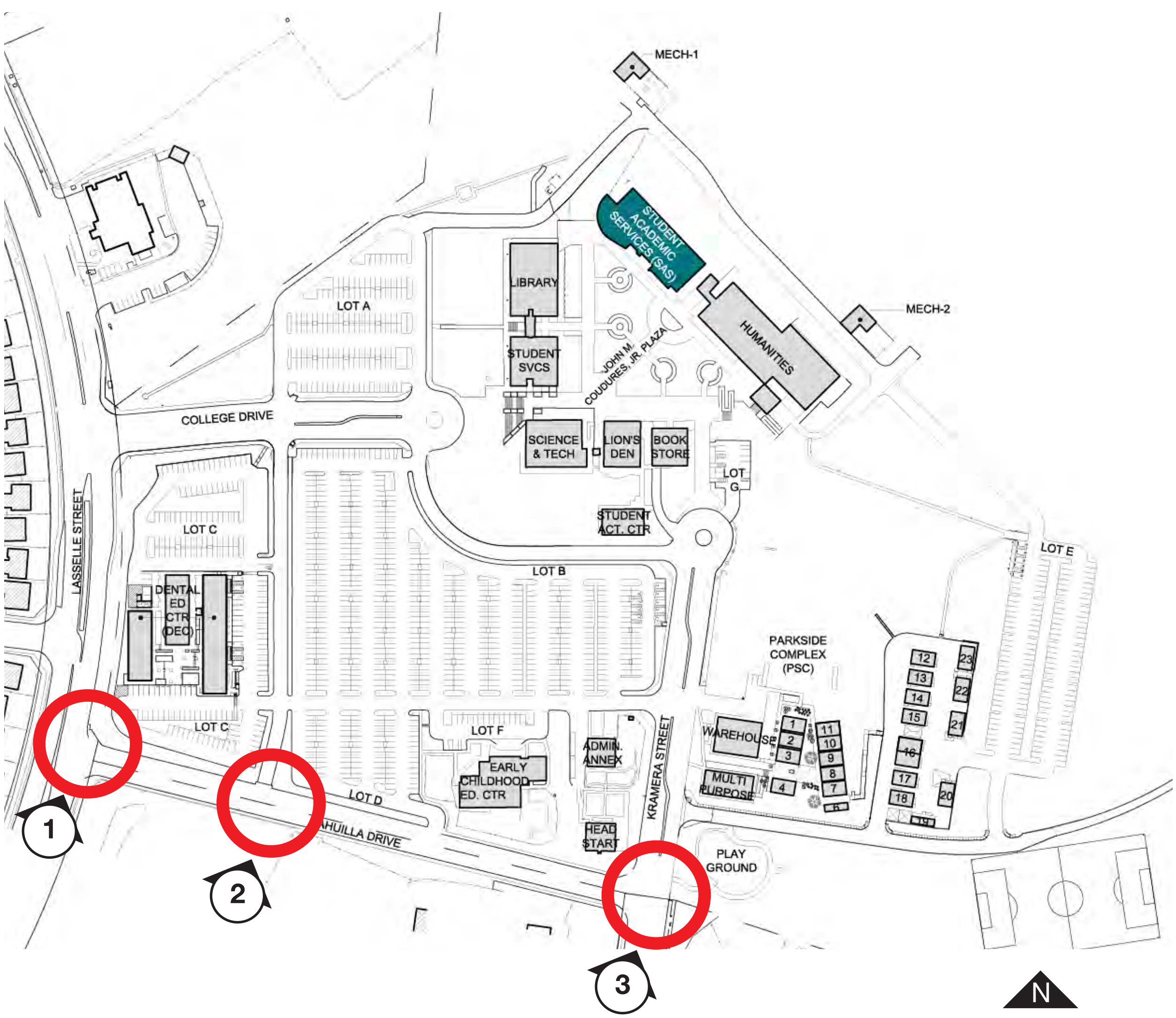
2. Lasselle Street - Southbound



3. Lasselle Street - Northbound

II. ARRIVAL: CAMPUS CORNERS + SECONDARY GATEWAYS

The intersection of Lasselle Street and Cahuilla Drive marks the southwest corner and secondary entry to the College. There is currently no identity marking this corner/edge of the campus. Cahuilla Drive provides direct entry to Lots B, C, and D as well as easy access to Parkside Drive and Lot E to the west.



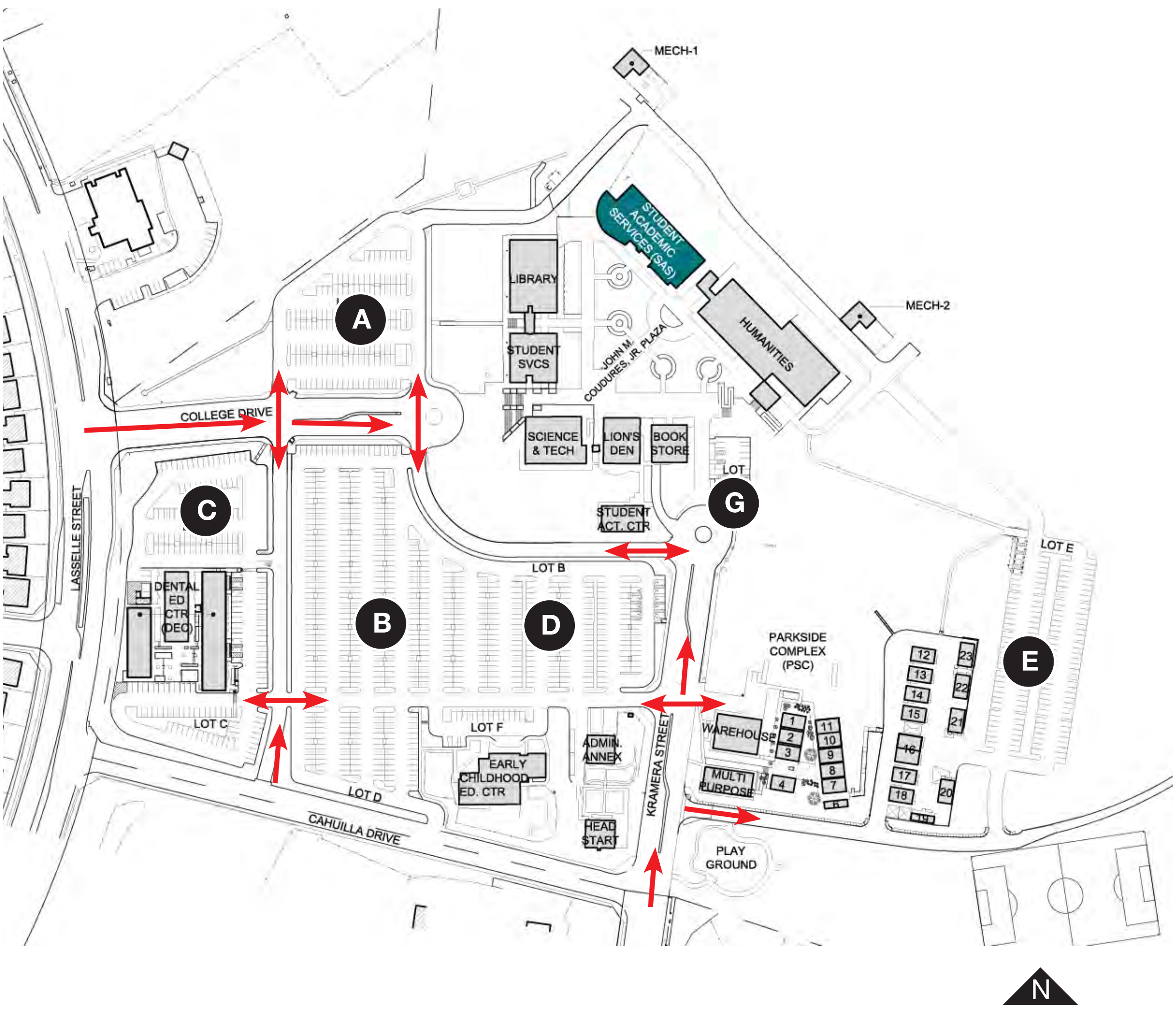
1. Cahuilla Drive

2. Parking Lot Entrance Drive

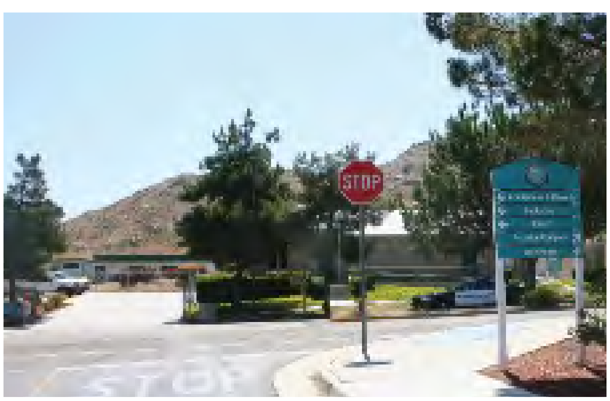
3. Krameria Avenue

III. VEHICULAR WAYFINDING + PARKING

A variety of vehicular direction signs and parking identification exist throughout the campus. The existing campus signage is characterized by inconsistent use of color, shape, and typography.



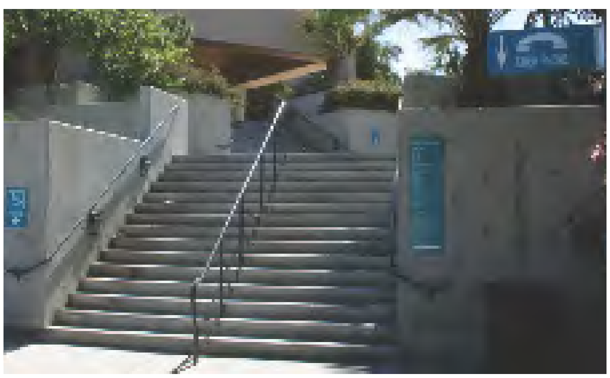

STUDENT PERMIT
PARKING

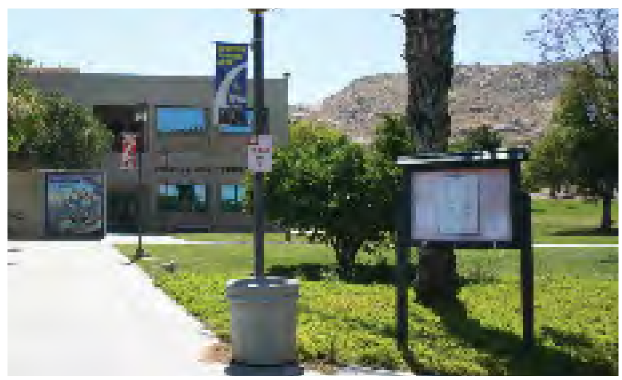

STOP
STOP


Moreno Valley Campus
Riverside Community College District
Parking Permit
Required on all
College Property
Authority 21113(a) C.V.C.

IV. EXISTING PEDESTRIAN WAYFINDING

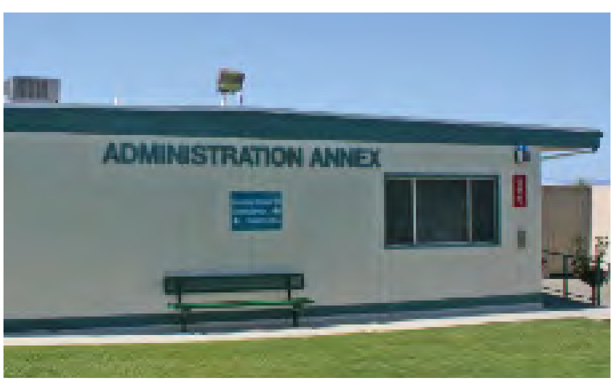
The images below document the variety of pedestrian signs used throughout campus.

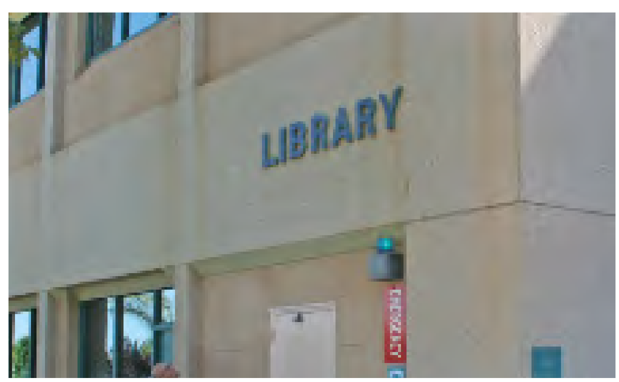




V. EXISTING BUILDING IDENTITY

The images below document the building identity signage used on campus. In most cases, the building signs use Helvetica typeface in various shades of teal.





PART B
SIGN OVERVIEW

INTRODUCTION

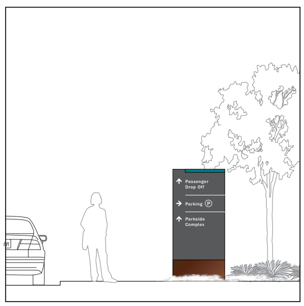
The proposed comprehensive wayfinding program provides a uniform family of sign types for campus entries, as well as vehicular and pedestrian wayfinding. The implementation of these sign types will improve the campus circulation and accommodate growth for years to come. The sign program design communicates the Moreno Valley College (MVC) brand and college fabric by using the newly implemented brand guidelines. Together with lighting, landscape, and architecture, the wayfinding program will express the high quality and reputation of Moreno Valley College to the community, students, faculty, visitors, and new recruits.

I. SUMMARY OF SIGNS

The Moreno Valley College Campus Signage + Wayfinding Guidelines address Gateways, Vehicular Direction, Pedestrian Wayfinding, Building Identity, and Accessible Route signage. The following drawings represent the signs included in these guidelines.

S1 PRIMARY GATEWAY

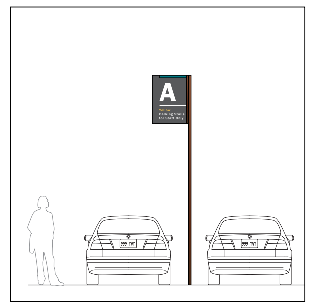
S2 SECONDARY GATEWAY



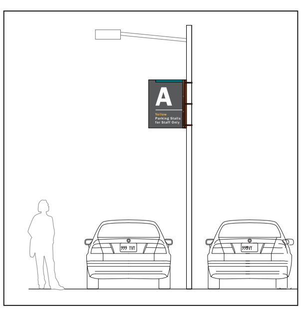
S3 PRIMARY VEHICULAR DIRECTION

S4 SECONDARY VEHICULAR DIRECTION

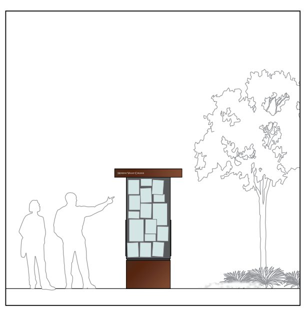
S5 PARKING ENTRY ID



S6a PARKING LOT ID

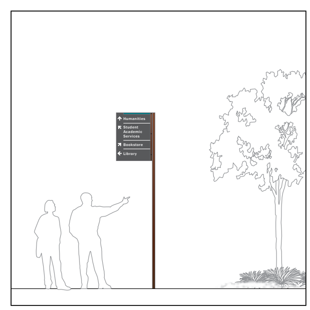


S6b PARKING LOT ID



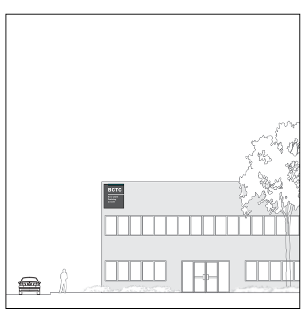
S7 KIOSK

S8 CAMPUS DIRECTORY

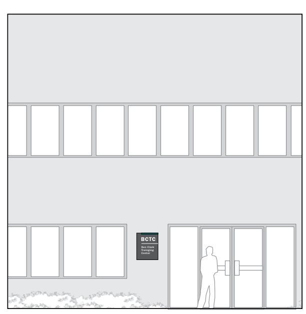


S9 PEDESTRIAN DIRECTION

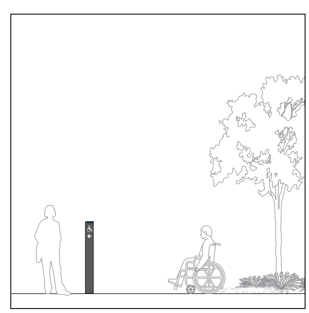
S10 GENERAL INFORMATION



S11 BUILDING ID



S12 ENTRY ID



S13 ACCESSIBLE ROUTE

II. IDENTITY, FONT, SYMBOLS, + COLORS

Graphic standards have been developed for the Moreno Valley College (MVC) brand identity. These standards include the use of the college seal and MVC logo, color and typography. ITC Franklin Gothic, medium and demi, is used as the primary wayfinding typeface. Use of the graphic standards are reflected on the wayfinding signage.

IDENTITY

ITC Franklin Gothic Medium

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

ITC Franklin Gothic Demi

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

The wayfinding program utilizes MVC standard brand colors. A corten steel color compliments the desert environment and the architectural materials recommended in *Section 8: Building Design Guidelines*. Use of colors and materials are reflected on the wayfinding signage.

COLOR PALETTE

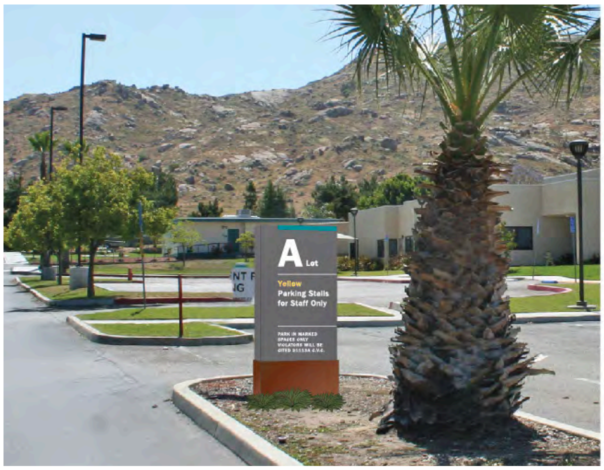
Teal
Black
White

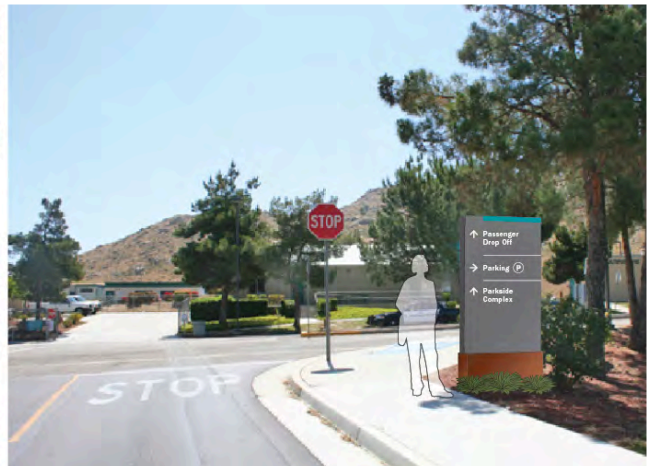
Corten
Charcoal
Yellow

SYMBOLS

PART C
SIGN TYPES

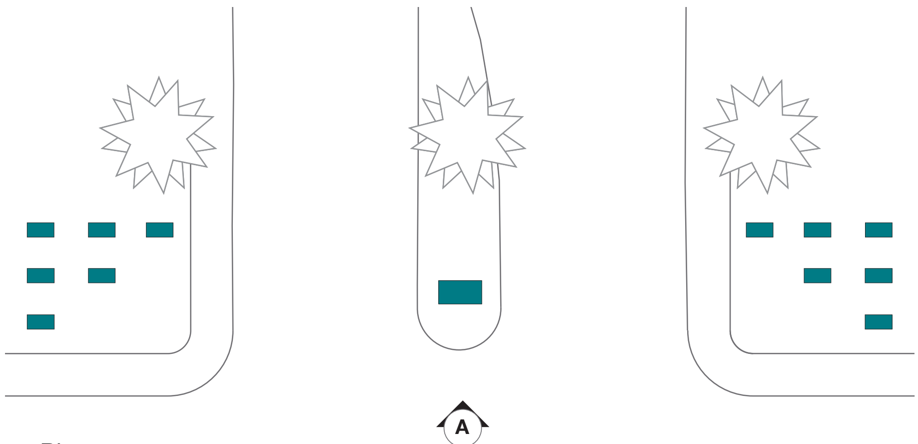
I. DESIGN



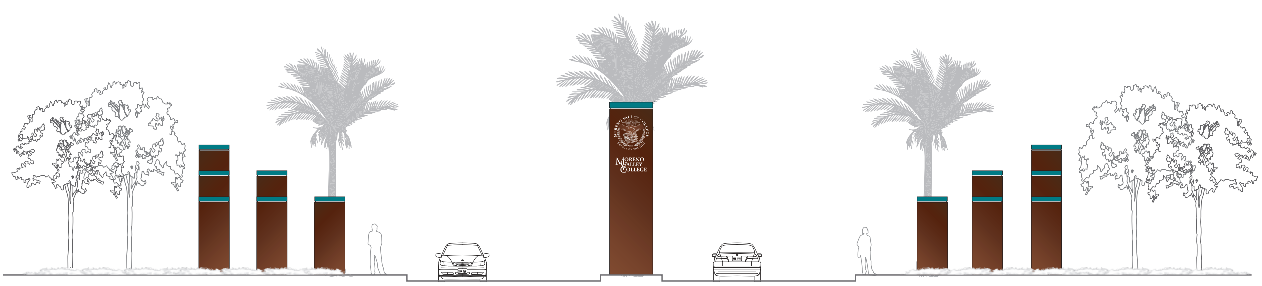


The wayfinding for Moreno Valley College utilizes a "kit-of-parts" approach for the design and layout of each sign. The repetition of color, typography, and materials creates a consistent appearance that allows a user to easily identify wayfinding elements throughout the campus environment. This section provides the design and general specification call-outs for all signs in the summary of sign types.

S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



B Context Plan
NTS

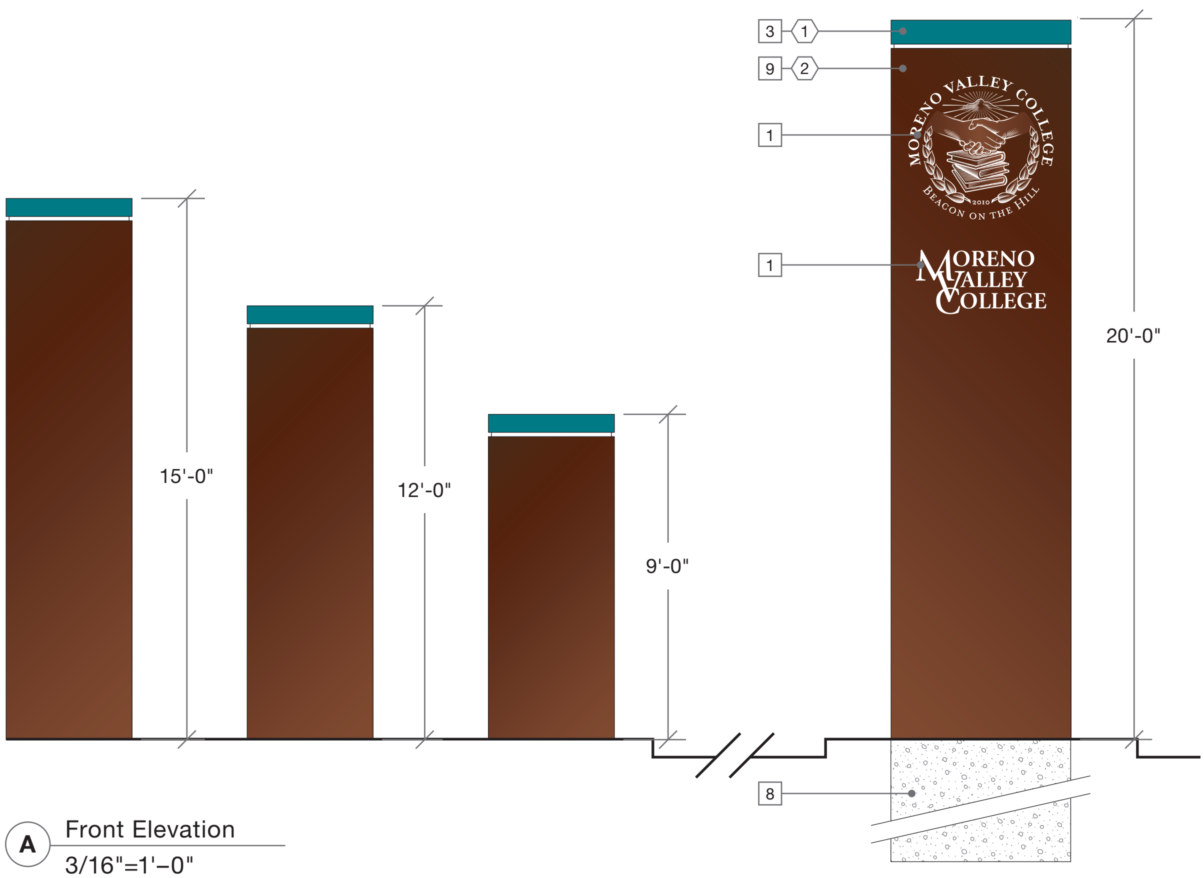


A Context Elevation
NTS

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

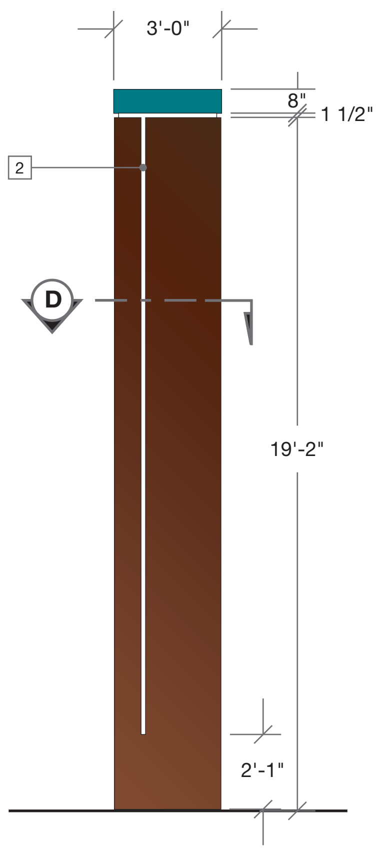
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



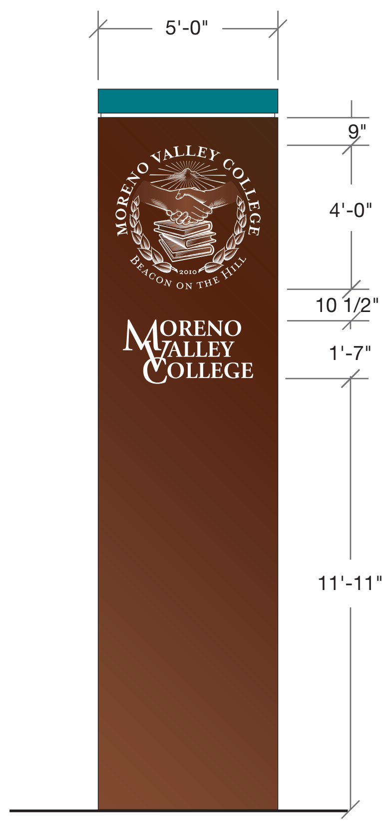
A Front Elevation
3/16"=1'–0"

S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal

D Section
3/8"=1'-0"



A Side Elevation
3/16"=1'-0"

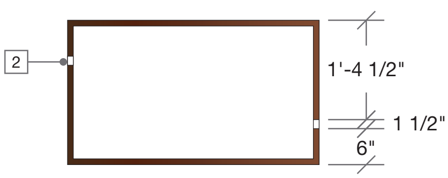


B Back Elevation
3/16"=1'-0"

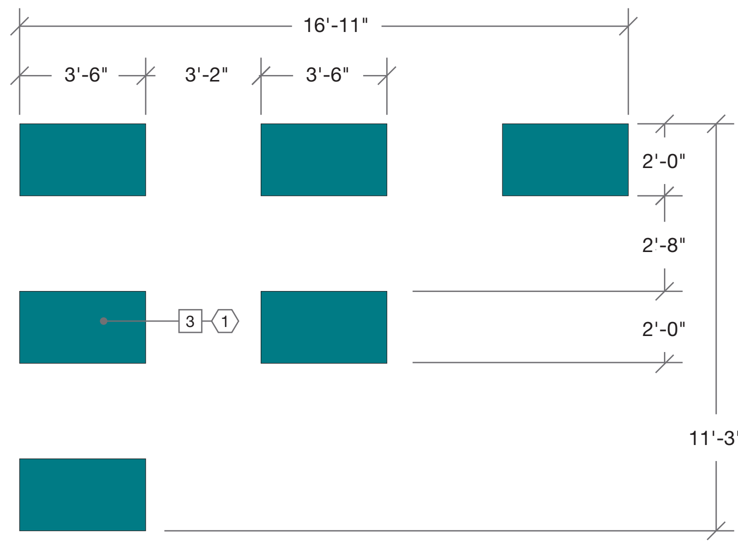
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

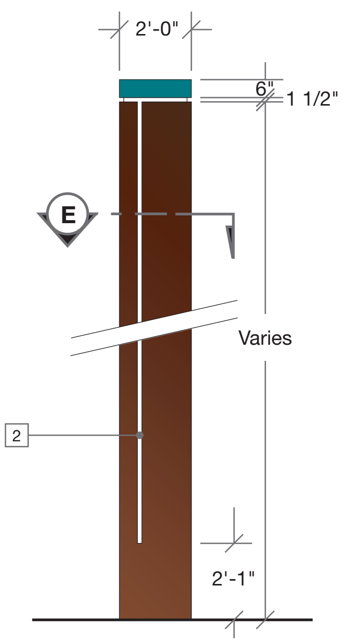
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Section
3/8"=1'–0"

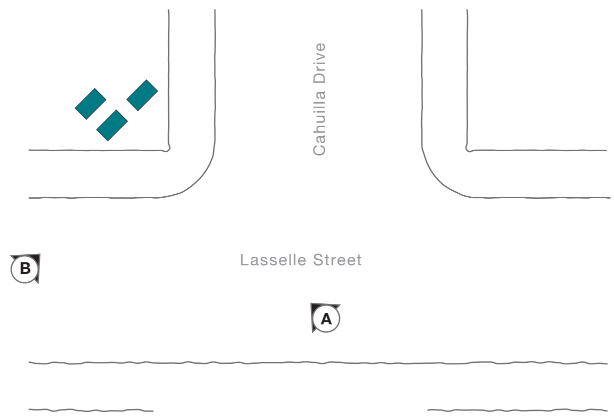


F Plan
1/4"=1'–0"

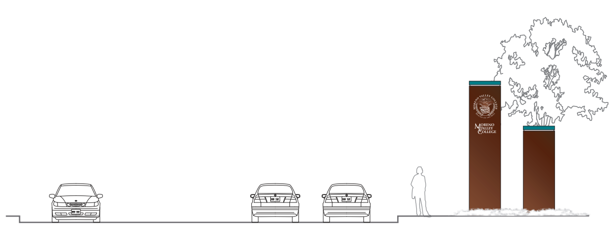


C Side Elevation (TYP)
3/16"=1'–0"

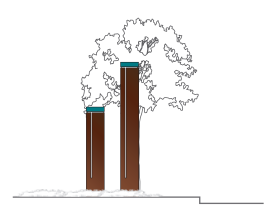
S2	Sign Type: Secondary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



C Plan
3/32"=1'–0"



A Context Elevation
3/32"=1'–0"

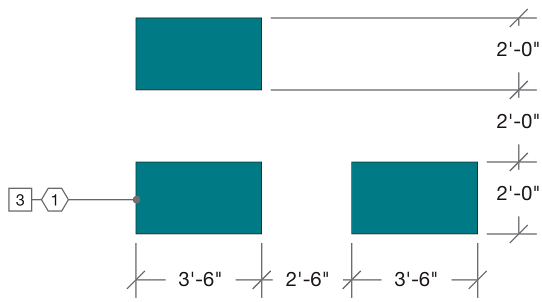


B Context Elevation
3/32"=1'–0"

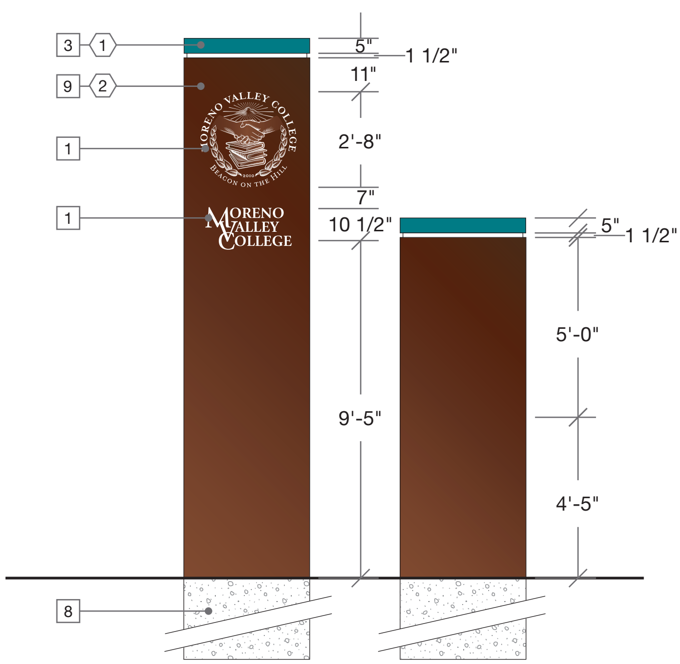
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

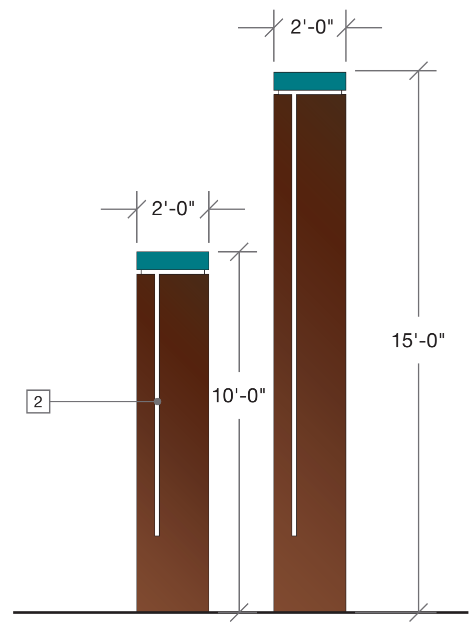
MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



Plan
3/16"=1'–0"

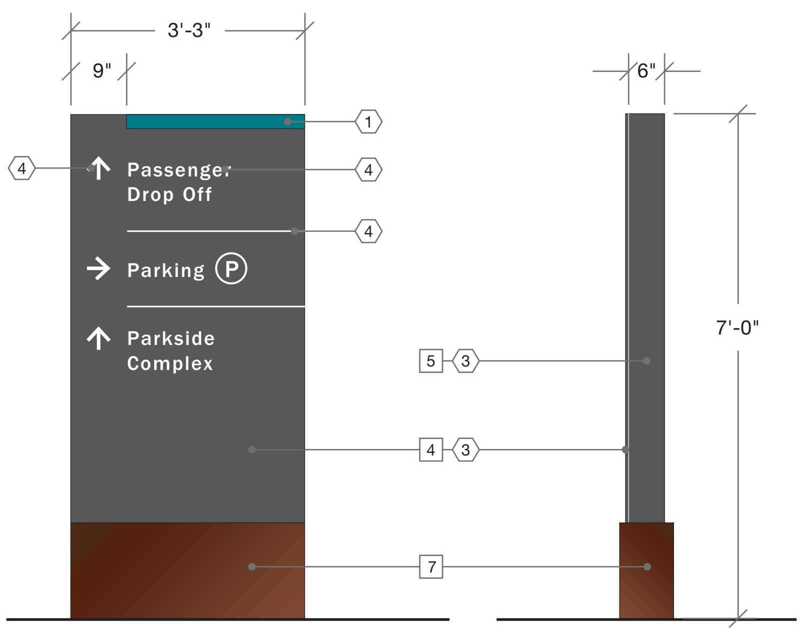




Front Elevation
3/16"=1'–0"

D Side Elevation
3/16"=1'–0"

S3	Sign Type: Primary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External



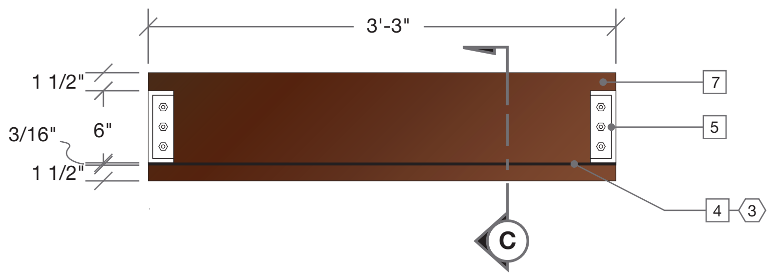
A Front Elevation 3/8"=1'–0"

B Side Elevation 3/8"=1'–0"

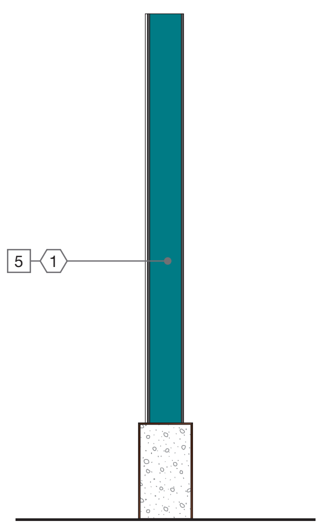
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

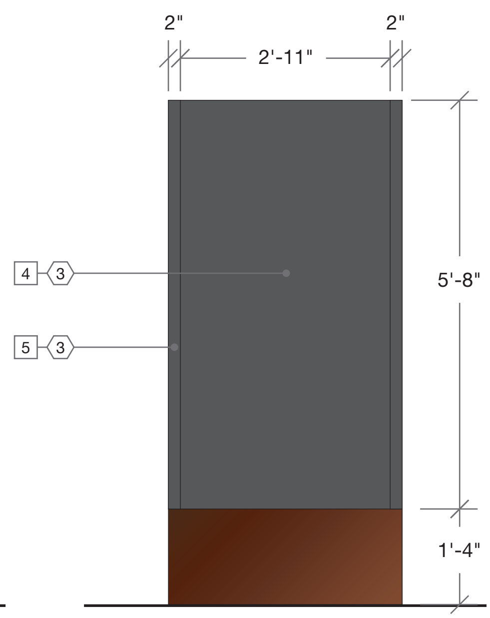
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

