SANTA ANA COLLEGE

AUGUST 2011

2011 FACILITIES MASTER PLAN

SANTA ANA COLLEGE • RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

HMC Architects

SANTA ANA COLLEGE
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MISSION AND GOALS

Mission Statement

The mission of Santa Ana College is to be a leader and partner in meeting the intellectual, cultural, technological, workforce and economic development needs of our diverse community. Santa Ana College prepares students for transfer, employment, careers and lifelong intellectual pursuit in a dynamic learning environment.

Goals

- Increase student academic literacy and learning across disciplines.
- Eliminate economic barriers to student achievement
- Increase transfer, progress/course completion, and employment rates for all students.
- Promote and sustain excellence in teaching and learning.
- Enhance cooperative efforts between credit and non-credit to encourage success in workforce preparation, transfer and basic skills.
- Santa Ana College students will graduate with highly competitive technology skills that will serve them in their continuing education and professional life.
- Santa Ana College will provide a technology rich environment that will promote efficiency and productivity for faculty, staff and students.
- Santa Ana College will provide innovative instructional technologies that will enable faculty to enhance and facilitate student learning.
- Increase development of innovative teaching techniques.

- Help students embrace scholarship, inquiry and a love of learning.
- Enhance opportunities for student access to non-traditional delivery modes.
- Promote an "achievement attitude" among our prospective student population and supporting networks.
- Extend awareness of the College as part of the community.
- Increase interest in lifelong learning across the college and community.
- Increase awareness and practice of healthful living across the College and community.
- Expand and identify partners and collaborate with industry and communities to identify workforce needs.
- Integrate basic skills and workplace competencies to address workforce education needs.
- Support regional economic development by becoming the primary local source of skilled employees for high demand occupations.
- Increase awareness and foster proactive civic responsibility.
- Increase Green efforts.
- Educate the faculty, staff, students and community regarding the New American Culture, the cultural polyglot that has transformed us and our community, promoting greater awareness and global enrichment.
- Create an environment among faculty, staff and students that encourages cross disciplinary collaboration, activities and dialogues.

LETTER FROM THE PRESIDENT

In 1915 Santa Ana Junior College opened its doors to 25 students as a department of Santa Ana High School. Since that time, the college has moved three times finally settling at its current location on the corner of 17th Street and Bristol Avenue in 1947. In 2002, voters approved Measure E, a $337 million local bond, that has allowed the college to implement a number of facilities projects including renovations, new buildings and campus improvements.

As the college approaches its 100th anniversary, the new Master Plan provides the critical guidance and necessary vision to lead us into the next century.

The new Master Plan is based on the college's Educational Plan and addresses its current and projected needs. Santa Ana College is known for its academic programs, as well as top-ranked student services serving over 27,000 students each semester. Students can enroll for full semester, mini-semester, weekend and online classes. A wide variety of courses are available in business, math and sciences, arts and humanities, and career and vocational education. The college offers over 300 vocational certificate and associate degree programs.

The planning process for the new Master Plan began with a dedicated group of faculty, staff and administrators who love the college. They shared insights and, first and foremost, wanted the plan to serve current and future students. With guidance from the architects and consultants from HMC Architects, the committee considered current offerings, potential future programs, current facility challenges, future instructional needs, and the state of infrastructure systems, while striving to incorporate sustainability.

The plan has been reviewed by shared governance groups and reflects a shared consensus for the direction of Santa Ana College. I cannot thank Deborah Shepley and Sheryl Sterry of HMC and committee members enough for the hours spent on this plan.

As this is a "living document," it will undoubtedly change. The plan includes Master Plan recommendations for new construction, as well as renovation projects. In addition, the document offers four phasing plans for consideration. An important feature also includes the documentation of eight infrastructure systems. This is a very important feature given the aging facilities at the college.

The 2011 Facilities Master Plan for Santa Ana College provides a thoughtful guide for the future. It respects and appreciates the history of the college. It also shines a light towards the future as Santa Ana College enters a new century serving our diverse community.

As ever,

Erlinda J. Martinez, Ed.D.
President
Santa Ana College
April 2011

Introduction

INTRODUCTION

Purpose

The 2011 Santa Ana College Facilities Master Plan has been created to serve as a guide for future campus development. It provides a graphic and narrative description of the College's strategy to support the initiatives of the 2007 Educational Master Plan, address the growth in enrollment that is anticipated for the next decade, and position the college to maximize funding opportunities.

The Master Plan includes recommendations for future development, including site improvements, renovations and replacements of facilities. Site utility master planning and a Central Plant Study are included in the master plan. The Central Plant Study was developed to investigate the potential to improve the energy efficiency of heating and cooling the campus facilities.

Master Planning Process

The HMC Planning Team worked in close collaboration with the College Master Plan Committee, comprised of key faculty, administrators and student representatives. The planning process included a series of meetings with the Master Plan Committee, as well as additional presentations and discussions with a wider audience to broaden the planning perspective and enhance acceptance by the College community.

At the start of the planning process, a set of goals was developed to guide the planning process and to measure its success. During the planning process, the committee reviewed an analysis of the existing conditions, evaluated a series of development options, and made the decisions that led to the development of the facilities master plan recommendations.

Document Organization

The 2011 Facilities Master Plan describes a plan for site and facilities improvements that will support current and future needs at Santa Ana College. The document is organized into the following sections:

i. Recommendations

ii. Analysis of Existing Conditions

iii. Appendix

Recommendations

Recommendations

Santa Ana College is looking toward its centennial celebration in 2015. The College is currently undergoing the final phase of work on the Measure E Bond Program projects, and is focused on the challenge of serving our students and community in the future. Through the 2011 Facilities Master Plan, the College has expressed its desire to define and create a unique physical character founded on its history and identity.

The 2011 Facilities Master Plan includes the projects that are under construction, as well as those in the planning pipeline. The campus, with its existing facilities and planned facilities, served as the starting point for the planning of future development.

The Facilities Master Plan drawings presented in this section describe an overall picture of the future, developed campus, and include recommendations and descriptions of the following.

- New Construction
- Renovations
- Site Improvements
- Phasing Plans

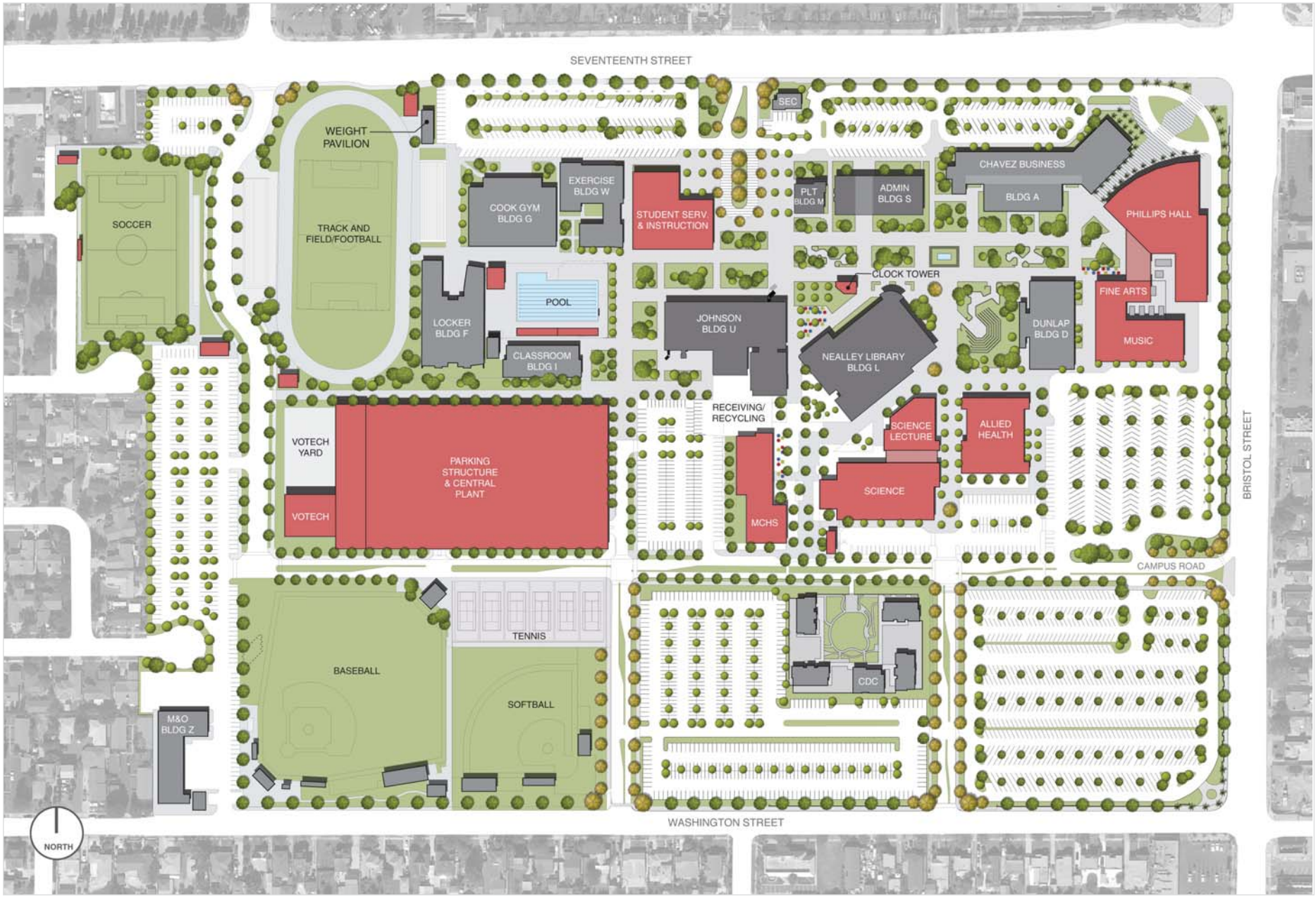
Master Plan Project Goals

- Create a plan with order and flexibility
- Develop a complete plan with long-term solutions
- Develop a plan that is based on college-wide priorities
- Develop the image of the campus to the surrounding community
- Focus on students
- Consolidate related programs
- Encourage collaboration and connections
- Right-size functions and spaces to align with state standards
- Identify facilities to be replaced versus renovated
- Develop total project scopes and budgets
- Incorporate universal access design principles
- Incorporate sustainable design principles

Master Plan Recommendations

The 2011 Facilities Master Plan for Santa Ana College presents a guide for future development that is based on the College's 2007 Educational Master Plan, and addresses current and projected needs through the year 2020. The Facilities Master Plan Recommendations are intended to address a projected on-campus enrollment of 25,000 students.

It is important to understand that, for planning purposes, the exact year in which projected "build-out" is achieved is not critical. What is critical is that the trend in student enrollment will be recognized; and instructional programs, support services, facilities, and staffing are master planned to be responsive when that level of enrollment is ultimately achieved. Although the drawings in the Master Plan appear specific, the design is intended to be a conceptual guide, conveying the location and purpose of improvements. The detailed programming and design of site and building projects will take place as they are funded. A series of facilities planning priorities were established to serve as a foundation of good planning practices and a guide to the development of the recommendations. The following is a summary of the priorities.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WASHINGTON STREET
NORTH

Facilities Planning Priorities

Maximize functional space

- Renovate facilities
- Address program needs

Eliminate non-functional space

- Remove temporary buildings
- Replace aging facilities

Improve efficiency/utilization of facilities

- Consolidate related programs
- Create flexible, interdisciplinary spaces

Right-size the campus to address program needs

- Align the projected space inventory with state guidelines
- Position the College to maximize funding (federal, state and local)

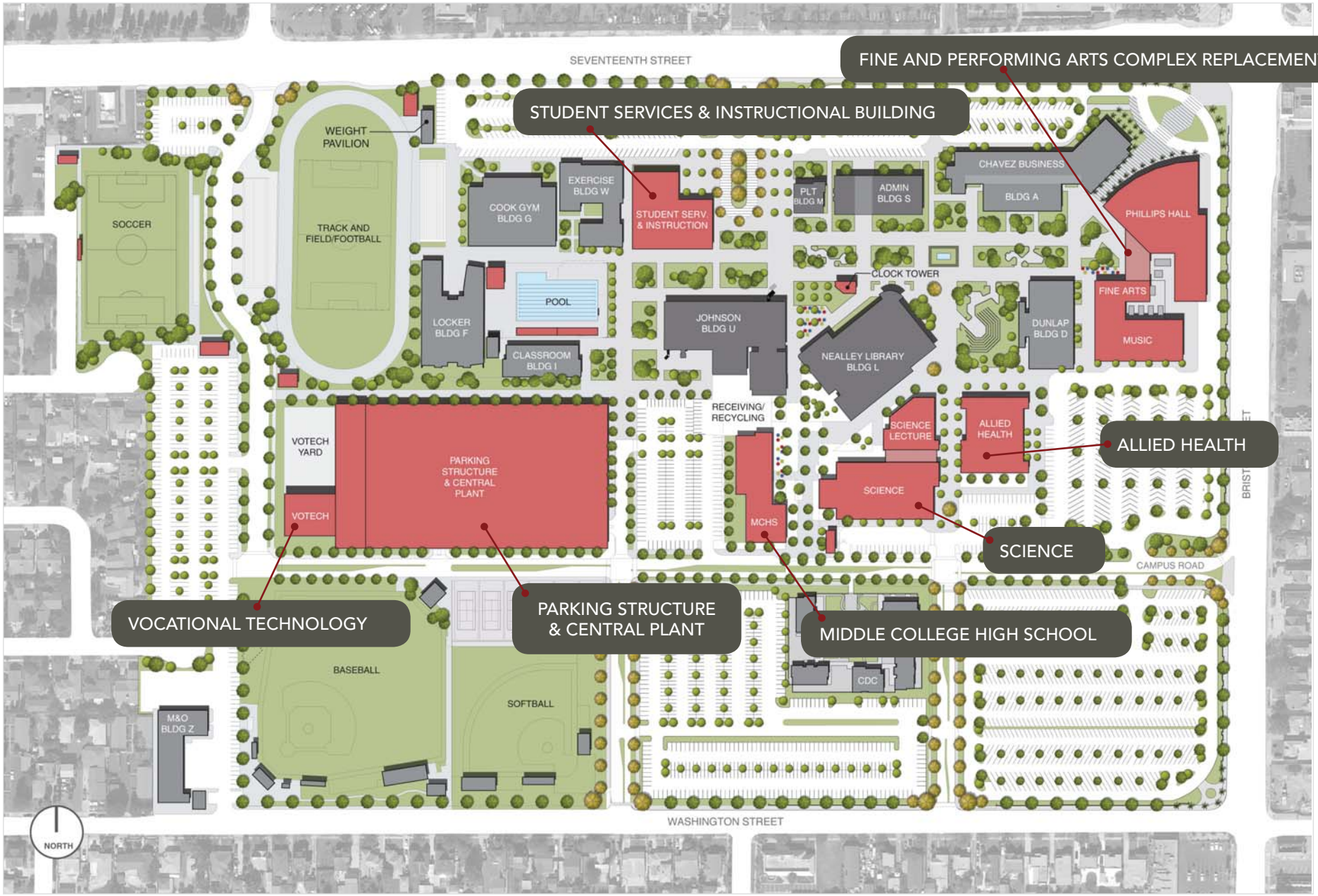
Develop the campus environment

- Define clear, inviting campus entry points
- Develop clear pedestrian connections
- Create gathering spaces to support collaboration

NEW CONSTRUCTION PROJECTS

The recommendations for new construction projects are included on the following pages. These new facilities will be welcoming, family friendly, safe, and accessible to all. They will be environmentally responsible, healthy, and durable. Designers will work in accordance with established standards to reinforce the unique identity of Santa Ana College. An emphasis will be placed on creating places for students to study, gather, and collaborate.