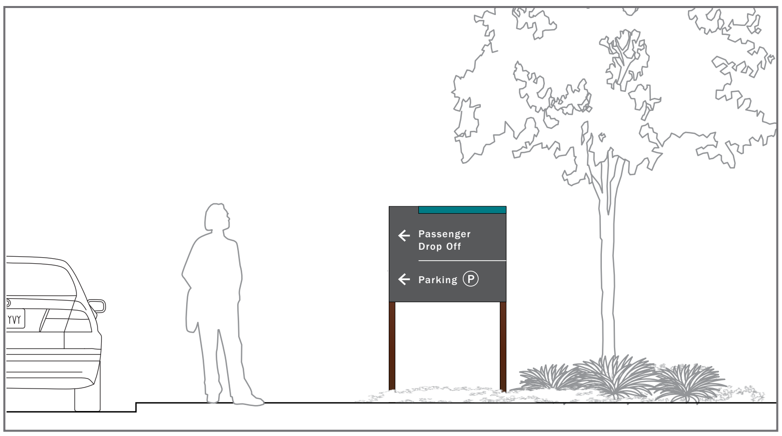


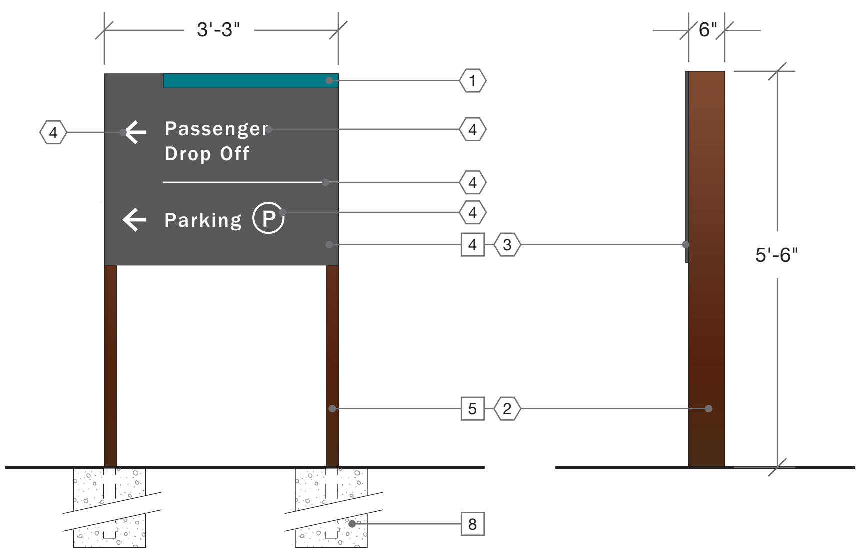
C Section
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S4	Sign Type: Secondary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External





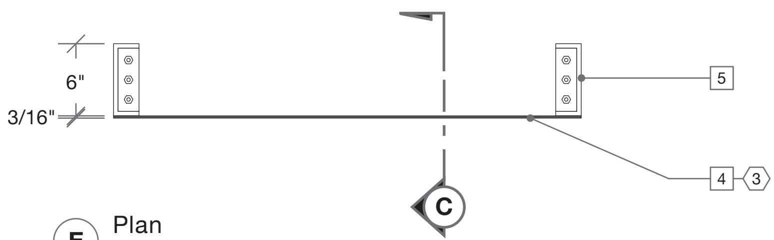
A Front Elevation
3/8"=1'–0"

B Side Elevation
3/8"=1'–0"

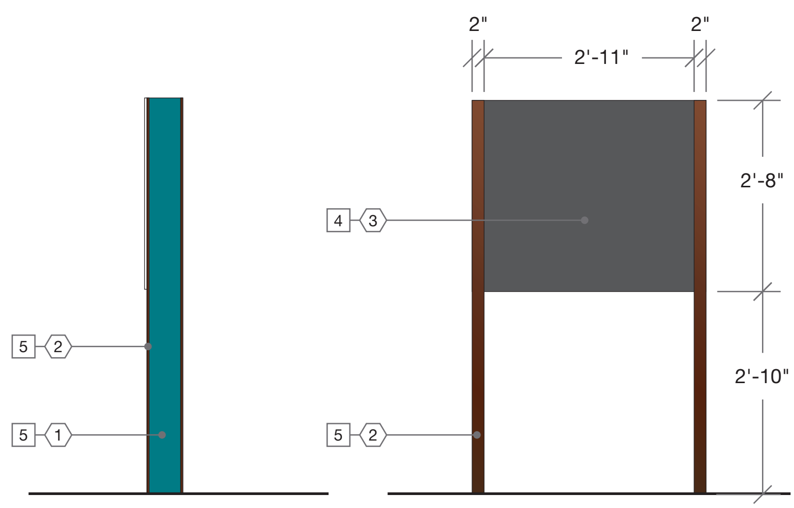
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



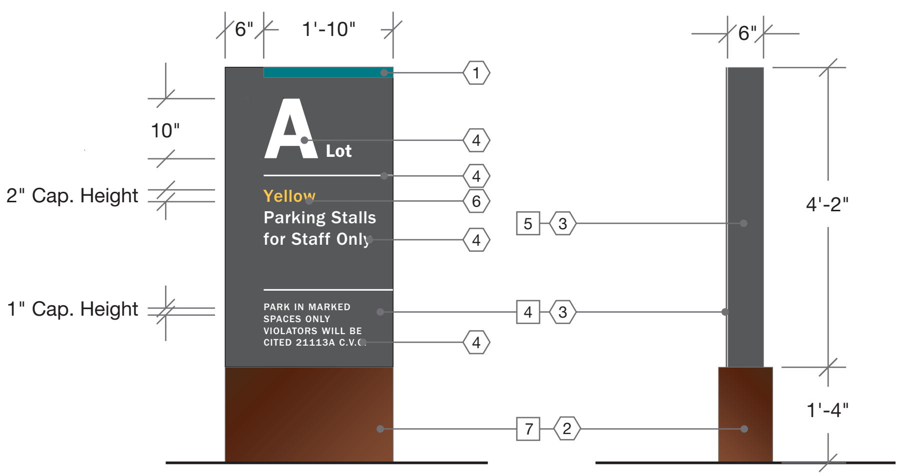
E Plan
3/4"=1'–0"



C Section
3/8"=1'–0"

D Back Elevation
3/8"=1'–0"

S5	Sign Type: Parking Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External



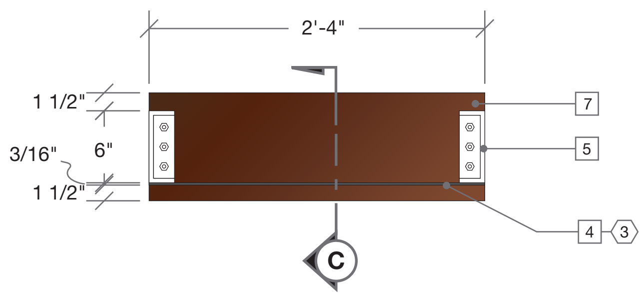
A Front Elevation
3/8"=1'–0"

B Side Elevation
3/8"=1'–0"

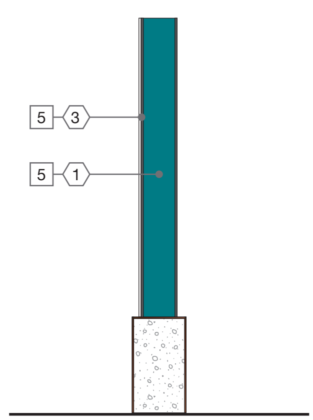
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

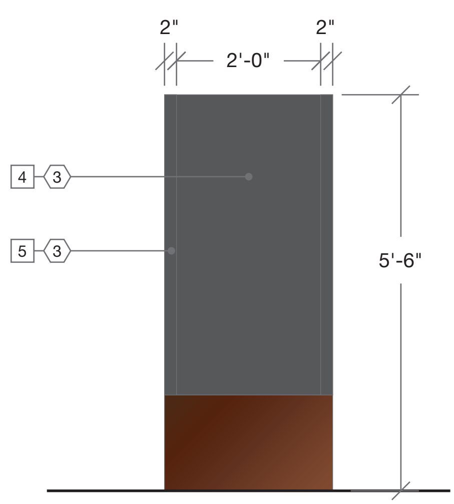
MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

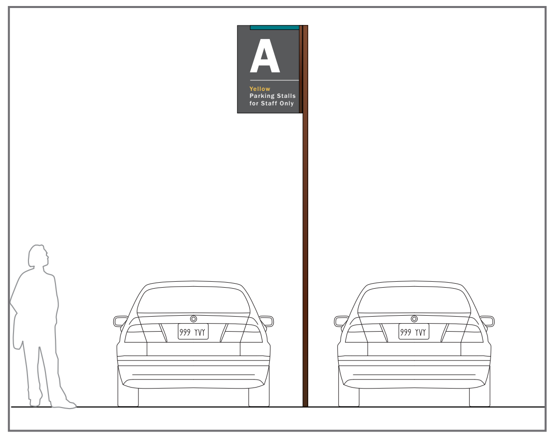


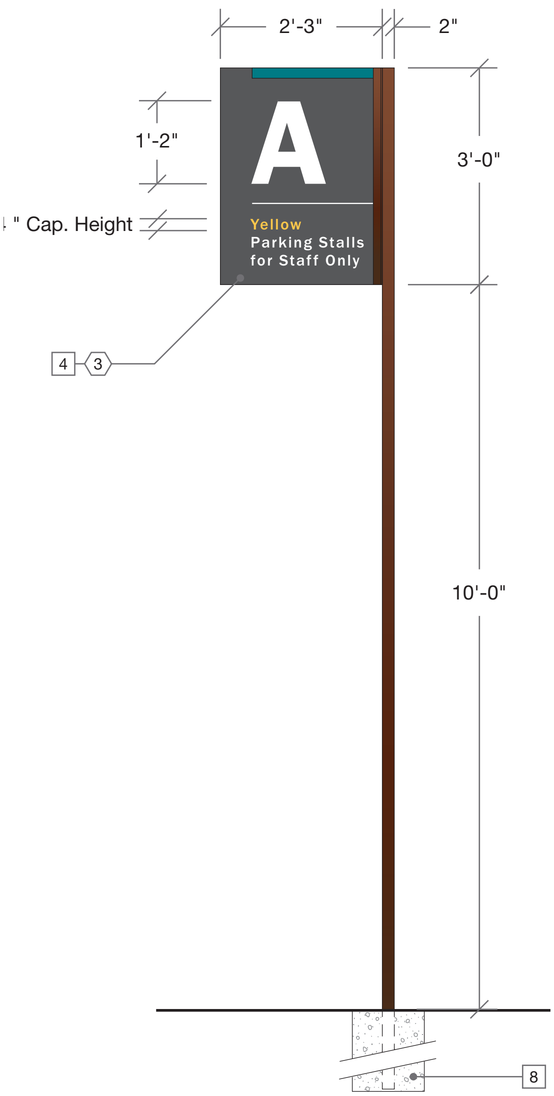


C Section
3/8"=1'–0"

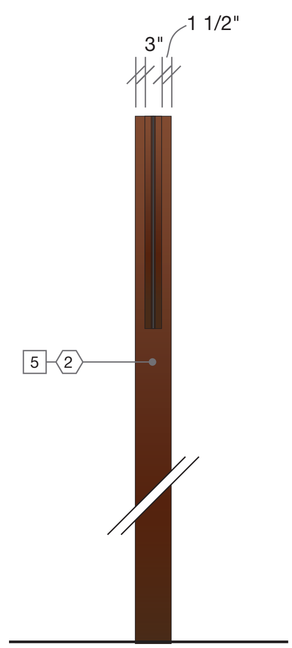
D Back Elevation
3/8"=1'–0"

S6a	Sign Type: Parking Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External





A Front Elevation
3/8"=1'–0"

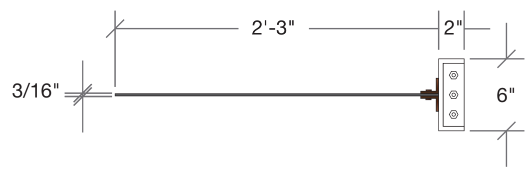


B Side Elevation
3/8"=1'–0"

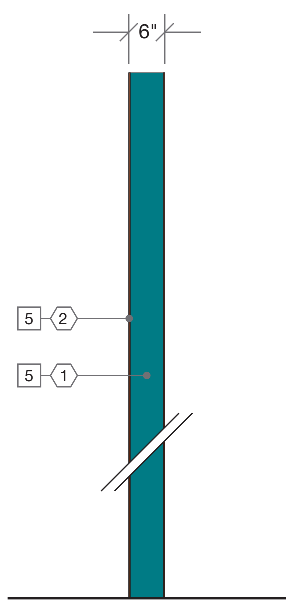
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

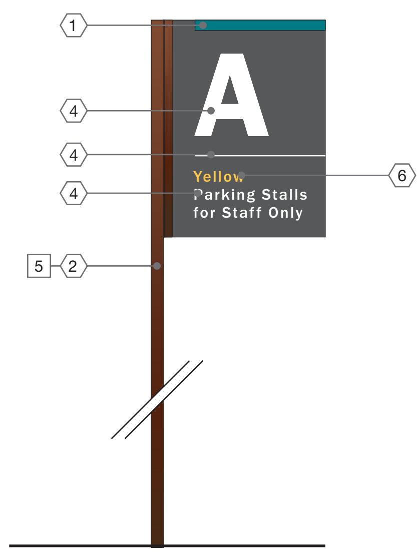
MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

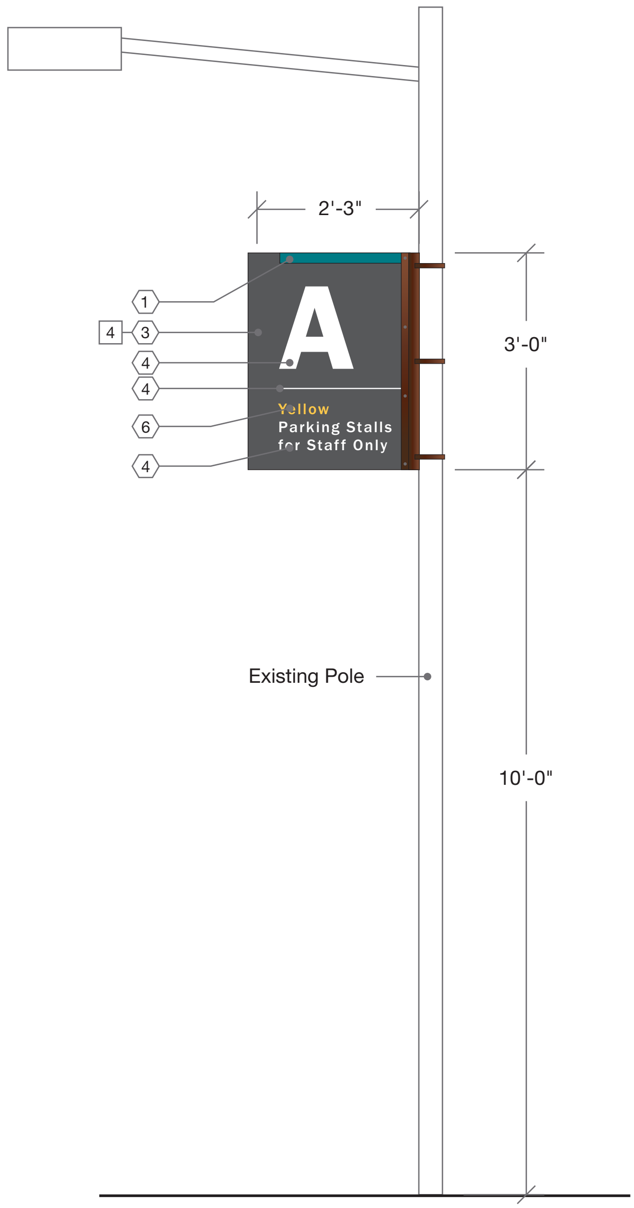


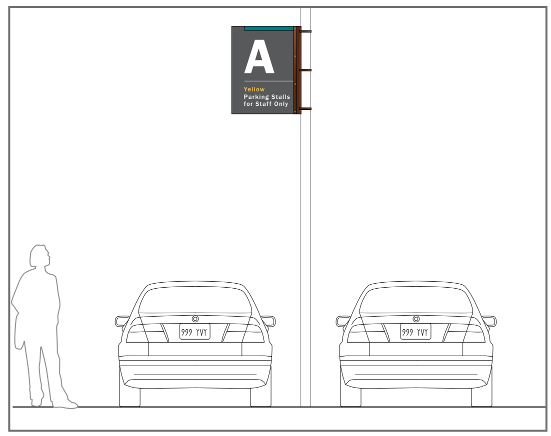


C Side Elevation
3/8"=1'–0"

D Back Elevation
3/8"=1'–0"

S6b	Sign Type: Parking Entry Identification	Mounting: Flag Mounted	Location: Exterior	Lighting: External



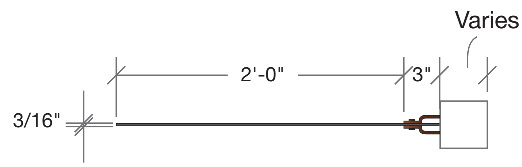


A Front Elevation
3/8"=1'–0"

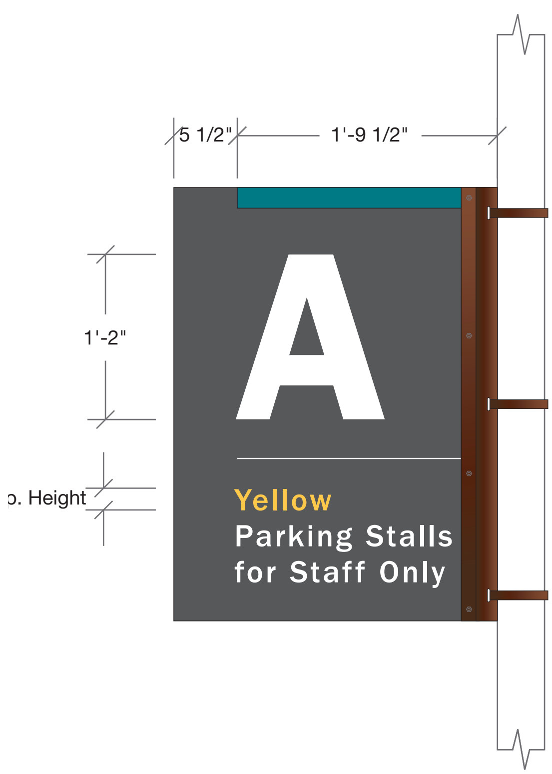
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

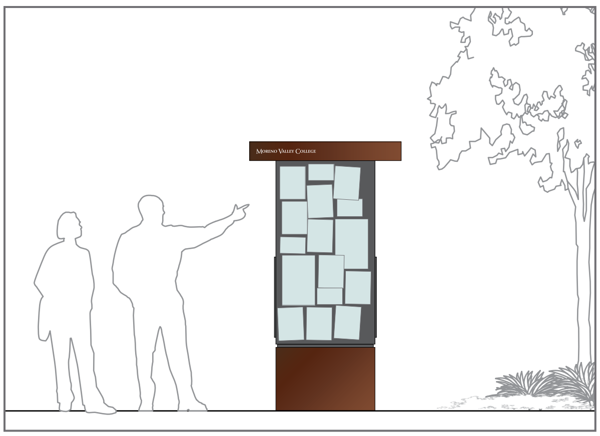


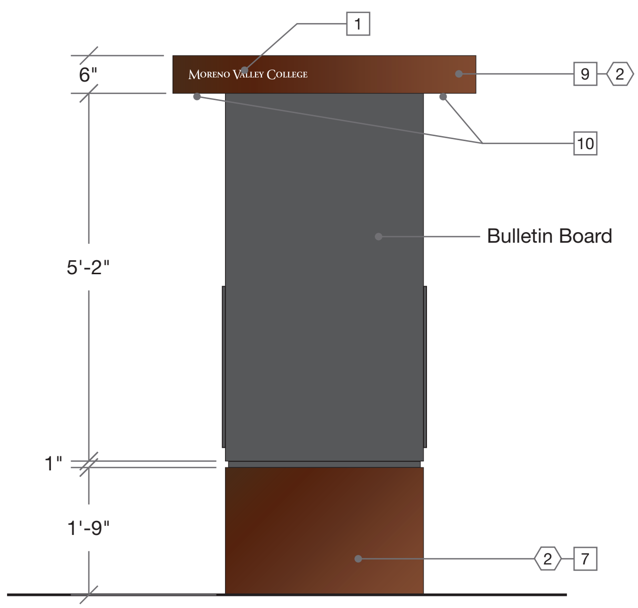
C Plan
3/4"=1'–0"



B Detail
3/4"=1'–0"

S7	Sign Type: Kiosk	Mounting: Freestanding	Location: Exterior	Lighting: Internal



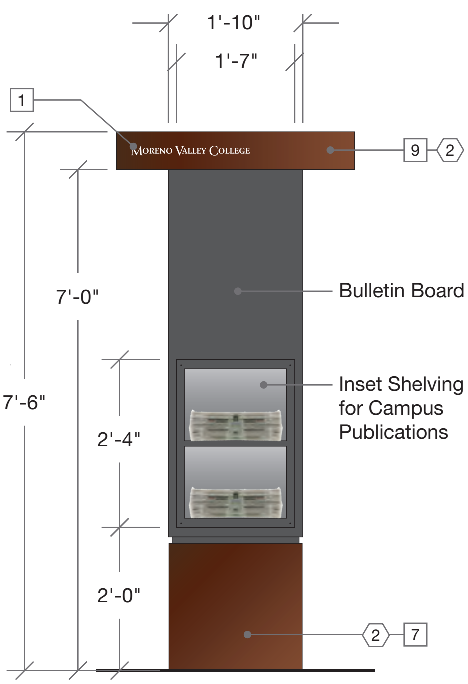


A Front Elevation
3/8"=1'–0"

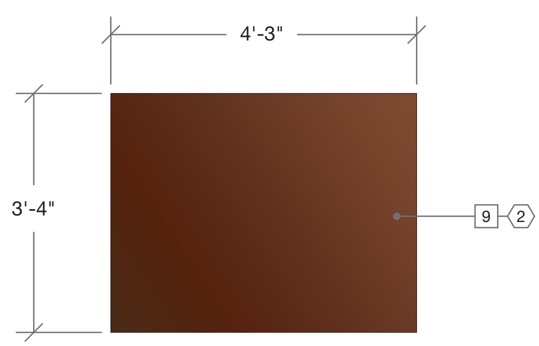
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

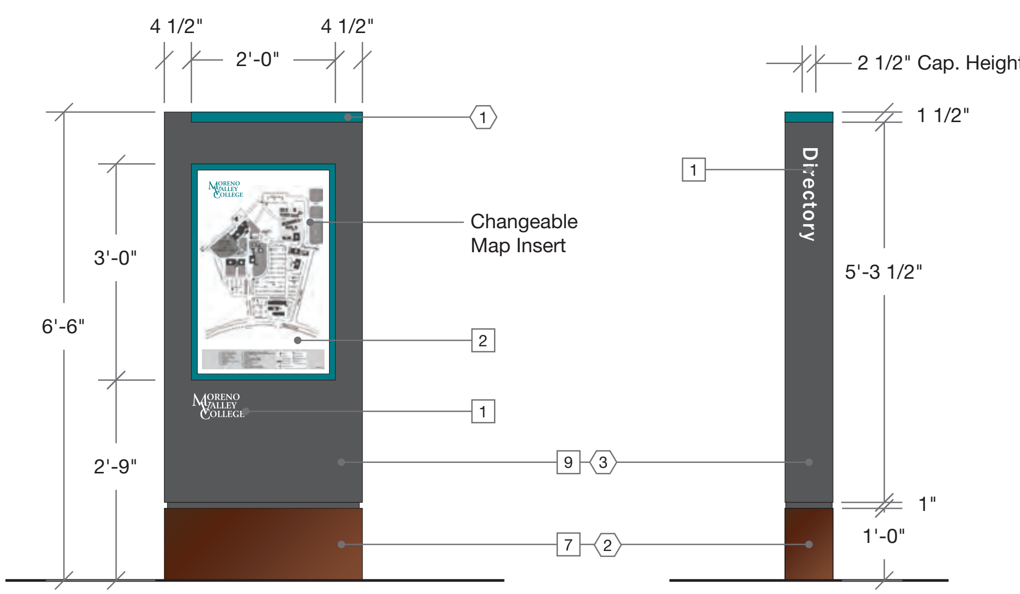


B Side Elevation
3/8"=1'–0"



C Canopy Plan
3/8"=1'–0"

S8	Sign Type: Campus Directory	Mounting: Freestanding	Location: Exterior	Lighting: External



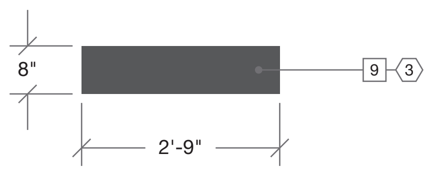
A Front Elevation 3/8"=1'–0"

B Side Elevation 3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

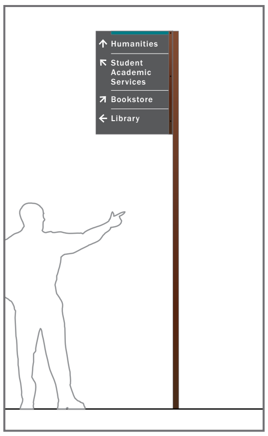


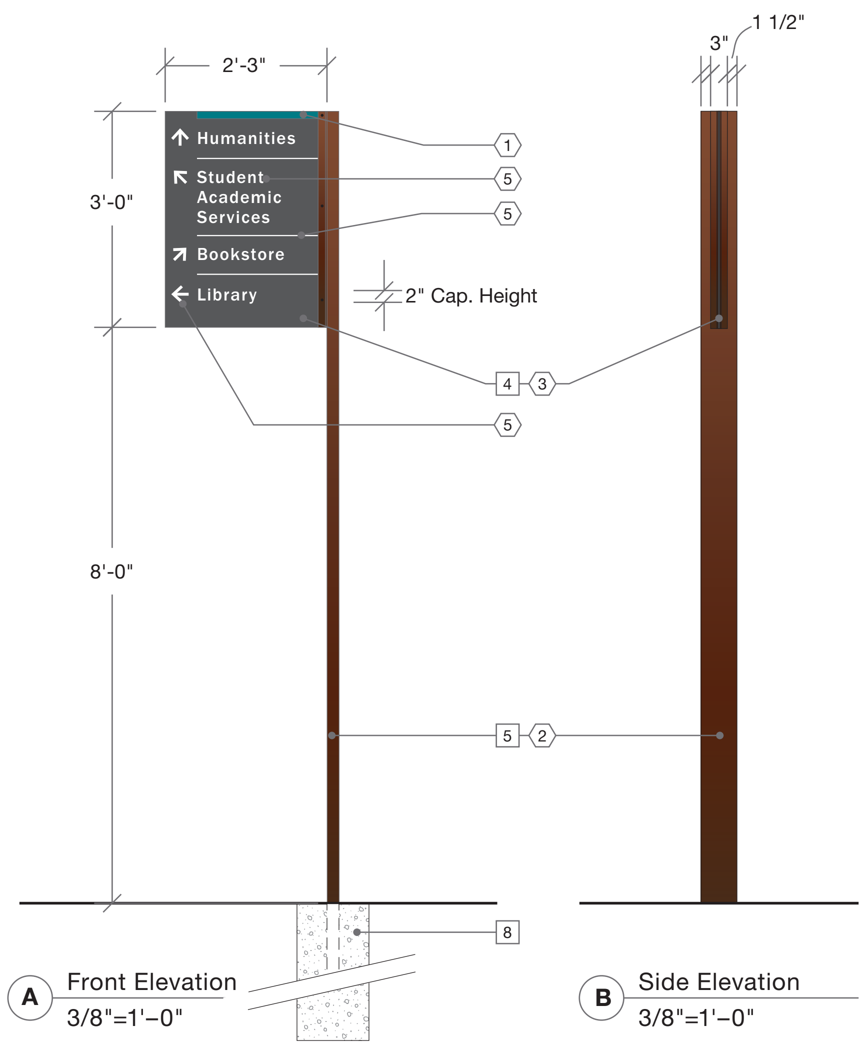
D Plan
3/4"=1'–0"

ght

C Back Elevation
3/8"=1'–0"

S9	Sign Type: Pedestrian Direction	Mounting: Freestanding	Location: Exterior	Lighting: External

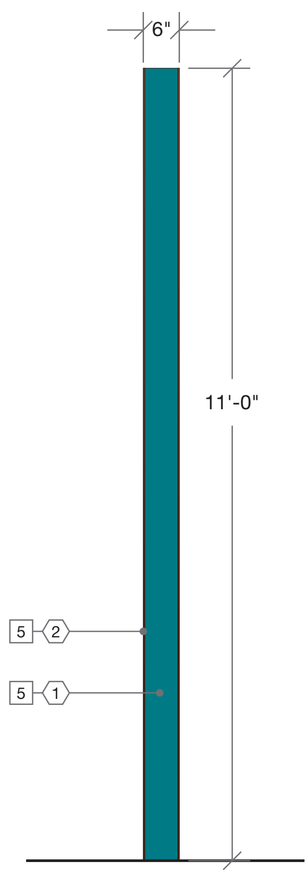


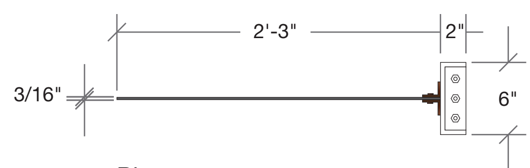


MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

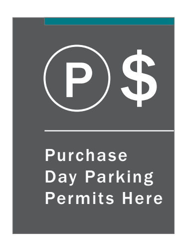
MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl





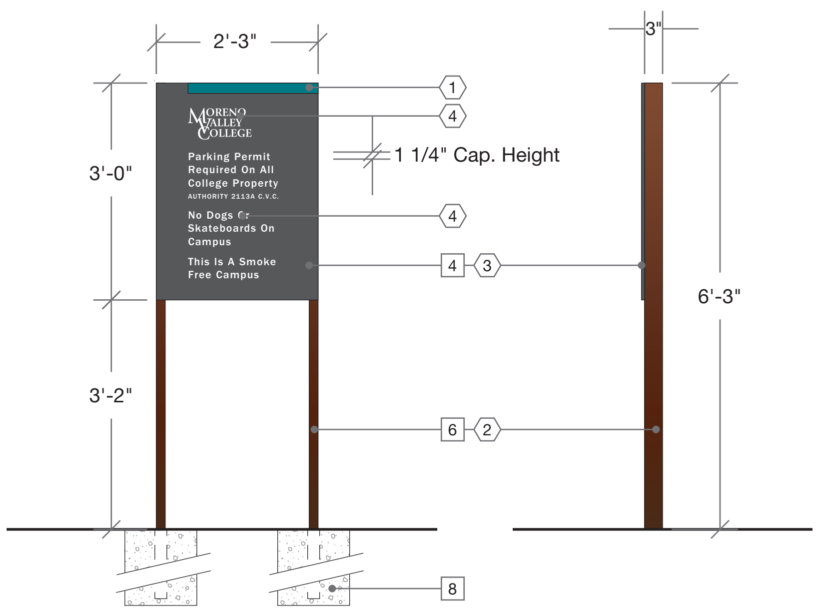
D Plan
3/4"=1'–0"



C Side Elevation
3/8"=1'–0"

E Alternate Layout
3/8"=1'–0"

S10	Sign Type: General Information	Mounting: Freestanding	Location: Exterior	Lighting: External



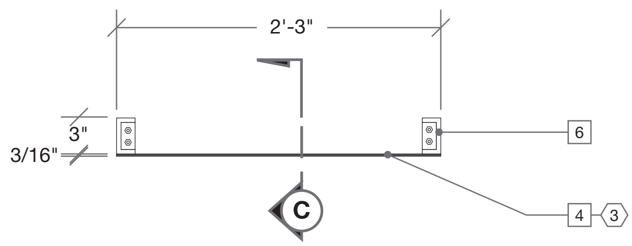
A Front Elevation 3/8"=1'–0"

B Side Elevation 3/8"=1'–0"

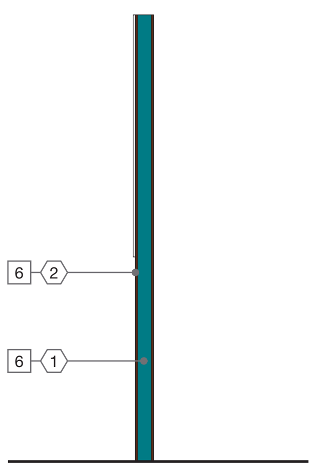
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

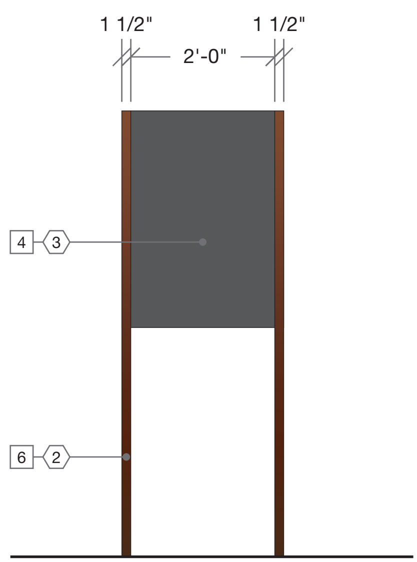
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"



C Section
3/8"=1'–0"



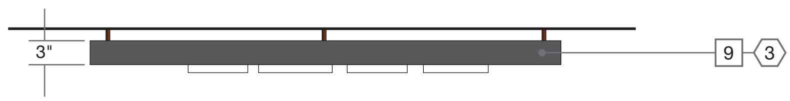
D Back Elevation
3/8"=1'–0"

S11	Sign Type: Building Identification	Mounting: Wall	Location: Exterior	Lighting: External

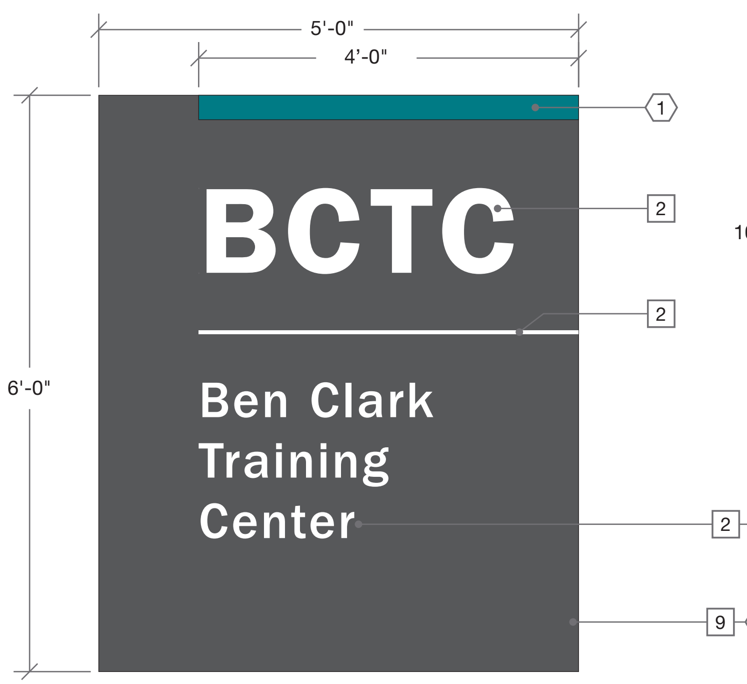
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

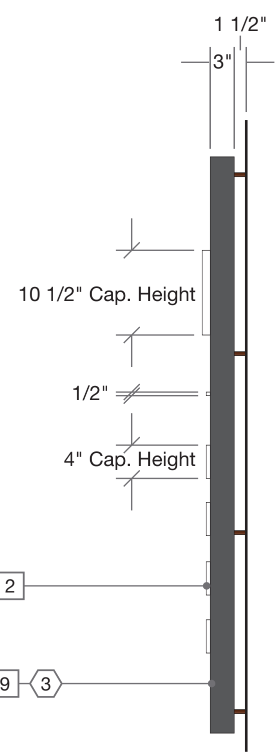
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



C Plan
1/2"=1'-0"



A Front Elevation
1/2"=1'-0"



B Side Elevation
1/2"=1'-0"

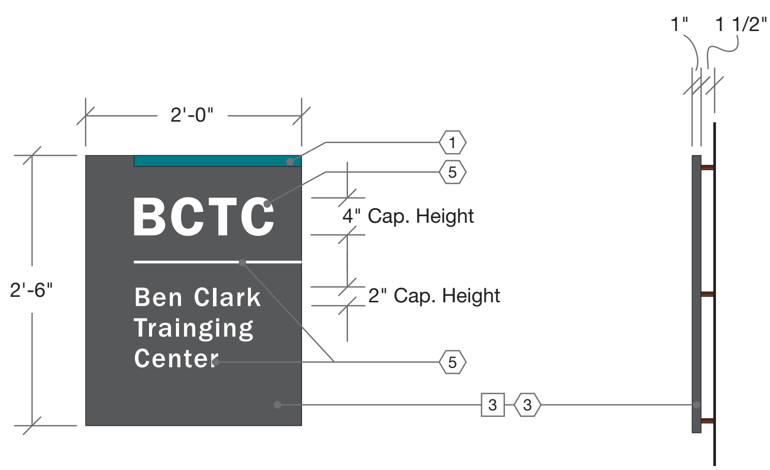
S12	Sign Type: Building Entry Identification	Mounting: Wall	Location: Exterior	Lighting: External

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

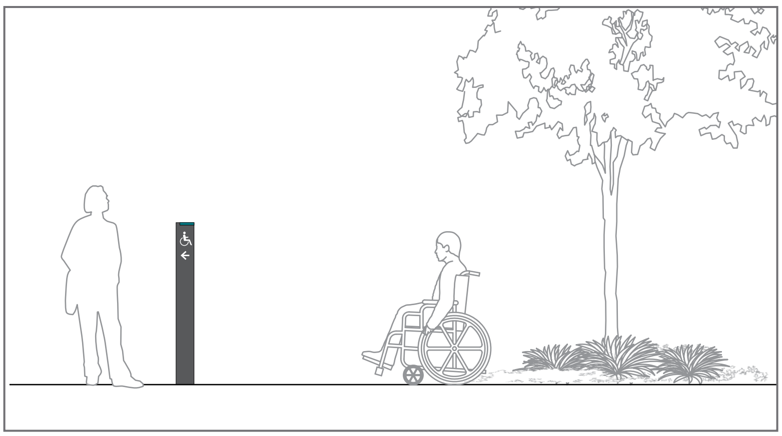
C Plan
1/2"=1'–0"

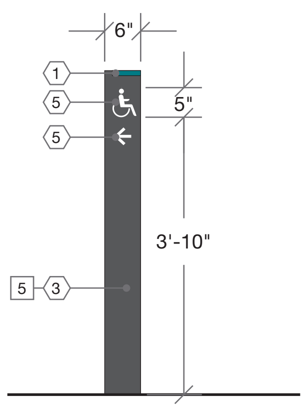


A Front Elevation
1/2"=1'–0"

B Side Elevation
1/2"=1'–0"

S13	Sign Type: Building Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External



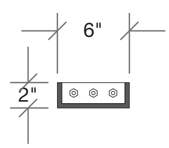


A Front Elevation
3/8"=1'–0"

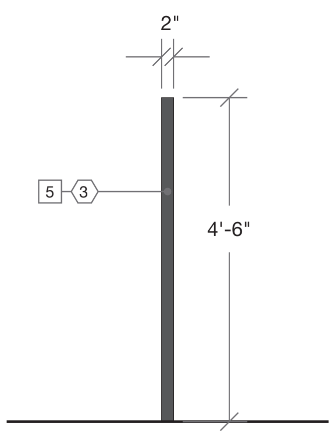
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

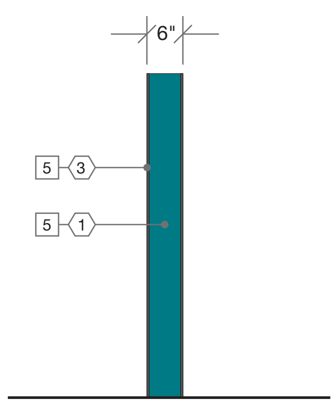
FINISHES	
1	Teal Paint
2	Corten Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



D Plan
3/4"=1'–0"



B Side Elevation
3/8"=1'–0"



C Back Elevation
3/8"=1'–0"

PART D
SIGN LOCATIONS

I. SIGN LOCATION PLANS

The sign location plans shown on the following pages represent the initial programming for the Moreno Valley College campus. In order to easily locate each sign the plans are divided into five categories: gateway signs, vehicular direction, parking signs, pedestrian wayfinding, and building and accessible route signs.