- Fine and Performing Arts Complex Replacement
- Science
- Allied Health
- Middle College High School
- Student Services and Instructional Building
- Vocational Technology
- Parking Structure and Central Plant


FINE AND PERFORMING ARTS COMPLEX REPLACEMENT
STUDENT SERVICES & INSTRUCTIONAL BUILDING
ALLIED HEALTH
SCIENCE
PARKING STRUCTURE & CENTRAL PLANT
VOCATIONAL TECHNOLOGY
MIDDLE COLLEGE HIGH SCHOOL
SEVENTEENTH STREET
WASHINGTON STREET
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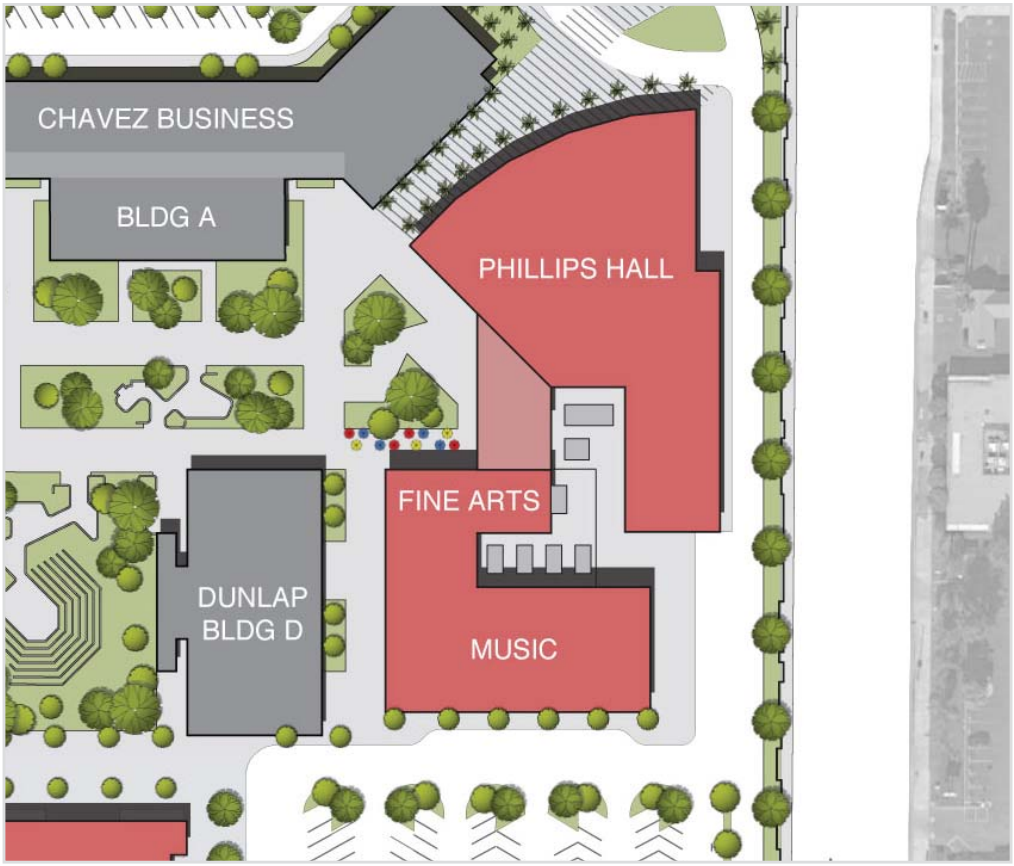
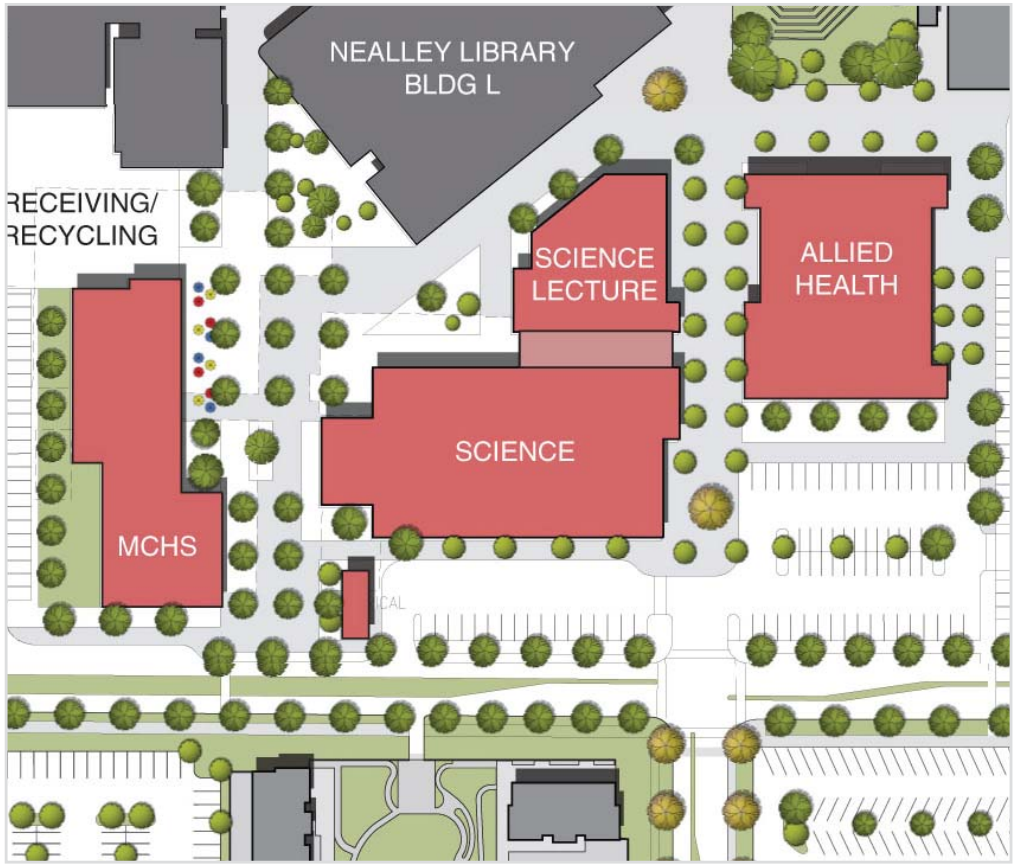
Fine and Performing Arts Building

The Fine and Performing Arts Complex replaces Phillips Hall, the Music Building and the Art Building—facilities that have aged beyond their useful lives—with state of the art performance, exhibition and specialized instructional space. This facility will accommodate art instruction in one location and in spaces designed and equipped for their use. This new complex will anchor the east end of the Campus Mall, energizing it with activity from spaces such as art exhibition space and a satellite food service facility. This signature building will be a highly visible landmark for the College and community at the well-traveled intersection of Seventeenth and Bristol Streets. Along with the Chavez Business Building, the fenestrated curved northern façade of Phillips Hall will create an inviting passageway into the Campus Mall. The adjacency to a primary vehicular route will facilitate passenger loading and service vehicle access. Direct access to exterior courtyards within the complex will enhance options for collaboration, outdoor art instruction and display.





Science Building

The Science Building provides space to consolidate and expand the Biological Sciences, Chemistry and the Physical Sciences, currently housed in aged and inadequate space in Russell Hall. This building will provide modern and functional facilities that are supported by efficient infrastructure and technology. The northern wing provides fully accessible tiered lecture halls. This project removes the Publication and Maintenance Facility, and begins the transformation of the central campus.

Allied Health Building

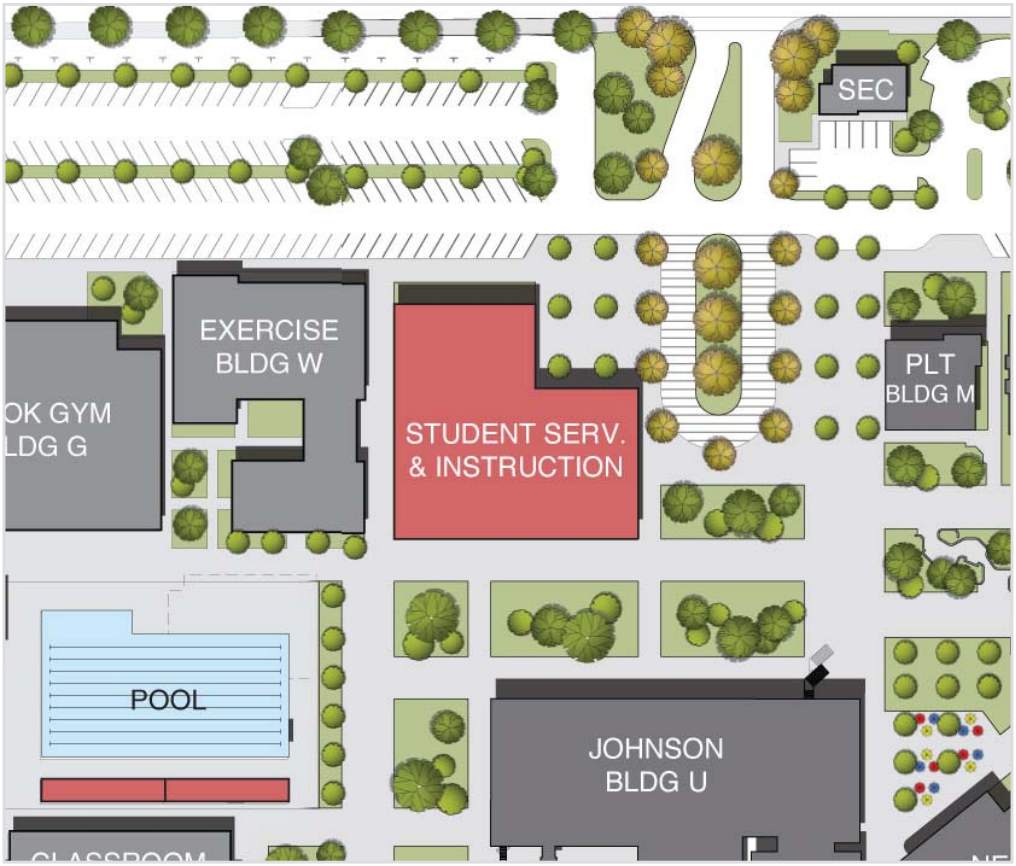
The Allied Health Building replaces Russell Hall, which has aged beyond its useful life. It will provide modern, functional facilities and consolidate the Allied Health programs in one location. Allied Health will benefit from the adjacency to the Science Building, and will replace a portion of Parking Lot 6.

Middle College High School

The Middle College High School (MCHS) Building replaces several modular buildings with one well-built permanent facility. This project removes Buildings B, J and K. MCHS will define the west side of a new campus mall that will provide outdoor learning and gathering spaces for students.

Student Services and Instructional Building

The Student Services and Instructional Building will consolidate all student services in one location, where it will welcome students at the main campus entry point. It will flank the west side of the Entry Plaza, and along with Johnson Center, and Nealley Library, will create a hub for student life. The new building will provide space that is well supported by technology, provides privacy and security, and allows for the flexibility to adjust quickly and economically to evolving needs. The building will provide interdisciplinary instructional space and faculty offices needed to accommodate future growth in enrollment, including the Math Division offices. This project will remove the Technology Education Building and Hammond Hall.



Vocational Technology

The Vocational Technology Building will replace the aged facilities in Buildings J and K with up-to-date facilities, supported by the equipment, technology and infrastructure necessary to prepare students for the modern workplace. This Building will house Manufacturing, Automotive Technology, Diesel and Refrigeration, and Welding in flexible space that can be economically adjusted to keep pace with the needs of the business community for skilled workers. The VoTech Building will be integrated with the Parking Structure, and located at the intersection of Campus Road and College Avenue with good vehicular access and convenient parking. This location separates industrial activities from other campus spaces and the adjacent residential neighborhoods.

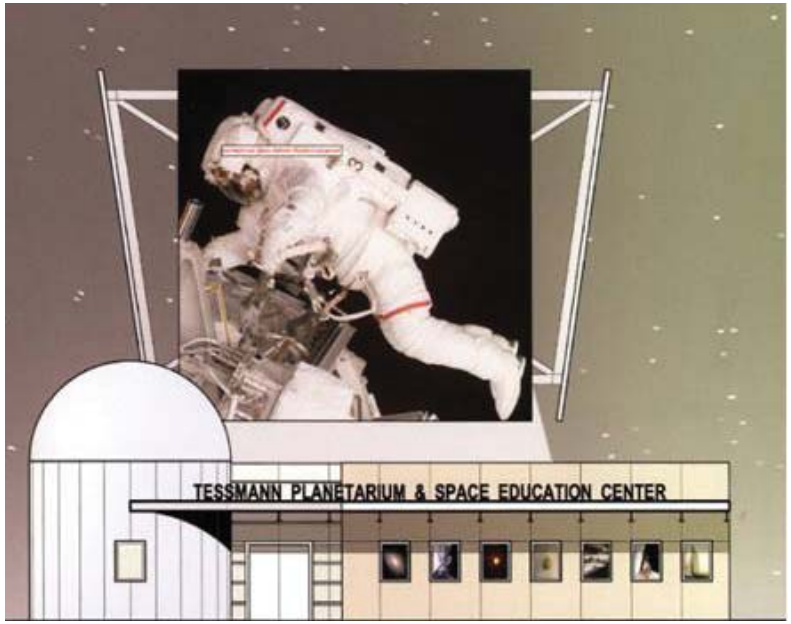
Parking Structure and Central Plant

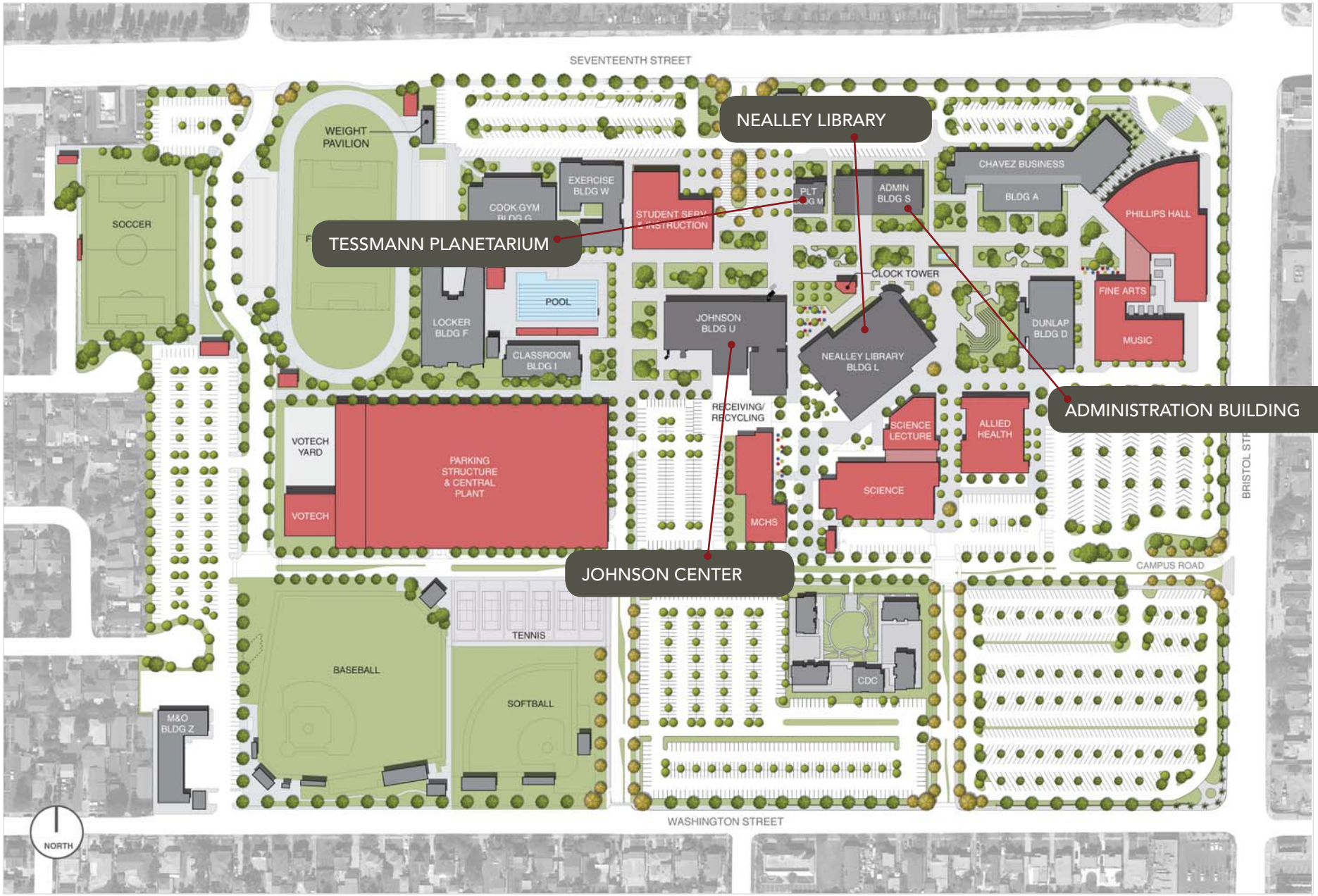
The Parking Structure will provide safe and convenient parking to support the projected growth in enrollment on a campus with limited land area. It will replace Parking Lot 11. As necessitated by its location at the center of campus, the Parking Structure will be designed to present a pleasing appearance when viewed from the adjacent spaces and the neighborhood. Parking stalls will be provided on a minimum of three levels—a ground level plus two raised deck levels. The parking structure will utilize the roof space over the Vocational Technology Building. The structure is also a potential location for a central cooling plant, which could be integrated into the design (see page 112, Central Plant Study). The parking structure also provides an opportunity for integrating a large scale photovoltaic electrical power facility into the campus. The College wishes to consider the feasibility of a rainwater harvesting system, which would use the upper deck as a collection area.