It is important to locate signs in areas that do not obstruct vehicular or pedestrian circulation and in areas least vulnerable to operational equipment and sprinklers. The sign locations are preliminary and subject to change based on existing and future conditions.

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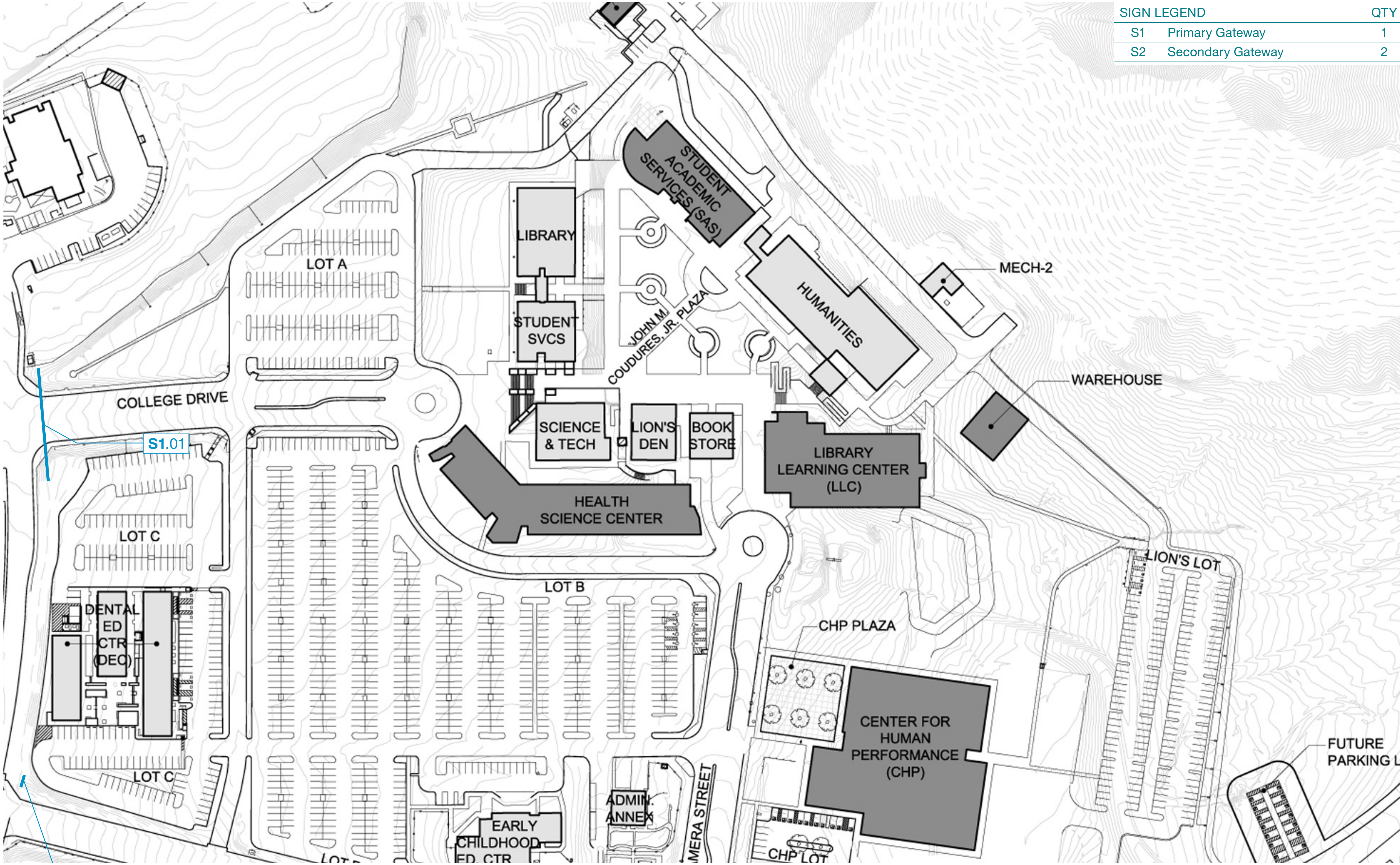
SIGN LEGEND		QTY
S1	Primary Gateway	1
S2	Secondary Gateway	2



SIGN LOCATION PLAN

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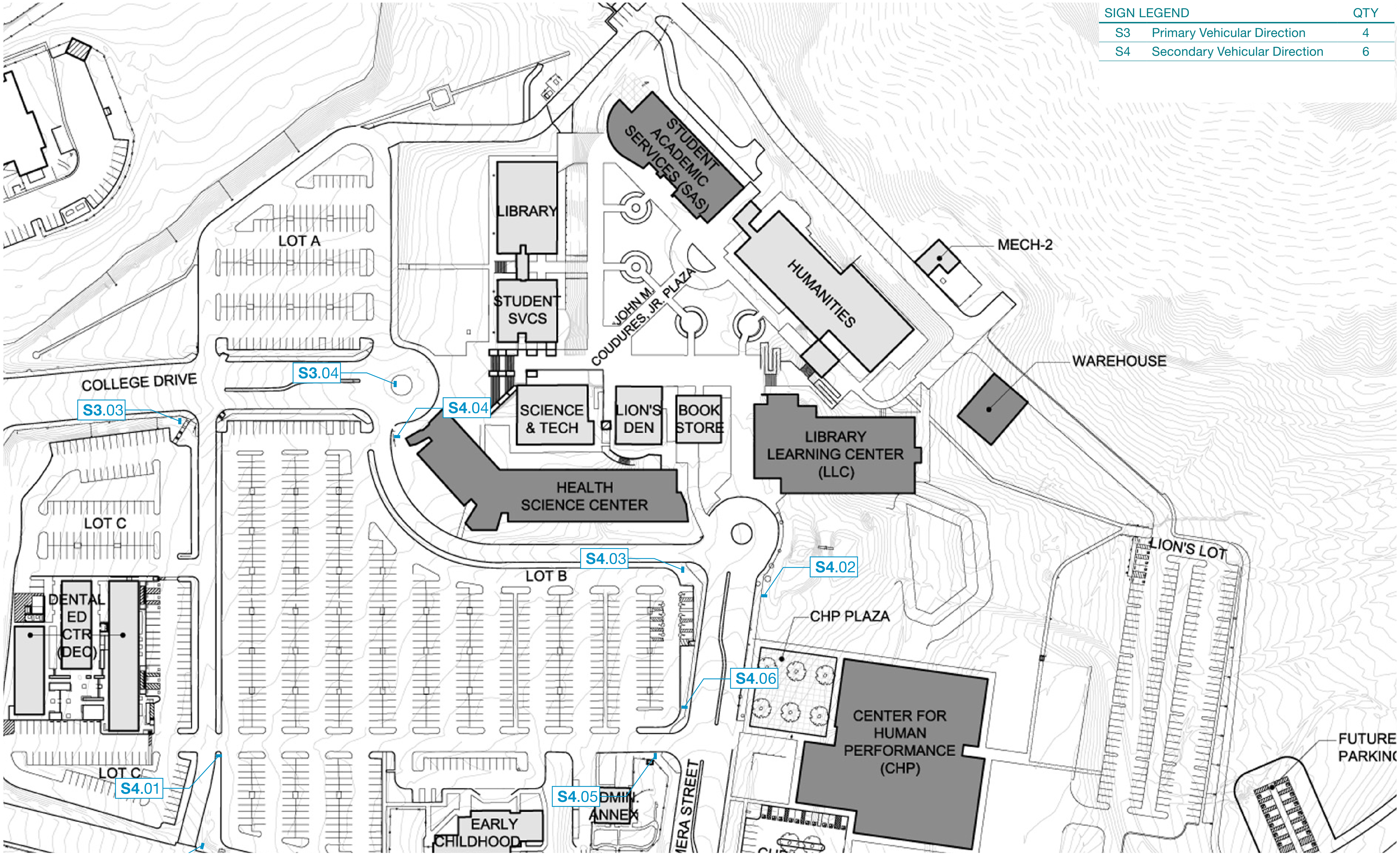
SIGN LEGEND		QTY
S3	Primary Vehicular Direction	4
S4	Secondary Vehicular Direction	6



SIGN LOCATION PLAN

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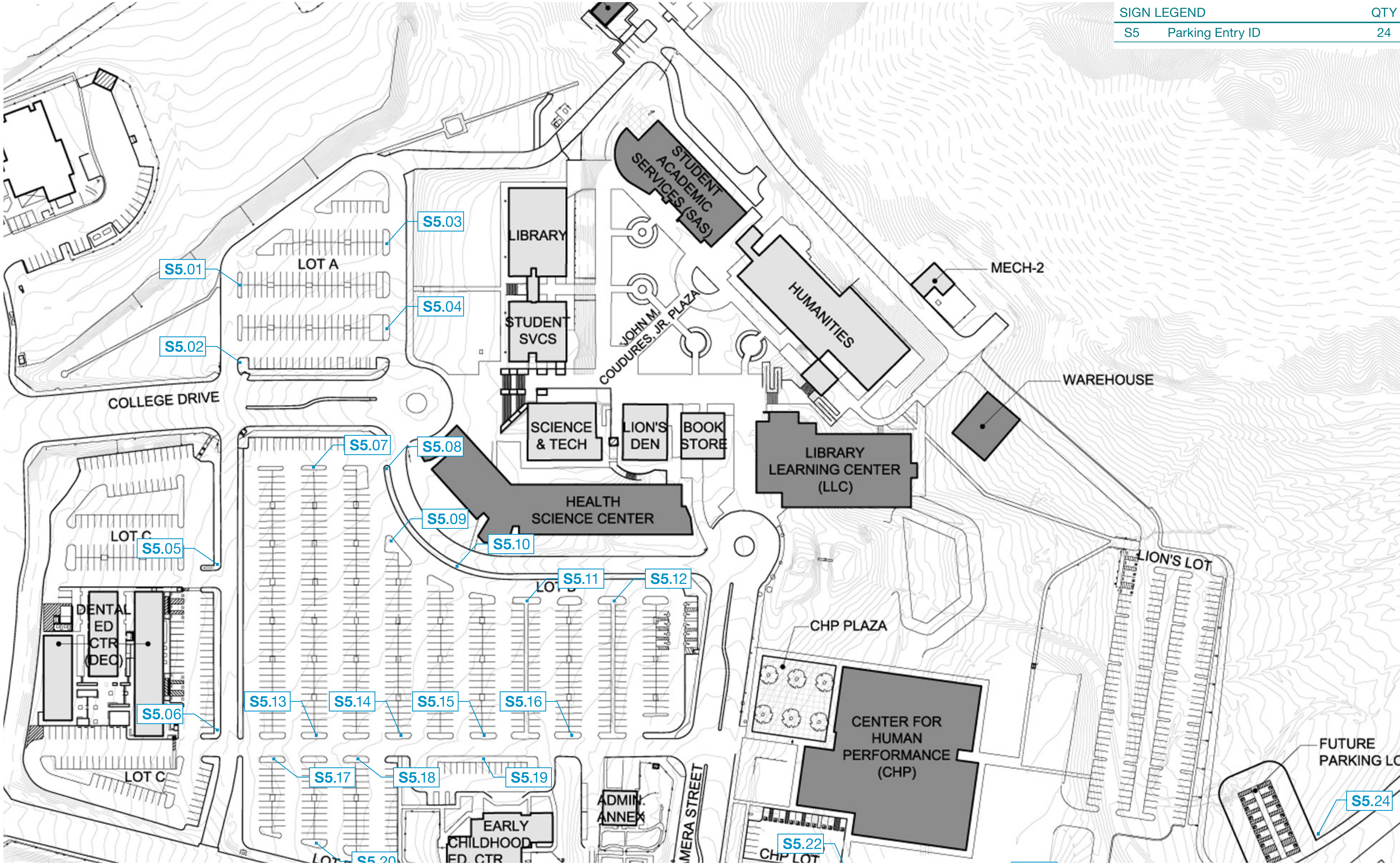
SIGN LEGEND		QTY
S5	Parking Entry ID	24



SIGN LOCATION PLAN

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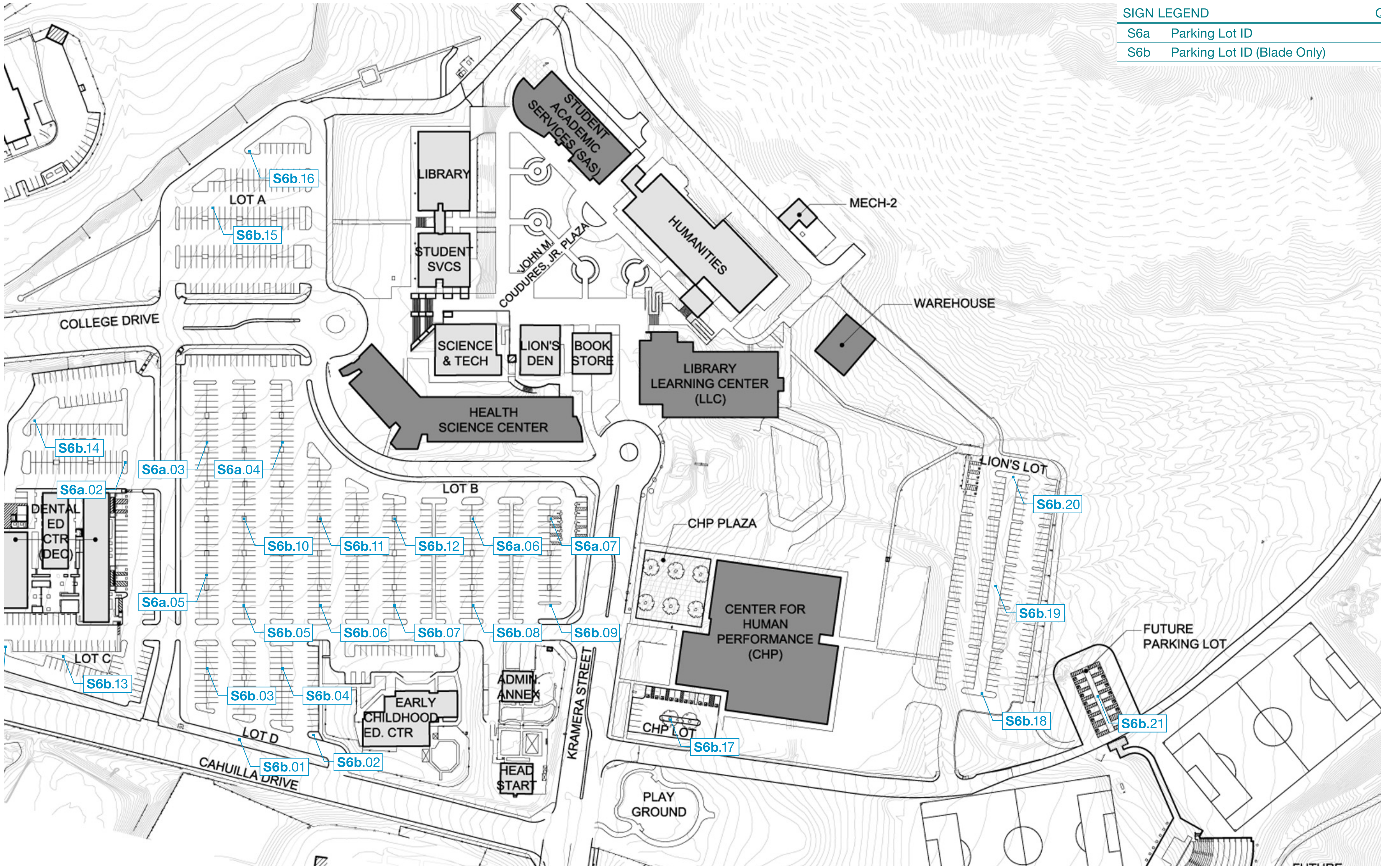
SIGN LEGEND		QTY
S6a	Parking Lot ID	7
S6b	Parking Lot ID (Blade Only)	21



SIGN LOCATION PLAN

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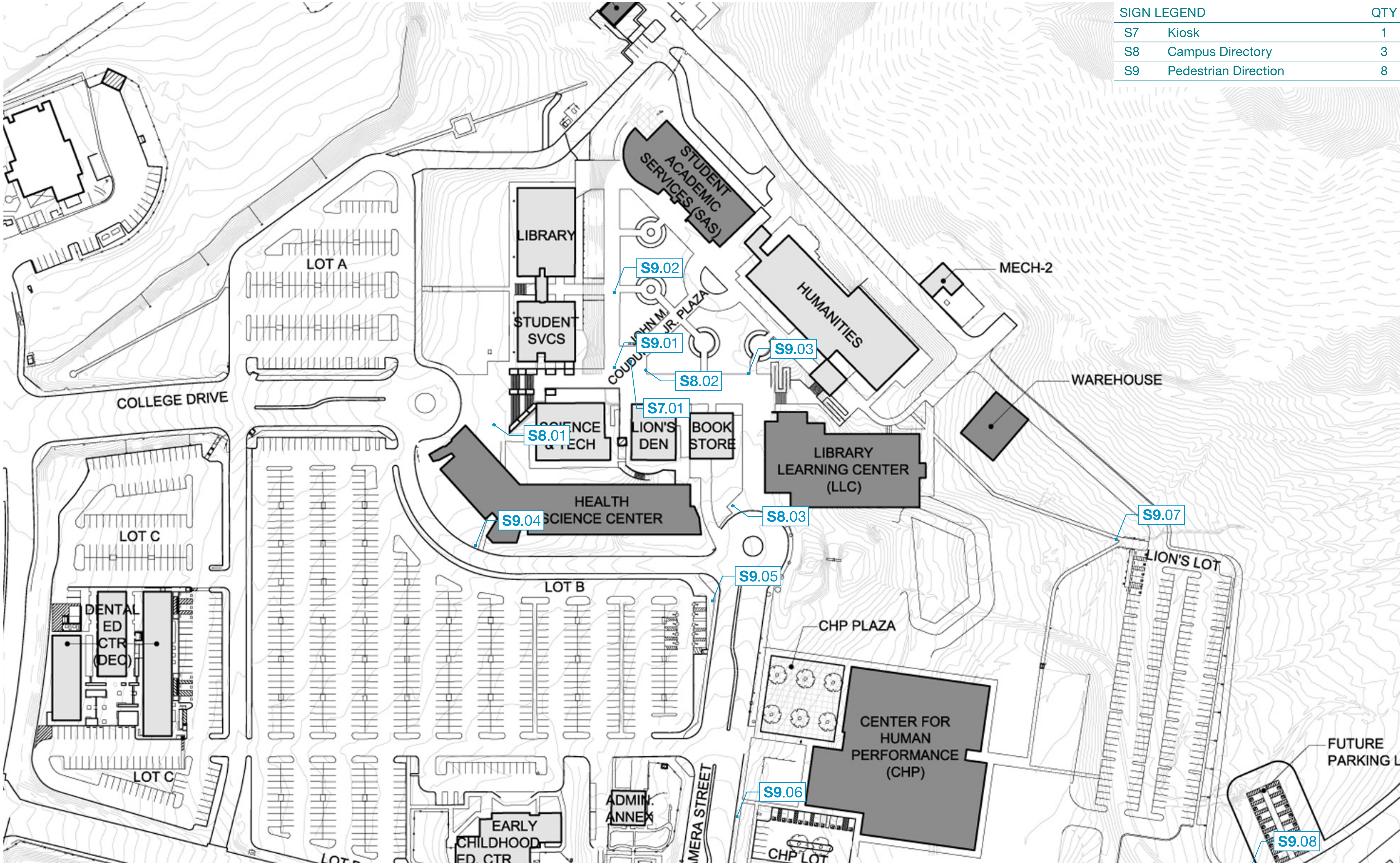

SIGN LEGEND		QTY
S7	Kiosk	1
S8	Campus Directory	3
S9	Pedestrian Direction	8

SIGN LOCATION PLAN

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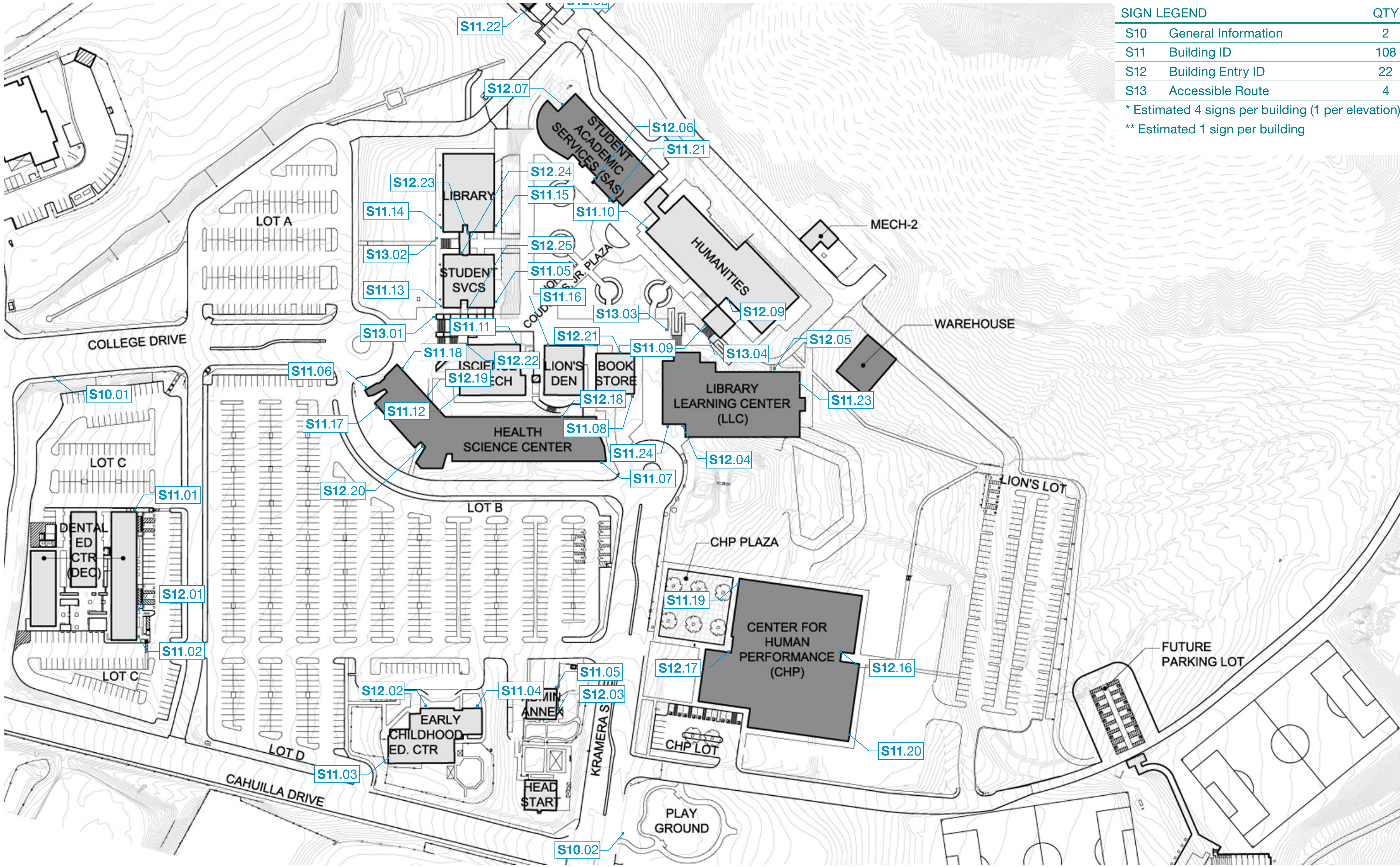
SIGN LEGEND		QTY
S10	General Information	2
S11	Building ID	108
S12	Building Entry ID	22
S13	Accessible Route	4

* Estimated 4 signs per building (1 per elevation)

** Estimated 1 sign per building



SIGN LOCATION PLAN

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SECTION 6
NORCO COLLEGE

PART A
EXISTING CONDITIONS

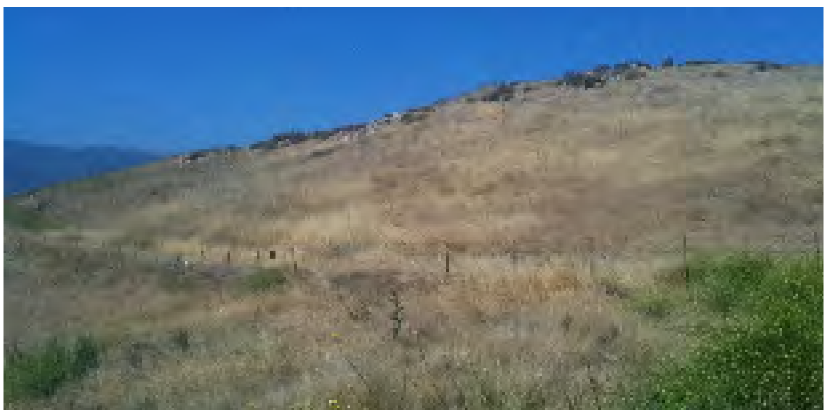
I. GENERAL REVIEW + PHOTO DOCUMENTATION

The existing Norco College campus edges and entries lack a branded arrival experience. The campus wayfinding signage is outdated and inconsistent while not representative of the new Norco College graphic standards. It is apparent that a variety of signs have been implemented over the years in response to specific needs and campus development.

I. OFF-SITE ARRIVAL

The main arrival to Norco College is Third Street via Hamner Avenue. Although not the campus entrance, it is identified by a small monument sign on in the center divider of Third Street. The high point on the campus can be seen from off-site. There is potential to outwardly identify the College from the "hill."

1. Hamner Avenue at Third Street

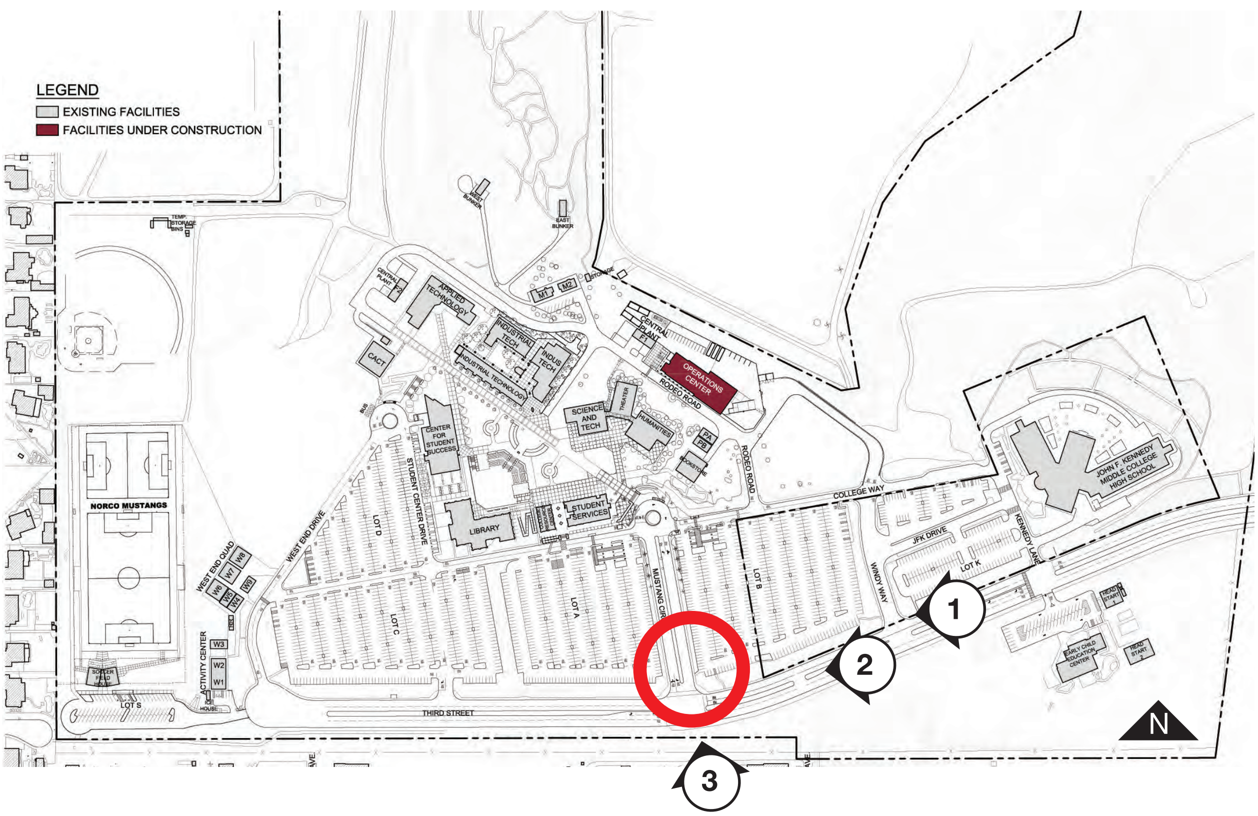


2. View West of “Norco Hill”

3. View East of “Norco Hill”

II. ARRIVAL: PRIMARY GATEWAY (CEREMONIAL + FUNCTIONAL)

The primary entrance to Norco College is at the southeast approach via Third Street to Mustang Circle. Currently there is no college identity sign at this location. It is distinguished with a palm lined street that leads to the passenger drop-off and parking.



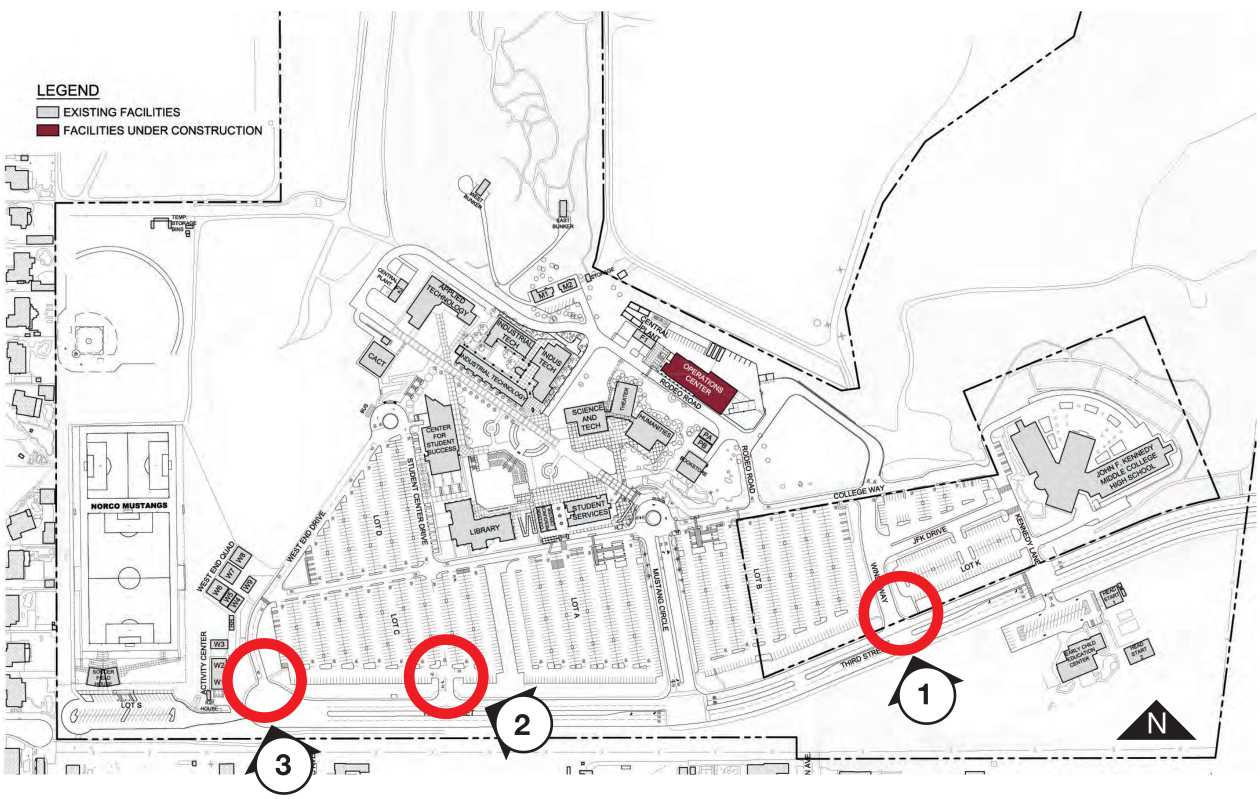
1. Third Street at Windy Way

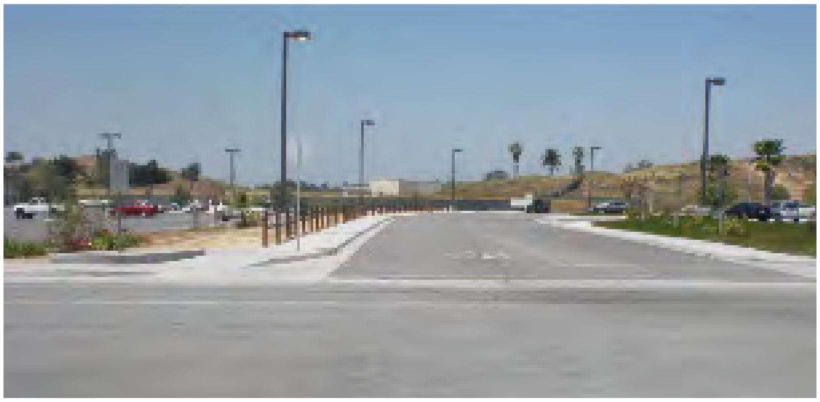
2. Third Street Prior to Mustang Circle

3. Mustang Circle Entrance

III. ARRIVAL: CAMPUS CORNERS + SECONDARY GATEWAYS

Secondary entries along Third Street at Windy Way, Center Drive, and West End Drive are not identified with campus entry signage. These entries lead to campus passenger drop-off and parking lots.



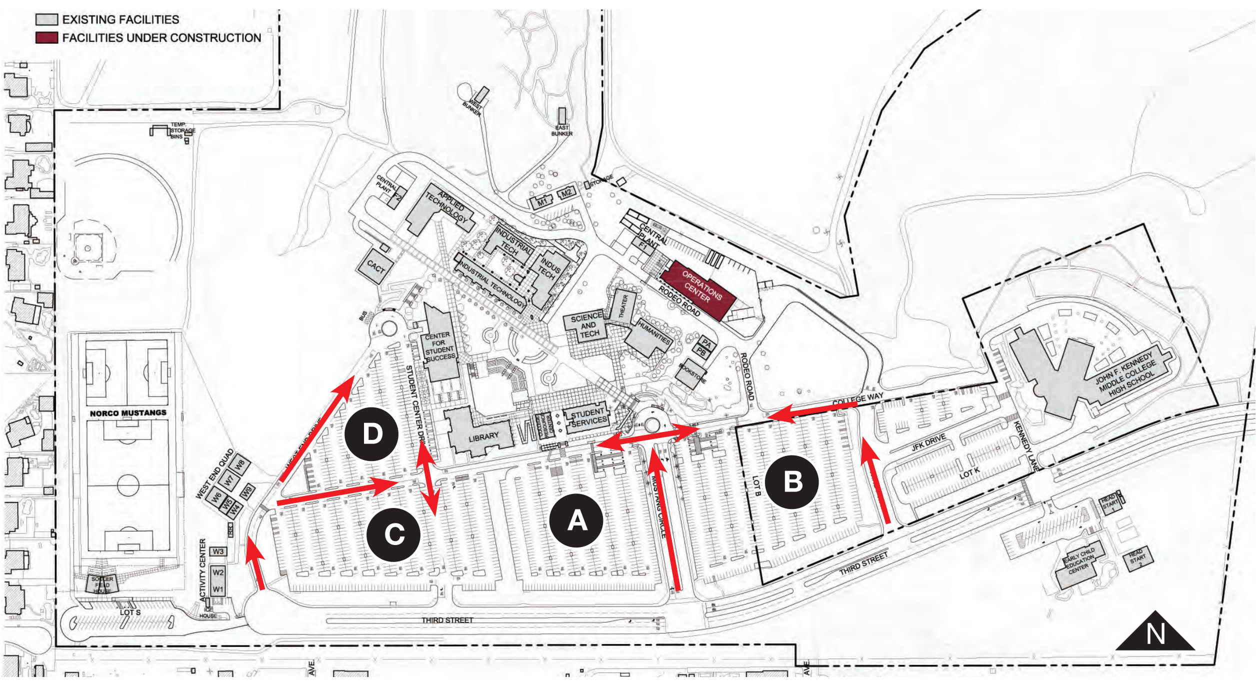

1. Third Street at Windy Way Entrance


2. Third Street at Center Drive


3. West End Drive Entrance

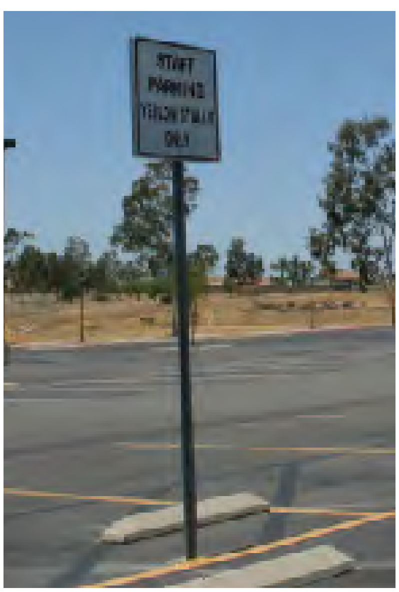
IV. VEHICULAR WAYFINDING + PARKING

A variety of vehicular direction signs and parking identification exist throughout the campus. The existing campus signage is characterized by inconsistent use of color, shape, and typography. Parking lots use an alpha designation to identify each lot. A variety of reserved parking exists in each lot.