RENOVATION PROJECTS

Santa Ana College has existed in its current location for more than 60 years. The land area of the campus has grown steadily through its history. Many of its buildings have a long history of service, and there is a need to address aging infrastructure, as well as advances in energy efficiency and educational technology. Renovation projects offer the opportunity to consolidate related programs, to create flexible state-of-the-art facilities, and to provide universal accessibility. These projects must also address logistical planning for temporary facilities, construction access and the protection of students, faculty and staff during the building process.

- Johnson Center Renovation
- Nealley Library Renovation
- Administration Building Renovation
- Tessman Planetarium Renovation
- On-going Scheduled Maintenance and Efficiency Improvements
- On-going Campus-wide Accessibility Improvements

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Johnson Center Renovation

The renovation of Johnson Center will transform it into a facility dedicated to student activities and faculty support space. With the Student Services and Instructional Building and Nealley Library, it will support a central hub for campus life. Student services and tutorial functions will be relocated to other buildings. Johnson Center will be rezoned to provide each program with appropriately sized space, placed in a location that supports its function. Consideration will be given to placing the food service facility on the ground floor. The bookstore will be expanded and relocated to have a prominent presence on the Central Mall. An Internet café will be included.

Better use will be made of the covered patio areas and the courtyard between Johnson Center and Nealley Library, which will be repurposed and enhanced for outdoor dining. On the second floor, the Student Activities lounge and recreation space will overlook and be seen from the Central Mall. Faculty and staff support, meeting and seminar spaces will also be housed on the second floor. The renovation will provide modern and efficient infrastructure and technology to support the building use and fulfill the College's objective for sustainable and environmentally responsible operations. Service and receiving facilities will be developed to accommodate recycling, and to separate delivery vehicles from pedestrian circulation.

Tessman Planetarium Renovation

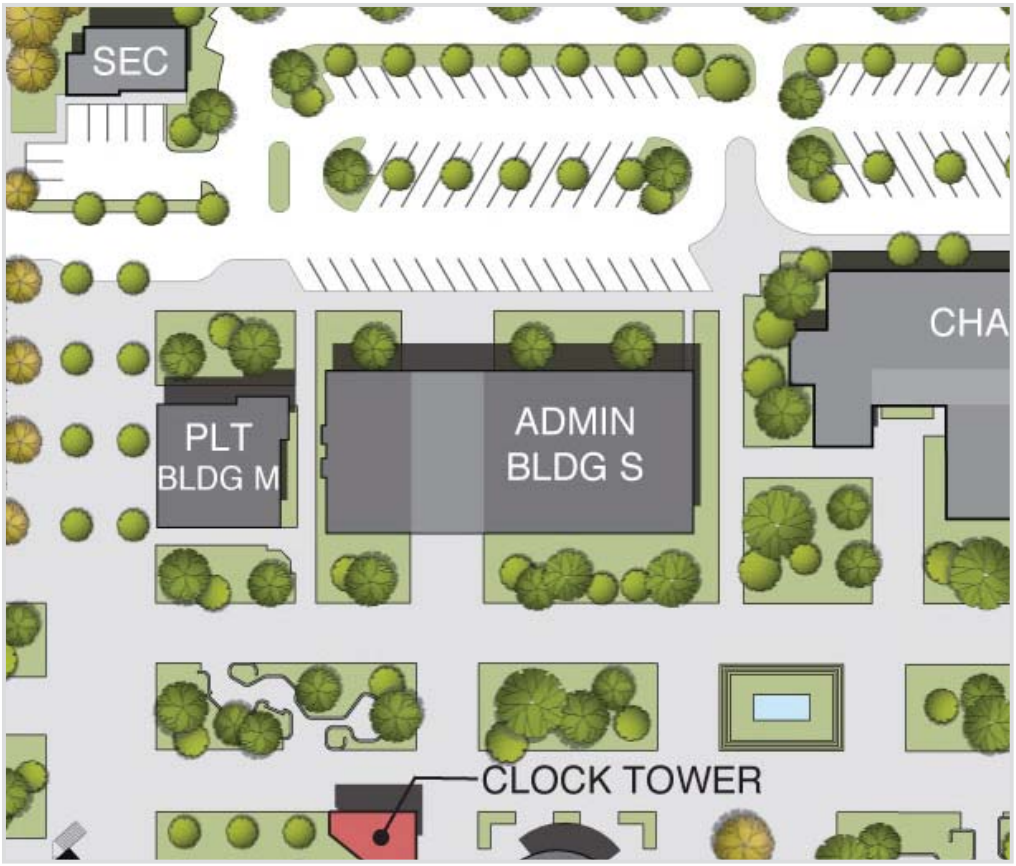
The renovation of Tessmann Planetarium will replace aging infrastructure and repurpose space that will be vacated when the Student Services and Instructional Building is built. The vacated space will be available to provide needed space for the planetarium program. This project will also provide an opportunity to implement the re-visioning of the building's exterior, raising its profile in the eyes of the community. Tessmann Planetarium will define the eastern edge of the Entry Plaza, which will serve as a passenger loading and gathering space for its many visitors.

Nealley Library Renovation

The renovation of Nealley Library will continue its transformation into a library/learning resource center, by bringing in tutorial functions that are currently located in Johnson Center and other buildings. The renovation will provide modern and efficient infrastructure in response to the increased need for technological support. Consideration will be given to rezoning the building for better access to functions that are most used by students. Building entry points and zoning will be designed with consideration to the southern extension of the campus building zone and circulation routes.

Administration Building Renovation

The renovation of the Administration Building will repurpose space that will be vacated when the Student Services and Instructional Building is built. The vacated space will be available for the consolidation of administrative functions, including the administration of community education and support for Santa Ana College Foundation programs, and to provide needed meeting space. Although it was remodeled in the last decade, there remains a need to replace aging infrastructure and building systems.



On-going Scheduled Maintenance and Efficiency Improvements

Santa Ana College places a high priority on keeping pace with the need to maintain its facilities, in order to provide sound and healthy learning environments, reduce operating costs, and lead the community in environmental stewardship. Immediate needs must be addressed—for example, exterior guardrails and elevators in Dunlap Hall are in need of repair or replacement. Other upgrades, such as water efficient fixtures will result in operational cost savings over time. All facilities will be assessed and their needs will be documented and prioritized. Project scopes will be defined, budgeted, and scheduled to facilitate the pursuit of funding opportunities.

On-Going Campus-Wide Effort for Accessibility

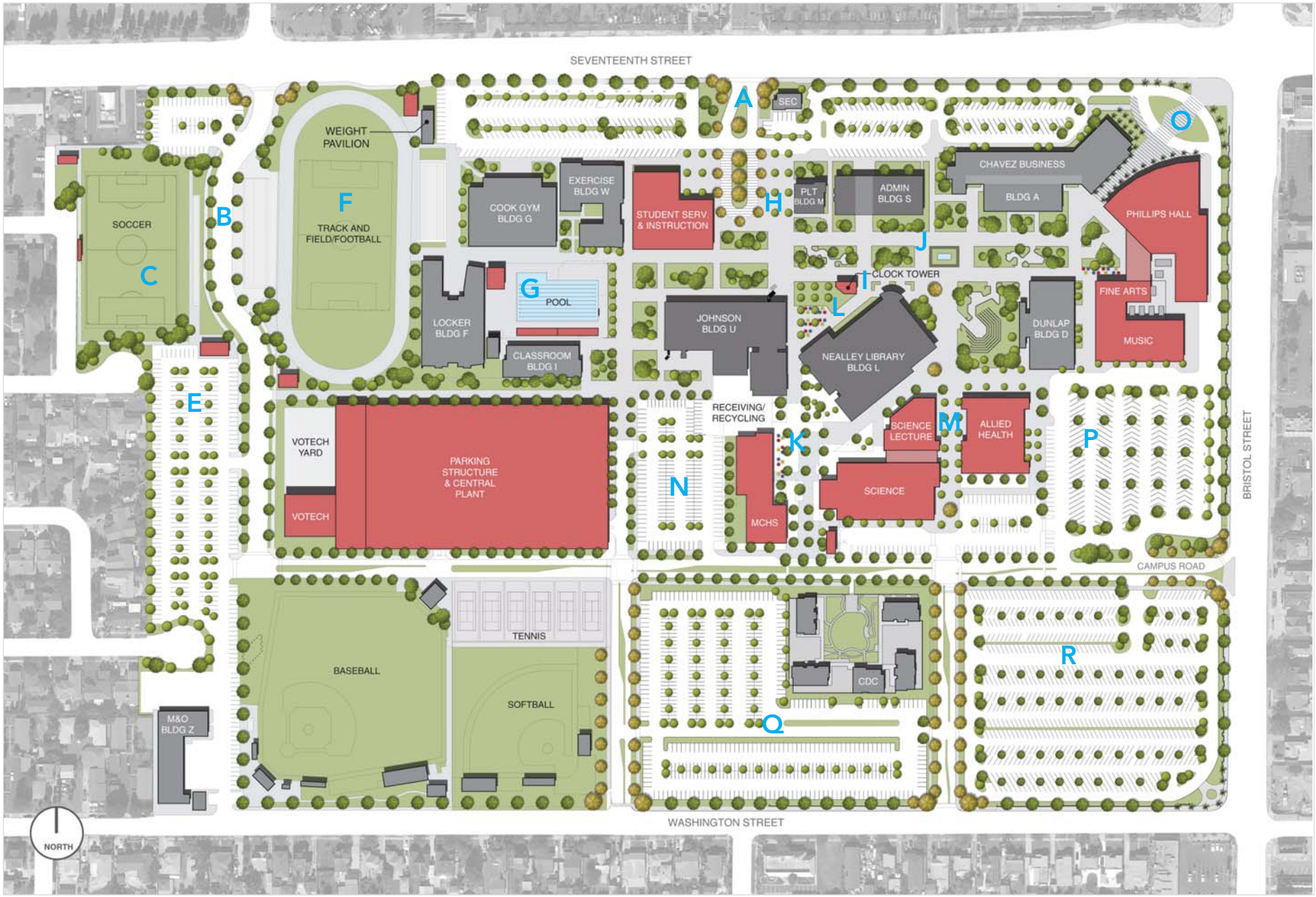
Santa Ana College has been implementing a program to study and improve accessibility as it relates to open space and buildings. An on-going effort is required to keep pace with evolving building codes, standards and emerging solutions. The College intends to continue this effort to assess and document the need for accessibility improvements in order to define projects, budgets and schedules. This effort will be coordinated with the parallel effort to improve campus way-finding and signage.

SITE IMPROVEMENTS

Santa Ana College places great importance on campus open space and the community's shared experience of these special places. Open space design standards will be established with the aim of creating a sense of place that is uniquely identifiable with Santa Ana College. On a campus where building styles vary, landscape and open space design will act as a unifying element. The master plan recommends the establishment of open space design standards that will grow out of the successful precedents. The informal style and intimate scale of the Central Mall is a model for the design of new gathering spaces. Landscape color will be used to signal entries, key locations and circulation routes. The excellent collection of trees will be maintained and expanded to areas of new development. Campus edges, entries and streets will utilize a more formal and rhythmic design to facilitate way-finding and circulation.

Santa Ana College intends for its campus to be a tool for teaching—an open and living system, demonstrating solutions for storm water management, water conservation and energy efficiency. The College will continue the effort to establish a campus-wide arboretum to take advantage of its diverse and mature collection of trees.

A. Campus Entry and Edge Improvements
B. College Avenue Improvements
C. CDC Demolition and Soccer Field Construction
D. Parking Lot 11 Extension
E. Cul-de-sacs, Perimeter Wall & Parking Lot 12 Extension
F. Stadium Improvements
G. Building E Demolition and Swimming Pool Replacement
H. Entry Plaza
I. Centennial Clock Tower and Park Construction
J. Campus Mall Improvements
K. South Campus Mall
L. Dining Courtyard
M. Science Walk
N. Parking Lot 10 and Receiving/ Recycling Facility
O. Arts Corner Improvements
P. Parking Lot 6 Alteration
Q. South Campus Circulation Improvements
R. Parking Lot 7 Improvements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Campus Entry and Edge Improvements

The entry and edge improvements are intended to increase the visibility and presence of Santa Ana College to the community, reinforce its positive image, and help visitors find the campus entries.

Campus Entries – Entries will be improved with signage, lighting, landscaping and paving to welcome visitors who arrive via foot, bicycle, bus and car. A consistent palette of landscape color will be used to signal the location of the entries.

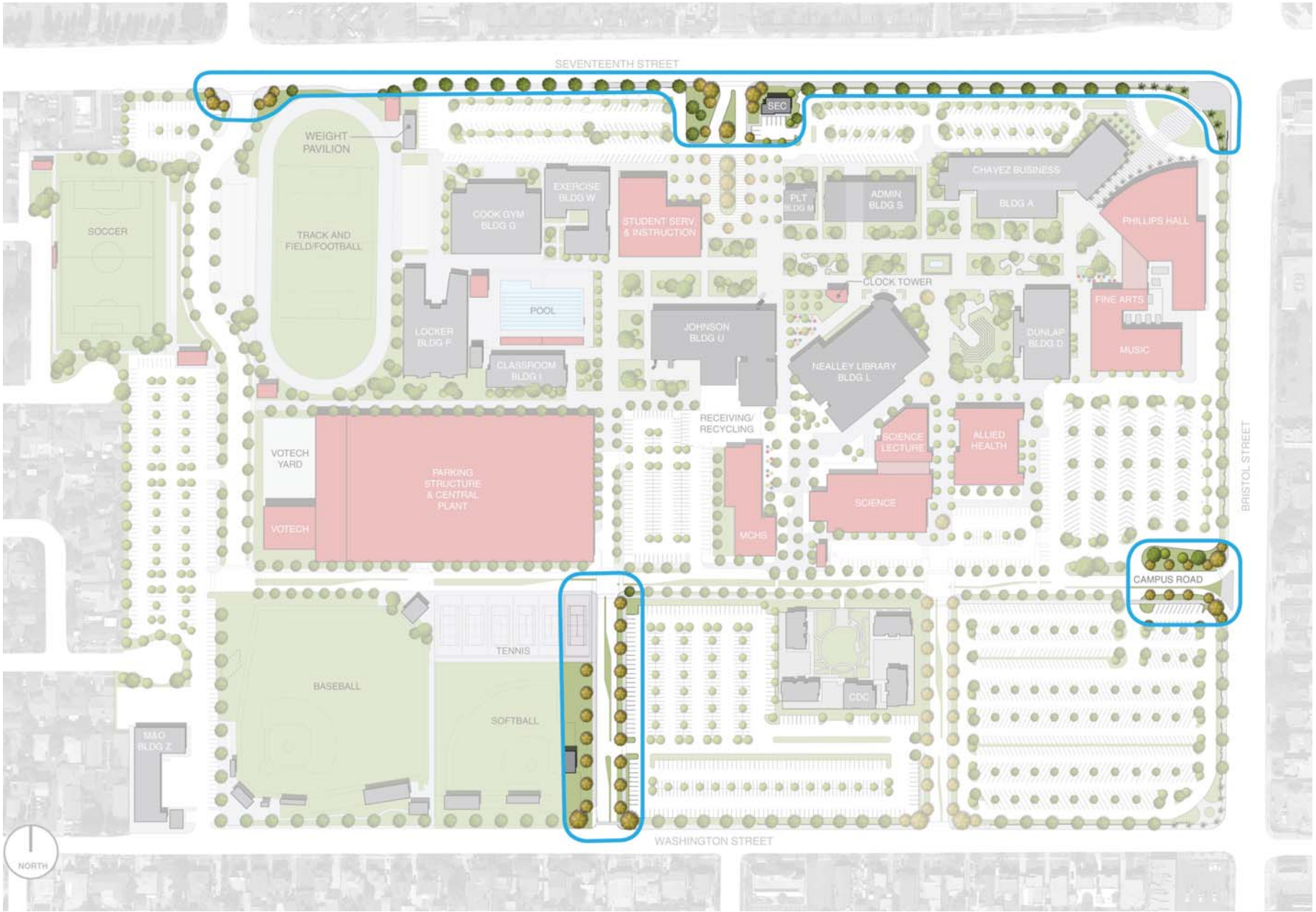
Seventeenth Street Edge – The existing property line wall and sidewalk will be removed, allowing the space between the street and the parking lots to be fully utilized for landscaping and a wider sidewalk. Bus stops will be designed with enough depth to accommodate bus wheelchair ramps and waiting areas. Pedestrian paths will be provided from the bus stops into campus, with safe crossings at the loop road. Fire hose access from the street side fire hydrants to the campus buildings must be maintained. Landscaping will be scaled to screen the parking lot, but allow views of the buildings from passing cars. This project will eliminate or improve the safety of the "exit only" driveway at the west end of Parking Lot 1. The entrance to the Security Building parking lot (Lot 2) will be relocated to the east side, to improve traffic flow into the campus.

Bristol Street Edge – The improvements here will be similar to those for Seventeenth Street, however the timing of these improvements must be considered. The northern portion of this frontage is subject to storm water incursion from Bristol Street during heavy rains. The Arts Corner Improvements project will construct a ten foot wide bio swale/water diversion swale between Bristol Street and the loop road, by shifting the loop road to the west. Until this work is done, the property line wall should remain as a partial barrier to storm water. Please see the note on the Bristol Street Widening Project, below.

Bristol Street Corners – The corners at the intersections of Bristol Street and both Seventeenth Street and Washington Street provide key views into campus. These corners will be improved with signage, lighting, landscaping and paving to welcome visitors who arrive via foot and bus. Please see the note on the Bristol Street Widening Project, below.

Washington Street Edge – The south edge of campus borders a single family residential neighborhood and the existing property line wall serves to screen the residents from the college parking lots. The wall will remain, with modifications at the new vehicular entries. The wall will be infilled where the Pacific Avenue entry is removed. The existing street trees will be kept, except where the streetscape is being changed.

Note: A key consideration for the design of the Bristol Street corners and edge is the design of the Bristol Street Widening Project, which is in process under the City of Santa Ana. Although current plans do not include changes to the west side of Bristol Street, the master plan recommendations include dialogue with the city to maintain awareness of possible impacts to the College. The master plan recommends an effort to collaborate with the city on the design of the Bristol Street corners and edge.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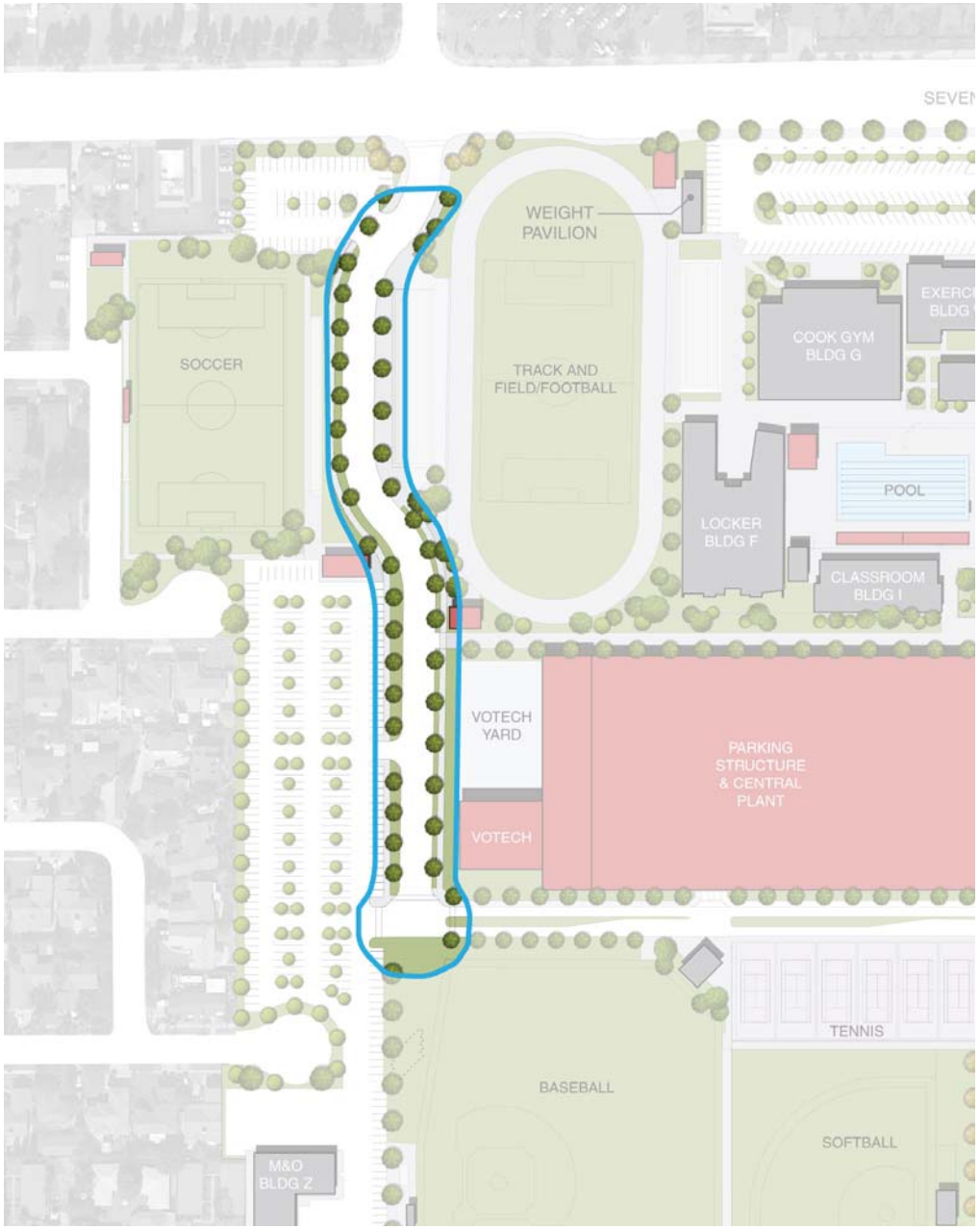
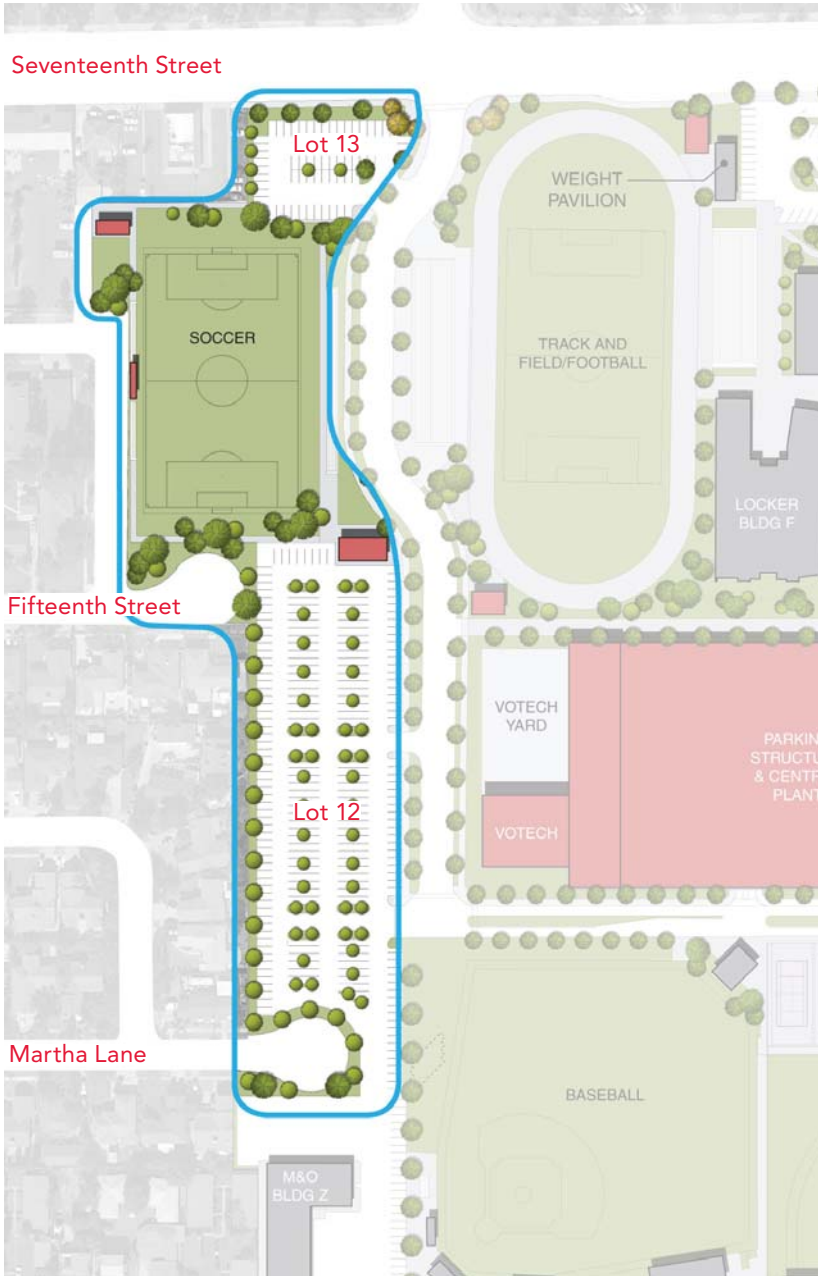
CHAVEZ BUSINESS
BLDG A
PHILLIPS HALL
CLOCK TOWER
FINE ARTS
MUSIC
POOL
LOCKER BLDG F
CLASSROOM BLDG I
JOHNSON BLDG U
NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
RECEIVING/ RECYCLING
SCIENCE LECTURE
ALLIED HEALTH
SCIENCE
VOTECH YARD
VOTECH
PARKING STRUCTURE & CENTRAL PLANT
MCHS
BRISTOL STREET
CAMPUS ROAD
TENNIS
BASEBALL
SOFTBALL
CDC
M&O BLDG Z
WASHINGTON STREET
NORTH

College Avenue Improvements

This project will create a major western entry into the campus from Seventeenth Street, incorporating signage, lighting, landscaping and paving to welcome pedestrians. Landscape color will be used to enhance this entry. College Avenue will be realigned to allow space for the addition of western grandstands at the stadium, and the streetscape will be designed to accommodate the numbers of pedestrians that will be expected to attend athletic events and graduations. The vehicular way will be designed to safely accommodate both bicycles and cars. Street trees, sidewalks and lighting will be provided. The central median will incorporate a series of bio swales to help manage storm water.





CDC Demolition and Soccer Field Construction

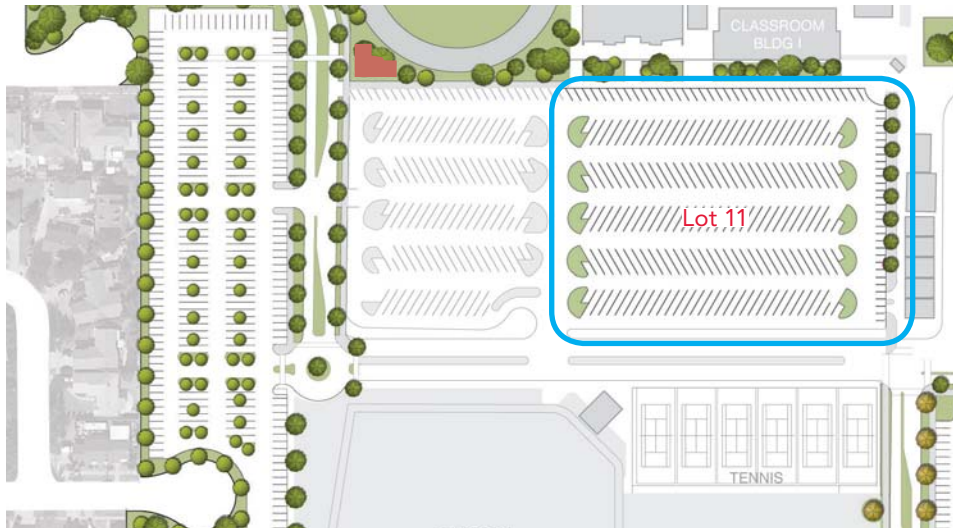
The Soccer Field will include restrooms, storage and audience seating. This project will remove the former Child Development Center.

Cul-de-sacs, Perimeter Wall, and Parking Lot 12 Extension

This project, which is currently in the design phase, will provide cul-de-sac terminations at Fifteenth Street and Martha Lane and extend Parking Lot 12 to include these former rights of way. It will also provide a concrete masonry wall along the western property line.

Parking Lot 11 Extension

The existing Soccer Field will be replaced with an extension of surface parking lot 11. This parking lot will remain in use until it is replaced by the Parking Structure.