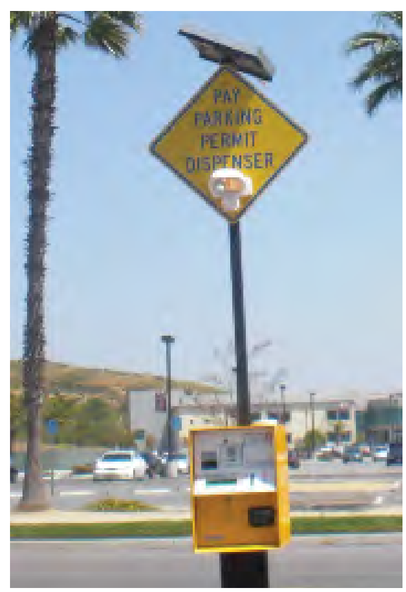


STUDENT
PARKING BY
PERMIT ONLY
LOT A

STUDENT SUCCESS CENTER
APPLIED TECH
INDUSTRIAL TECH BLD.
ADMISSIONS
BOOKSTORE
PARK IN MARKED SPACES ONLY
VIOLATORS WILL BE CITED



STAFF
PARKING
ONLY



PAY
PARKING
PERMIT
DISPENSER

V. EXISTING PEDESTRIAN WAYFINDING

The images below document the wide variety of pedestrian signs used throughout campus.

VI. EXISTING BUILDING IDENTITY

The images below document the building identity signage used on campus. Typically, the building signs use Helvetica typeface in various shades of red. The Center for Student Success uses Futura typeface for the building sign.

PART B
SIGN OVERVIEW

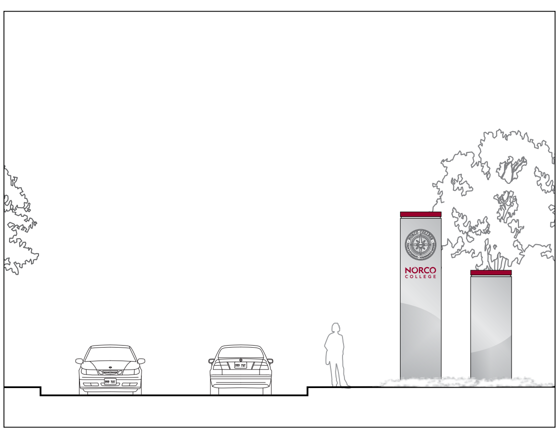
INTRODUCTION

The proposed comprehensive wayfinding program provides a uniform family of sign types for campus entries, as well as vehicular and pedestrian wayfinding. The implementation of these sign types will improve the campus circulation and accommodate growth for years to come. The sign program design communicates the Norco College (NC) brand and college fabric by using the newly implemented brand guidelines. Together with lighting, landscape, and architecture, the wayfinding program will express the high quality and reputation of Norco College to the community, students, faculty, visitors, and new recruits.

I. SUMMARY OF SIGNS

The Norco College Campus Signage + Wayfinding Guidelines address Gateways, Vehicular Direction, Pedestrian Wayfinding, Building Identity, and Accessible Route signage. The following drawings represent the signs included in these guidelines.

S1 PRIMARY GATEWAY

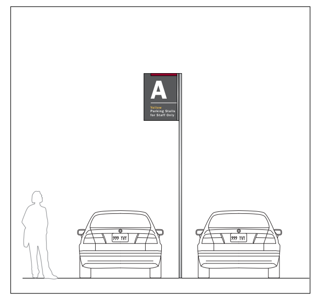


S2 SECONDARY GATEWAY

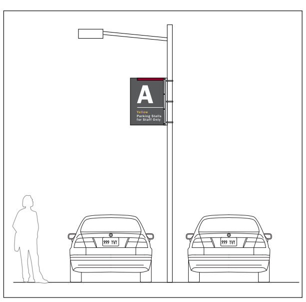
S3 PRIMARY VEHICULAR DIRECTION

S4 SECONDARY VEHICULAR DIRECTION

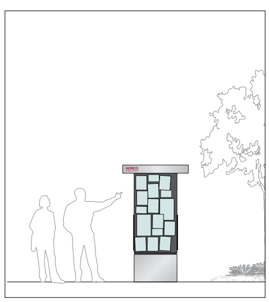
S5 PARKING ENTRY ID



S5 PARKING LOT ID



S6b PRIMARY LOT ID



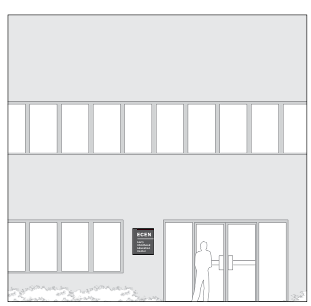
S7 KIOSK

S8 CAMPUS DIRECTORY

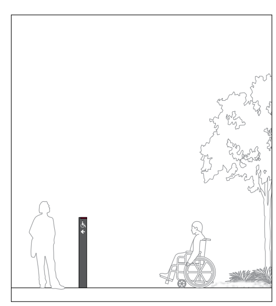
S9 PEDESTRIAN DIRECTION

S10 GENERAL INFORMATION

S11 BUILDING D



S12 BUILDING ENTRY ID



S13 ACCESSIBLE ROUTE

II. IDENTITY, FONT, SYMBOLS, + COLORS

Graphic standards have been developed for the Norco College (NC). These standards include the use of the college seal and NC logo, color, and typography. Use of the graphic standards are reflected on the wayfinding signage.

IDENTITY

NORCO COLLEGE

NORCO COLLEGE • TODAY'S STUDENTS • TOMORROW'S LEADERS • 2010

ITC FRANKLIN GOTHIC MEDIUM

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

ITC FRANKLIN GOTHIC DEMI

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

The wayfinding program utilizes the NC standard brand colors. The material palette that compliment the architectural materials, in use on campus and recommended in *Secion 8: Building Design Guidelines*. Use of colors and materials are reflected on the wayfinding signage.

COLOR PALETTE

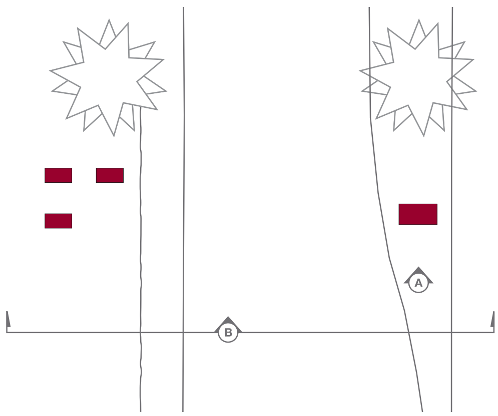
SYMBOLS

PART C
SIGN TYPES

I. DESIGN

The wayfinding for Norco College utilizes a “kit-of-parts” approach for the design and layout of each sign. The repetition of color, typography, and materials creates a consistent appearance that allows a user to easily identify wayfinding elements throughout the campus environment. This section provides the design and general specification call-outs for all signs in the summary of sign types.

S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



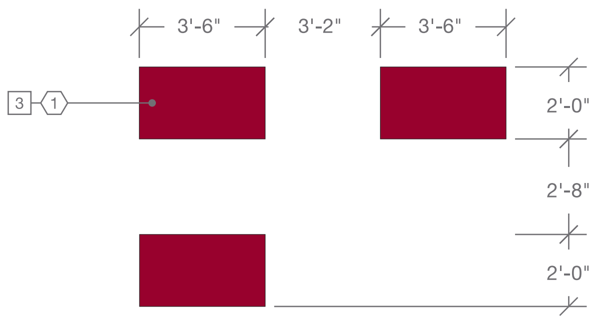
A Context Rendering
NTS

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

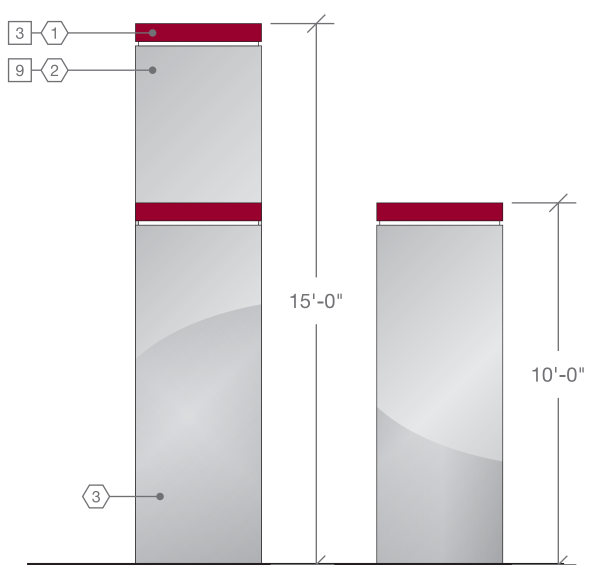
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

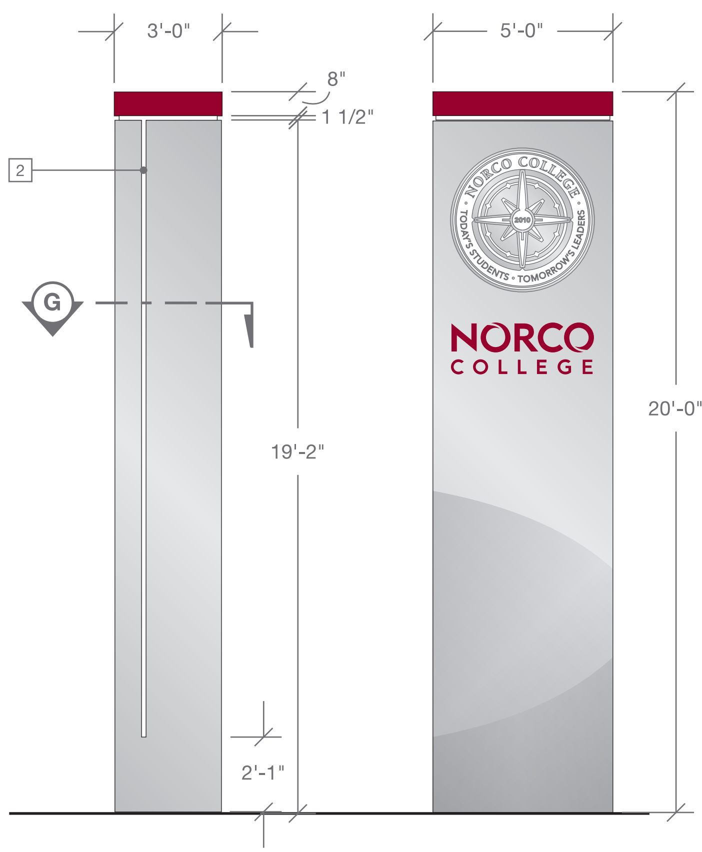


B Plan
3/16"=1'–0"



A Front Elevation
3/16"=1'–0"

S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



A Side Elevation 3/16"=1'–0"

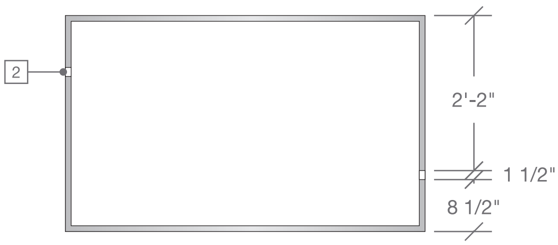
B Back Elevation 3/16"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

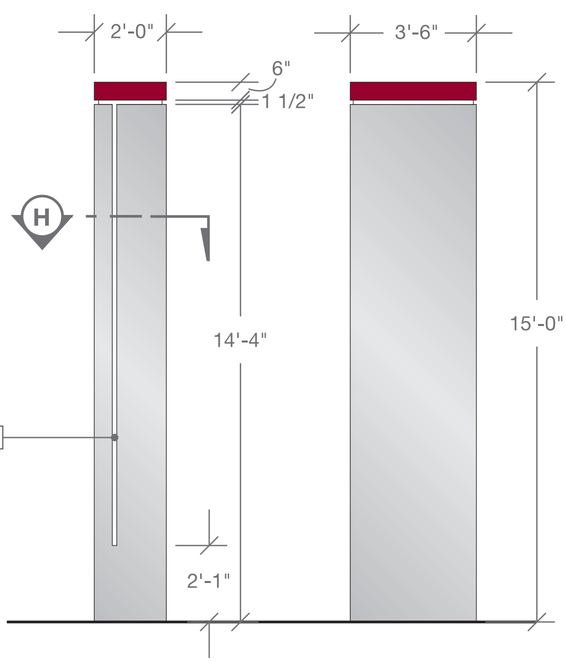
FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



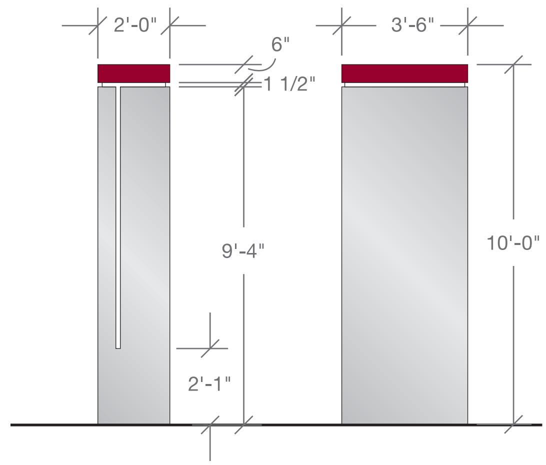
G Section
3/8"=1'–0"

H Section
3/8"=1'–0"



C Side Elevation
3/16"=1'–0"

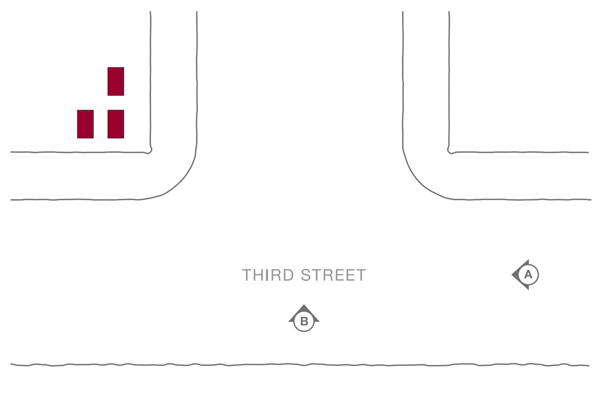
D Back Elevation
3/16"=1'–0"

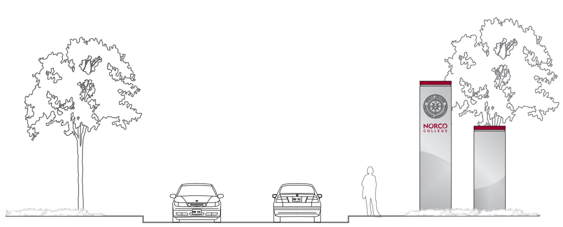


E Side Elevation
3/16"=1'–0"

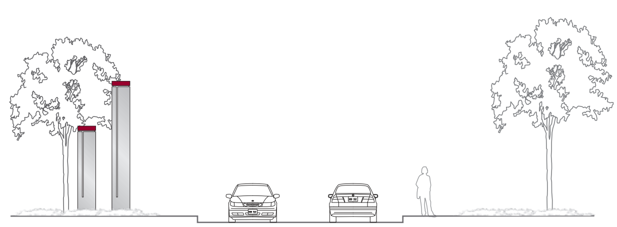
F Back Elevation
3/16"=1'–0"

S2	Sign Type: Secondary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal





A Context Rendering
NTS



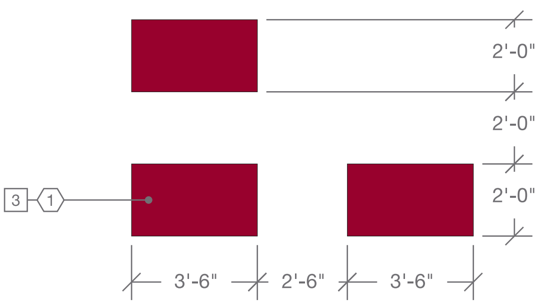
B Context Rendering
NTS

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

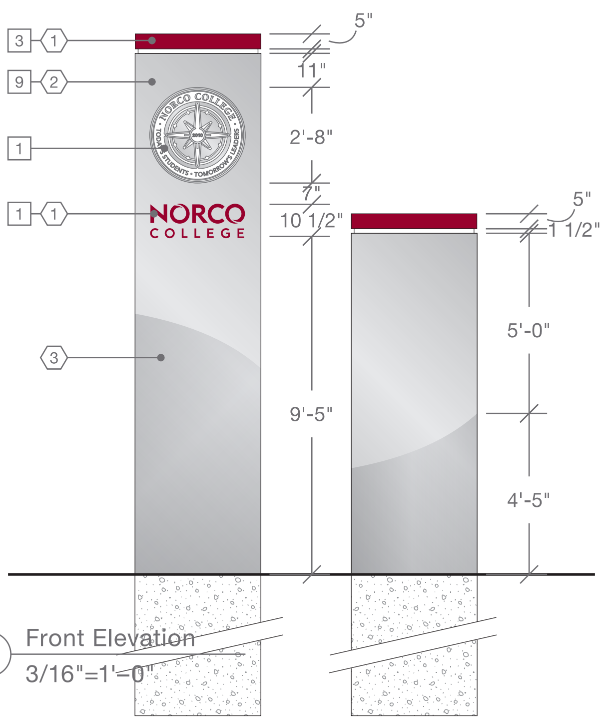
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

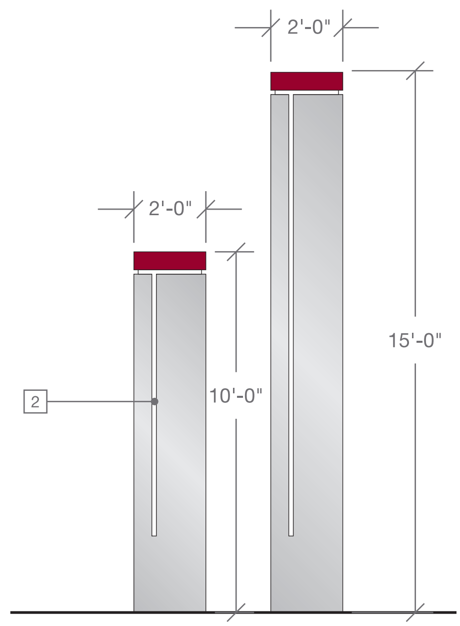
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



C Plan
3/16"=1'–0"

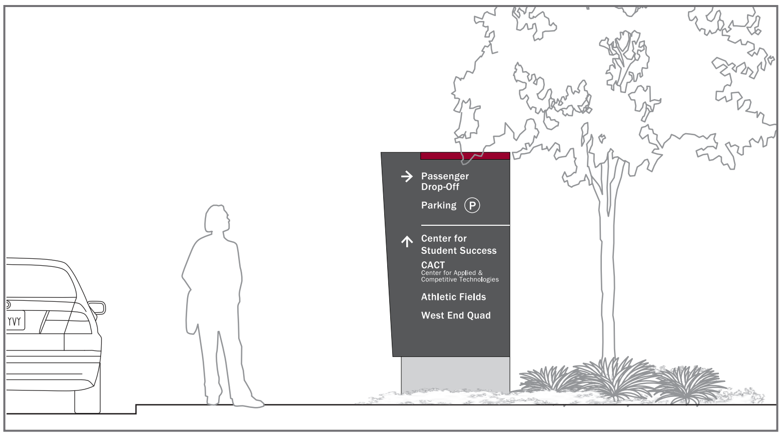


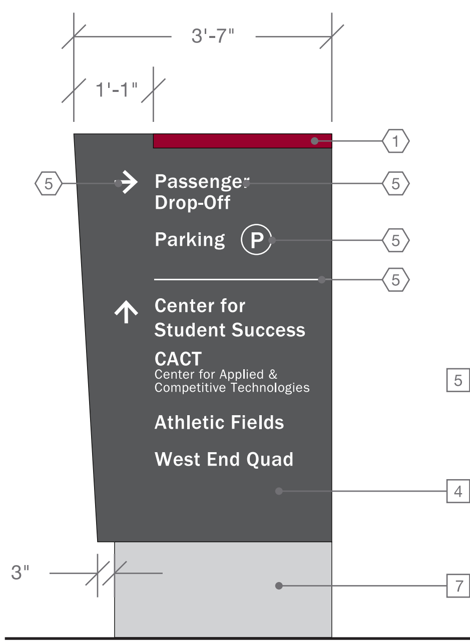
A Front Elevation
3/16"=1'–0"



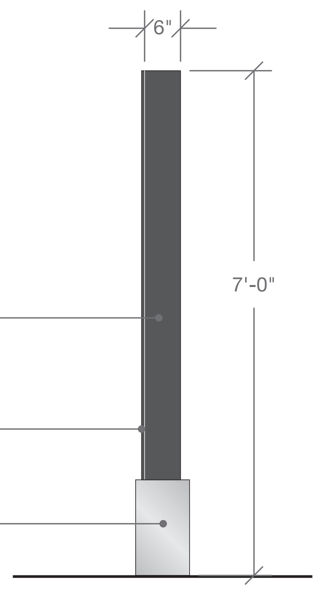
B Side Elevation
3/16"=1'–0"

S3	Sign Type: Primary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External





A Front Elevation
3/8"=1'–0"



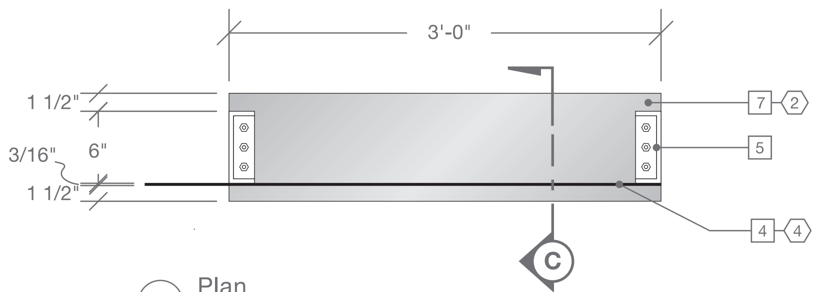
B Side Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

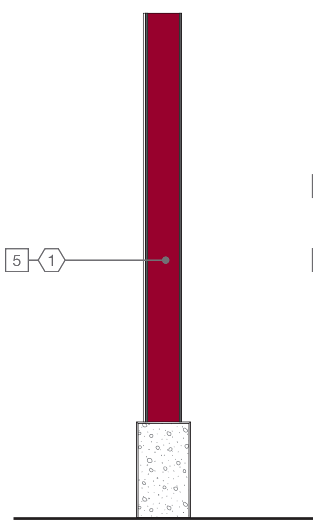
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

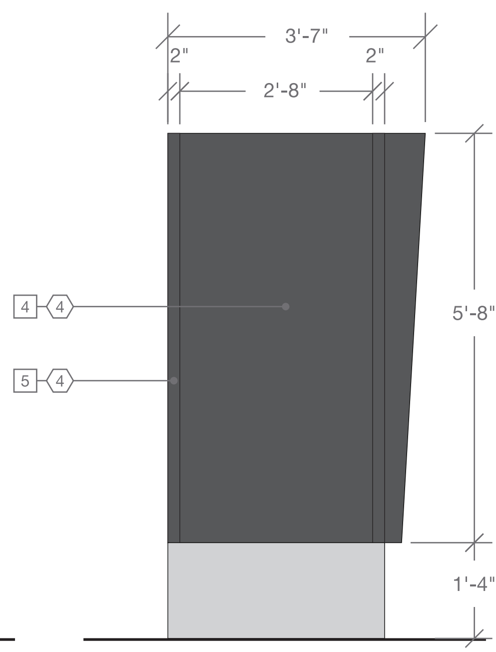
FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

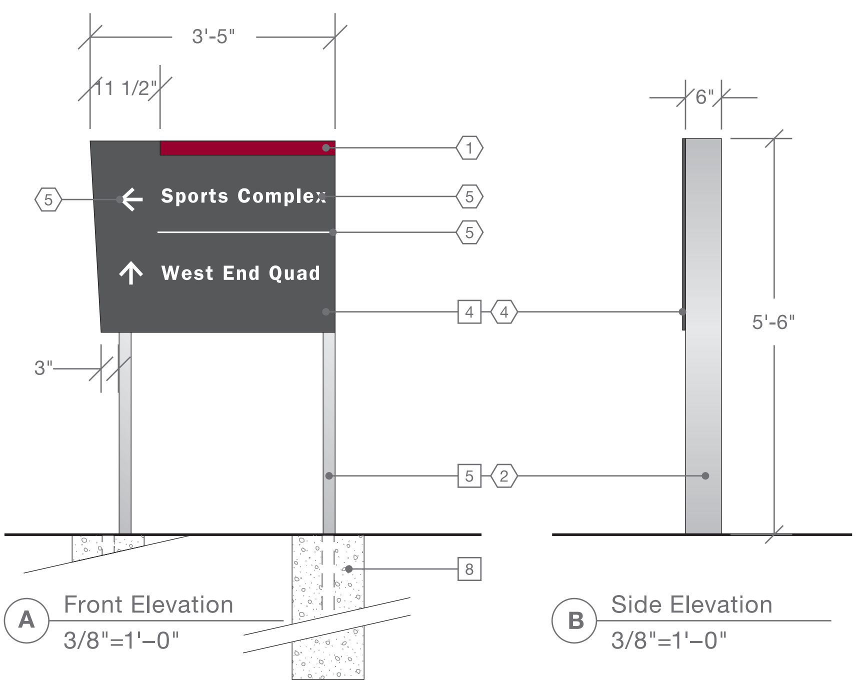




C Section
3/8"=1'–0"

D Back Elevation
3/8"=1'–0"

S4	Sign Type: Secondary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External



A Front Elevation 3/8"=1'–0"

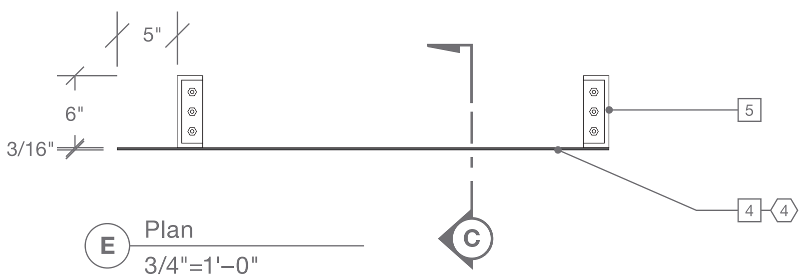
B Side Elevation 3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

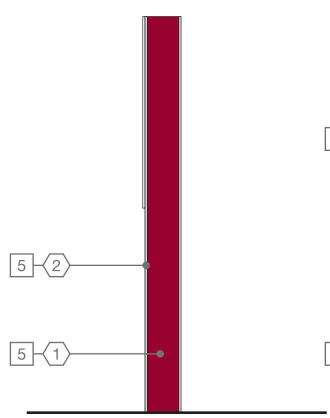
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

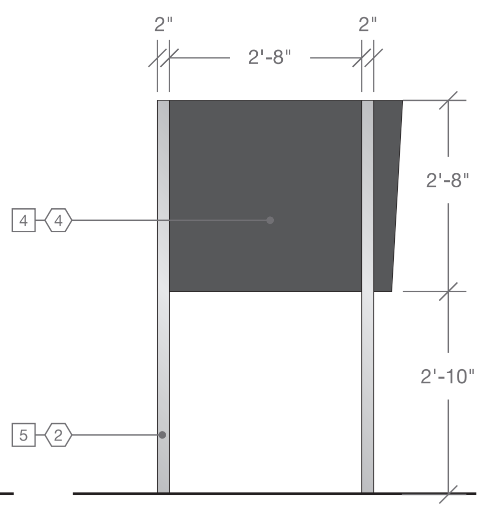
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

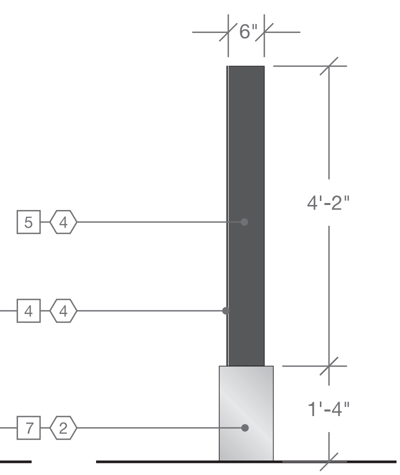


C Section
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S5	Sign Type: Parking Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External



A Front Elevation
3/8"=1'–0"

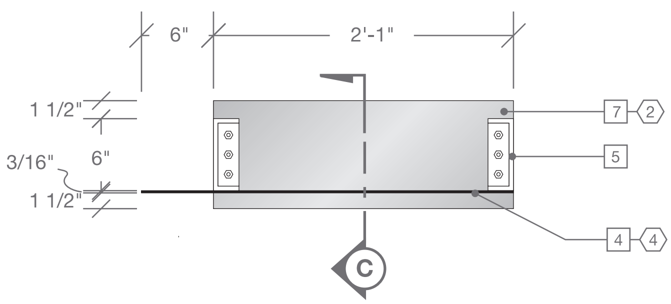
B Side Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

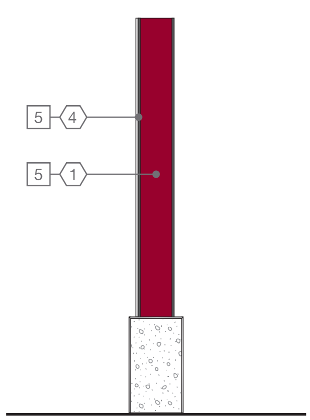
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

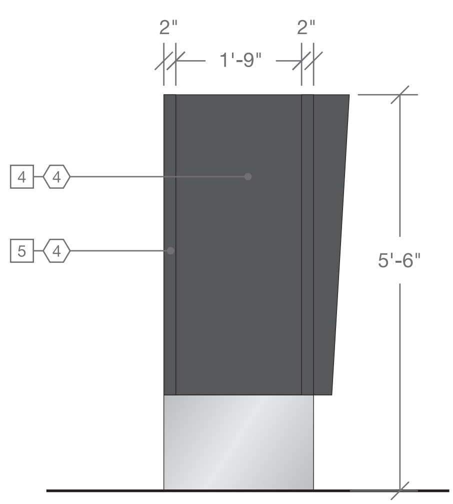
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

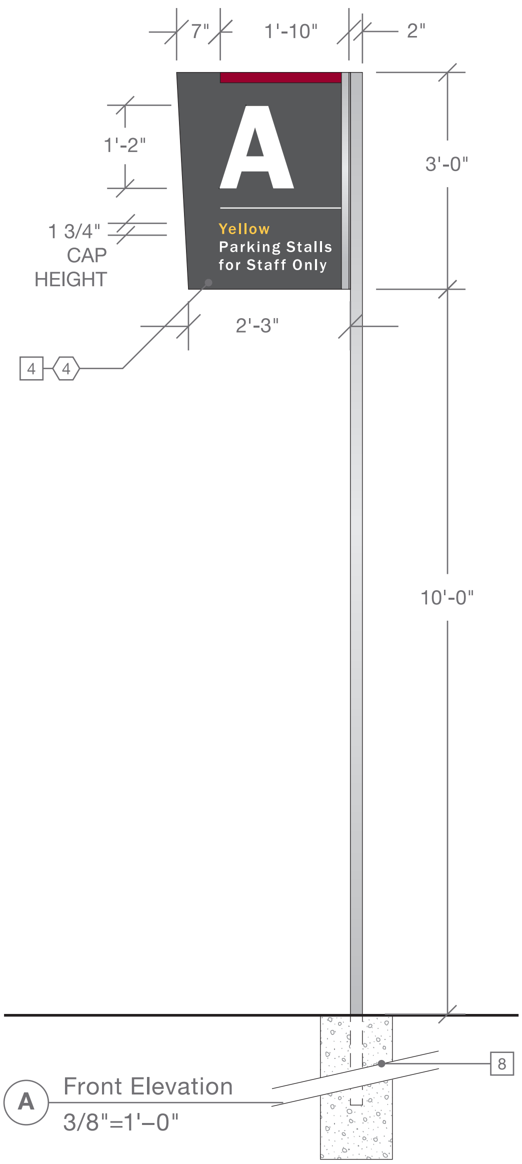


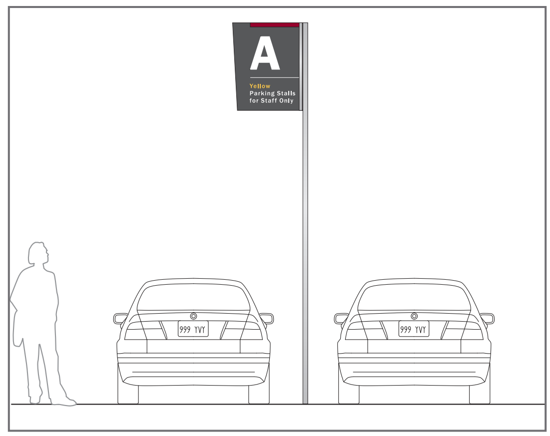
C Section
3/8"=1'–0"

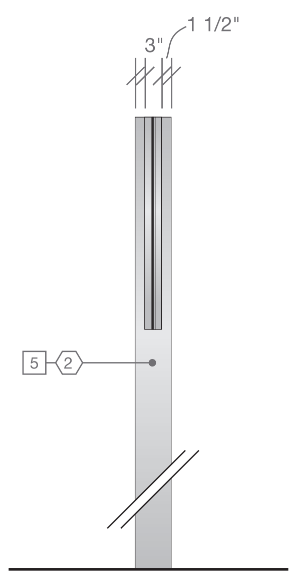


D Back Elevation
3/8"=1'–0"

S6a	Sign Type: Parking Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External







A Front Elevation
3/8"=1'–0"

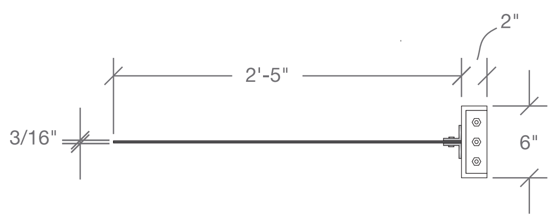
B Side Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

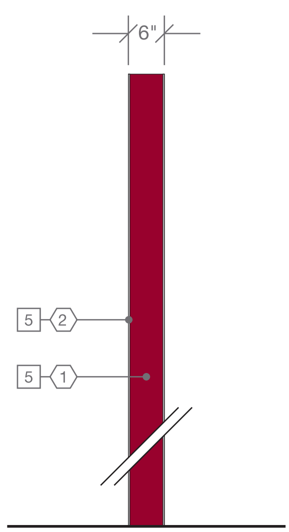
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

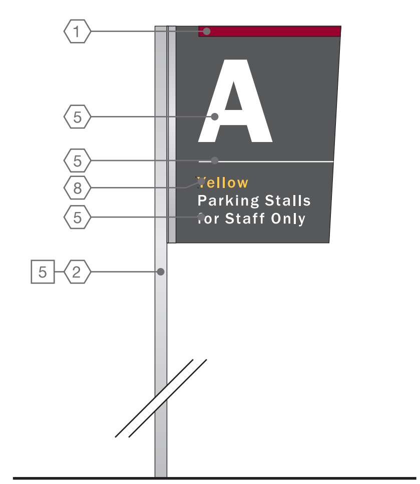
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

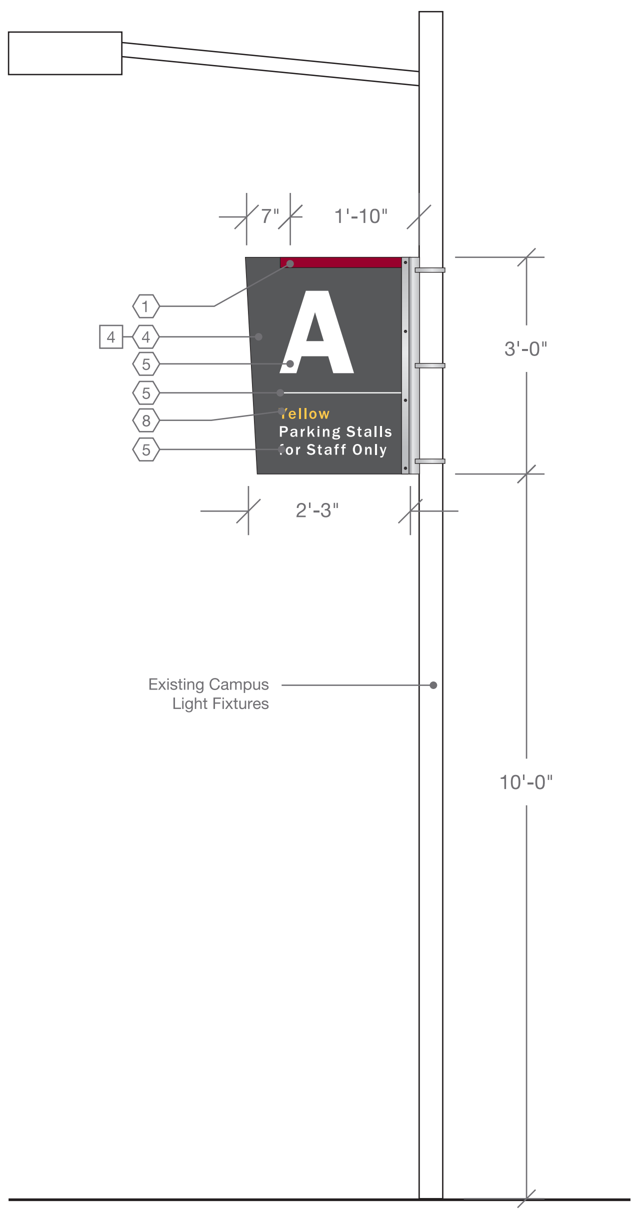


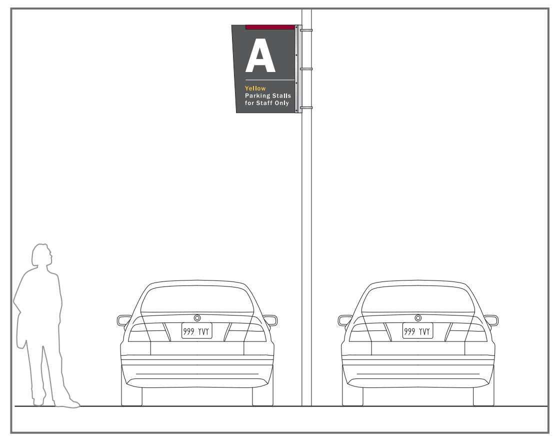
C Side Elevation
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S6b	Sign Type: Parking Entry Identification	Mounting: Existing Pole	Location: Exterior	Lighting: External