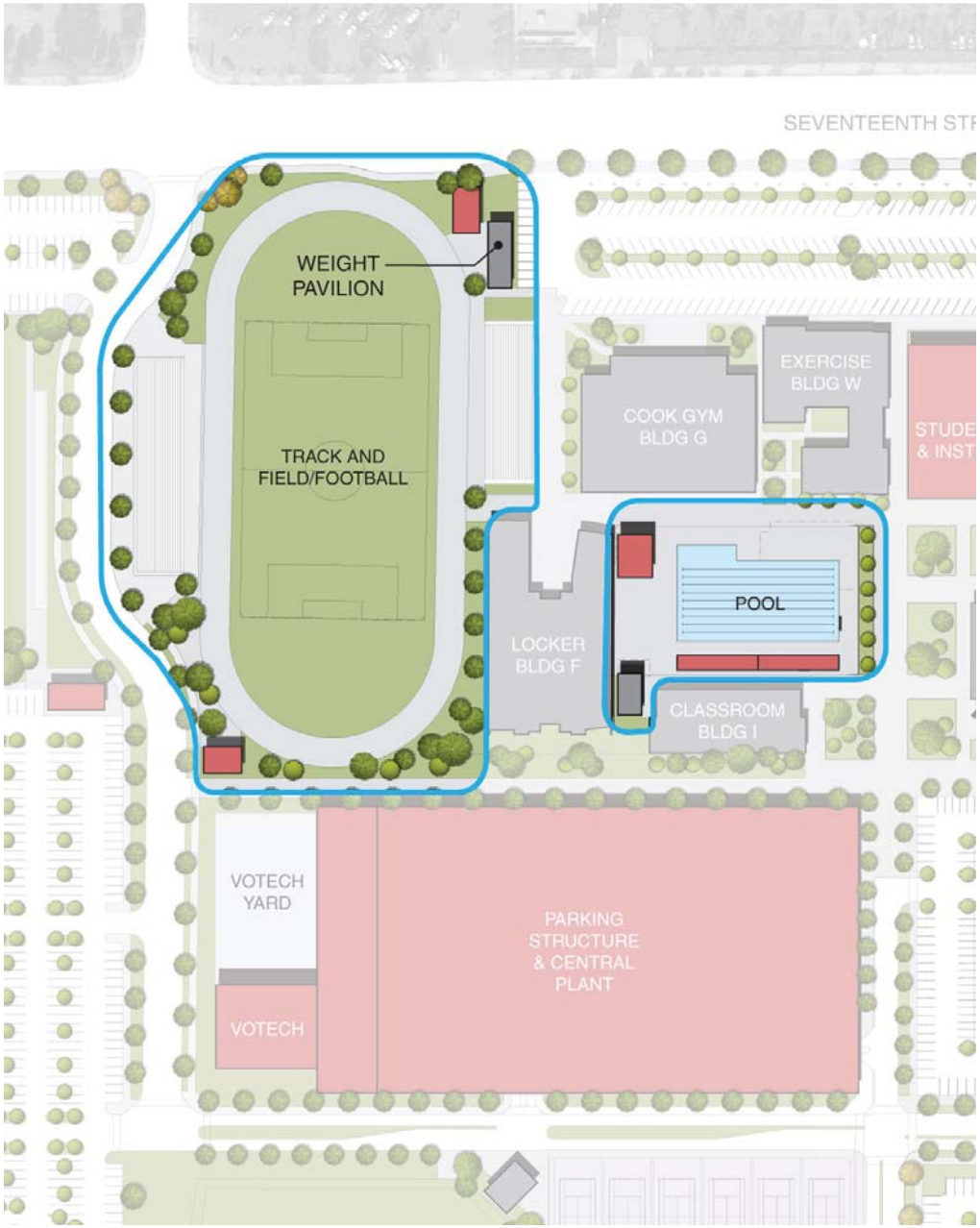


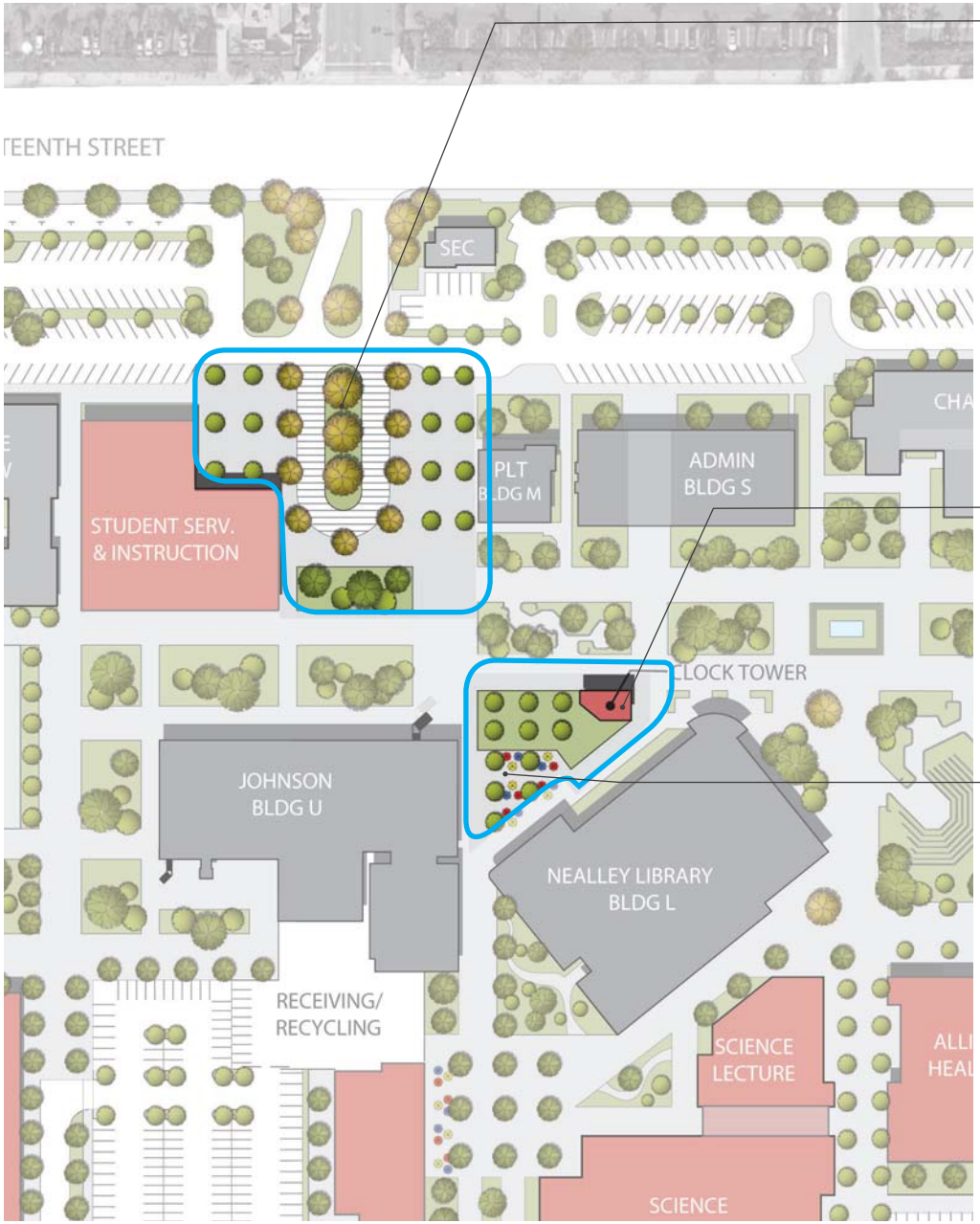
Stadium Improvements

The stadium will be enhanced to accommodate athletic competitions, such as football and soccer games, and large gatherings, including graduation ceremonies. A western grandstand will be added, including restrooms, storage and a concession. The sides and rear of the grandstand will be designed to an aesthetic standard appropriate for its location near the College Avenue entry. The existing eastern grandstand will be enhanced with a press box, accessible by elevator, and a concession.

Building E Demolition and Swimming Pool Replacement

The existing facility will be replaced with a 50 meter swimming pool. Building E will be removed to provide space for the expansion of the pool facility, and a new home for the Fitness Center will be determined. This facility will utilize state of the art technology for efficient energy and water use. It will include bleachers, a concession and storage, and will maintain the direct connection to the shower and locker rooms in Building F.





Entry Plaza

The removal of Russell Hall will create an open entry plaza leading into the Central Mall. A vehicular looped driveway will provide a generous passenger loading zone to serve visitors and students, including OCTA Access bus users. Enhanced paving in the driveway will signal the presence of pedestrians.

The Plaza will be formally landscaped with low trees and planted beds to maintain the open views into the Mall. The area adjacent to the Student Services and Instructional Building and the Tessmann Planetarium will provide open gathering space for visitors.

Centennial Clock Tower and Park Construction

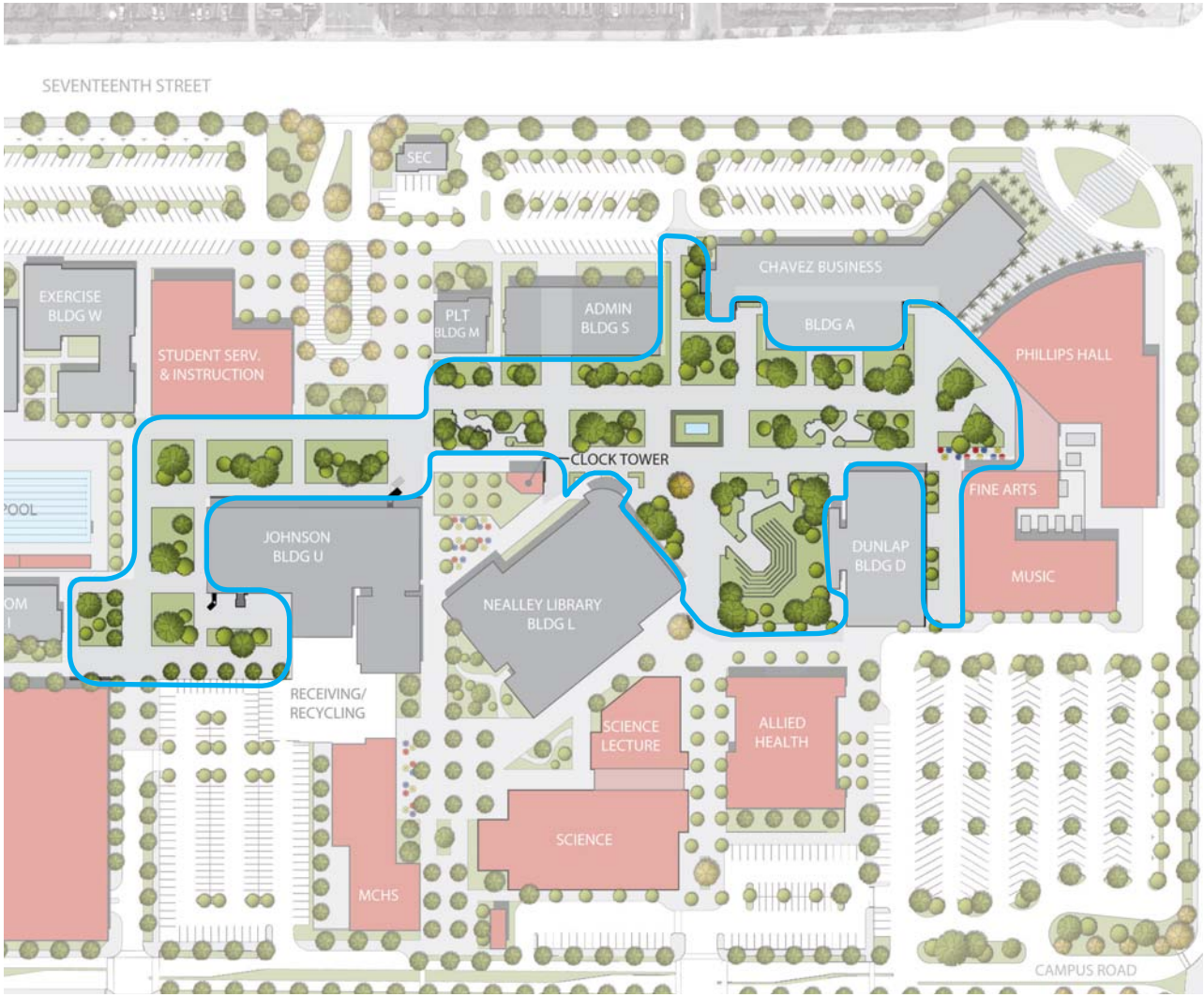
This gift from the Santa Ana College Foundation will commemorate the College's centennial in 2015. The clock tower will rise from a slightly elevated terrace situated in a symbolically landscaped park.

Dining Courtyard

The courtyard between Johnson Center and Nealley Library will be enhanced to provide a welcoming outdoor dining and gathering space. Elements such as shade trees and pergolas will shade the space and create a comfortable scale. Signage and landscaping will improve the connection and visibility of the entrance stair to the second floor of Nealley Library.

Campus Mall Improvements

The Campus Mall is the well loved heart of the campus. The intimate scale of the seating areas, the informal arrangement of mature shade trees, and the wide paved walkways create restful and welcoming spaces for people to gather. This project will build on the successful elements of the Mall, make adjustments to better accommodate outdoor programmed uses, and repair or replace aging elements. Consideration will be given to gathering spaces near the entries of buildings, to foster collaboration and support programs housed within these buildings. The portions of the Mall that are adjacent to Johnson Center will be enhanced to accommodate activities such as outdoor dining and organized gatherings. Preference will be given to the use of long-lived shade trees, and a diversity of species.



South Campus Mall

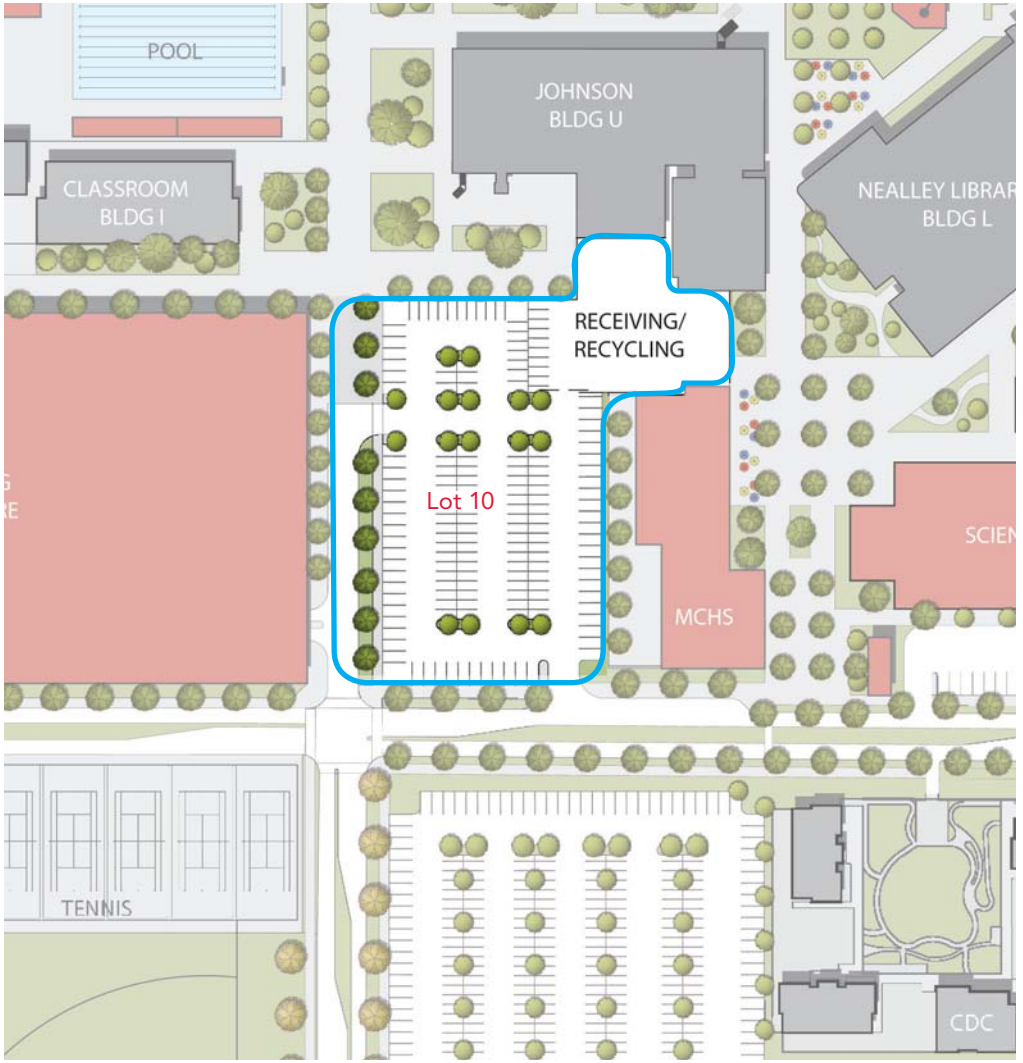
The South Campus Mall extends the successful Campus Mall to create a new zone of development, which will mainly include instructional buildings. The South Campus Mall will accommodate outdoor teaching spaces, a science garden, and quiet study spaces. The area near Middle College High School will serve as a gathering space for students. The Campus Road OCTA bus stop will be relocated to this vicinity.

Science Walk

The Science Walk extends campus circulation toward the south to create a link between the Campus Mall, and the Allied Health and Science Buildings. The pedestrian link will continue farther south to provide an accessible path to the Child Development Center, and to Washington Street.

Parking Lot 10 and Receiving/ Recycling Facility

This area will accommodate surface parking, service vehicle circulation, and the Custodial Support Center. It will include recycling and waste management facilities, receiving for the bookstore and food service facilities in Johnson Center, and a custodial office and storage facility. Site walls will be provided for visual and acoustical screening of storage and support spaces.



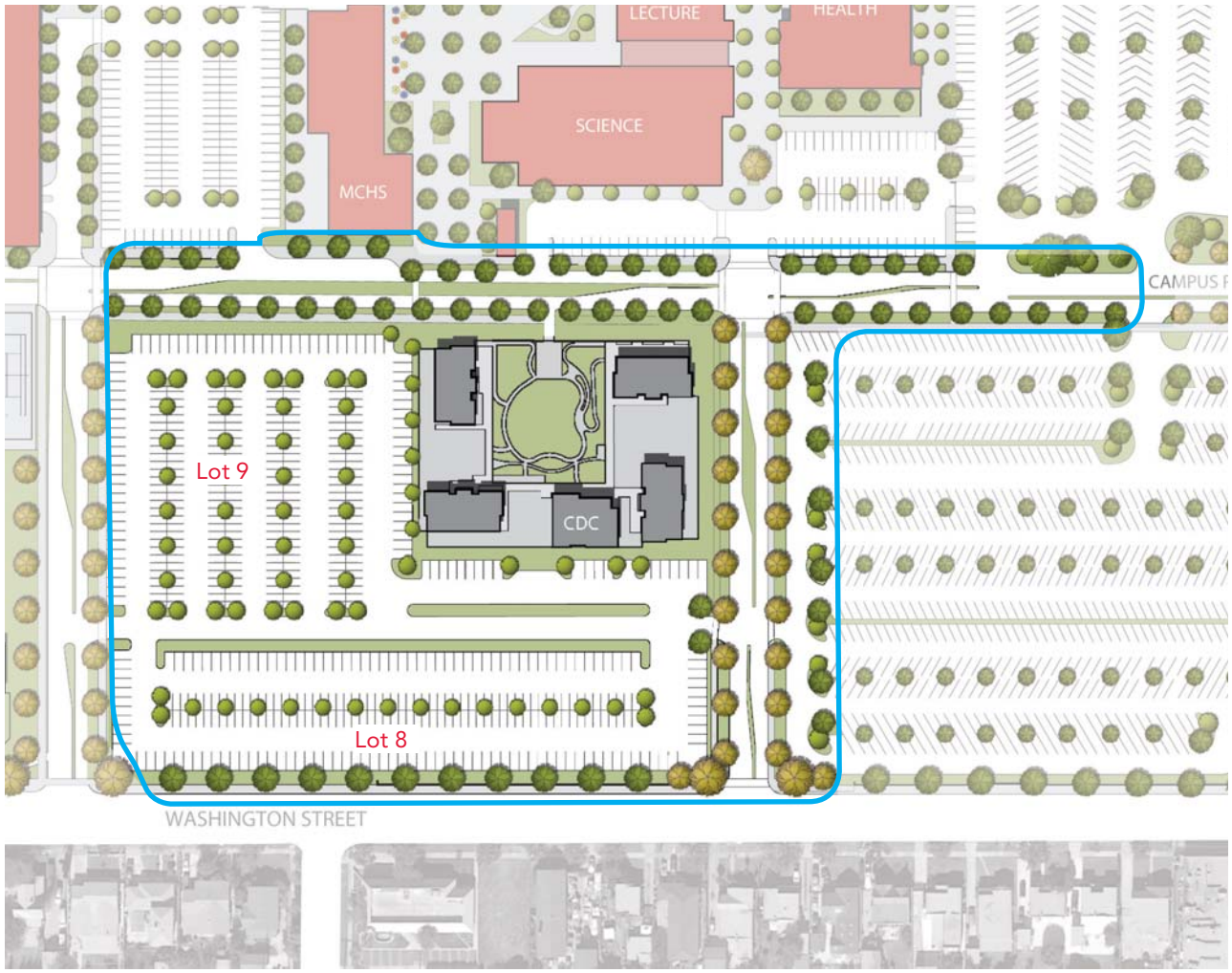
Arts Corner Improvements

The Arts Corner will create a spacious plaza and passenger loading zone for Phillips Hall and the east side of campus. Enhanced paving in the driveway and the crossing points on the loop road, will signal the presence of pedestrians. The plaza will be scaled and formally landscaped to effect a transition to the urban streetscape. Trees will be sized or shaped to maintain views of Phillips Hall from the street corner. The Phillips Hall façade and plaza will employ lighting to enhance its presence at night. Street scale signage on Phillips Hall will be used to advertise events. This project will continue the Bristol Street campus edge improvements. See Campus Entry and Edge Improvements (page 40).

Parking Lot 6 Alteration

Parking Lot 6 will be altered to accommodate the Allied Health Building. Its eastern edge will be adjusted for the construction of a storm water diversion swale. A bio swale will be constructed between the loop road and the rest of parking lot 6. This project will continue the Bristol Street campus edge improvements. See Campus Entry and Edge Improvements (page 40).

Additional parking will be constructed to the south of the Allied Health Building and the Science Building. The existing main campus electrical facility, currently in Building J, will be housed in a new structure at the west end of the parking lot.



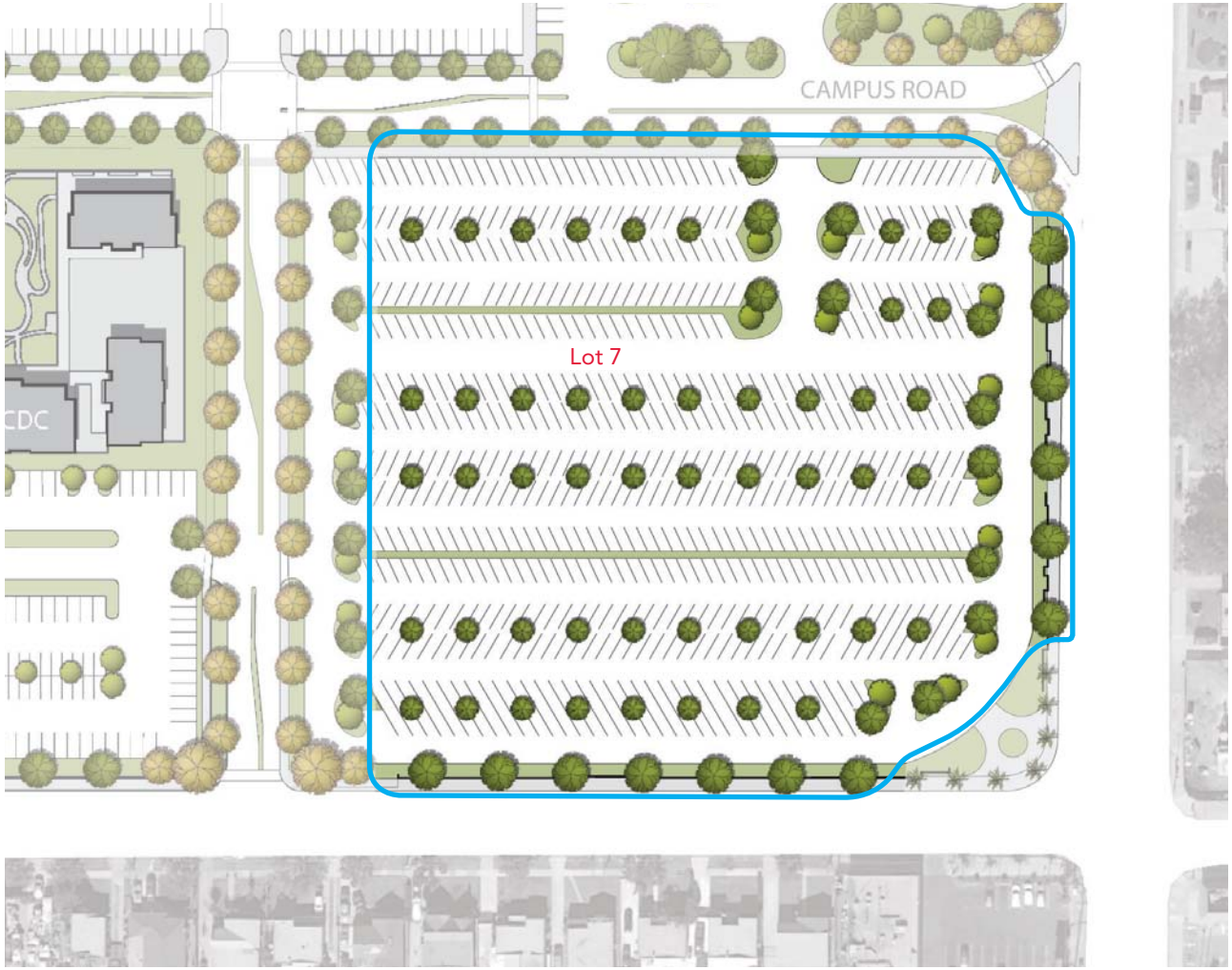
South Campus Circulation Improvements

This project will provide a new campus entry driveway from Washington Street to Campus Road. It will realign and create a new streetscape for the eastern half of Campus Road, including accessible sidewalks, a median which functions as a bio swale for storm water management, street trees and lighting. The parking stalls will be removed and trash storage areas will be relocated.

The Pacific Avenue entry drive will be removed. These improvements have been carried over from the 2004 Master Plan. Parking Lots 8 and 9 will be reconfigured and merged. Vehicular circulation serving the Child Development Center will be improved. Pedestrian circulation between the CDC and the campus core will be improved with accessible paths and clearly marked crossing points at Campus Road. The parking lots and driveways will be designed to consider storm water management needs, and will incorporate bio swales and other best management practices.

Parking Lot 7 Improvements

Parking lot 7 will be improved to incorporate bio swales in two of the existing parking rows and along the southern and western edge.

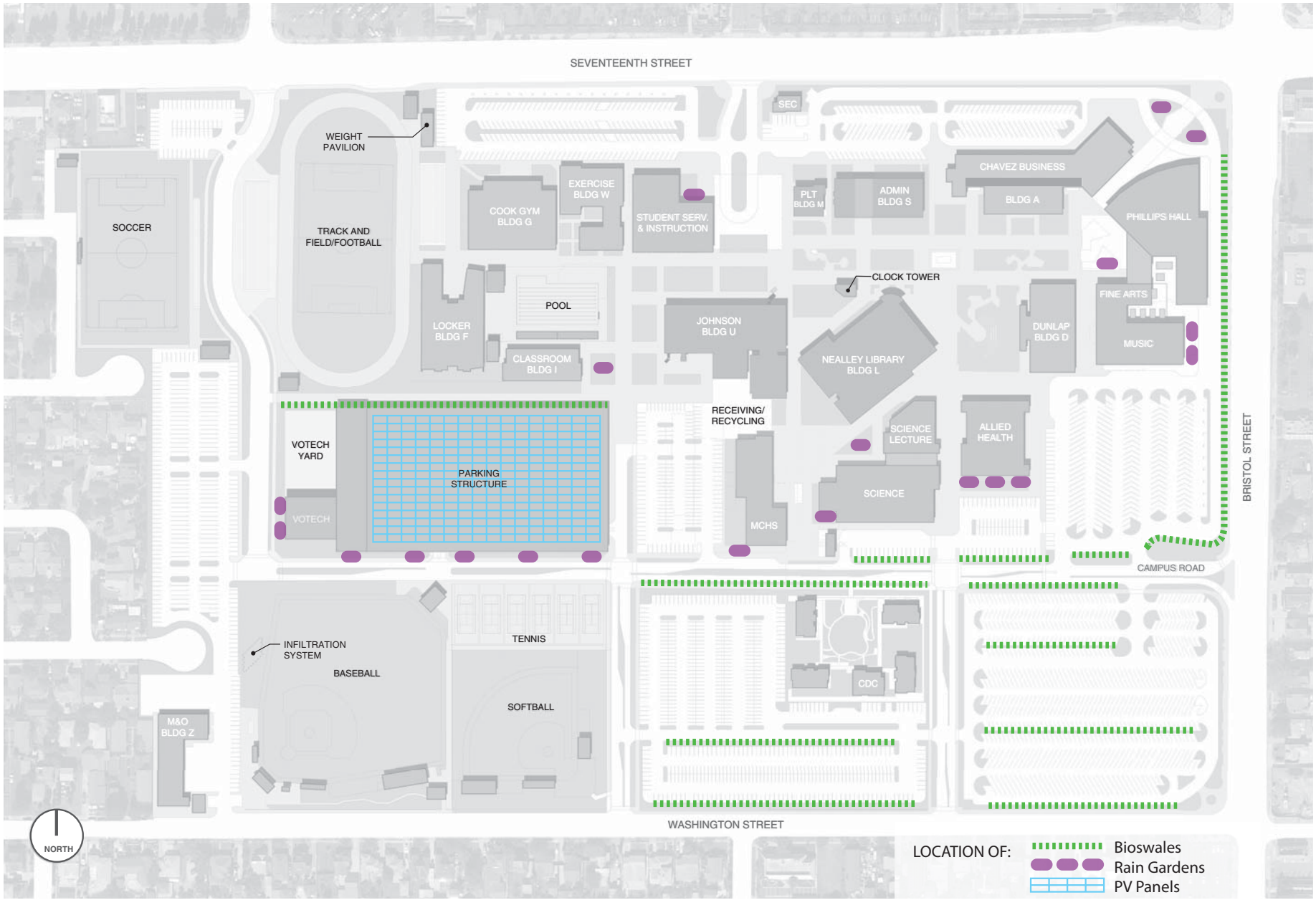


Storm Water Management

Storm water management has been a concern to the College and an environmental issue in Southern California. A long dry season followed by frequent, sometimes heavy rains contributes to the flushing of pollutants into the Santa Ana River and the Pacific Ocean. The Master Plan recommendations include the incorporation of best management practices which use natural processes to filter and retain or slow the flow of storm water. Opportunities for bio swales and rain gardens are shown on this plate.

Rain gardens will be used to retain and percolate water for building roof drains. They will be incorporated in attractive outdoor seating areas near the entrances of buildings. Rain gardens will be engineered to overflow to the storm drain system if needed.

Bio swales will be incorporated in large areas of impervious paving, including roads and parking lots. Currently most of these areas are drained by surface flow to the southwest, ultimately draining to the box culvert under Washington Street. The city drainage system has a finite capacity, and efforts to retain or detain storm water on the campus significantly reduce the College's environmental impact. As future campus development occurs, the College will explore the feasibility of harvesting storm water to replace potable water used for irrigation and other uses. Efforts to promote sustainable storm water management is a key part of Santa Ana College's planning for environmental stewardship. See storm water management strategies on page 110.


SEVENTEENTH STREET
WEIGHT PAVILION
SOCCER
TRACK AND FIELD/FOOTBALL
COOK GYM BLDG G
EXERCISE BLDG W
STUDENT SERV. & INSTRUCTION
SEC
PLT BLDG M
ADMIN BLDG S
CHAVEZ BUSINESS
BLDG A
PHILLIPS HALL
CLOCK TOWER
FINE ARTS
MUSIC
POOL
LOCKER BLDG F
CLASSROOM BLDG I
JOHNSON BLDG U
NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
RECEIVING/ RECYCLING
SCIENCE LECTURE
ALLIED HEALTH
VOTECH YARD
PARKING STRUCTURE
VOTECH
MCHS
SCIENCE
BRISTOL STREET
CAMPUS ROAD
INFILTRATION SYSTEM
TENNIS
BASEBALL
SOFTBALL
CDC
M&O BLDG Z
WASHINGTON STREET
NORTH
LOCATION OF:
Bioswales
Rain Gardens
PV Panels


BE THE MATCH
Marrow
Donor
Registry
Drive
HERE

PHASING PLANS

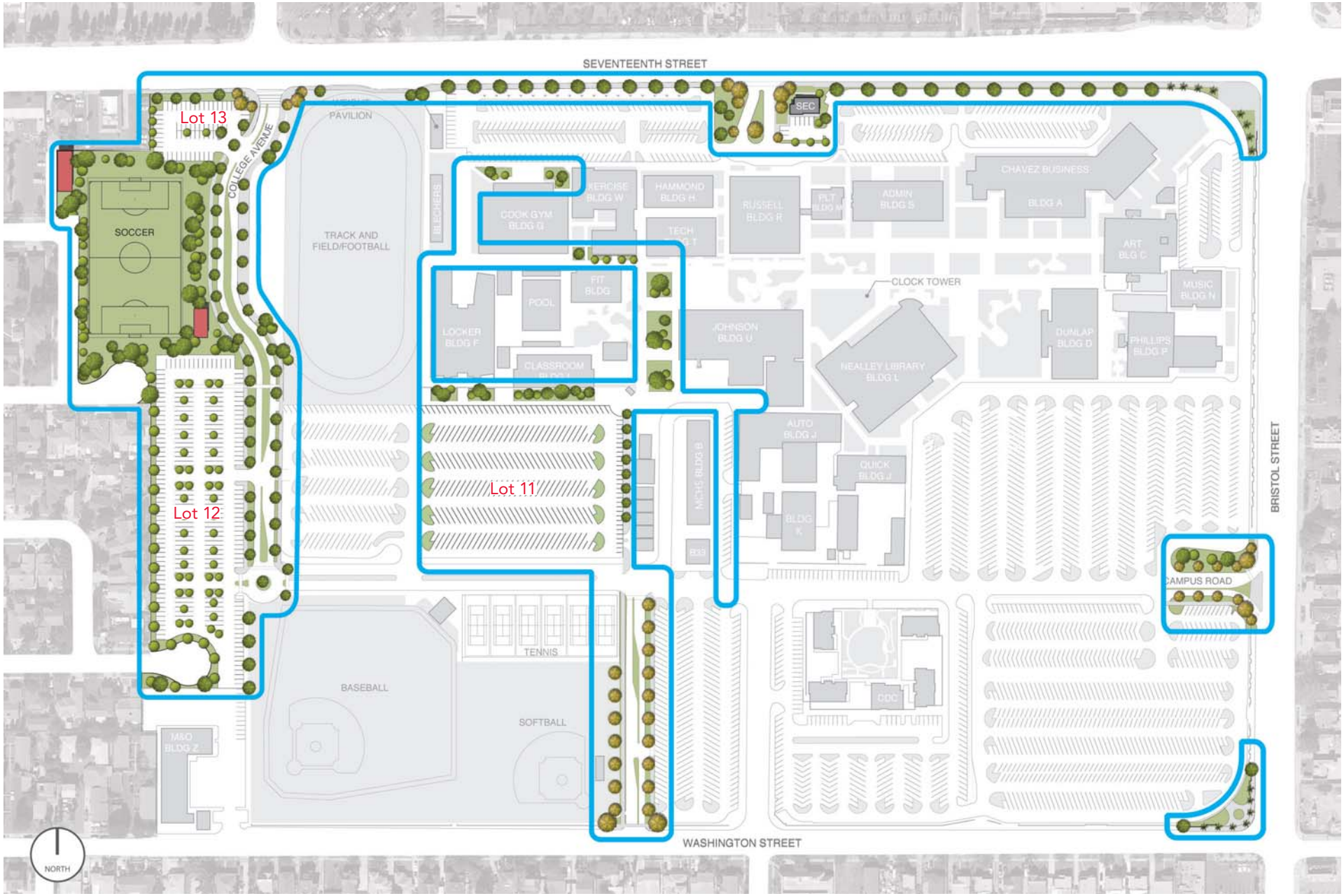
The projects in the Plan are grouped into four construction phases as shown on the following pages. The final order and timing of construction will be determined by specific priorities and funding opportunities.