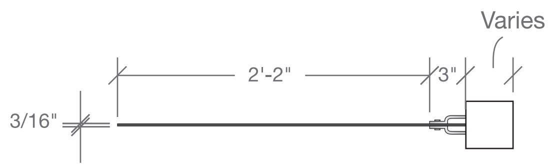
A Front Elevation
3/8"=1'–0"

MATERIALS

1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES

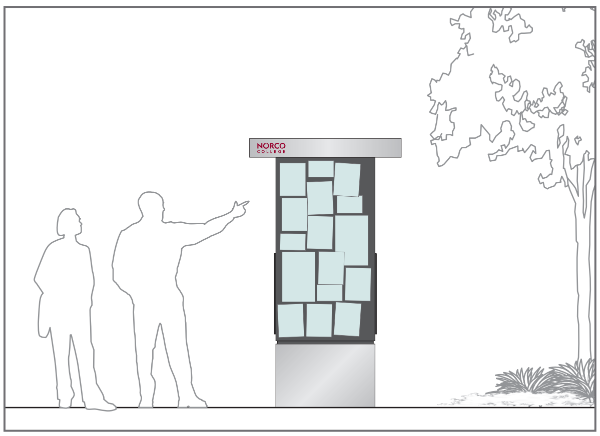
1	MP00000 Burgundy Paint
2	Light Silver Paint
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

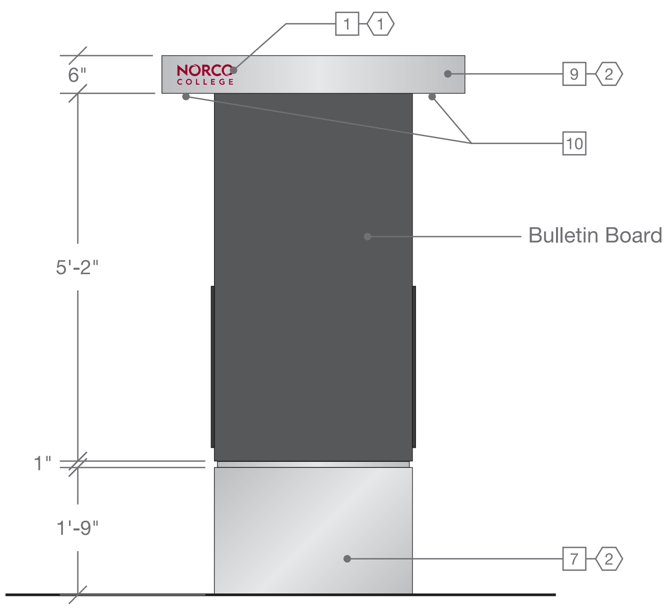


C Plan
3/4"=1'–0"

B Detail
3/4"=1'–0"

S7	Sign Type: Kiosk	Mounting: Freestanding	Location: Exterior	Lighting: Internal





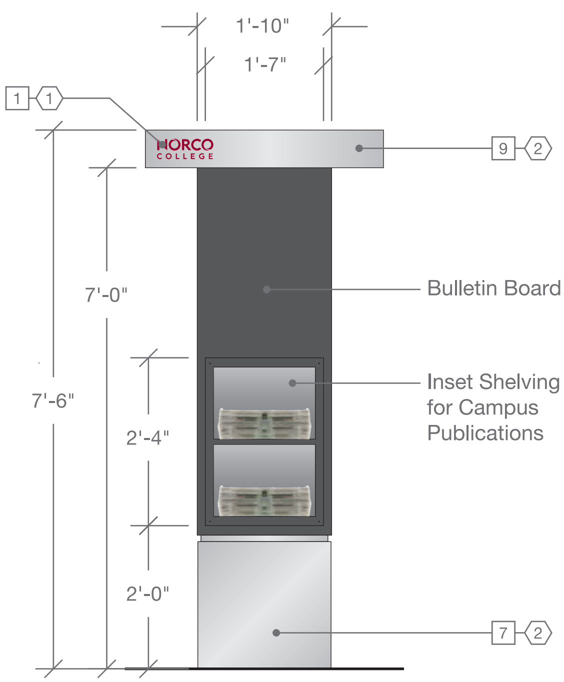
A Front Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

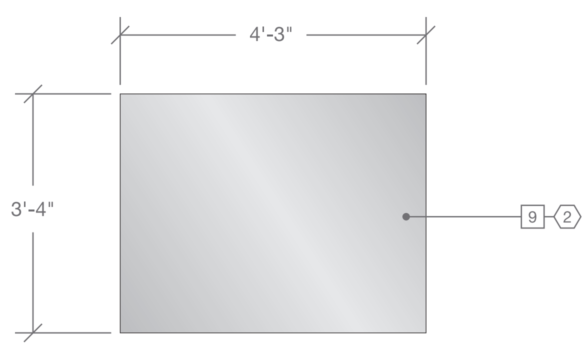
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

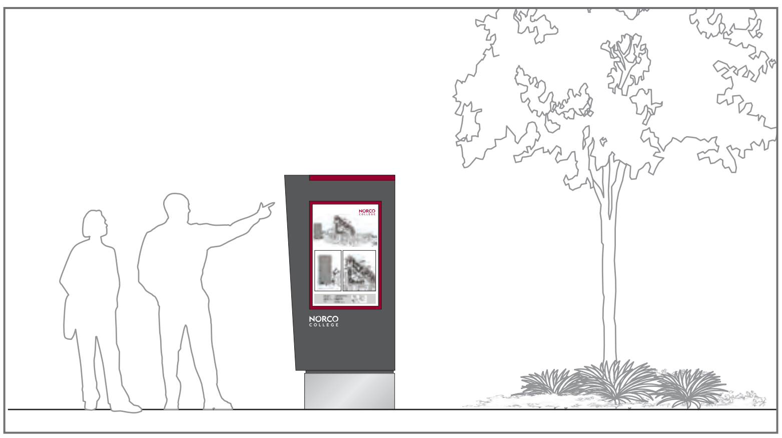


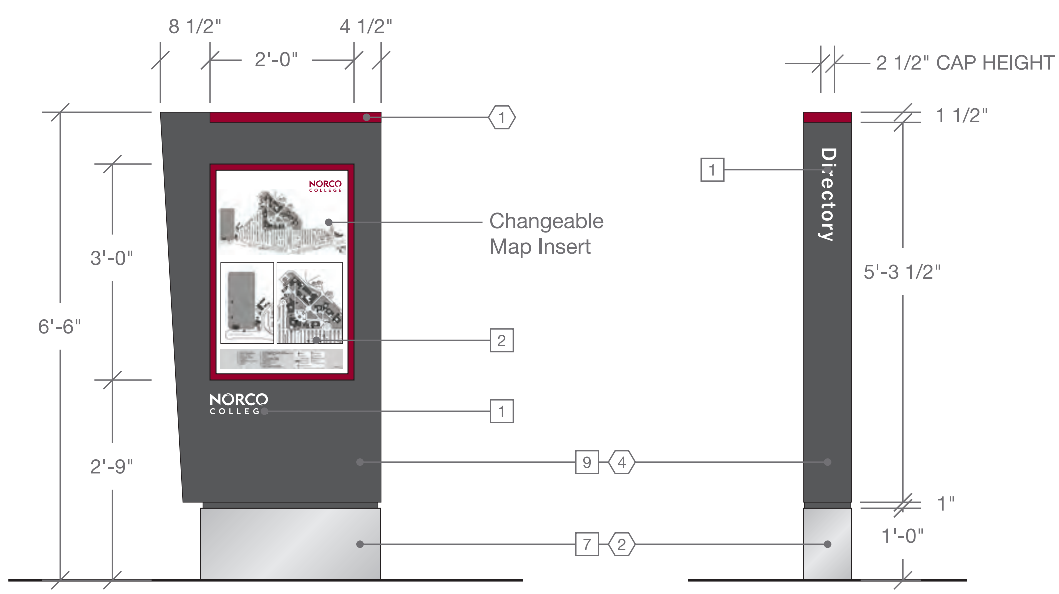
B Side Elevation
3/8"=1'–0"



C Roof Plan
3/8"=1'–0"

S8	Sign Type: Campus Directory	Mounting: Freestanding	Location: Exterior	Lighting: Internal





A Front Elevation
3/8"=1'–0"

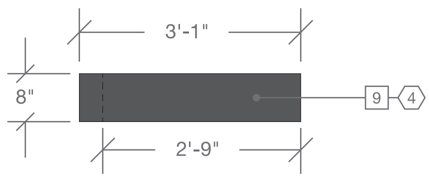
B Side Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

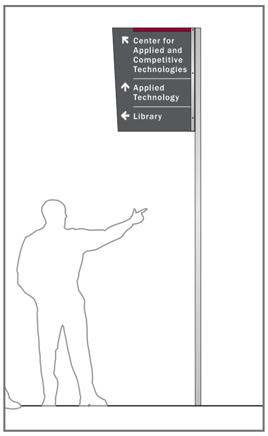
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

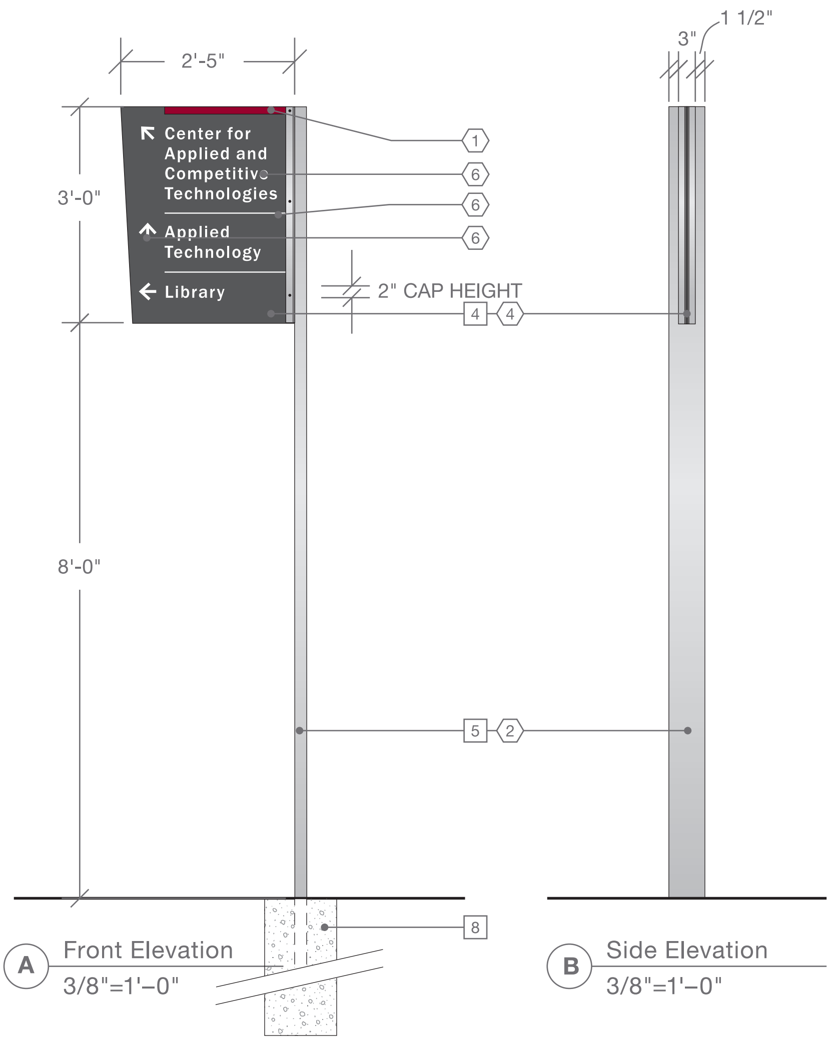


D Plan
3/8"=1'–0"

C Back Elevation
3/8"=1'–0"

S9	Sign Type: Pedestrian Direction	Mounting: Freestanding	Location: Exterior	Lighting: External





A Front Elevation 3/8"=1'–0"

B Side Elevation 3/8"=1'–0"

MATERIALS

1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

MATERIALS

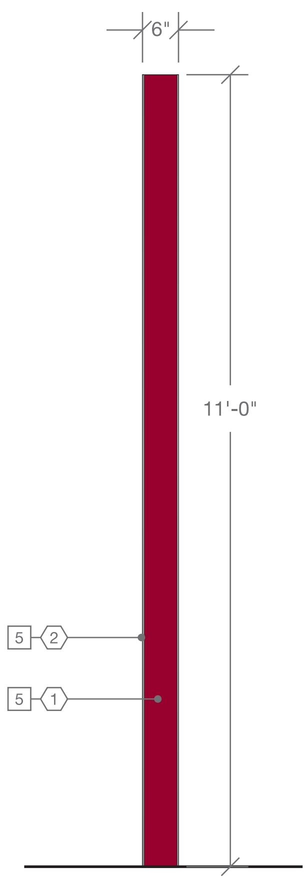
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES

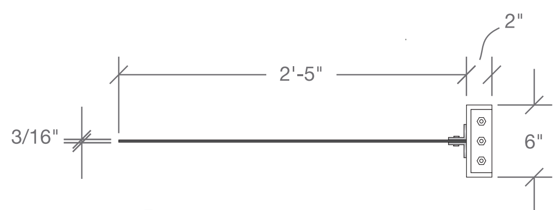
1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES

3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



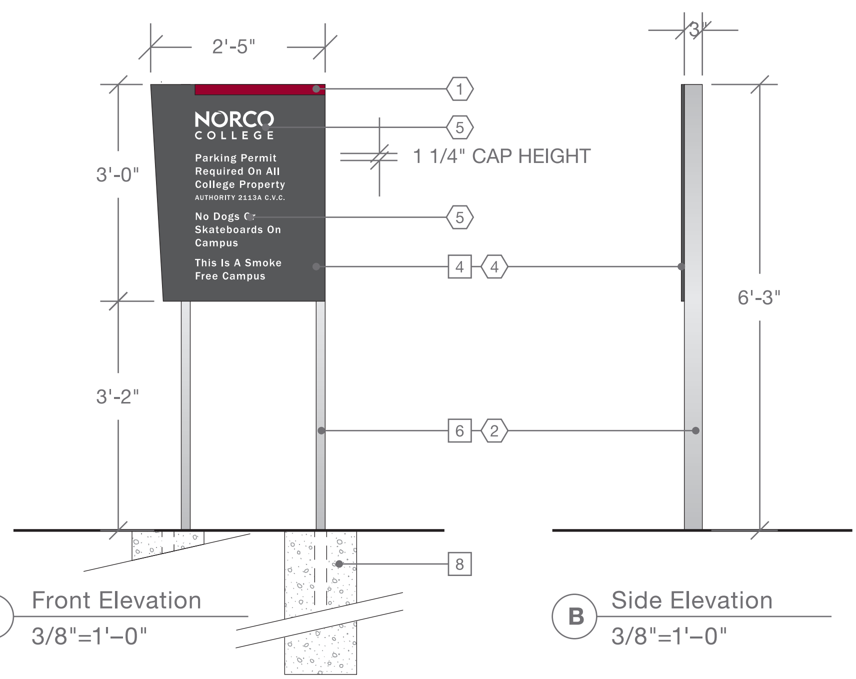
C Side Elevation
3/8"=1'–0"



D Plan
3/4"=1'–0"

E Alternate Layout
3/8"=1'–0"

S10	Sign Type:	Mounting:	Location:	Lighting:
	General Information	Freestanding	Exterior	External



A Front Elevation
3/8"=1'–0"

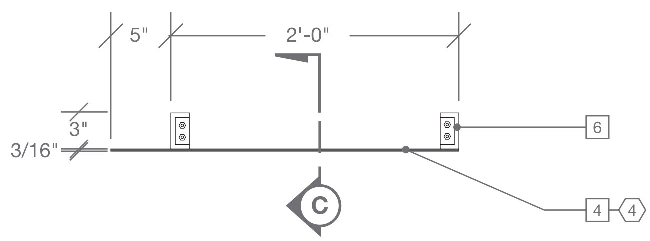
B Side Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

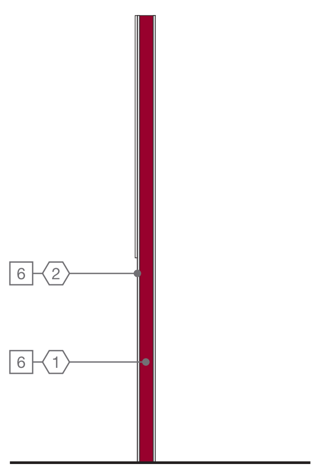
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

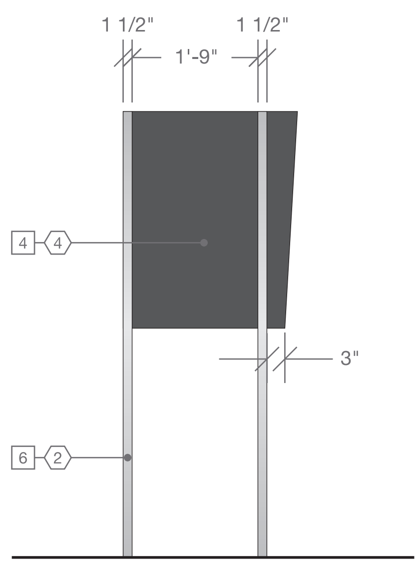
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"



C Section
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S11	Sign Type: Building Identification	Mounting: Wall	Location: Exterior	Lighting: Internal

MATERIALS

1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

MATERIALS

8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

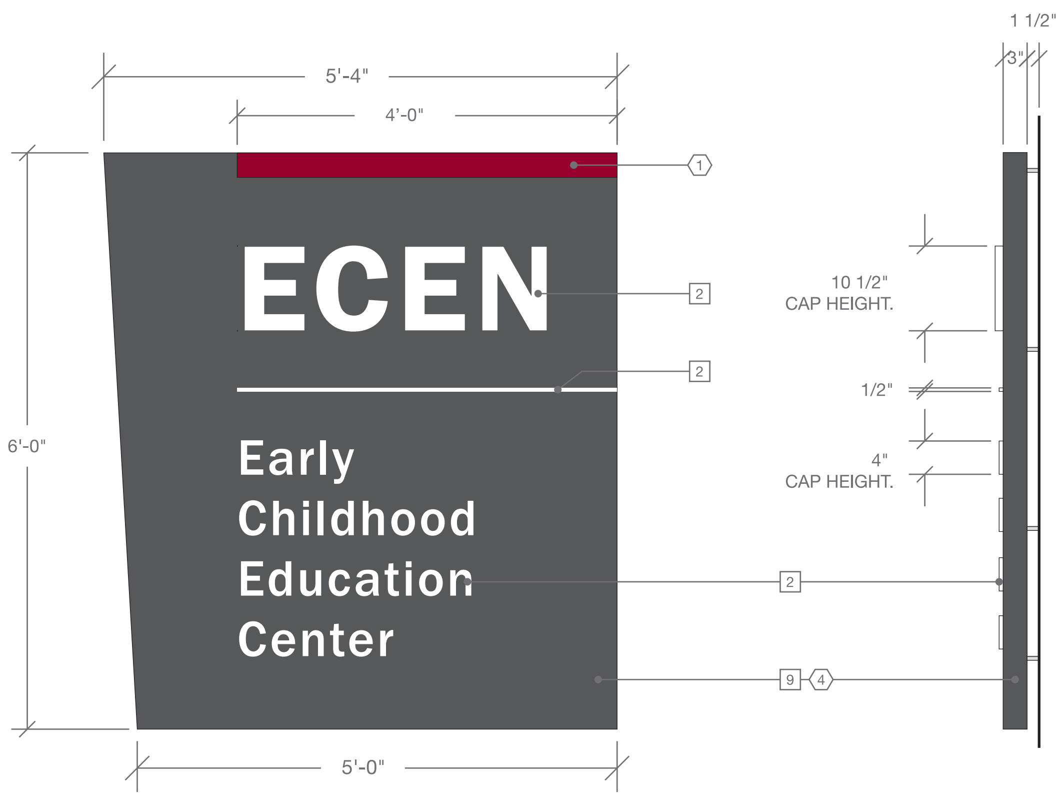
FINISHES

1	MP00000 Burgundy Paint
2	Light Silver Paint

FINISHES

3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

C Plan
1/2"=1'–0"



A Front Elevation
1/2"=1'–0"

B Side Elevation
1/2"=1'–0"

S12	Sign Type: Building Entry Identification	Mounting: Wall	Location: Exterior	Lighting: External

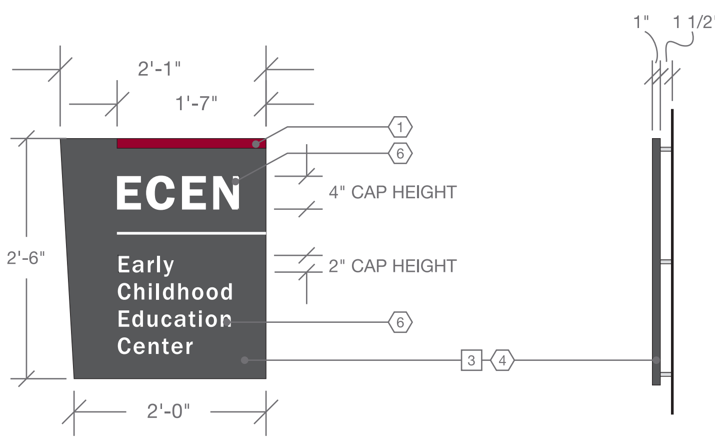
MATERIALS

1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES

1	MP00000 Burgundy Paint
2	Light Silver Paint
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl

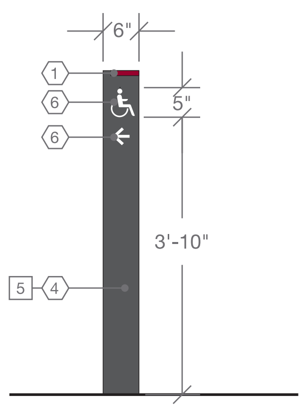
C Plan
1/2"=1'–0"



A Front Elevation
1/2"=1'–0"

B Side Elevation
1/2"=1'–0"

S13	Sign Type: Building Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External



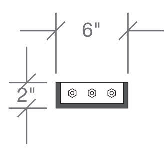
A Front Elevation
3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel
7	Aluminum Clad Concrete Base

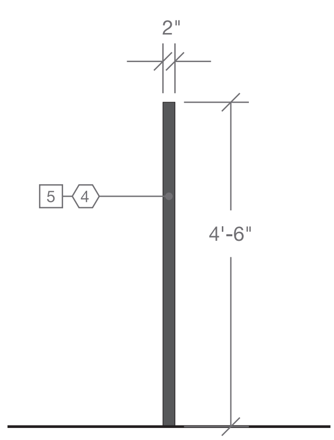
MATERIALS	
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Recessed Lighting

FINISHES	
1	MP00000 Burgundy Paint
2	Light Silver Paint

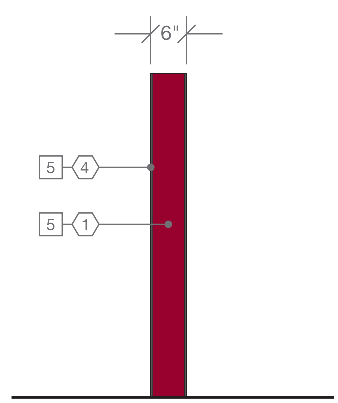
FINISHES	
3	Medium Silver Paint
4	Charcoal Paint
5	3M White Reflective Vinyl
6	3M White Vinyl
7	Dark Silver Paint
8	3M Yellow Reflective Vinyl



D Plan
3/4"=1'–0"



B Side Elevation
3/8"=1'–0"



C Back Elevation
3/8"=1'–0"

PART D
SIGN LOCATIONS

I. SIGN LOCATION PLANS

The sign location plans shown on the following pages represent the initial programming for the Norco College campus. In order to easily locate each sign the plans are divided into five categories: gateway signs, vehicular direction, parking signs, pedestrian wayfinding, and building and accessible route signs.

It is important to locate signs in areas that do not obstruct vehicular or pedestrian circulation and in areas least vulnerable to operational equipment and sprinklers. The sign locations are preliminary and subject to change based on existing and future conditions.

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SIGN LEGEND		QTY
S1	Primary Gateway	1
S2	Secondary Gateway	3

SIGN LOCATION PLAN

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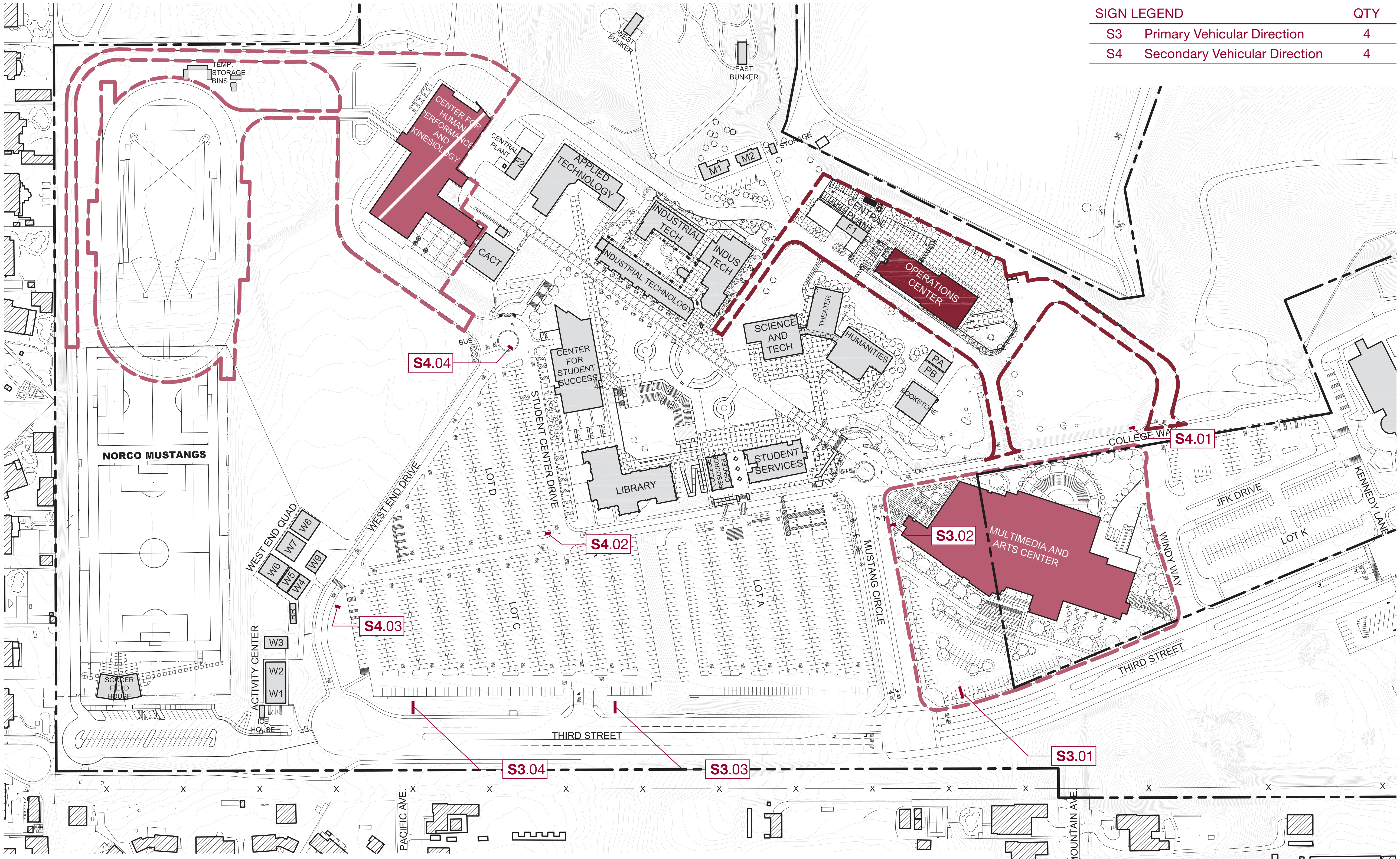

SIGN LEGEND		QTY
S3	Primary Vehicular Direction	4
S4	Secondary Vehicular Direction	4

SIGN LOCATION PLAN

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SIGN LEGEND		QTY
S5	Parking Entry ID	21

SIGN LOCATION PLAN

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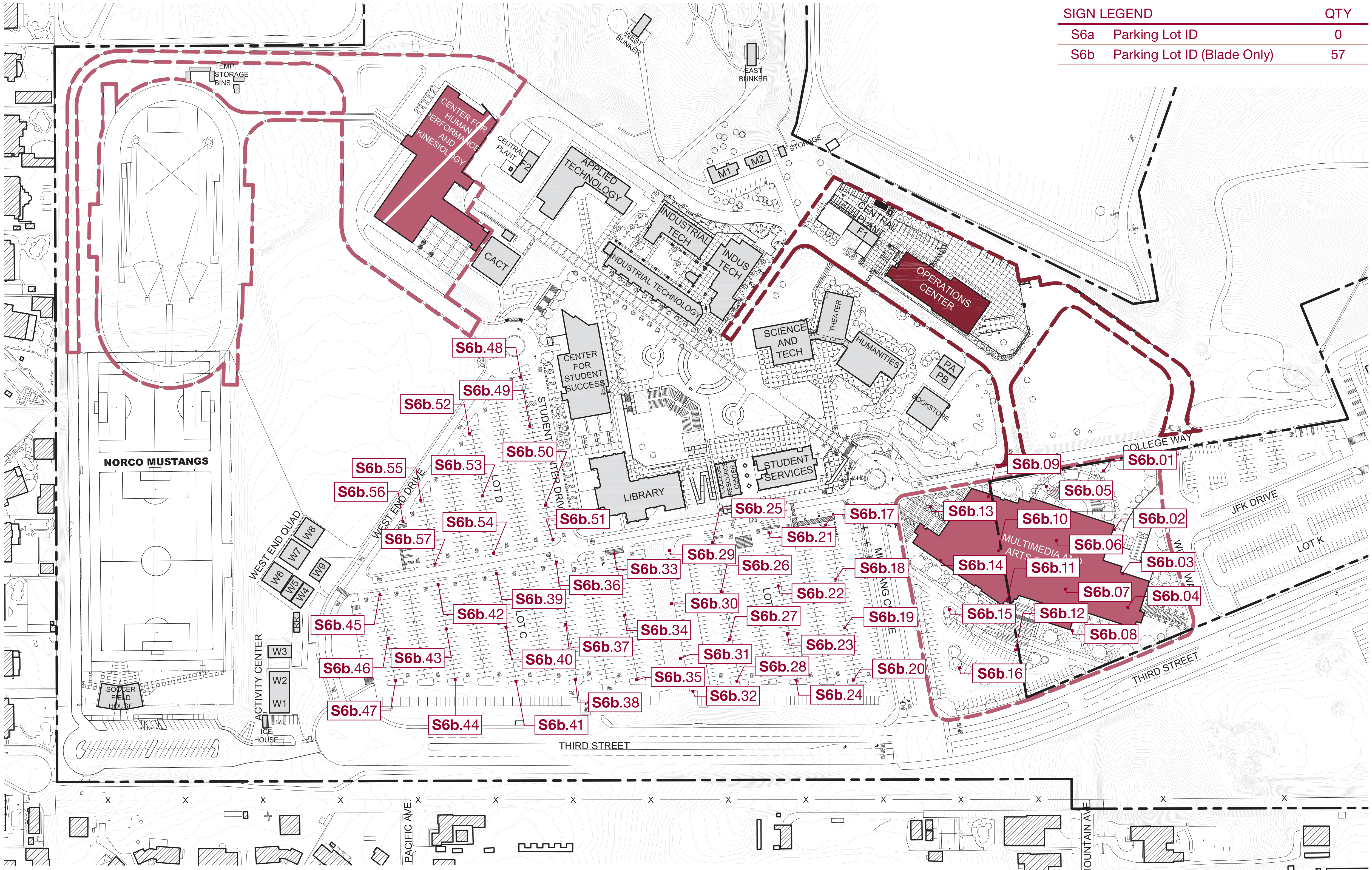

SIGN LEGEND		QTY
S6a	Parking Lot ID	0
S6b	Parking Lot ID (Blade Only)	57

SIGN LOCATION PLAN

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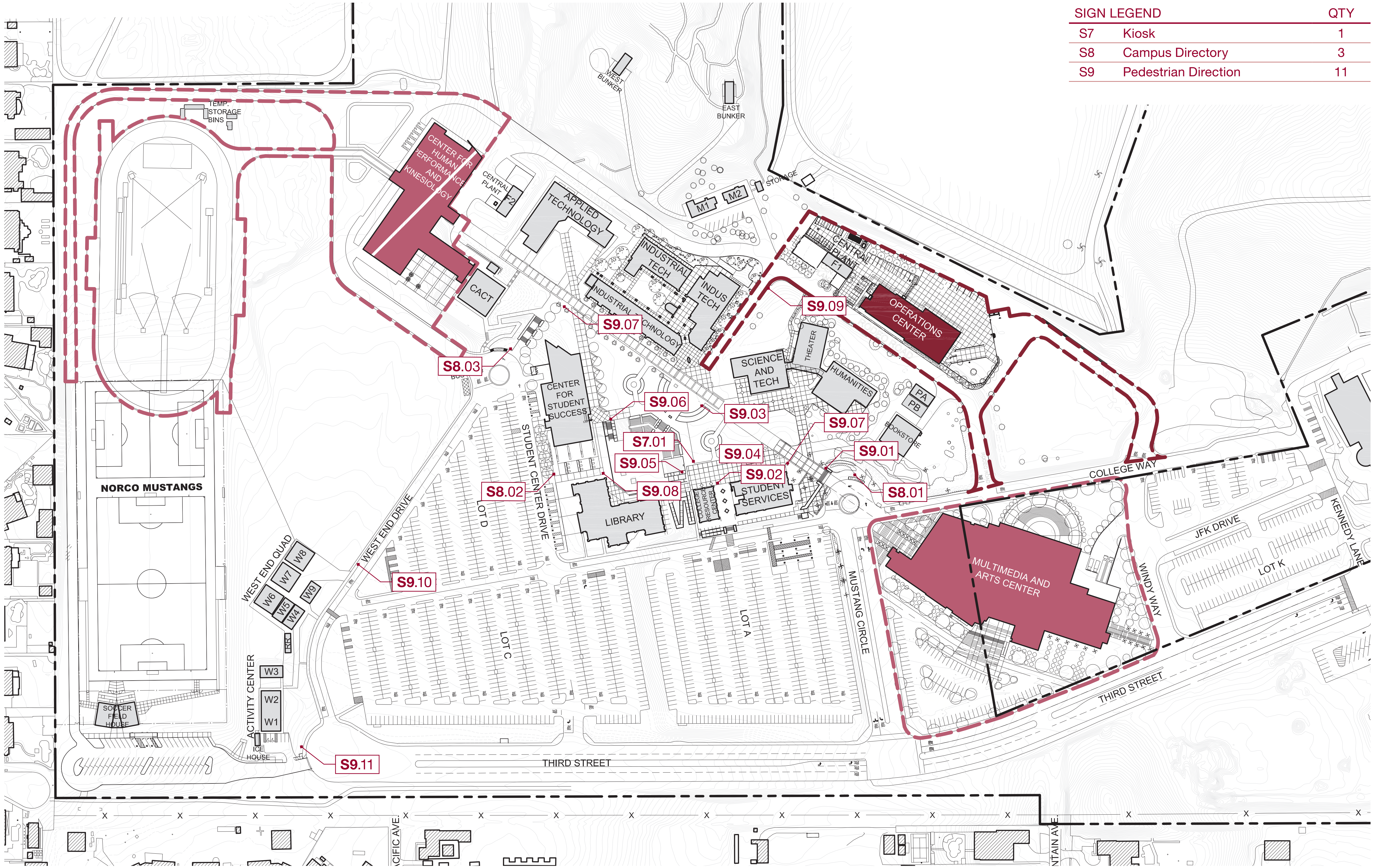
SIGN LEGEND		QTY
S7	Kiosk	1
S8	Campus Directory	3
S9	Pedestrian Direction	11



SIGN LOCATION PLAN

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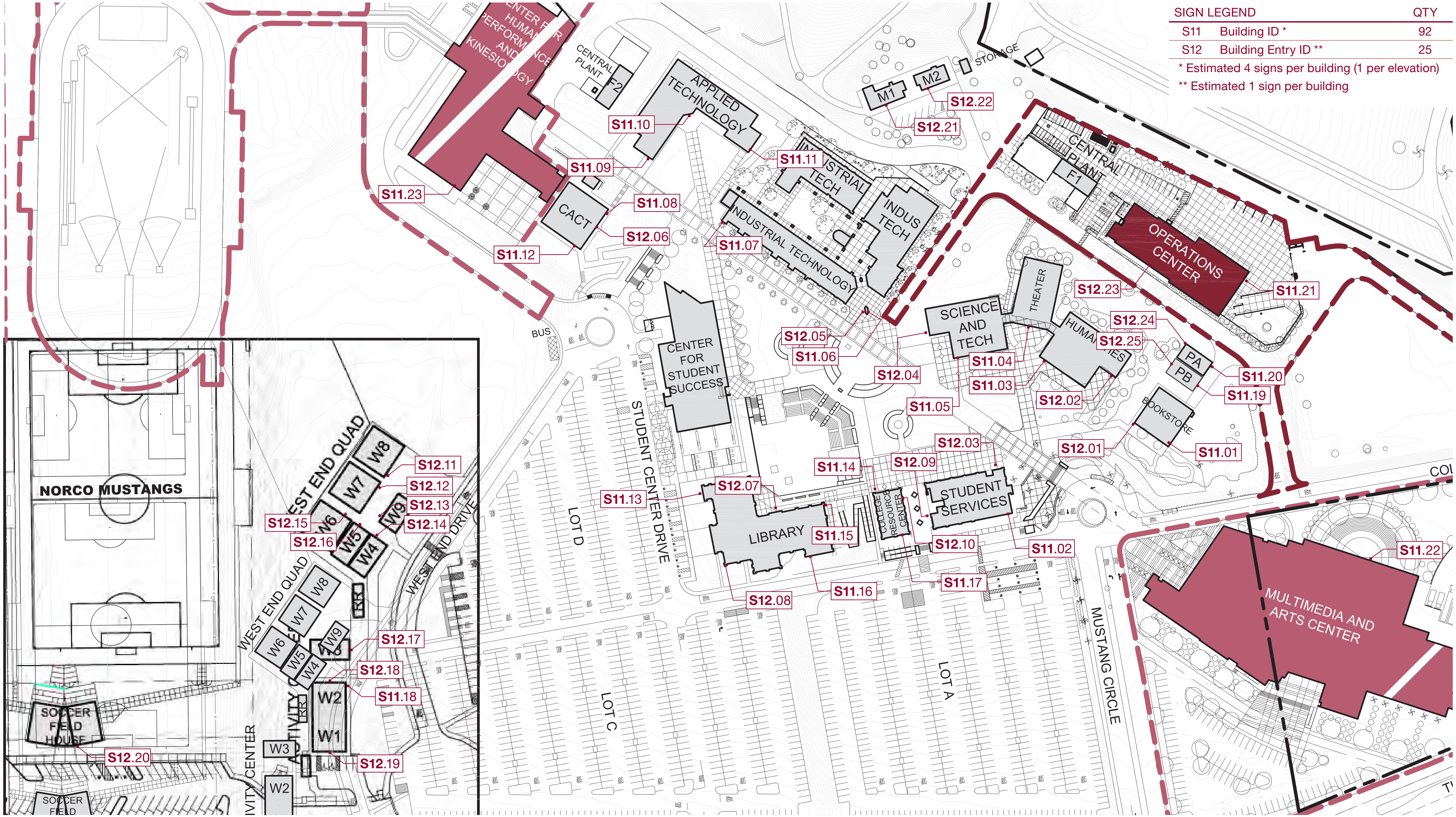
SIGN LEGEND		QTY
S11	Building ID *	92
S12	Building Entry ID **	25

* Estimated 4 signs per building (1 per elevation)

** Estimated 1 sign per building



SIGN LOCATION PLAN

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SIGN LEGEND		QTY
S10	General Information	3
S13	Accessible Route	6

SIGN LOCATION PLAN

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END OF SECTION 6 - NORCO COLLEGE

SECTION 6
RIVERSIDE CITY COLLEGE

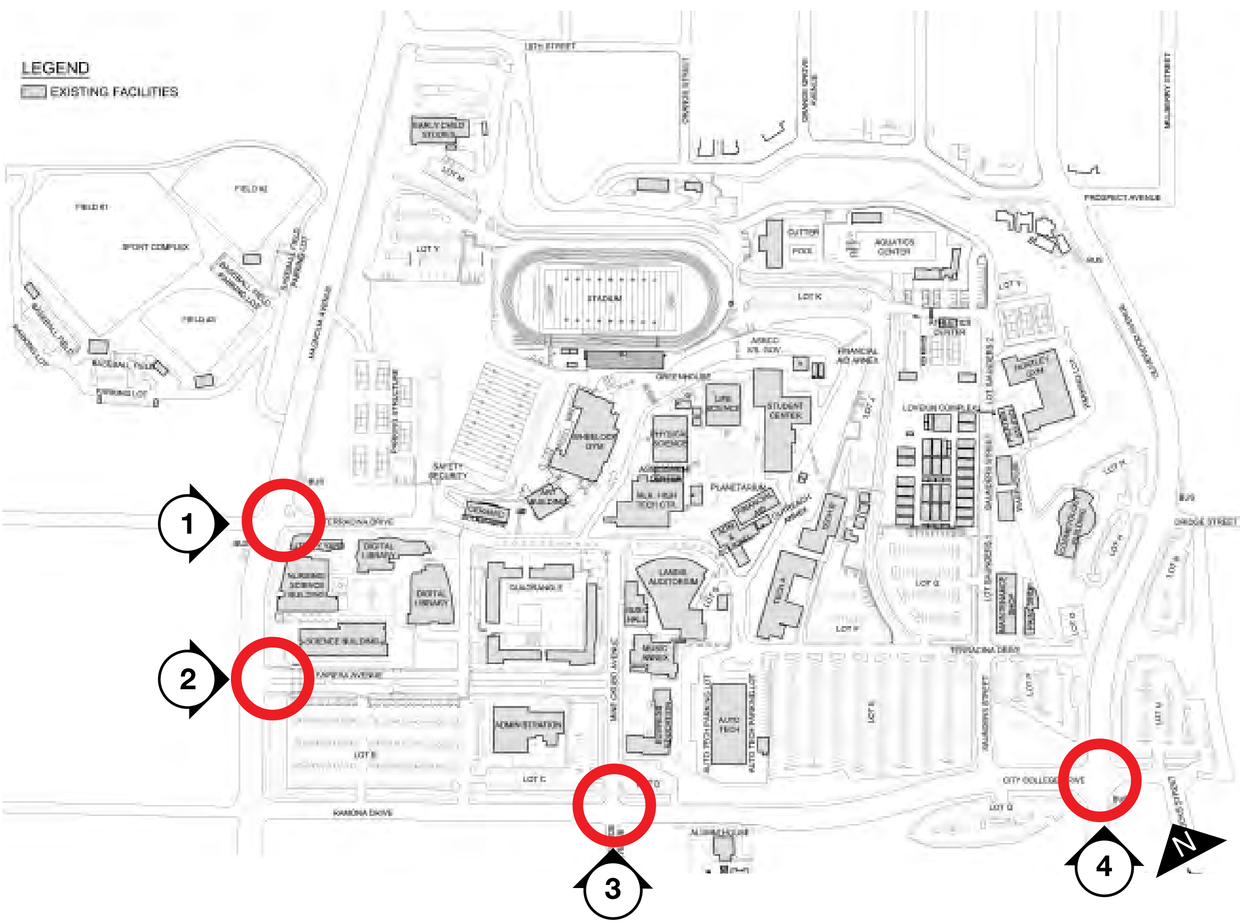
PART A
EXISTING CONDITIONS

I. GENERAL REVIEW + PHOTO DOCUMENTATION

The existing Riverside City College (RCC) campus edges and entries lack a branded arrival experience. The campus wayfinding signage is outdated and inconsistent while not representative of the new RCC graphic standards. It is apparent that a variety of signs have been implemented over the years in response to specific needs and campus development.