PHASE

1

Phase 1 Projects

- Campus Entry and Edge Improvements
- College Avenue Improvements
- Cul-de-sacs, Perimeter Wall and Parking Lot 12 Extension
- Soccer Field Construction
- Parking Lot 11 Extension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Lot 12
Lot 11
SOCCER
COLLEGE AVENUE
PAVILION
TRACK AND FIELD/FOOTBALL
BLEACHERS
SEC
EXERCISE BLDG W
HAMMOND BLDG H
COOK GYM BLDG G
RUSSELL BLDG R
PLT BLDG M
ADMIN BLDG S
CHAVEZ BUSINESS BLDG A
ART BLDG C
MUSIC BLDG N
TECH BLDG T
FIT BLDG
POOL
LOCKER BLDG F
CLASSROOM BLDG
CLOCK TOWER
JOHNSON BLDG U
NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
PHILLIPS BLDG P
AUTO BLDG J
MICHS BLDG B
QUICK BLDG J
BLDG K
B33
BRISTOL STREET
CAMPUS ROAD
TENNIS
BASEBALL
SOFTBALL
M&O BLDG Z
CDC
WASHINGTON STREET
NORTH

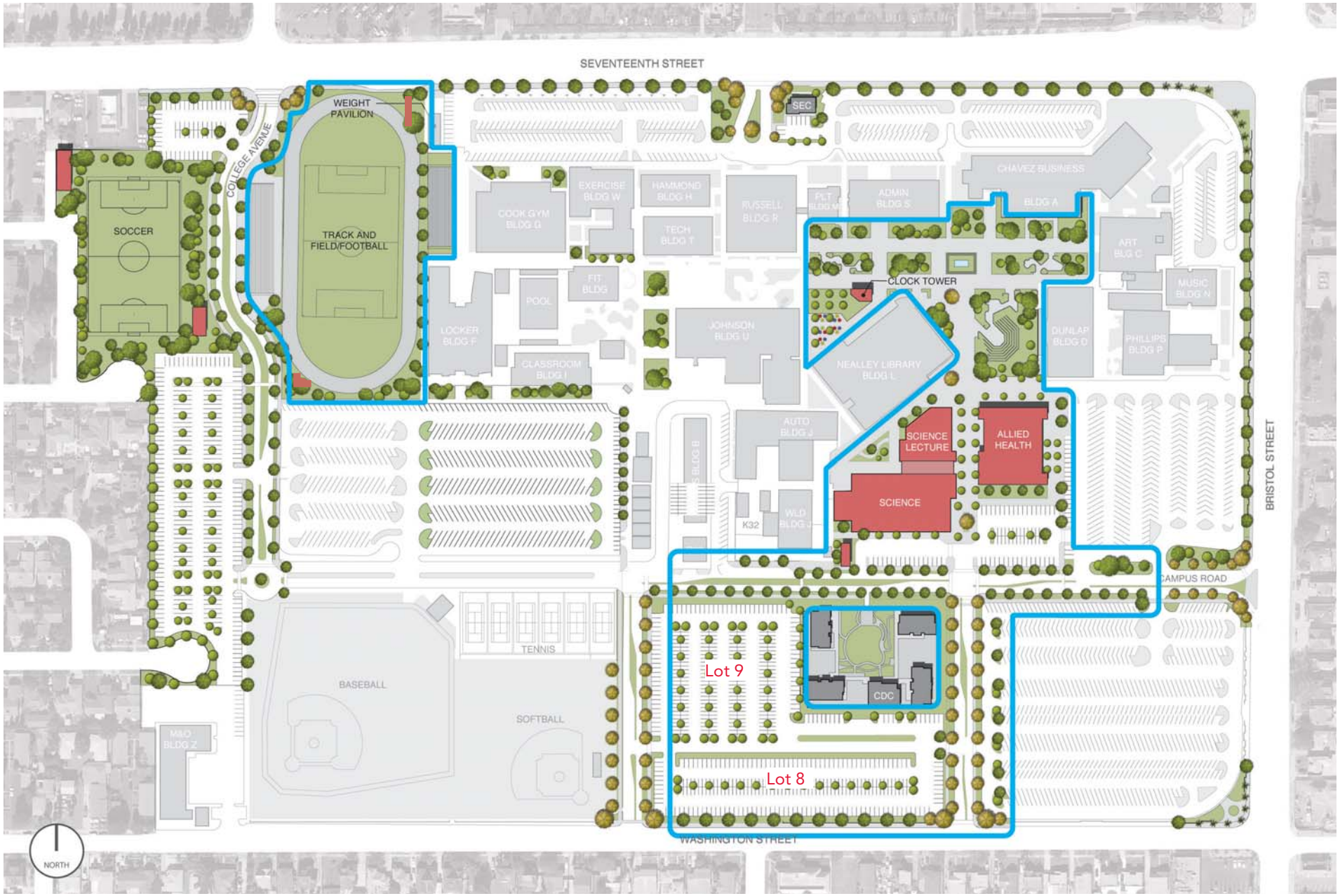
PHASE 1

PHASE

2

Phase 2 Projects

- Science Building
- Allied Health Building
- Stadium Improvements
- Centennial Clock Tower and Park
- Dining Courtyard
- Science Walk
- Campus Mall Improvements - Phase A
- Parking Lot 6 Alteration
- South Campus Circulation Improvements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COOK GYM BLDG G
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CHAVEZ BUSINESS
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MUSIC BLDG N
CLOCK TOWER
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LOCKER BLDG F
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NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
PHILLIPS BLDG P
CLASSROOM BLDG I
AUTO BLDG J
SCIENCE LECTURE
ALLIED HEALTH
SCIENCE
K32
WLD BLDG
BRISTOL STREET
CAMPUS ROAD
TENNIS
BASEBALL
SOFTBALL
Lot 9
CDC
Lot 8
MAIO BLDG Z
WASHINGTON STREET
NORTH

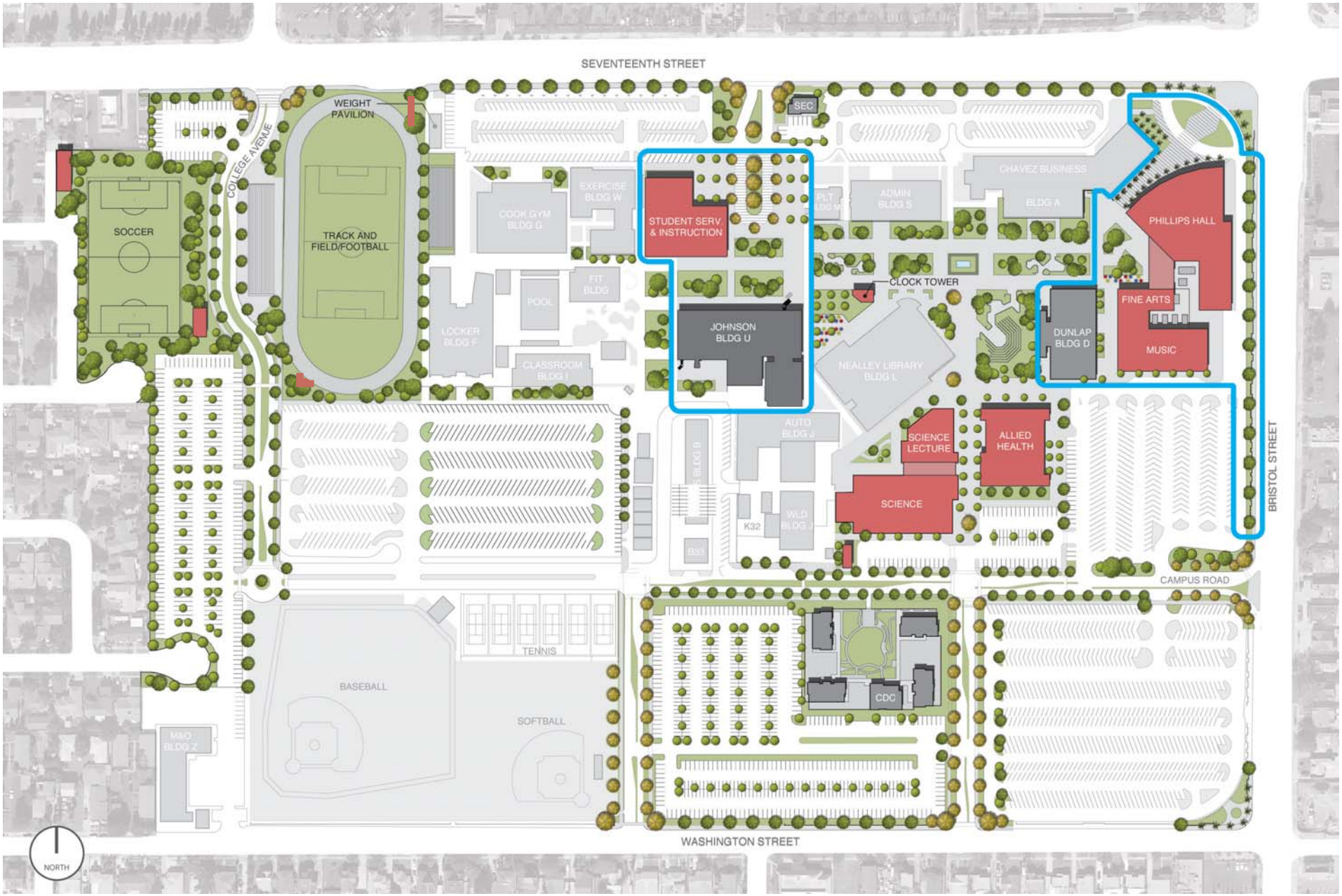
PHASE 2

PHASE

3

Phase 3 Projects

- Fine and Performing Arts Complex Replacement
- Student Services and Instructional Building
- Johnson Center Renovation
- Entry Court
- Arts Corner Improvements
- Campus Mall Improvements - Phase B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TRACK AND FIELD/FOOTBALL
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DUNLAP BLDG D
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BRISTOL STREET
CAMPUS ROAD
TENNIS
BASEBALL
SOFTBALL
CDC
M&O BLDG Z
WASHINGTON STREET
NORTH

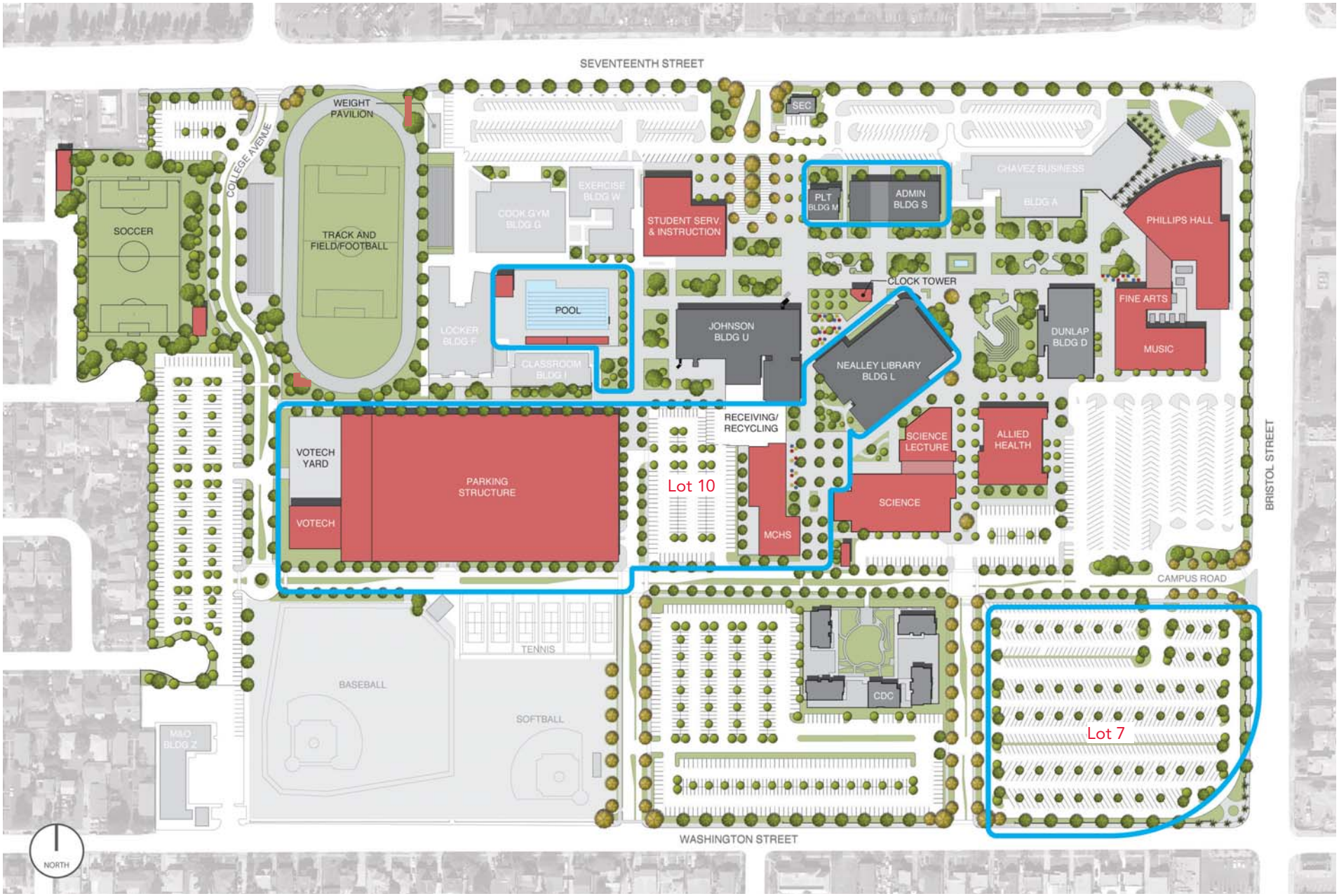
PHASE 3

PHASE

4

Phase 4 Projects

- Nealley Library Renovation
- Tessmann Planetarium Renovation
- Administration Building Renovation
- Vocational Technology Building
- Middle College High School
- Parking Structure and Central Plant
- South Campus Mall
- Parking Lot 10 and Receiving/Recycling Facility
- Swimming Pool Replacement
- Parking Lot 7 Improvements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STUDENT SERV. & INSTRUCTION
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CHAVEZ BUSINESS BLDG A
PHILLIPS HALL
CLOCK TOWER
FINE ARTS
MUSIC
LOCKER BLDG F
POOL
CLASSROOM BLDG I
JOHNSON BLDG U
NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
RECEIVING/ RECYCLING
VOTECH YARD
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PARKING STRUCTURE
Lot 10
MCHS
SCIENCE LECTURE
ALLIED HEALTH
SCIENCE
BRISTOL STREET
CAMPUS ROAD
TENNIS
BASEBALL
SOFTBALL
CDC
MAIO BLDG Z
Lot 7
WASHINGTON STREET
NORTH

PHASE 4


ADMINISTRATION

Existing Conditions

EXISTING CONDITIONS

Santa Ana College moved its main campus site in 1947. The original 48 acre site was bounded by Seventeenth Street to the north, Bristol Street to the east, Campus Road to the south, and College Avenue to the west. The campus core resides within this original area. About thirty years ago, the land along Martha Lane was acquired and developed. More recently, the College has acquired land to the west of College Avenue.