I. ARRIVAL: PRIMARY GATEWAY (CEREMONIAL + FUNCTIONAL)

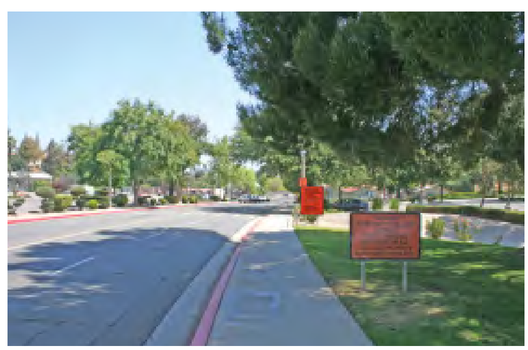
The Fairfax Avenue entry from Magnolia Avenue is considered the ceremonial entrance to Riverside City College (RCC), although not the highest volume entry. This entry currently has no RCC sign, but is highlighted by a distinctive tree-lined street. Terracina Drive is considered a main entrance to the campus since it has a garage to accommodate parking. The Terracina entrance is identified by the RCC name on the south wall.



1. Functional Gateway at Magnolia Avenue

2. Ceremonial Gateway at Magnolia Avenue

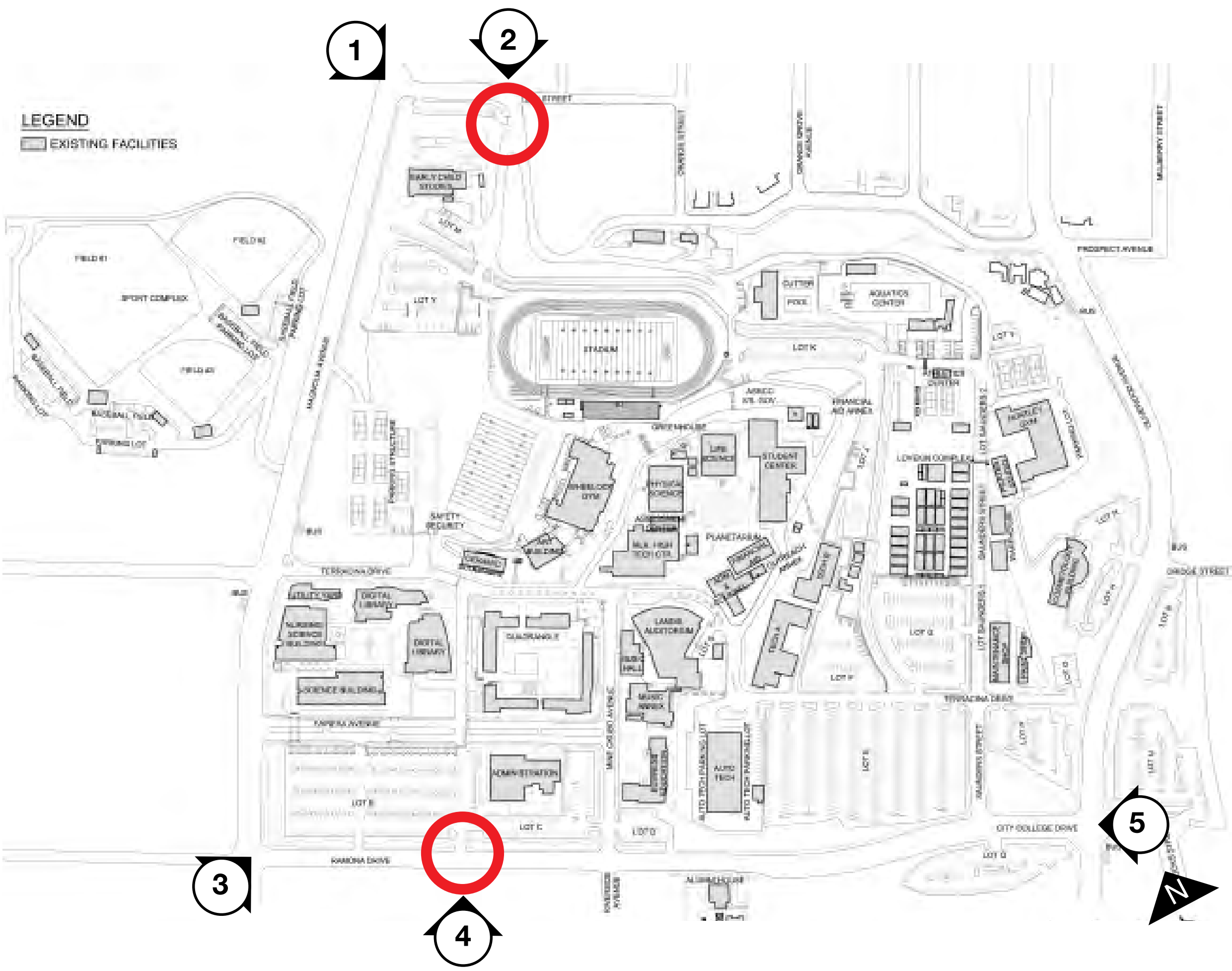
3. Ceremonial Gateway at Ramona Drive



4. Functional Gateway at College Drive

II. ARRIVAL: CAMPUS CORNERS + SECONDARY GATEWAYS

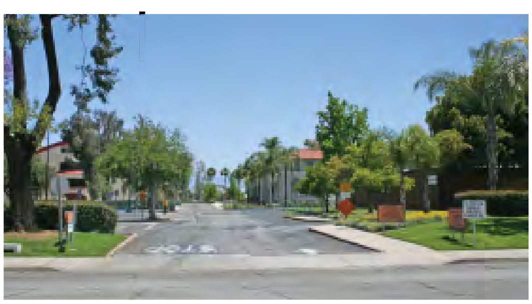
Ramona Drive (City College Drive) runs along the south edge of the campus providing several entry points to the College. Corner identity monument signs exist at Magnolia + Ramona avenues and Olivewood Avenue + City College Drive. The current monuments do not reflect the new College name and identity. A secondary entry does exist on the northwest corner of the campus at Magnolia Avenue + 15th Street. It is not currently identified as a campus entry.



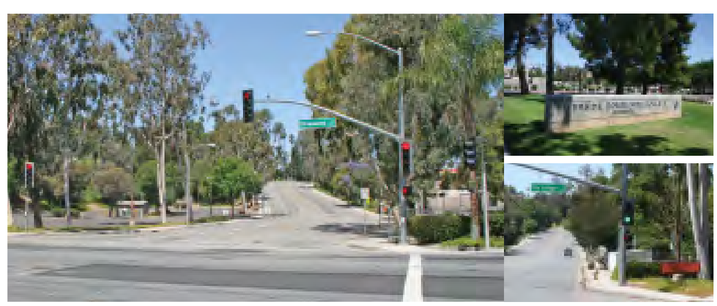
1. Magnolia Avenue at 15th Street

2. 15th Street at Stadium Way

3. Magnolia Avenue at Ramona Drive



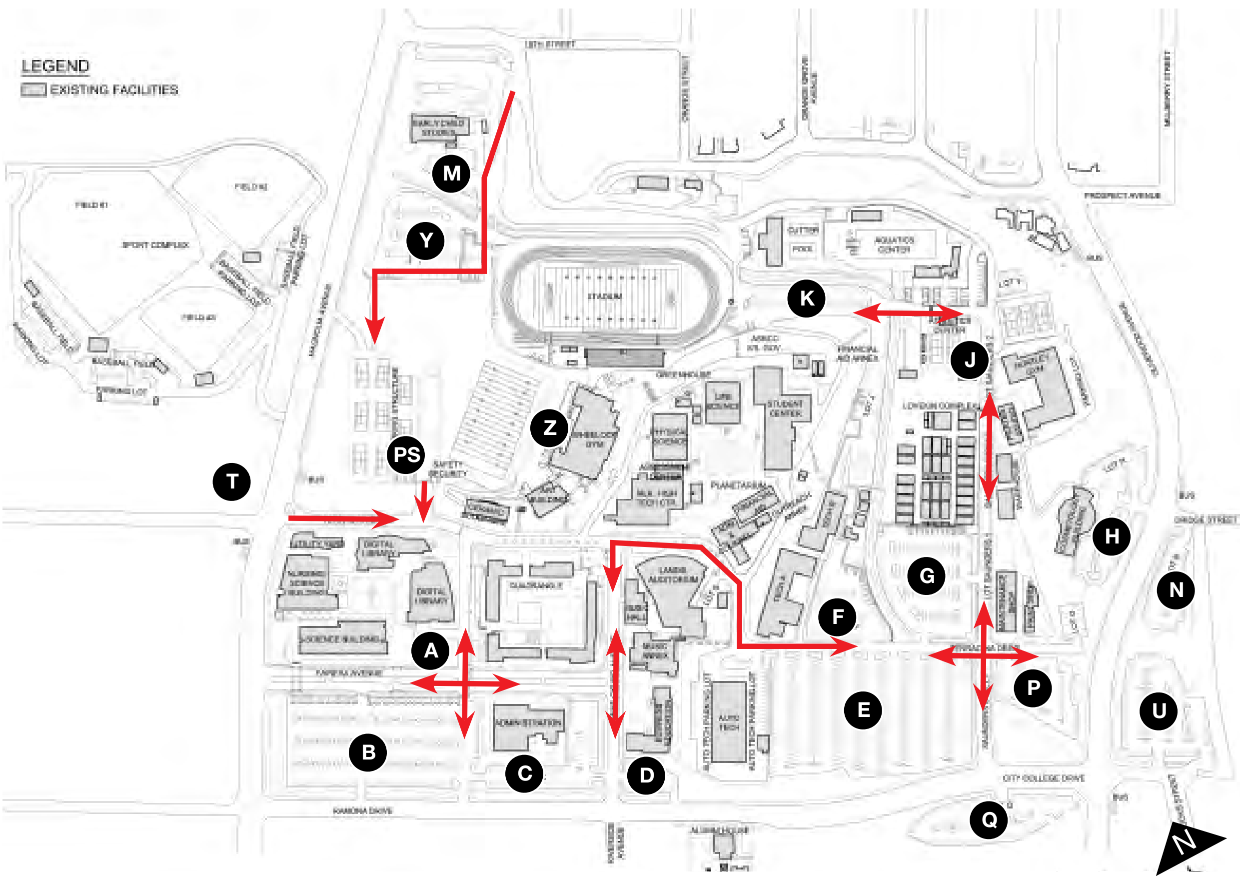
4. Ramona Drive at Parking Lot B



5. City College Drive at Olivewood Avenue

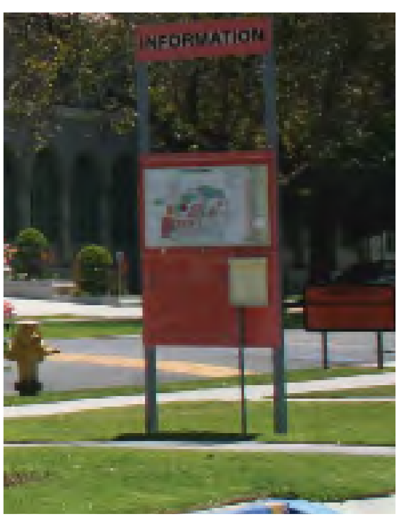
III. VEHICULAR WAYFINDING + PARKING

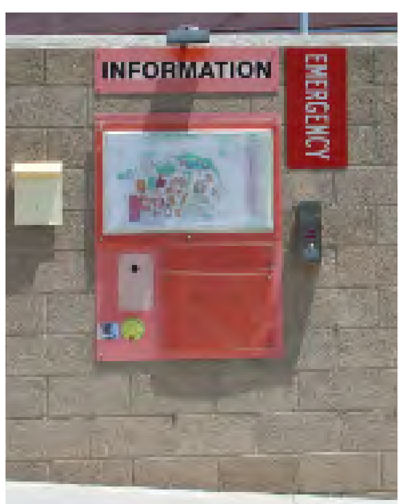
A primary system of orange vehicular direction signs (easily confused with standard construction signage) and parking identification exist throughout the campus. The existing campus use signage is characterized by inconsistent use of color, shape, and typography.

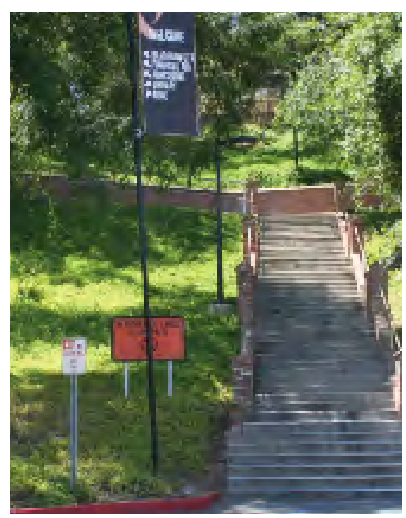


IV. EXISTING PEDESTRIAN WAYFINDING

The images below document the wide variety of pedestrian signs used throughout campus.

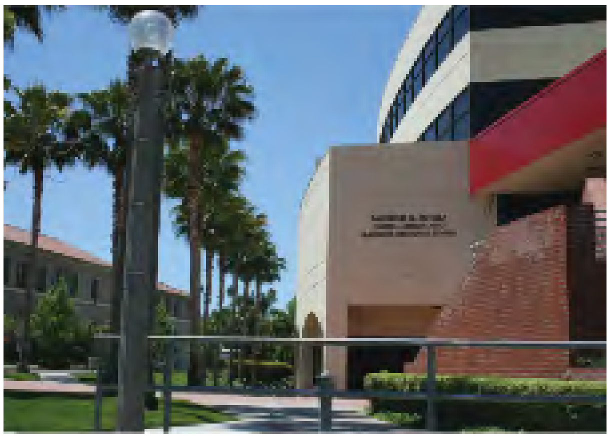






V. EXISTING BUILDING IDENTITY

The images below document the wide variety of building identity signage used on campus.



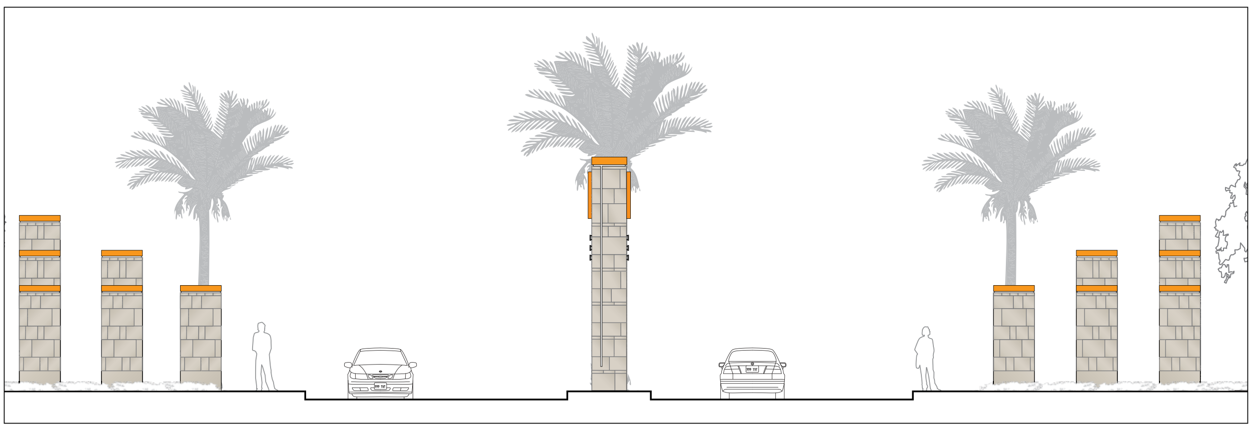
PART B
SIGN OVERVIEW

INTRODUCTION

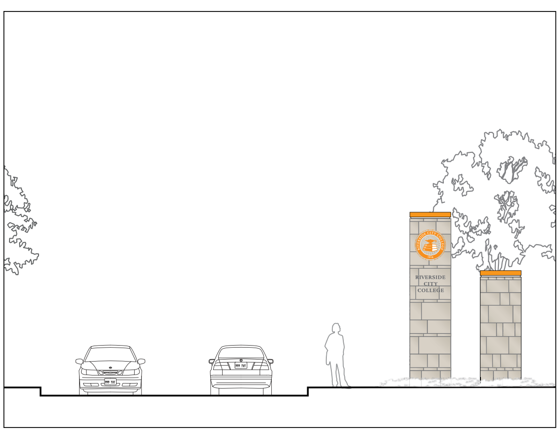
The proposed comprehensive wayfinding program provides a uniform family of sign types for campus entries, as well as vehicular and pedestrian wayfinding. The implementation of these sign types will improve the campus circulation and accommodate growth for years to come. The sign program design communicates the Riverside City College (RCC) brand and college fabric by using the newly implemented brand guidelines. Together with lighting, landscape, and architecture, the wayfinding program will express the high quality and reputation of Riverside City College to the community, students, faculty, visitors, and new recruits.

I. SUMMARY OF SIGNS

The Riverside City College Campus Signage + Wayfinding Guidelines address Gateways, Vehicular Direction, Pedestrian Wayfinding, Building Identity, and Accessible Route signage. The following drawings represent the signs included in these guidelines.



S1 PRIMARY GATEWAY

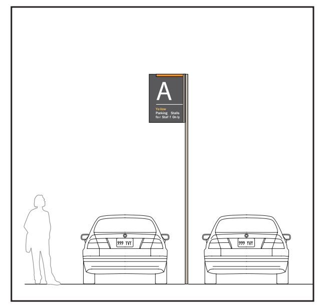


S2 SECONDARY GATEWAY

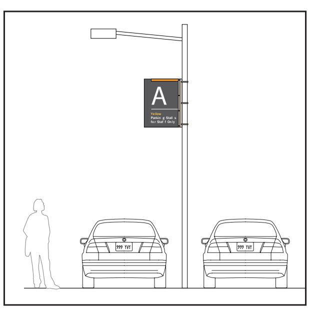
S3 PRIMARY VEHICULAR DIRECTION

S4 SECONDARY VEHICULAR DIRECTION

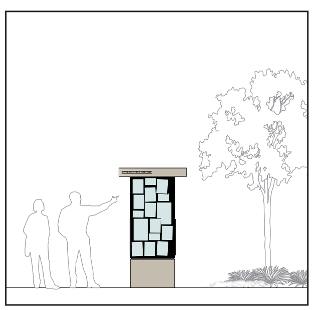
S5 PARKING ENTRY ID



S5 PARKING LOT ID

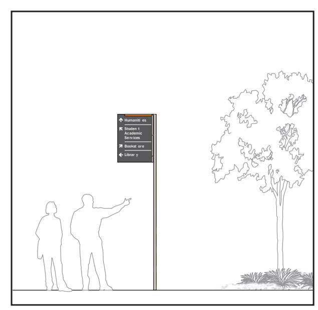


S6b PRIMARY LOT ID



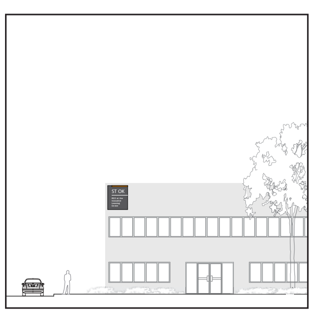
S7 KIOSK

S8 CAMPUS DIRECTORY

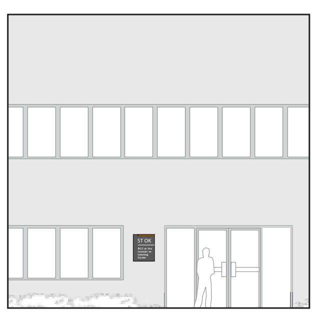


S9 PEDESTRIAN DIRECTION

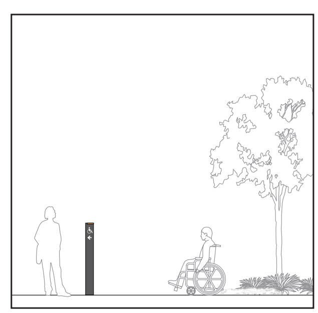
S10 GENERAL INFORMATION



S11 BUILDING D



S12 BUILDING ENTRY ID



S13 ACCESSIBLE ROUTE

II. IDENTITY, FONT, SYMBOLS, + COLORS

Graphic standards have been developed for the Riverside City College (RCC) brand identity. These standards include the use of the college seal and RCC logo. ITC Franklin Gothic is used as the primary wayfinding typeface. Use of the graphic standards are reflected on the wayfinding signage.

Identity

RCC
RIVERSIDE CITY COLLEGE

RIVERSIDE CITY COLLEGE
1916

ITC FRANKLIN GOTHIC MEDIUM

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

ITC FRANKLIN GOTHIC DEMI

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

The wayfinding program utilizes the RCC standard brand colors and a material palette that compliments the campus architecture. Use of colors and materials are reflected on the wayfinding signage.

COLOR PALETTE

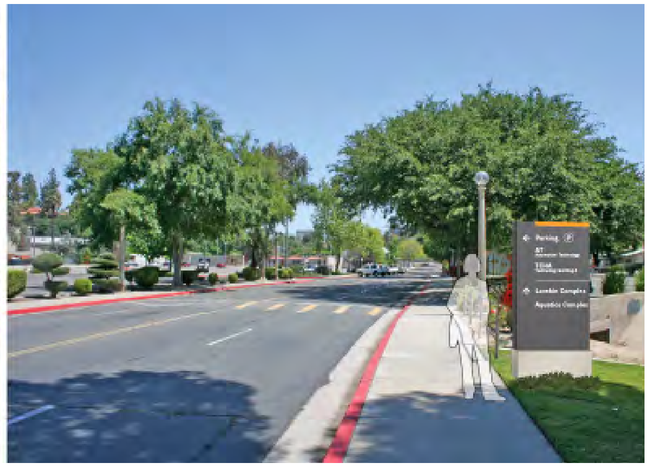
Orange Black White

Stone Light Tan Charcoal

SYMBOLS

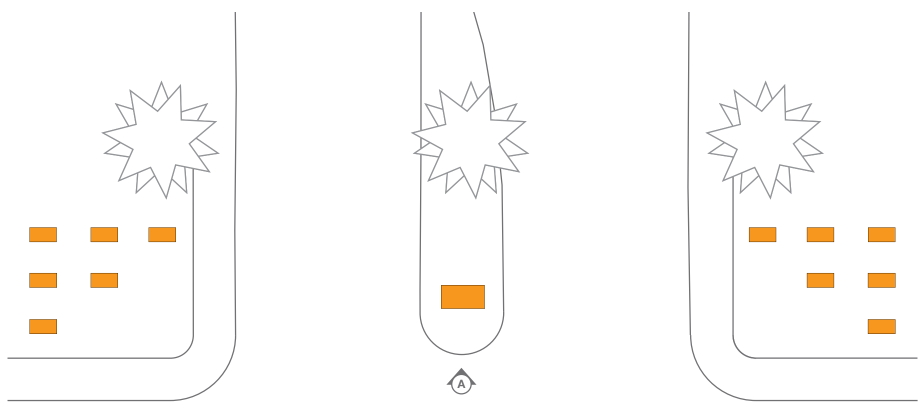
PART C
SIGN TYPES

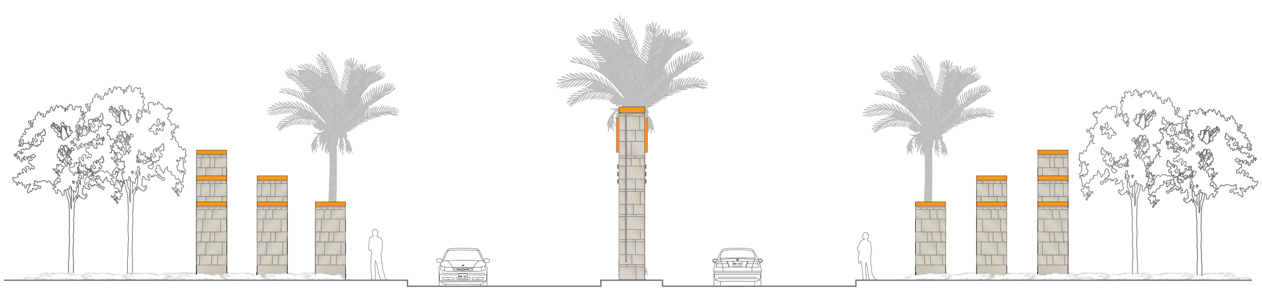
I. DESIGN



The wayfinding for Riverside Community College utilizes a "kit-of-parts" approach for the design and layout of each sign. The repetition of color, typography, and materials creates a consistent appearance that allows a user to easily identify wayfinding elements throughout the campus environment. This section provides the design and general specification call-outs for all signs in the summary of sign types.

S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



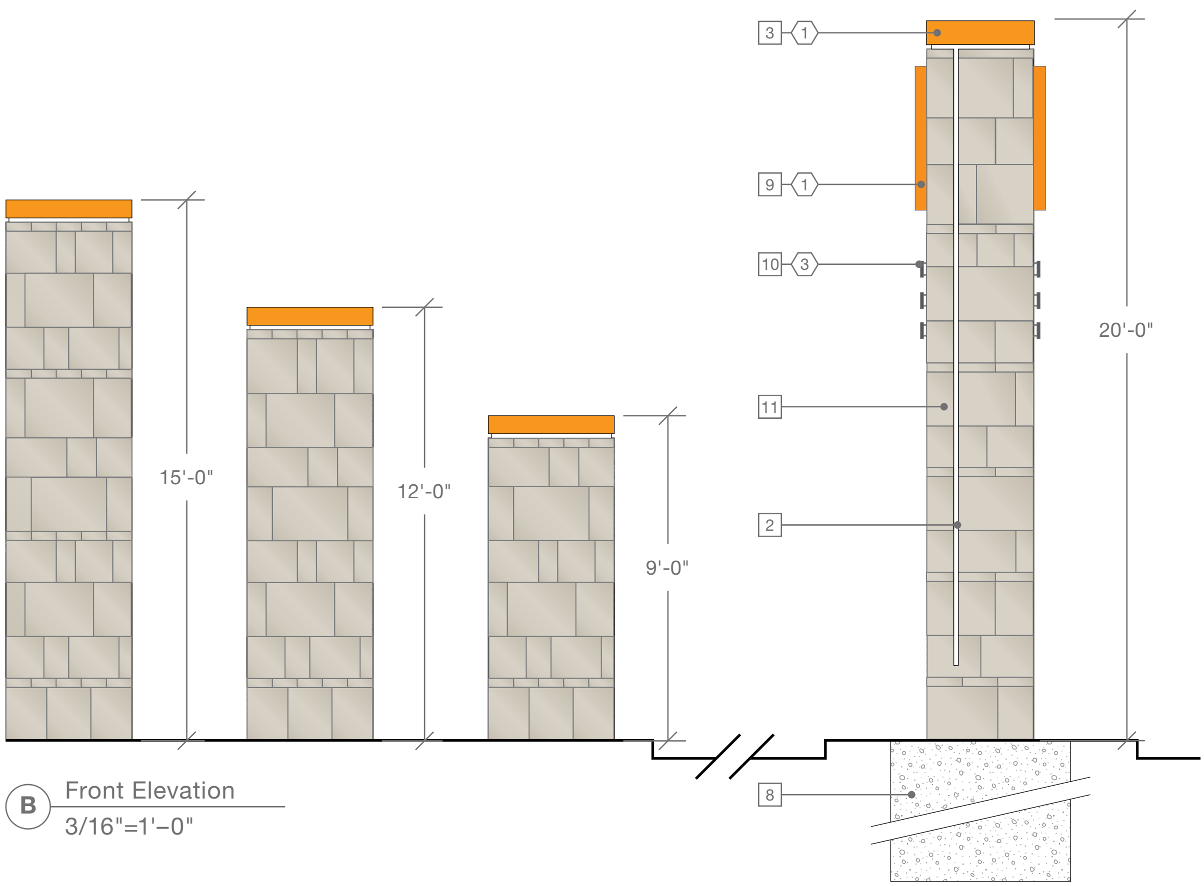


A Context Rendering
NTS

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

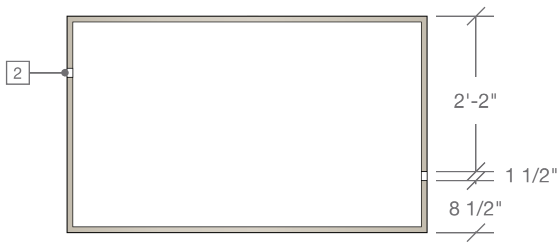
MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

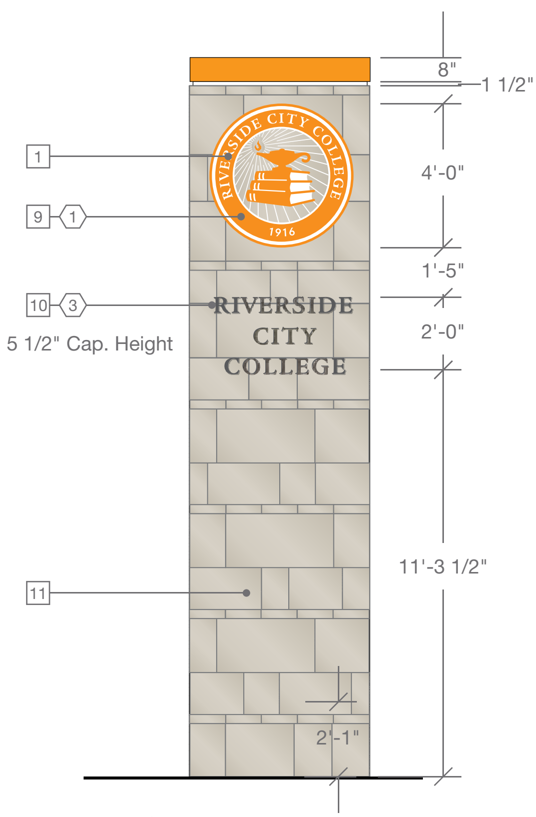


B Front Elevation
3/16"=1'–0"

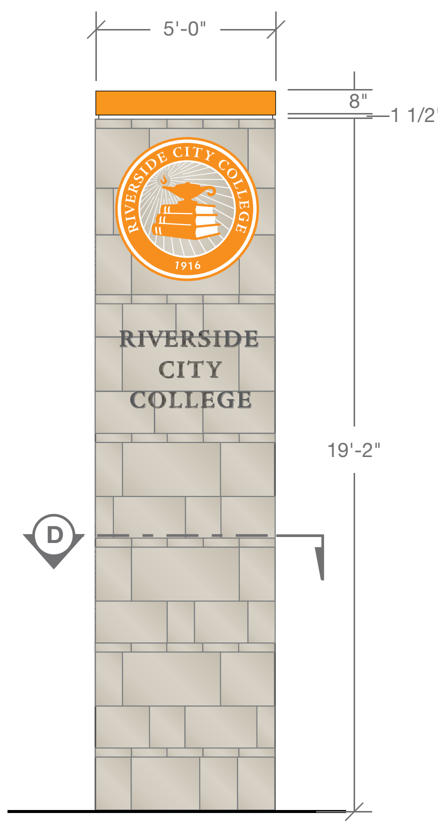
S1	Sign Type: Primary Gateway	Mounting: Freestanding	Location: Exterior	Lighting: Internal



D Section
3/8"=1'–0"



A Side Elevation
3/16"=1'–0"

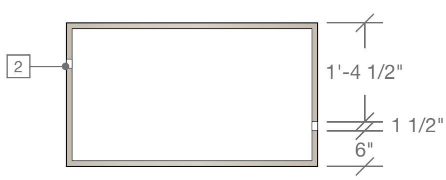


B Back Elevation
3/16"=1'–0"

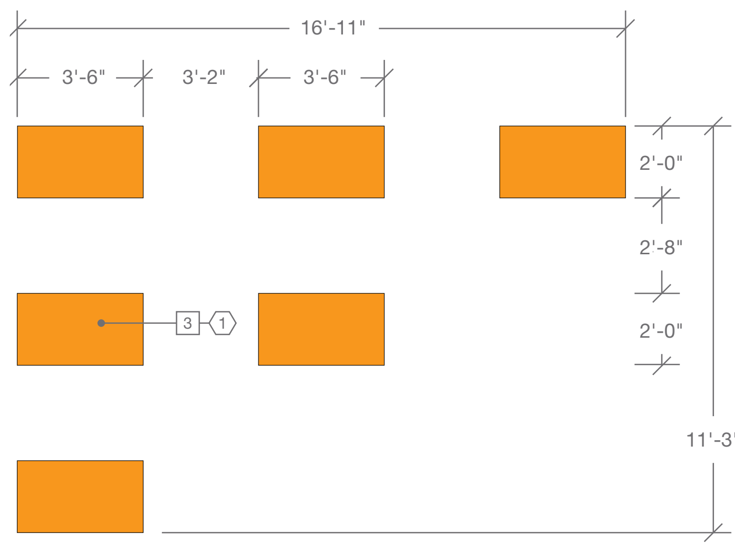
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

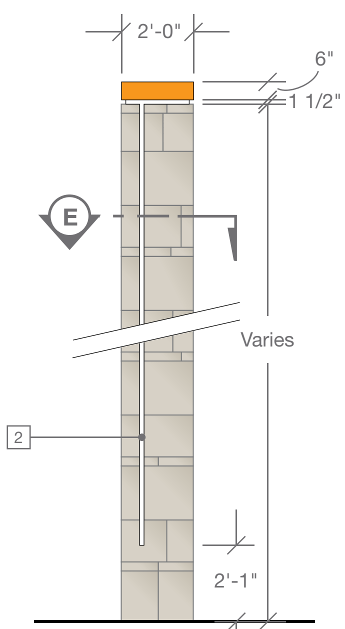
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Section
3/8"=1'–0"

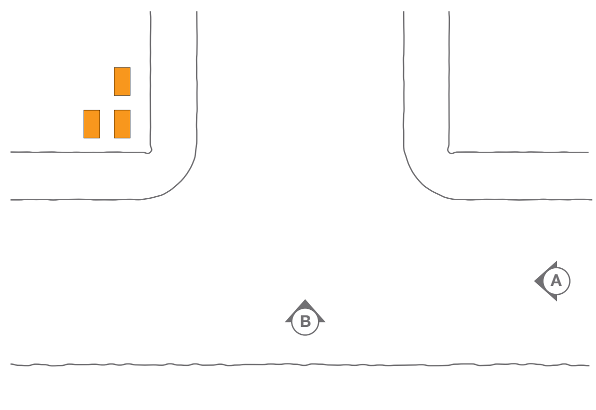


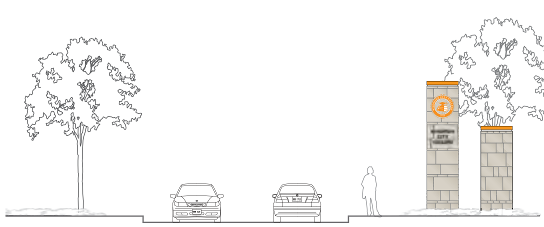
F Plan
3/16"=1'–0"



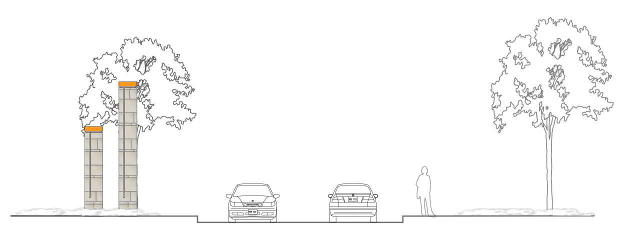
C Side Elevation (TYP)
3/16"=1'–0"

S2	Sign Type: Secondary Gateway (may incorporate digital sign)	Mounting: Freestanding	Location: Exterior	Lighting: Internal





A Context Rendering
NTS

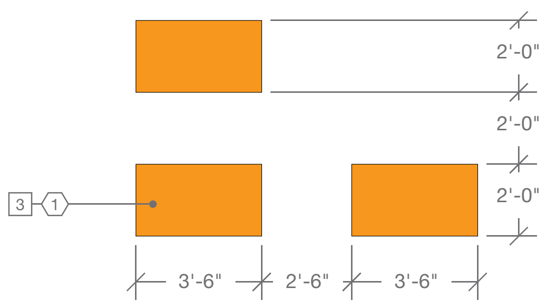


B Context Rendering
NTS

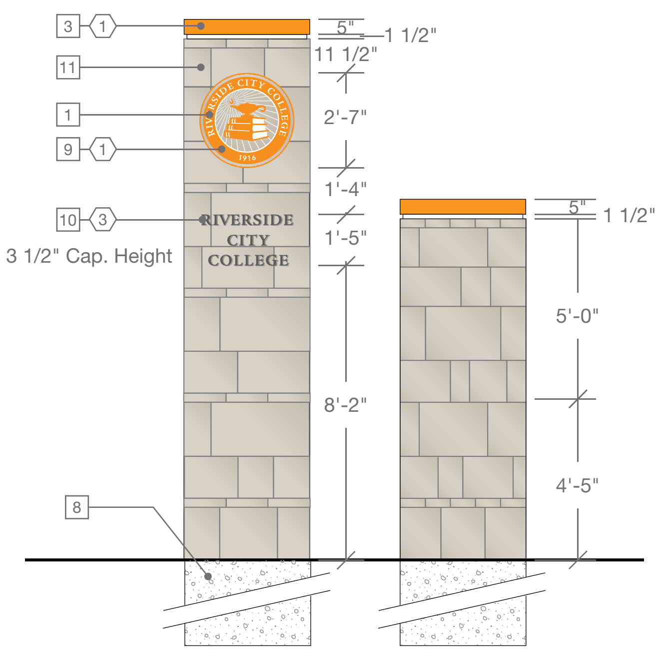
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

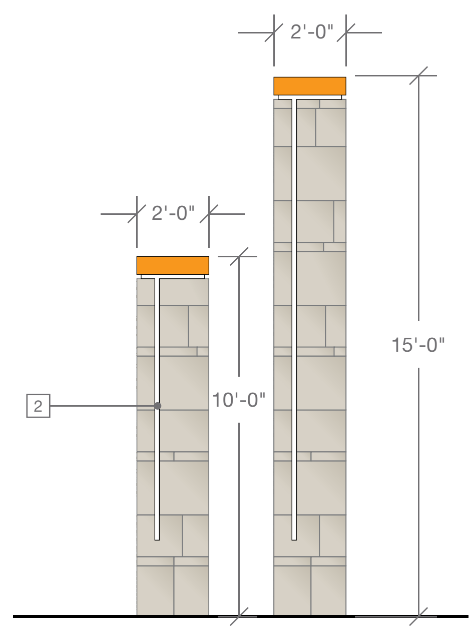
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



C Plan
3/16"=1'–0"

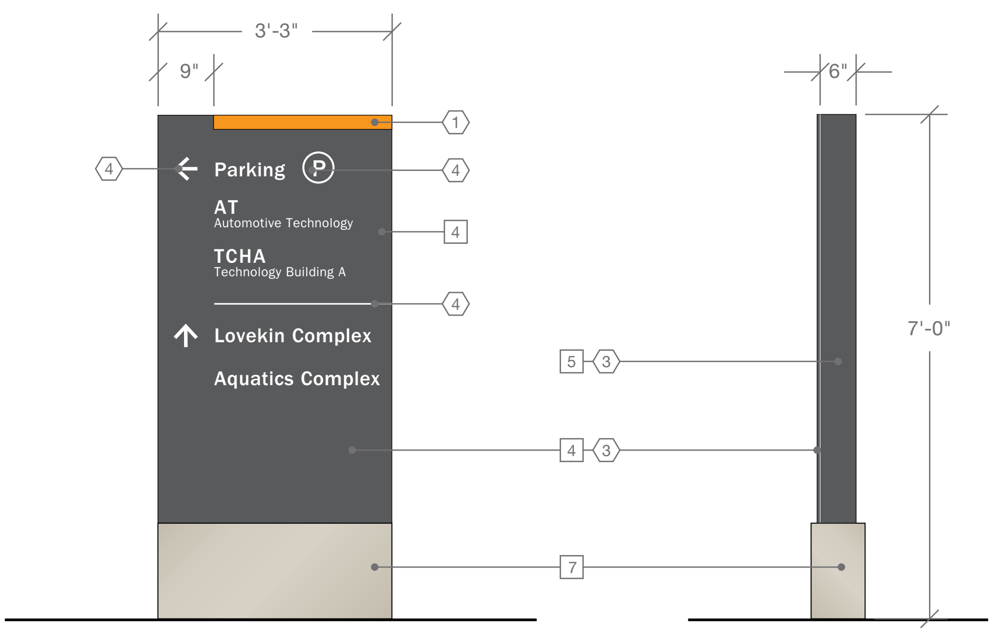


D Front Elevation
3/16"=1'–0"



E Side Elevation
3/16"=1'–0"

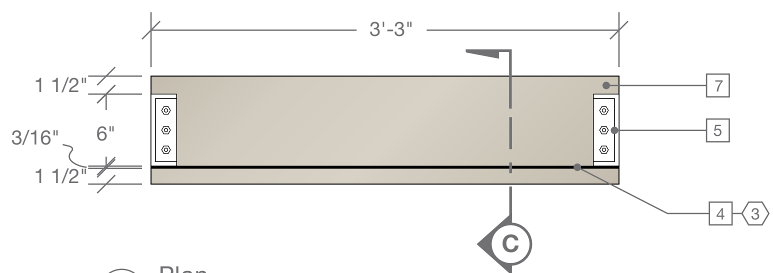
S3	Sign Type: Primary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External



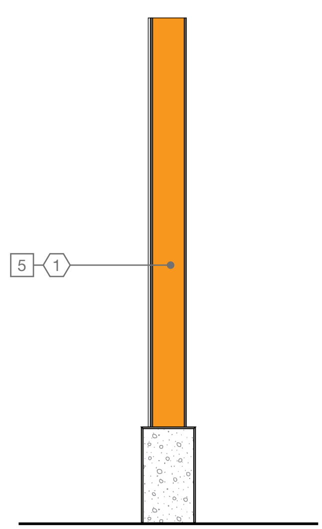
A Front Elevation
3/8"=1'–0"

B Side Elevation
3/8"=1'–0"

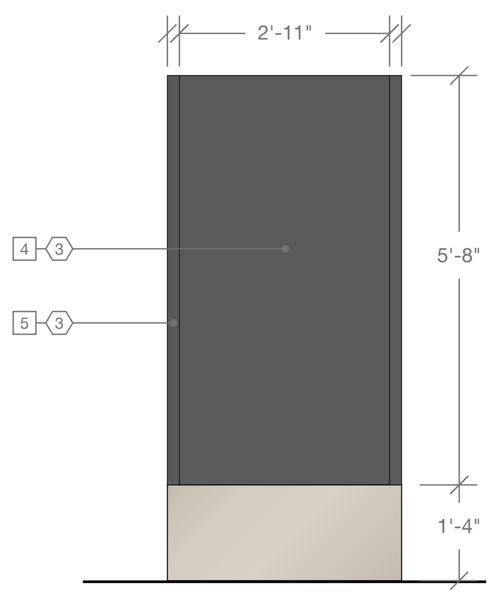
MATERIALS		MATERIALS		FINISHES	
1	Flush Push-Thru White Acrylic	7	Stone Veneer Clad Concrete Base	1	Orange Paint
2	White Acrylic	8	Direct Burial Post Foundation	2	Light Tan Paint
3	Aluminum Cabinet	9	Internally Lit Aluminum Cabinet	3	Charcoal Paint
4	3/16" Aluminum Panel	10	Halo Illuminated Channel Letters	4	3M White Reflective Vinyl
5	2" x 6" Aluminum Channel	11	Stone Veneer	5	3M White Vinyl
6	1 1/2" x 3" Aluminum Channel	12	Recessed Lighting	6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

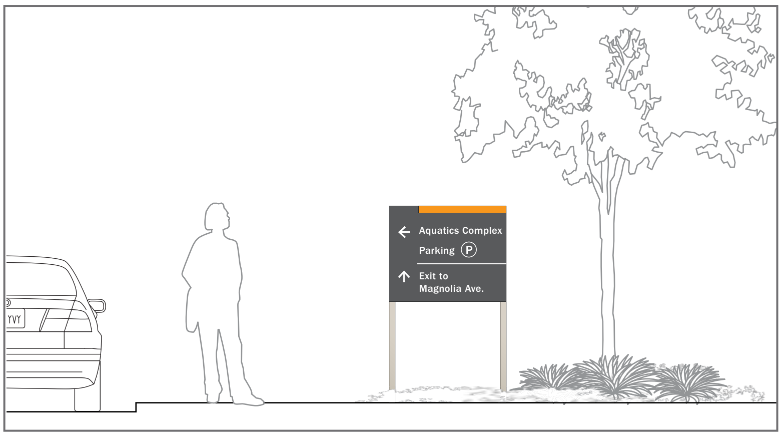


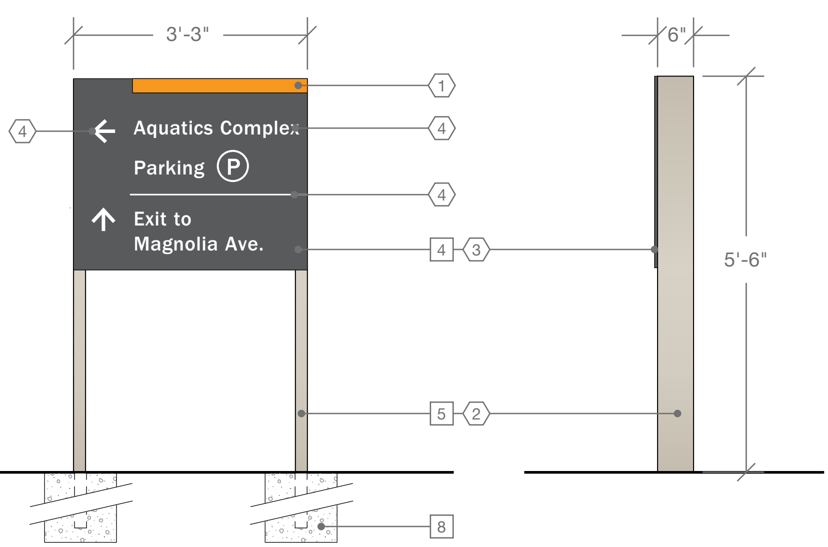
C Section
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S4	Sign Type: Secondary Vehicular Directional	Mounting: Freestanding	Location: Exterior	Lighting: External





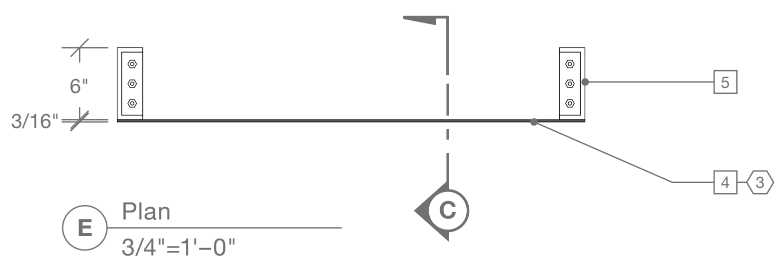
A Front Elevation
3/8"=1'–0"

B Side Elevation
3/8"=1'–0"

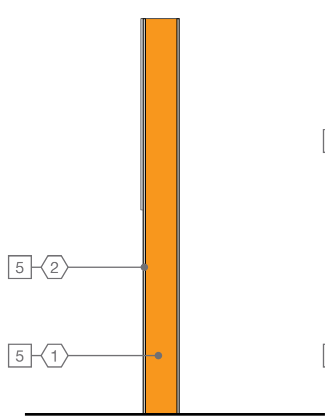
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

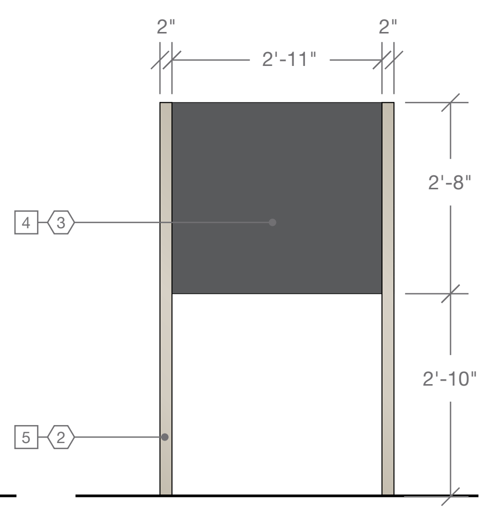
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

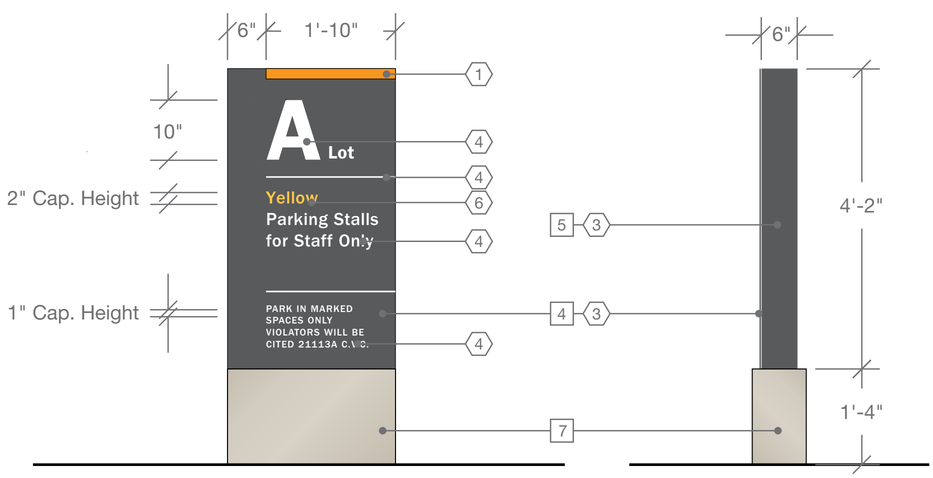


C Section
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S5	Sign Type: Parking Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External



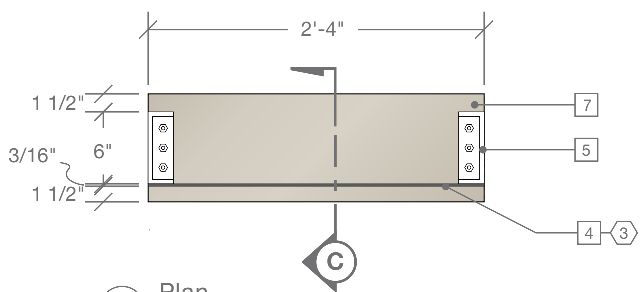
A Front Elevation
3/8"=1'–0"

B Side Elevation
3/8"=1'–0"

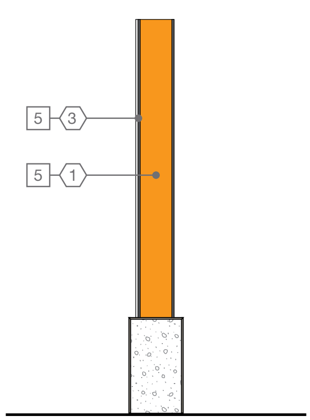
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

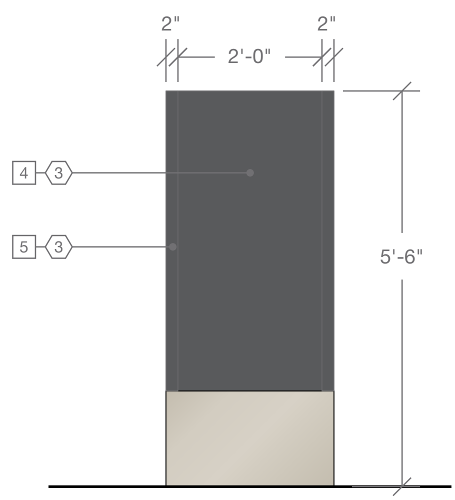
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

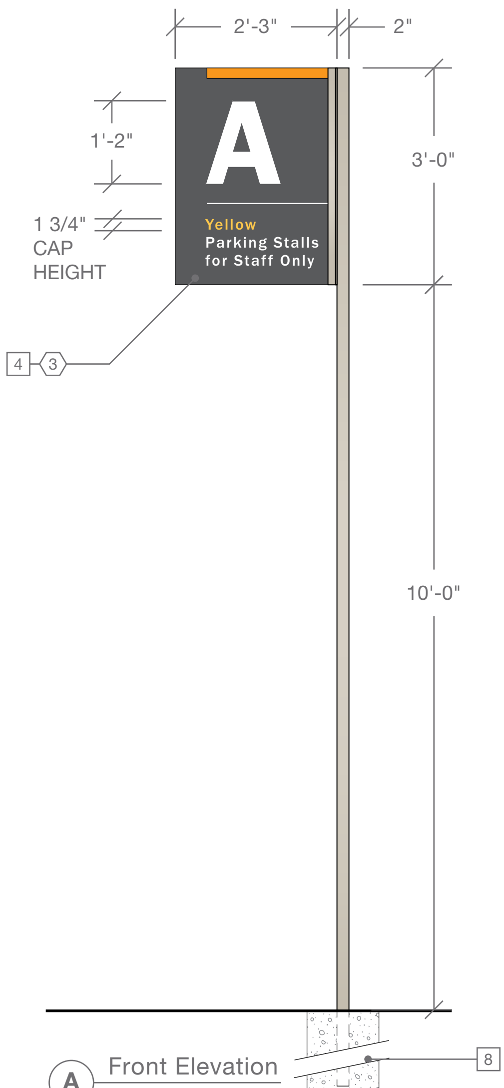


C Section
3/8"=1'–0"

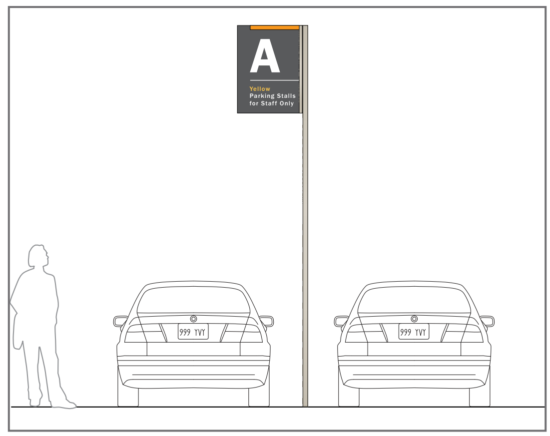


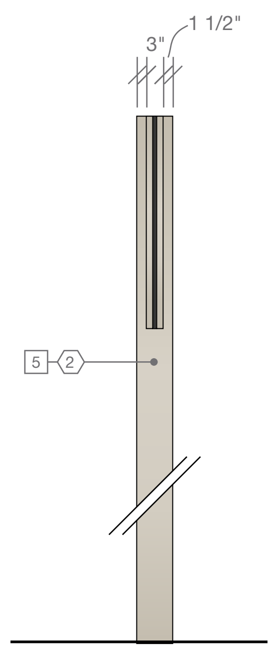
D Back Elevation
3/8"=1'–0"

S6a	Sign Type: Parking Entry Identification	Mounting: Pole	Location: Exterior	Lighting: External



A Front Elevation
3/8"=1'–0"



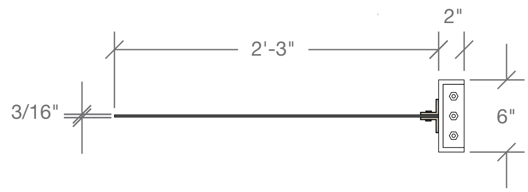


B Side Elevation
3/8"=1'–0"

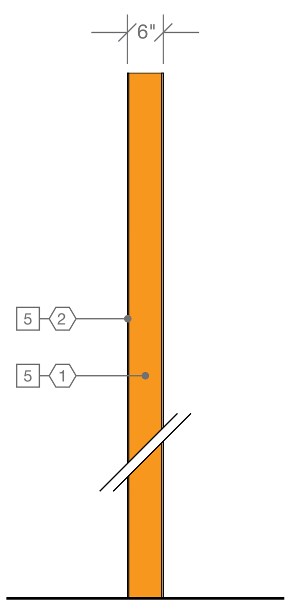
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

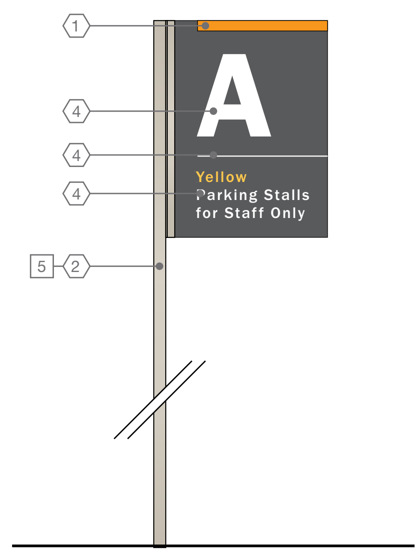
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'–0"

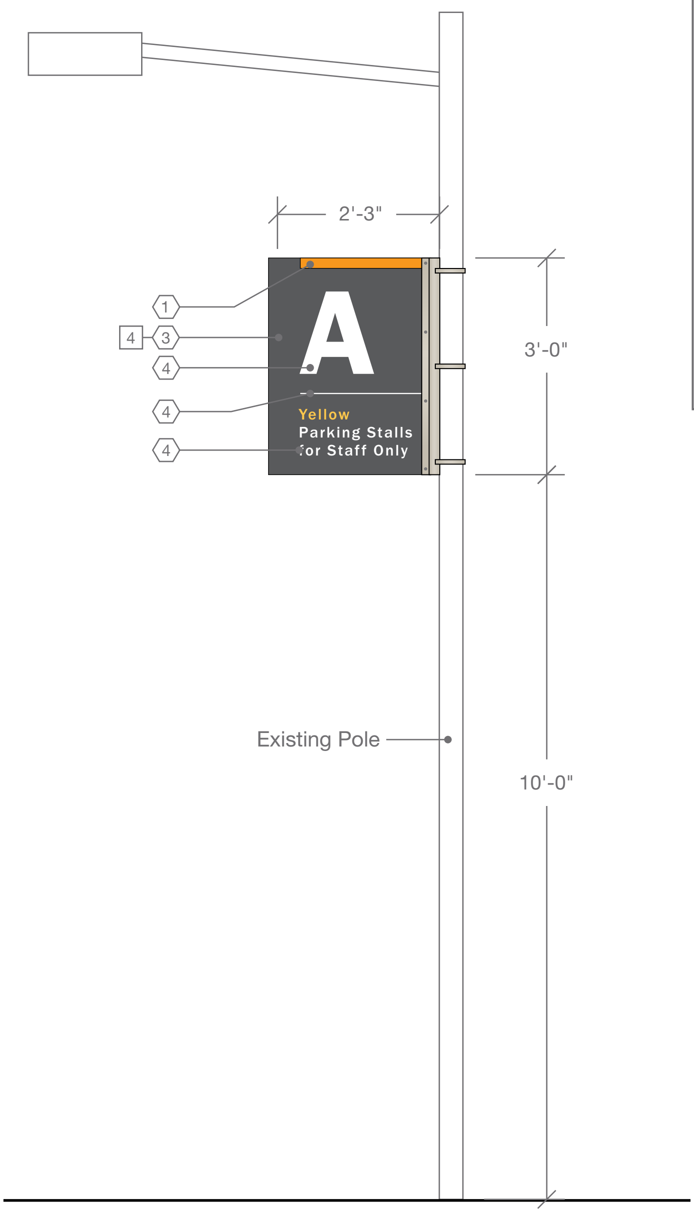


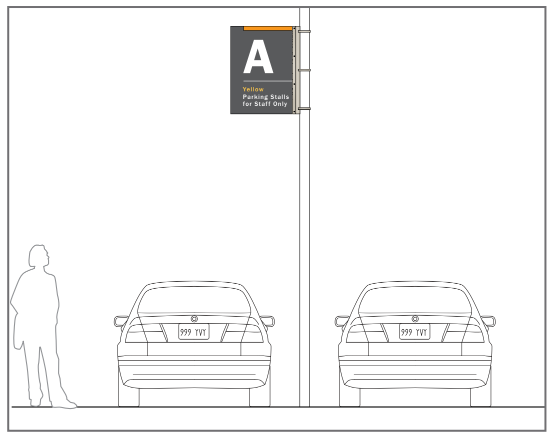
C Side Elevation
3/8"=1'–0"



D Back Elevation
3/8"=1'–0"

S6b	Sign Type: Parking Entry Identification	Mounting: Existing Pole	Location: Exterior	Lighting: External



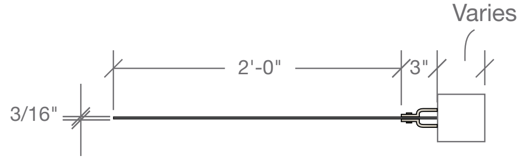


A Front Elevation
3/8"=1'–0"

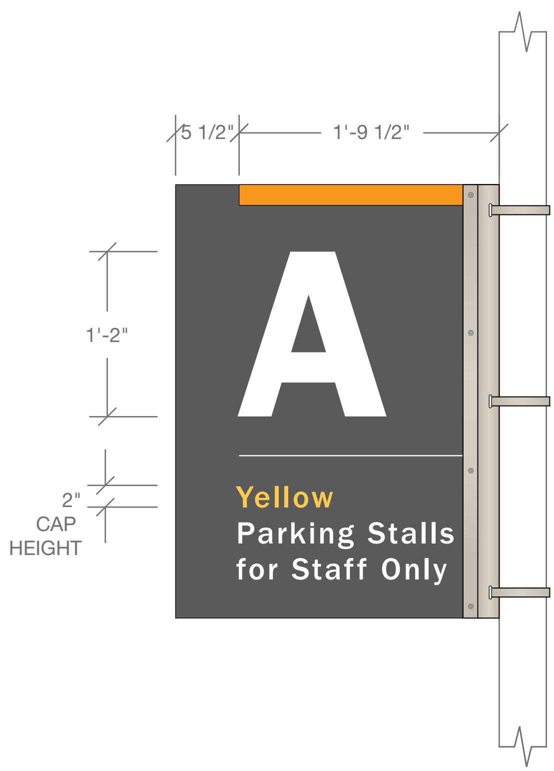
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

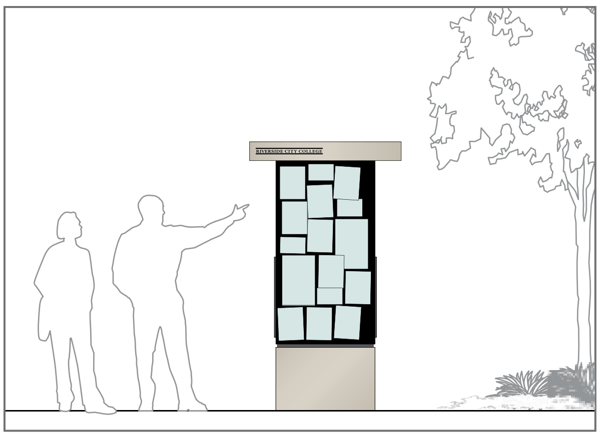


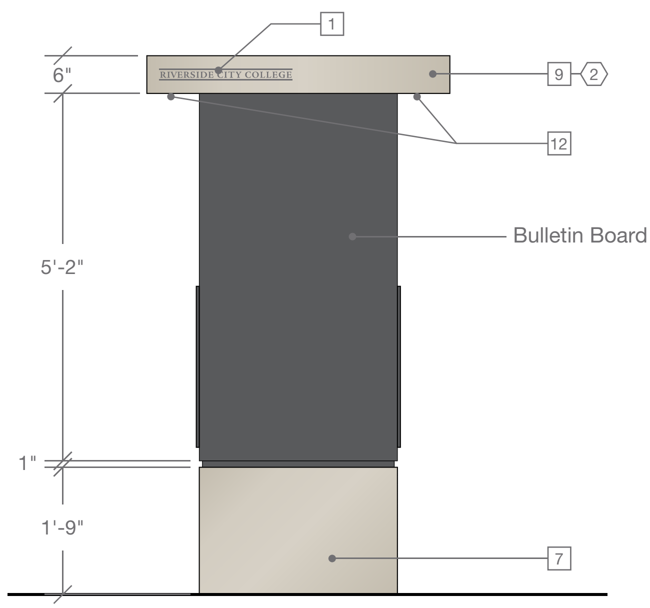
C Plan
3/4"=1'–0"



B Detail
3/4"=1'–0"

S7	Sign Type: Kiosk	Mounting: Freestanding	Location: Exterior	Lighting: Internal



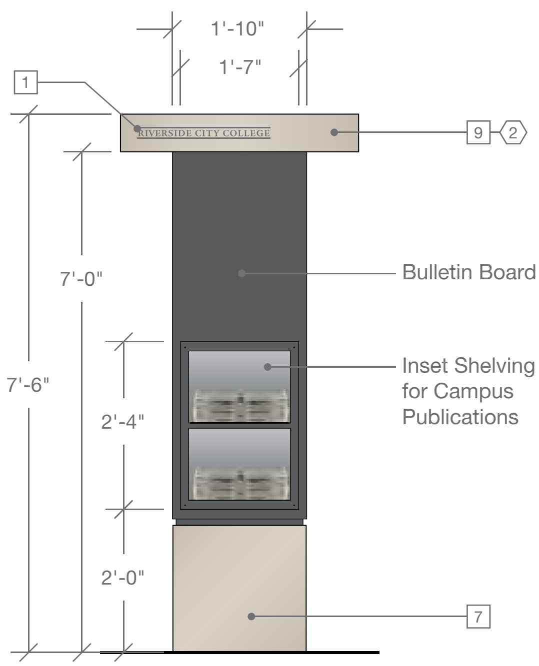


A Front Elevation
3/8"=1'–0"

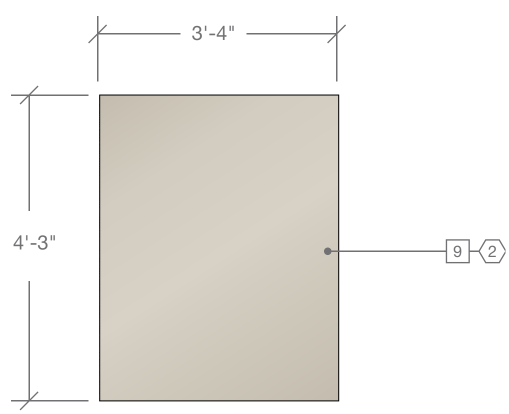
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

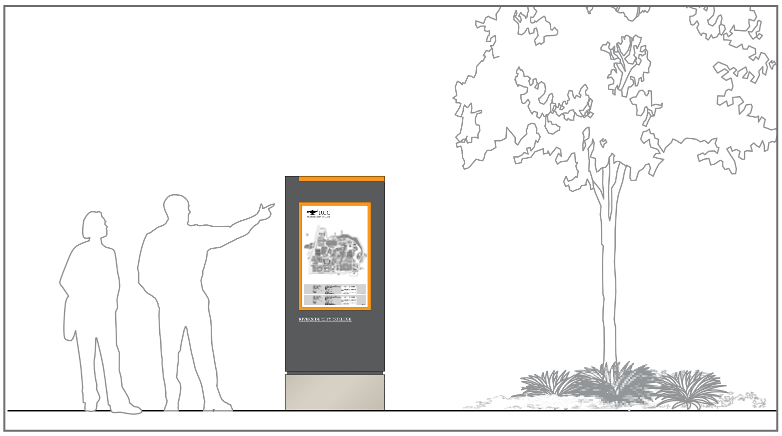


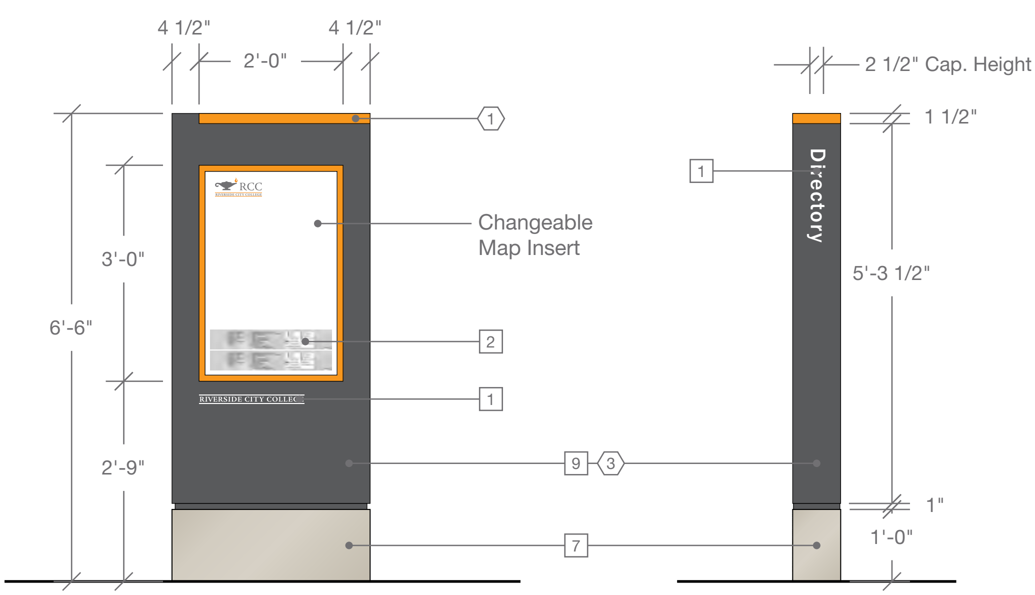
B Side Elevation
3/8"=1'–0"



C Roof Plan
3/8"=1'–0"

S8	Sign Type: Campus Directory	Mounting: Freestanding	Location: Exterior	Lighting: Internal





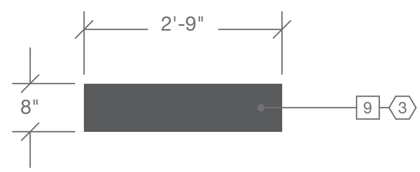
A Front Elevation 3/8"=1'–0"

B Side Elevation 3/8"=1'–0"

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

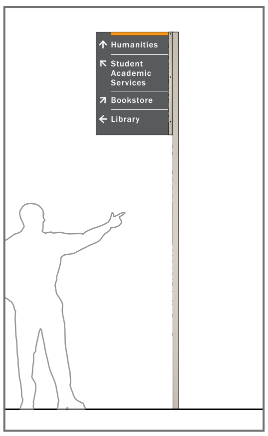


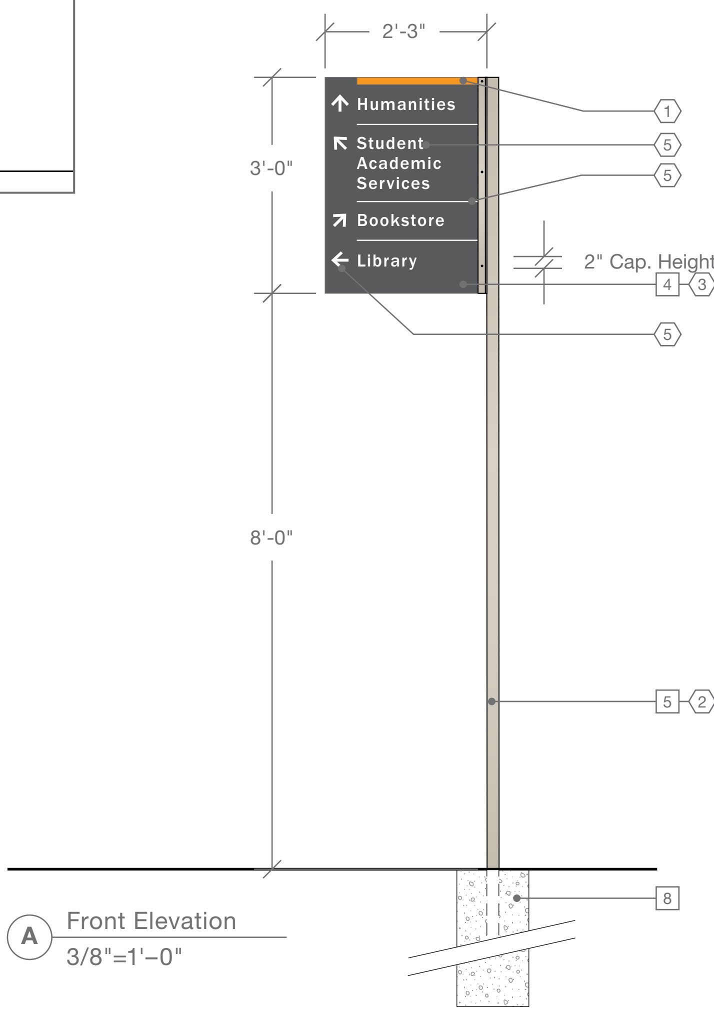
D Plan
3/8"=1'–0"

ight

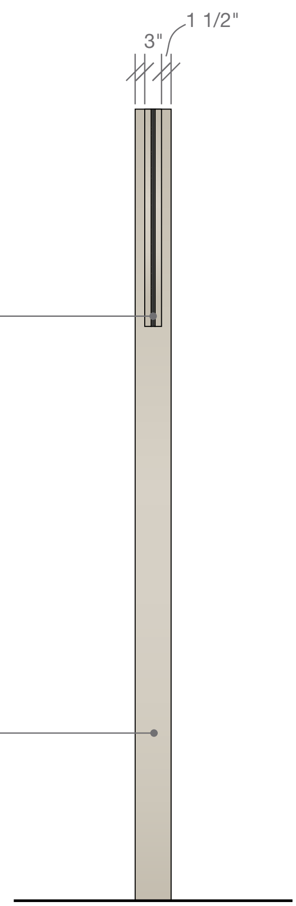
C Back Elevation
3/8"=1'–0"

S9	Sign Type: Pedestrian Direction	Mounting: Freestanding	Location: Exterior	Lighting: External





Front Elevation
3/8"=1'–0"

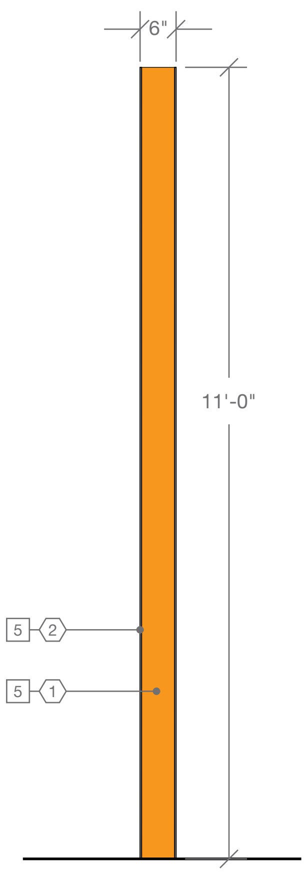


Side Elevation
3/8"=1'–0"

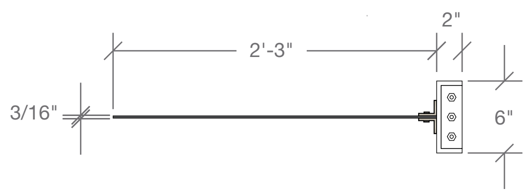
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

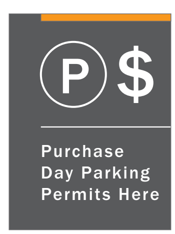
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



C Side Elevation
3/8"=1'–0"

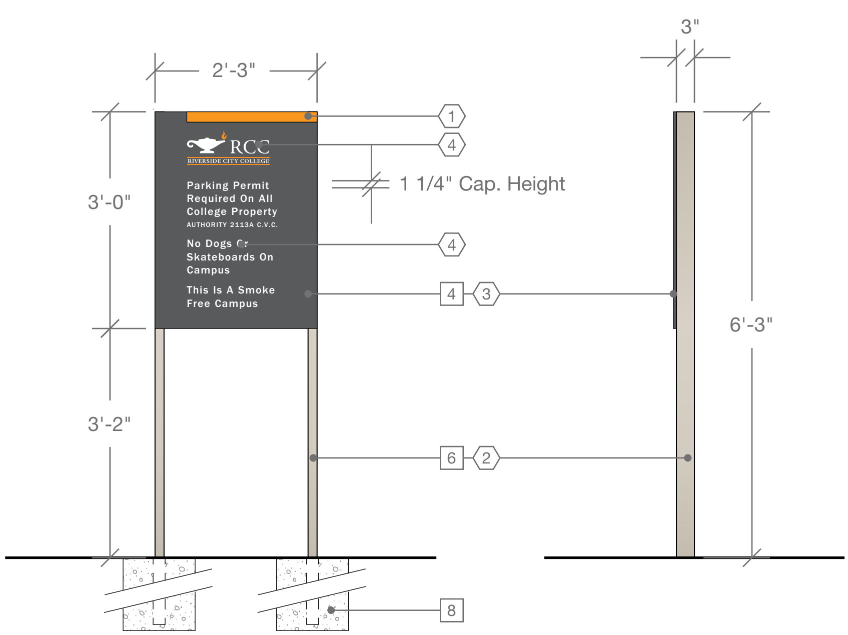


D Plan
3/4"=1'–0"



E Alternate Layout
3/8"=1'–0"

S10	Sign Type: General Information	Mounting: Freestanding	Location: Exterior	Lighting: External



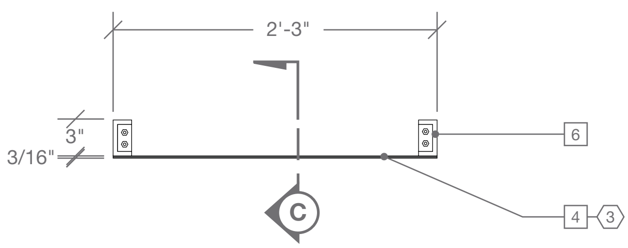
A Front Elevation
1/2"=1'–0"

B Side Elevation
1/2"=1'–0"

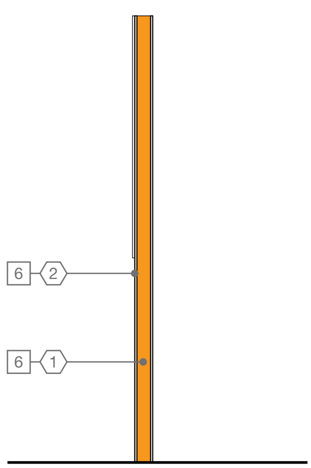
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

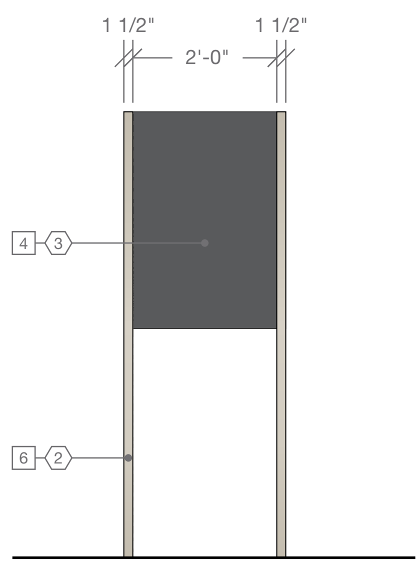
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



E Plan
3/4"=1'-0"



C Section
1/2"=1'-0"



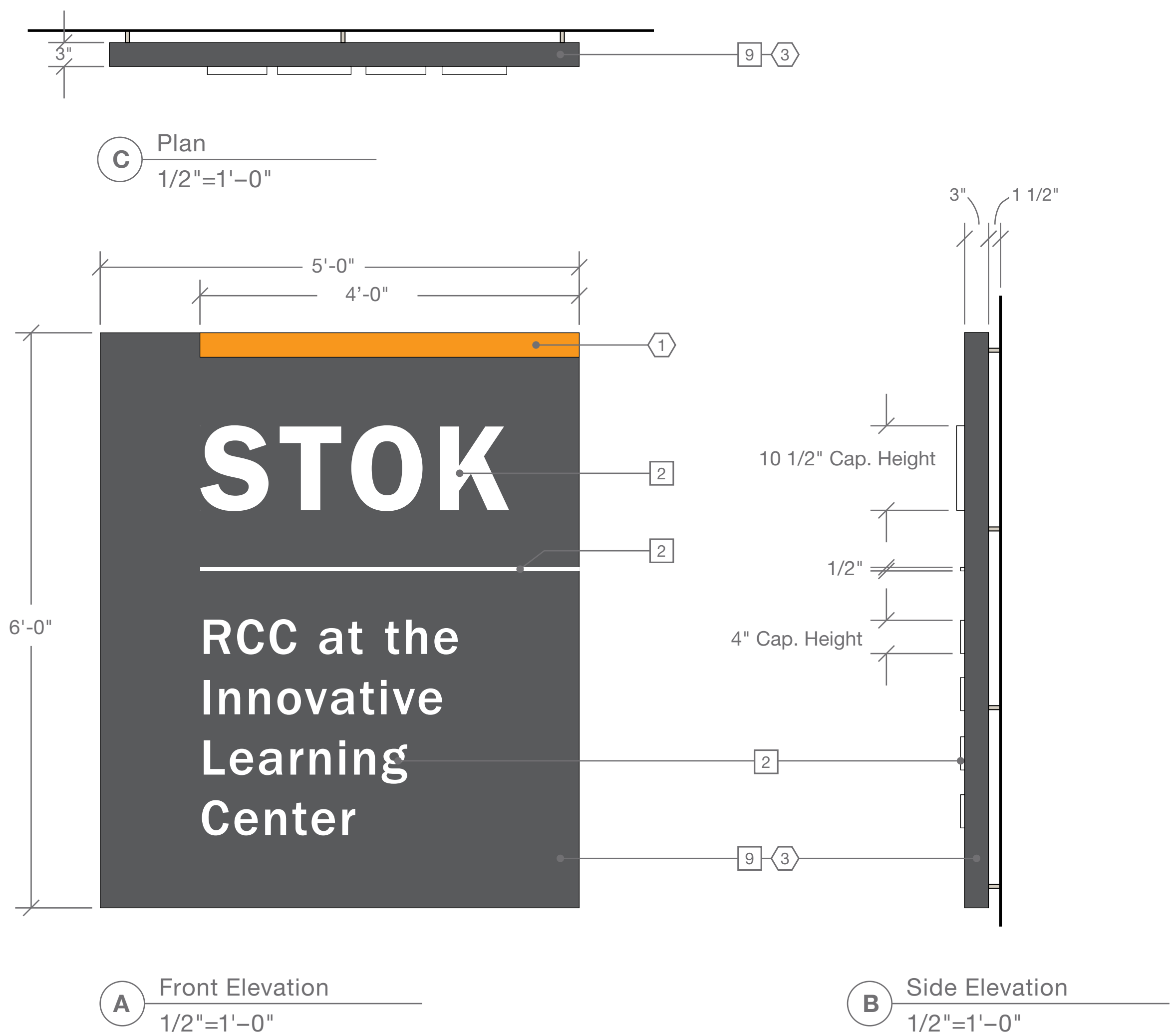
D Back Elevation
1/2"=1'-0"

S11	Sign Type: Building Identification	Mounting: Wall	Location: Exterior	Lighting: Internal

MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

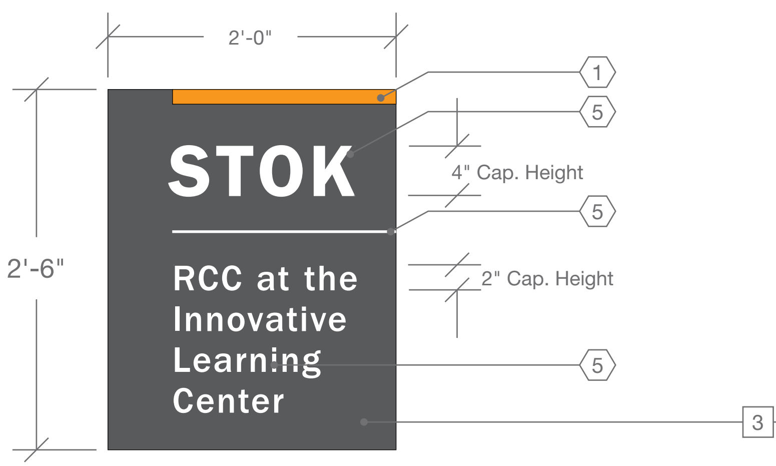
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl

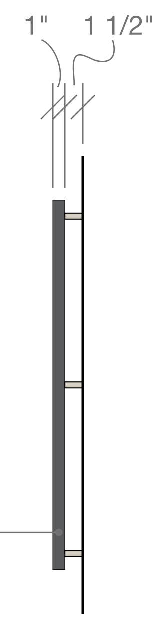


S12	Sign Type: Building Entry Identification	Mounting: Wall	Location: Exterior	Lighting: External

MATERIALS		MATERIALS		FINISHES	
1	Flush Push-Thru White Acrylic	7	Stone Veneer Clad Concrete Base	1	Orange Paint
2	White Acrylic	8	Direct Burial Post Foundation	2	Light Tan Paint
3	Aluminum Cabinet	9	Internally Lit Aluminum Cabinet	3	Charcoal Paint
4	3/16" Aluminum Panel	10	Halo Illuminated Channel Letters	4	3M White Reflective Vinyl
5	2" x 6" Aluminum Channel	11	Stone Veneer	5	3M White Vinyl
6	1 1/2" x 3" Aluminum Channel	12	Recessed Lighting	6	3M Yellow Reflective Vinyl

C Plan
3/4"=1'–0"

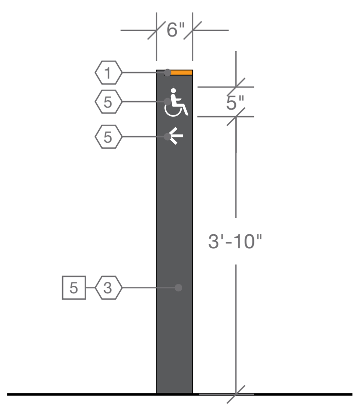




A Front Elevation
3/4"=1'–0"

B Side Elevation
3/4"=1'–0"

S13	Sign Type: Building Entry Identification	Mounting: Freestanding	Location: Exterior	Lighting: External

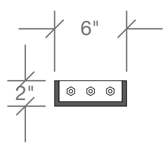


A Front Elevation
3/8"=1'–0"

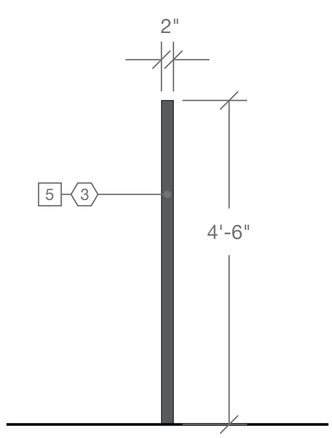
MATERIALS	
1	Flush Push-Thru White Acrylic
2	White Acrylic
3	Aluminum Cabinet
4	3/16" Aluminum Panel
5	2" x 6" Aluminum Channel
6	1 1/2" x 3" Aluminum Channel

MATERIALS	
7	Stone Veneer Clad Concrete Base
8	Direct Burial Post Foundation
9	Internally Lit Aluminum Cabinet
10	Halo Illuminated Channel Letters
11	Stone Veneer
12	Recessed Lighting

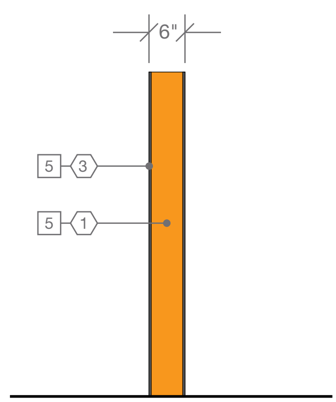
FINISHES	
1	Orange Paint
2	Light Tan Paint
3	Charcoal Paint
4	3M White Reflective Vinyl
5	3M White Vinyl
6	3M Yellow Reflective Vinyl



D Plan
3/4"=1'–0"



B Side Elevation
3/8"=1'–0"



C Back Elevation
3/8"=1'–0"

PART D
SIGN LOCATIONS

I. SIGN LOCATION PLANS

The sign location plans shown on the following pages represent the initial programming for the Riverside City College campus. In order to easily locate each sign the plans are divided into five categories: gateway signs, vehicular direction, parking signs, pedestrian wayfinding, and building and accessible route signs.

It is important to locate signs in areas that do not obstruct vehicular or pedestrian circulation and in areas least vulnerable to operational equipment and sprinklers. The sign locations are preliminary and subject to change based on existing and future conditions.

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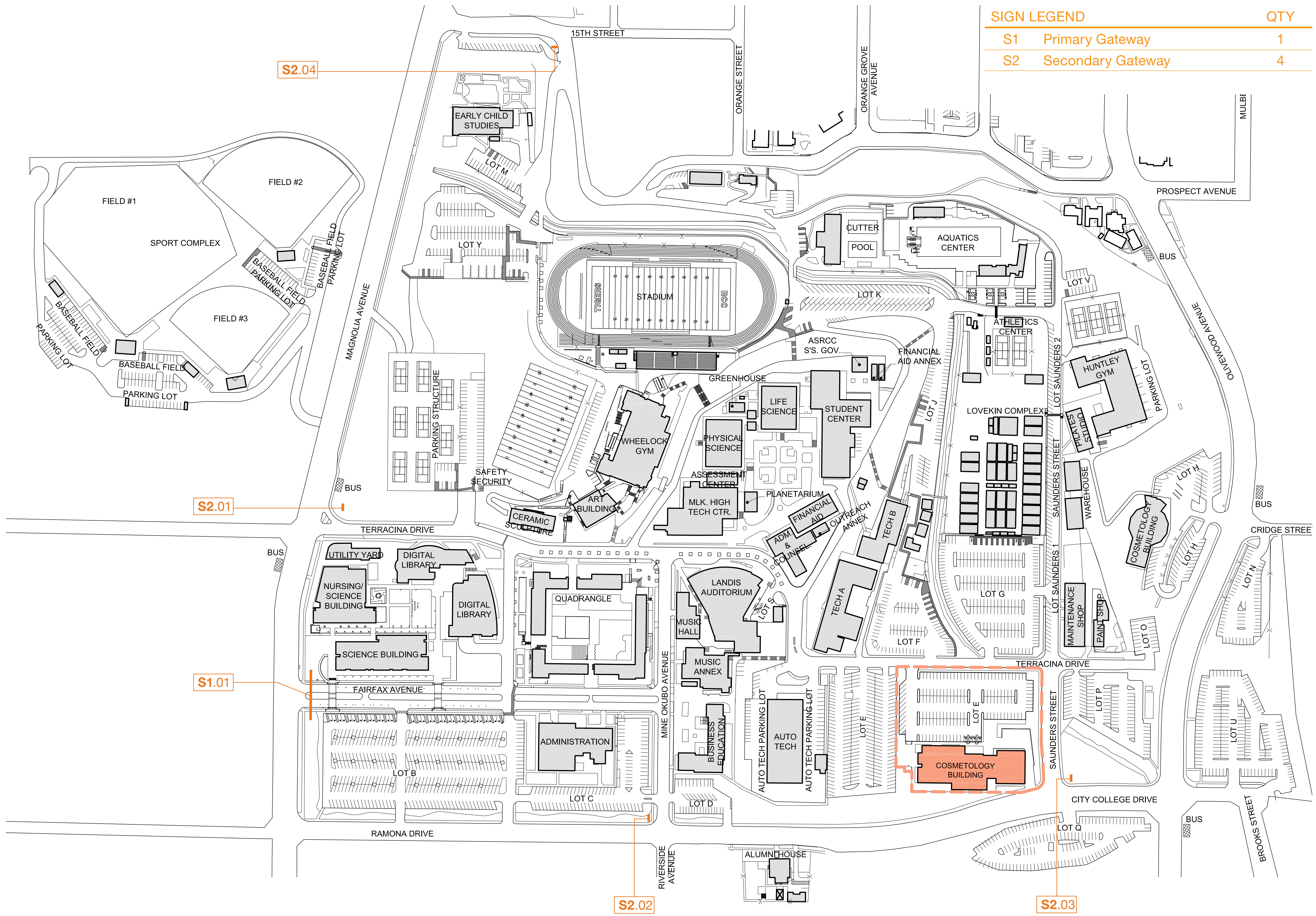

SIGN LEGEND		QTY
S1	Primary Gateway	1
S2	Secondary Gateway	4

SIGN LOCATION PLAN

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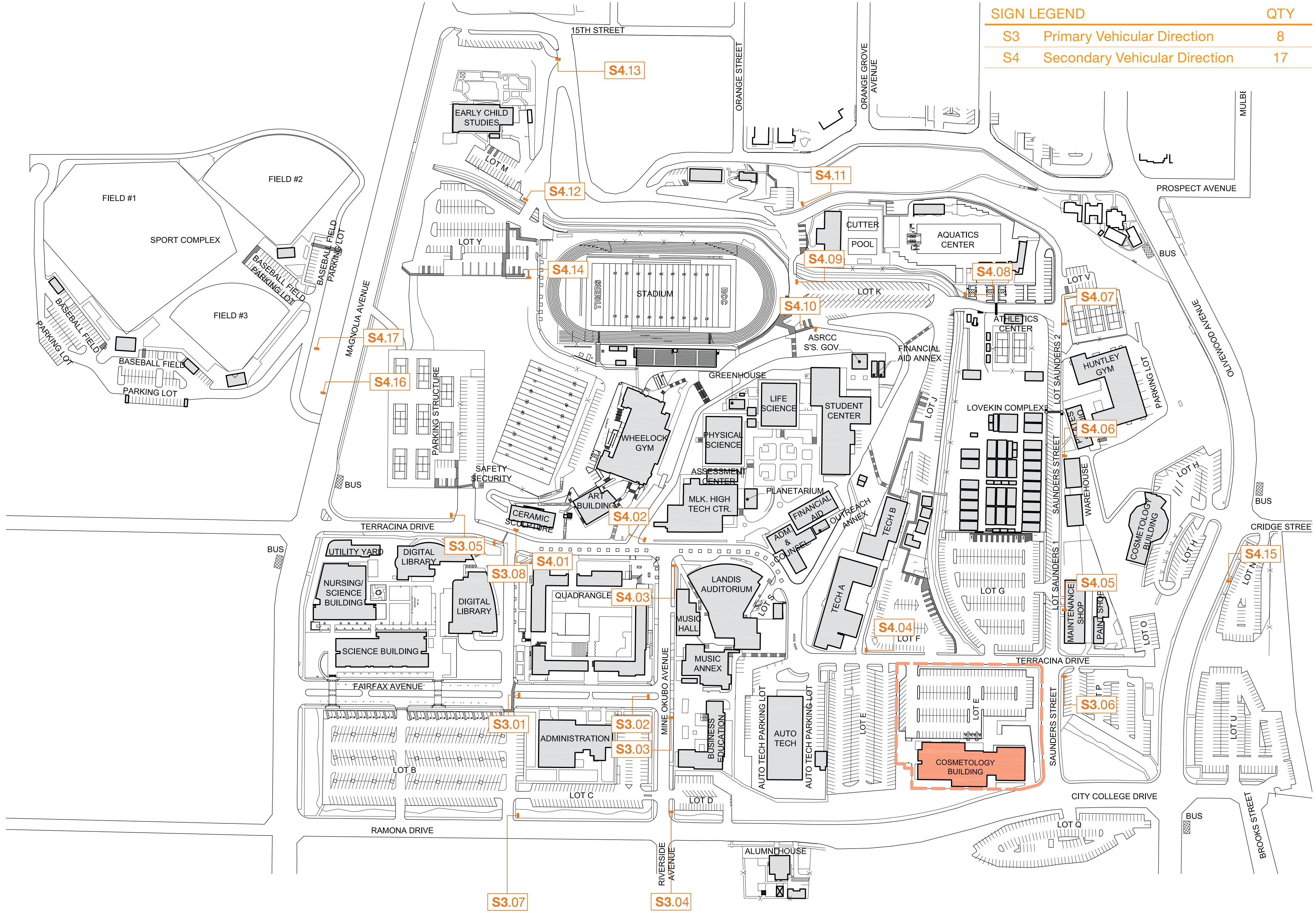
SIGN LEGEND		QTY
S3	Primary Vehicular Direction	8
S4	Secondary Vehicular Direction	17



SIGN LOCATION PLAN

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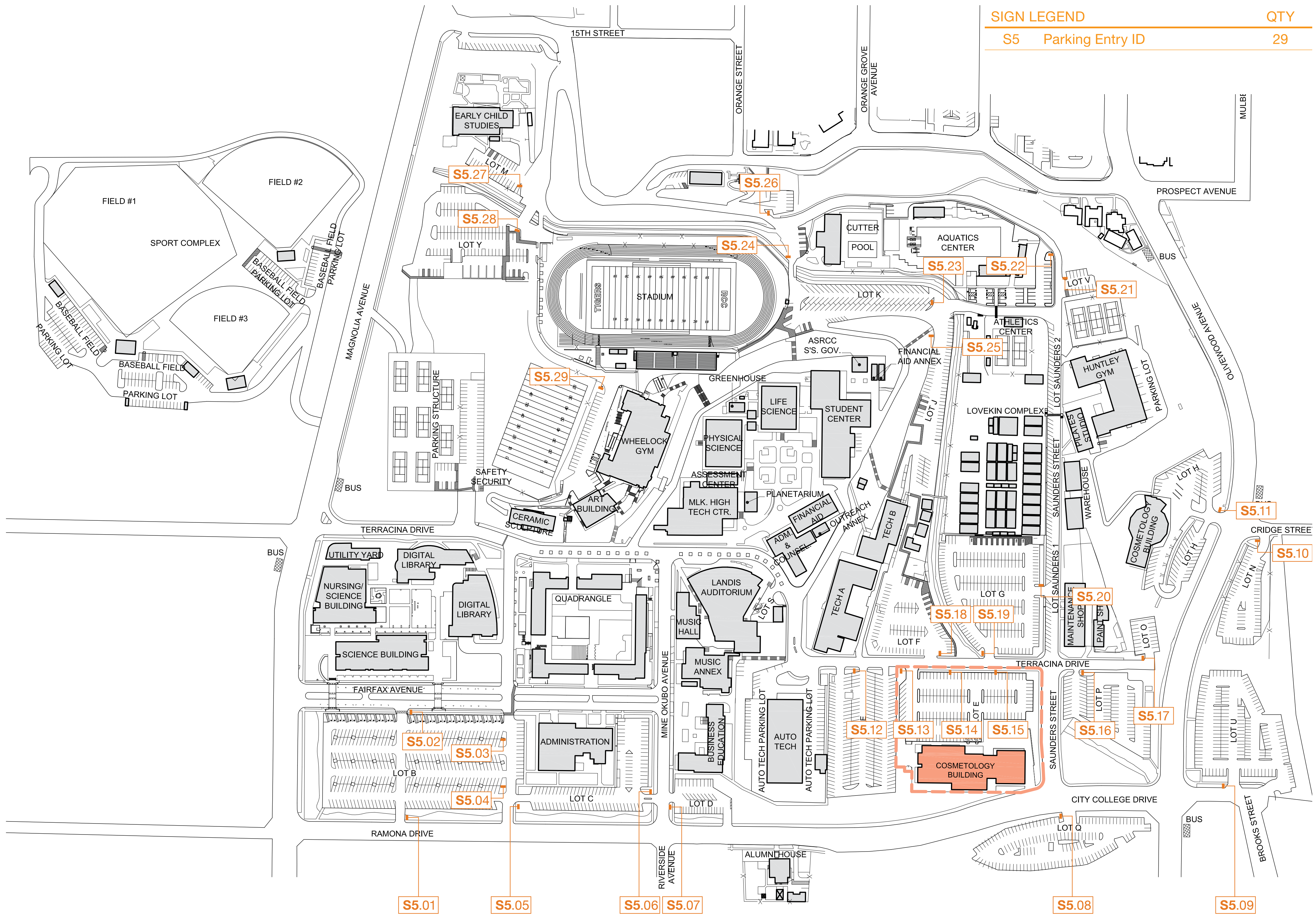
SIGN LEGEND		QTY
S5	Parking Entry ID	29



SIGN LOCATION PLAN

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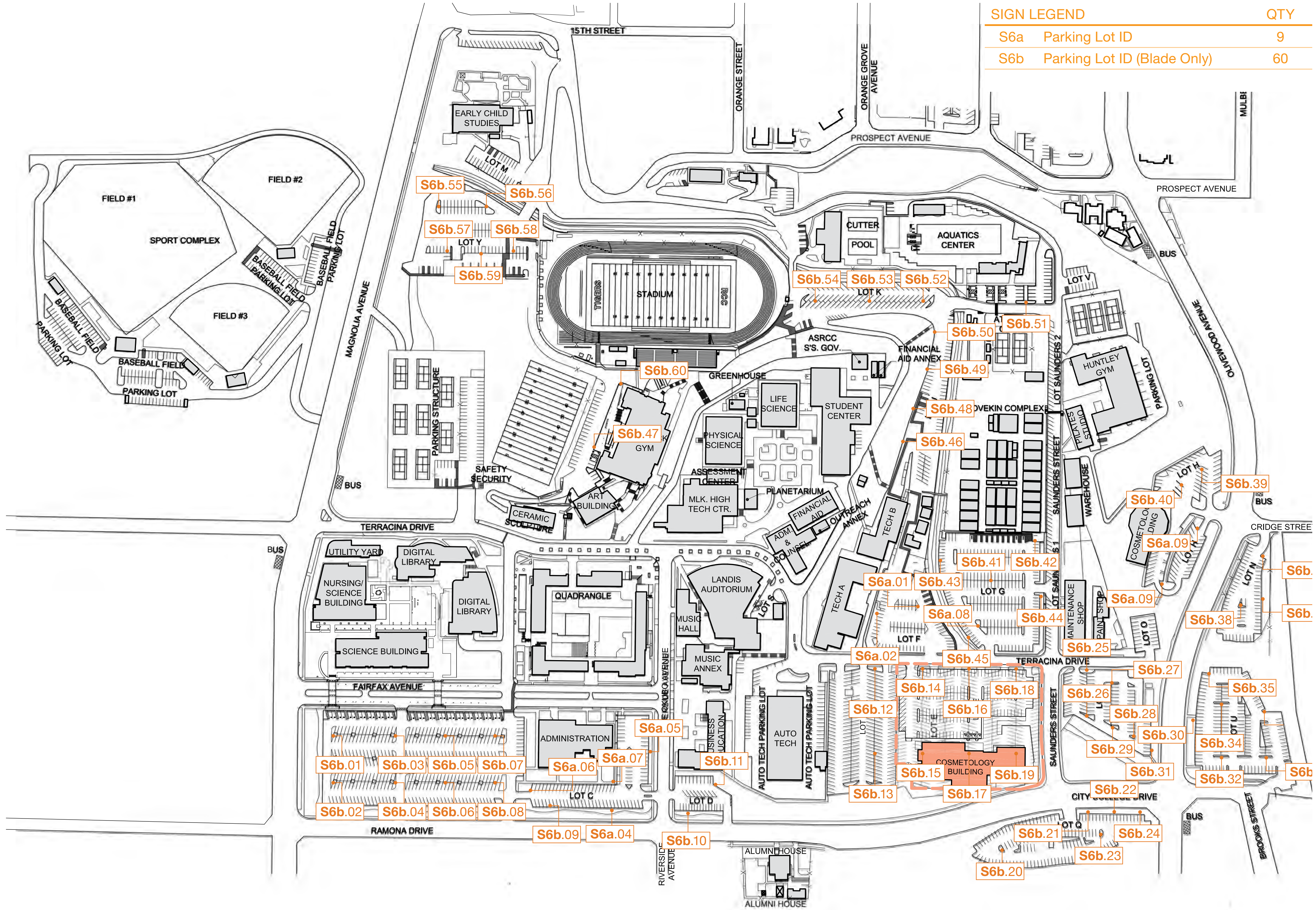
SIGN LEGEND		QTY
S6a	Parking Lot ID	9
S6b	Parking Lot ID (Blade Only)	60



SIGN LOCATION PLAN

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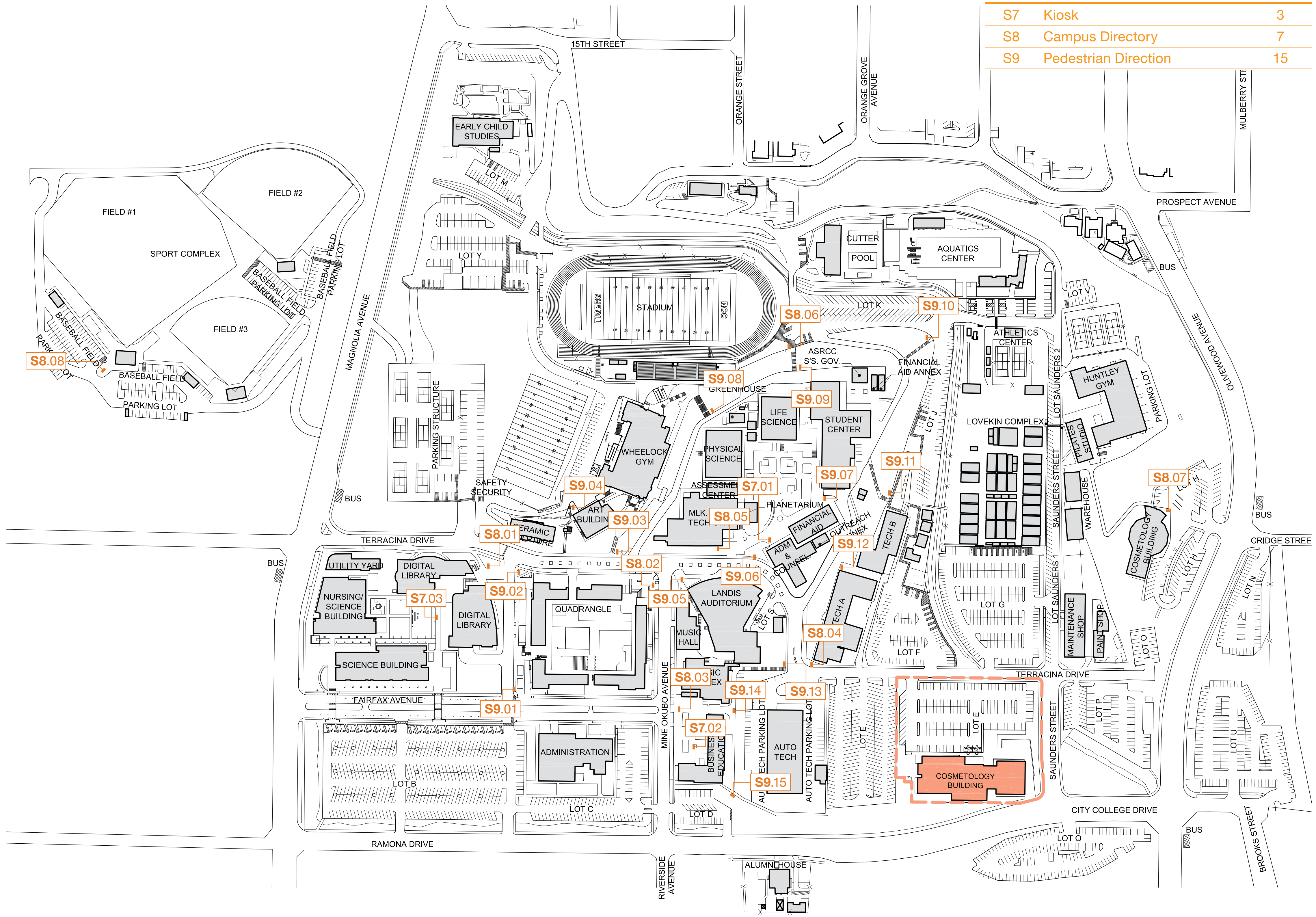
SIGN LEGEND		QTY
S7	Kiosk	3
S8	Campus Directory	7
S9	Pedestrian Direction	15



SIGN LOCATION PLAN

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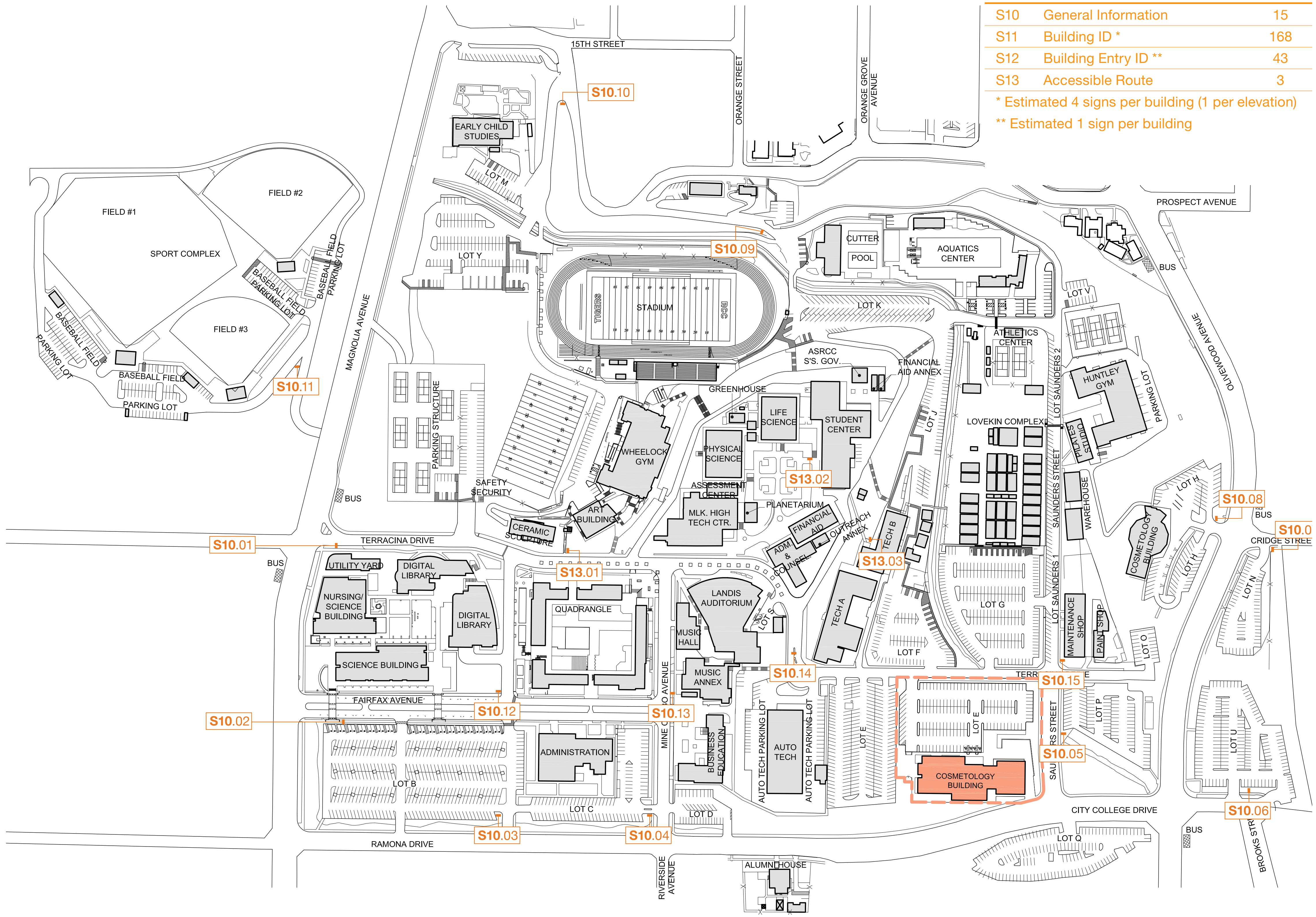
SIGN LEGEND		QTY
S10	General Information	15
S11	Building ID *	168
S12	Building Entry ID **	43
S13	Accessible Route	3

* Estimated 4 signs per building (1 per elevation)

** Estimated 1 sign per building



SIGN LOCATION PLAN

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