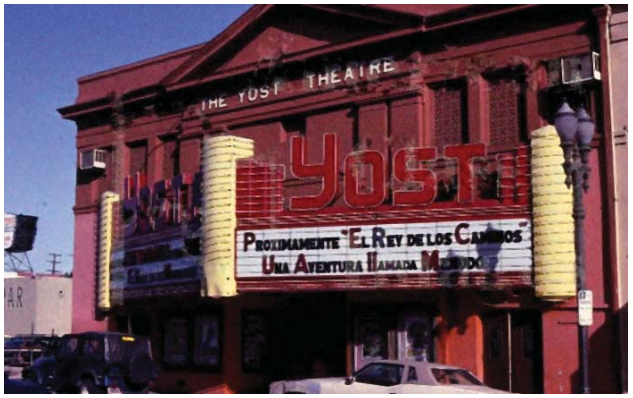
In all, the campus has grown to 65 acres. The surrounding community has also evolved into a populous urban center and the College's enrollment has grown commensurately. Its ratio of student population to acreage is considered high, highlighting the need for efficient use of the available land. There remains a continuing need for the facilities planning process to address full utilization of, and connections to, the southern and western margins of the campus.

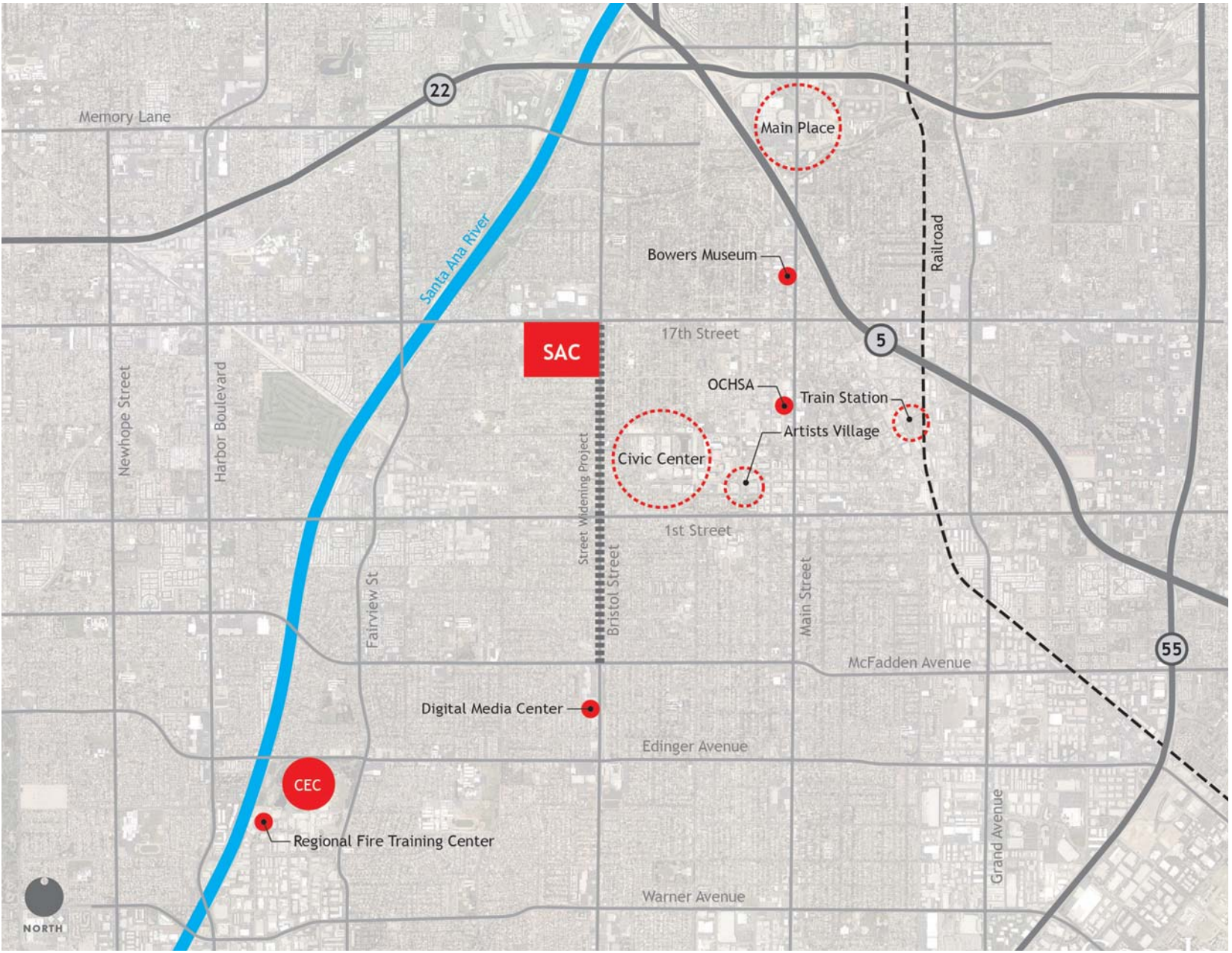
REGIONAL CONTEXT

Santa Ana College resides in a dense urban community near the Orange County Civic Center, Historic Downtown Santa Ana, Santa Ana Artist's Village, Orange County High School for the Arts, Bowers Museum and Main Place Mall. It is located near the convergence of major freeways and the Amtrack and Metrolink rail systems. The intersection of Seventeenth and Bristol Streets has the highest traffic volume in the county. Santa Ana College includes the Orange County Sheriff's Regional Training Academy, the Digital Media Center, the Regional Fire Academy, and the Centennial Education Center.

Observations:

- The region is diverse and full of contrasts.
- The College is well served by major freeways and streets.
- The Bristol Street Widening Project is planned to extend to Seventeenth Street. It will recharacterize Bristol Street and bring increased traffic from the south.
- The site is nearly flat with a gentle slope toward the Santa Ana River.





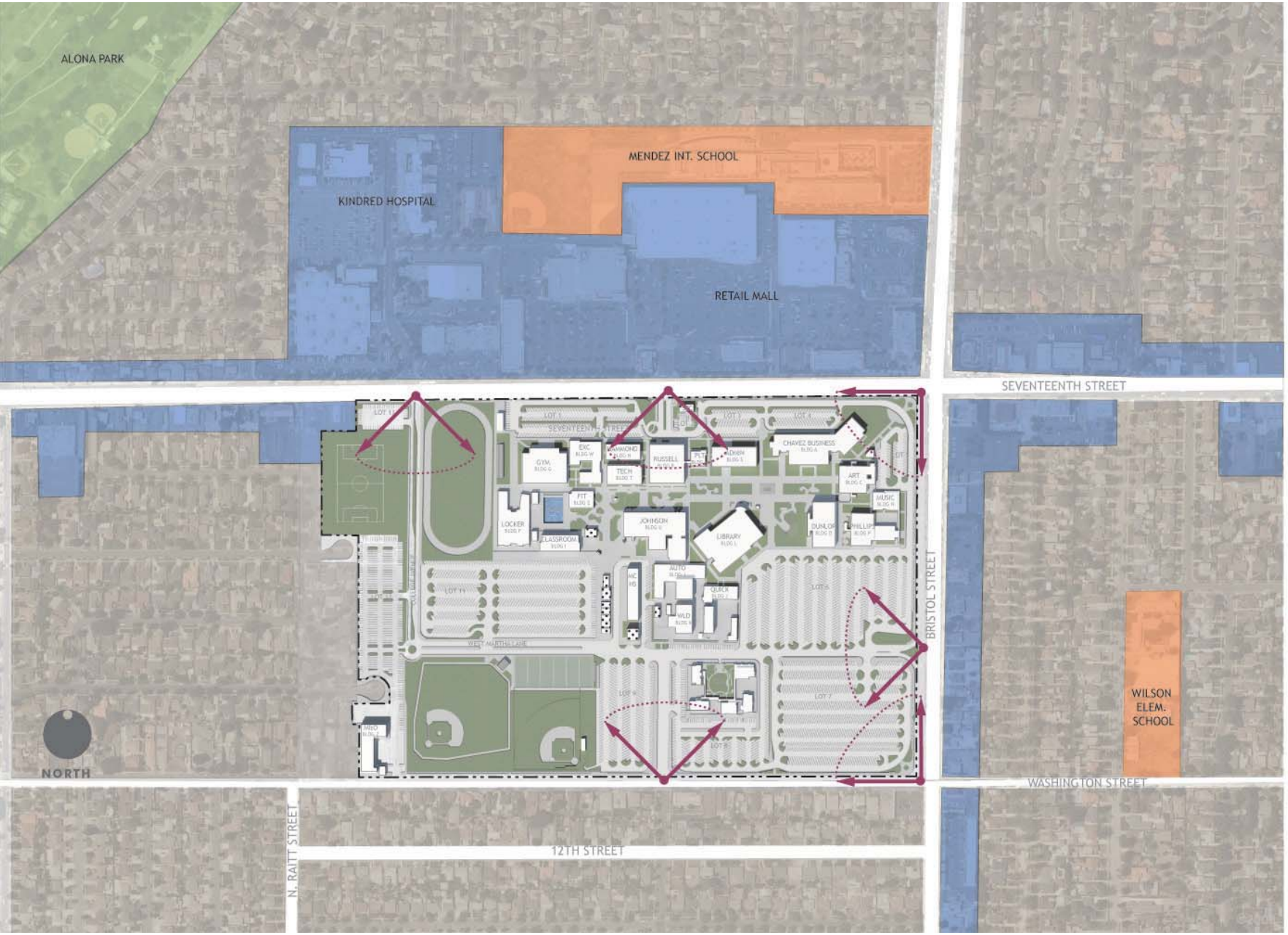
REGIONAL CONTEXT

COMMUNITY CONTEXT

Santa Ana College is adjacent to residential and commercial land uses.

Observations:

- The neighborhood is very walkable, with many nearby services.
- The scarcity of open green space puts a premium on the value of the College's athletic facilities and open space to the community.
- There is a need to improve views into the campus from Bristol and Seventeenth Streets.
- There is a need to buffer the adjacent residential neighborhoods from negative impacts.



COMMUNITY CONTEXT

EXISTING CAMPUS

Existing & Projected Campus

This plate shows the campus as it will be in the near future, and it includes projects currently in design or construction.

Observations:

- Most of the buildings are in the northern half of the campus, creating a facade facing Seventeenth Street which screens the Central Mall.
- Most of the parking is located in the southern half of the campus, and the athletic fields are mostly in the western zone.
- There are temporary and modular buildings in use, mostly in the center of the campus.

Existing Campus Plan

Permanent Facilities

Temporary Facilities

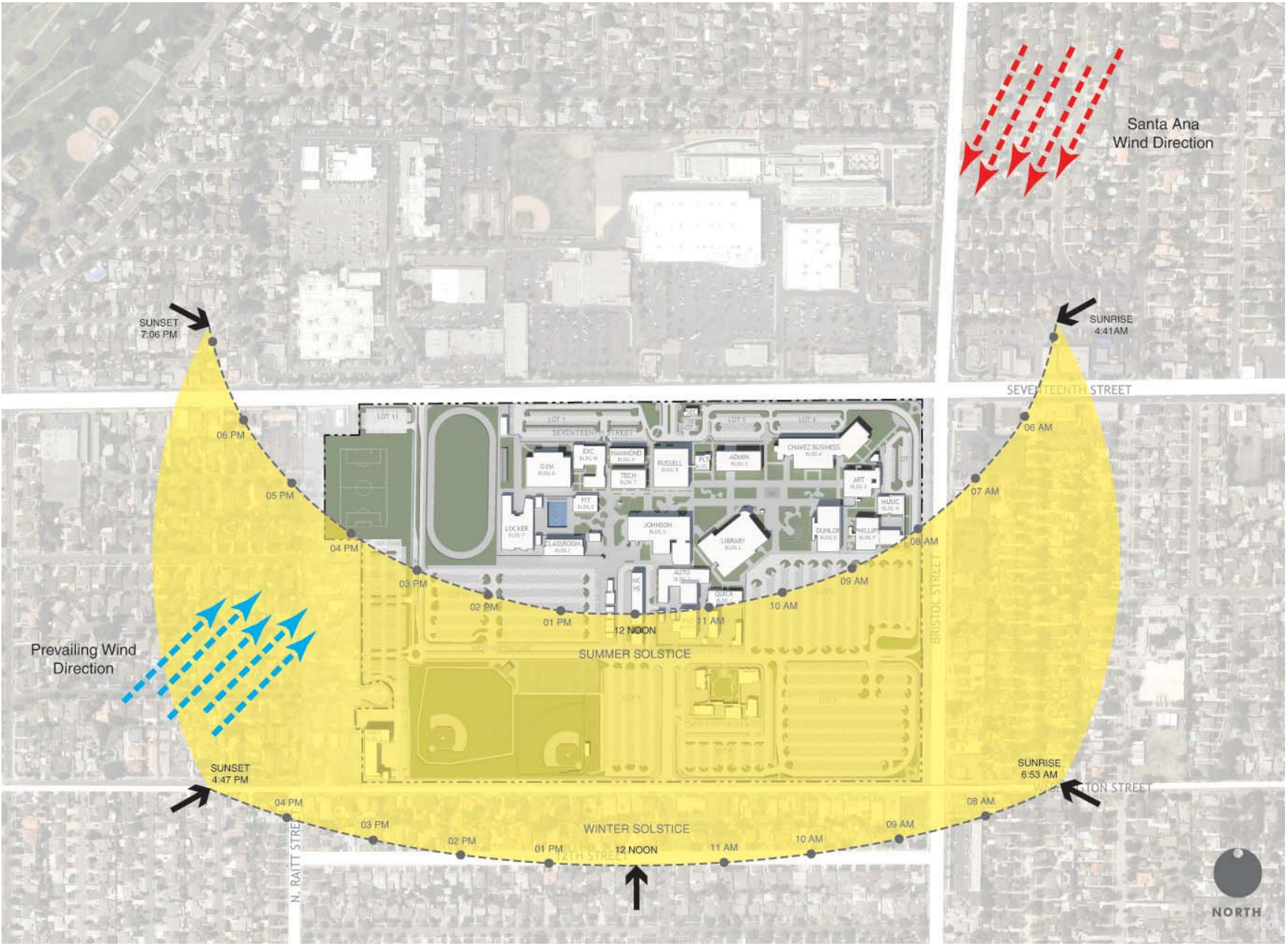
EXISTING CAMPUS

ENVIRONMENTAL CONDITIONS

Santa Ana College is located on the alluvial plane of the Santa Ana River. Its climate is tempered by the Pacific Ocean, however it is often beyond the cover of the coastal marine layer of low clouds. Due to its location near the mouth of the Santa Ana Canyon, the campus can be strongly impacted by the Santa Ana winds.

Observations:

- Conditions are often comfortable for outdoor activities.
- Outdoor gathering spaces would benefit from shade and screening from the Santa Ana winds.



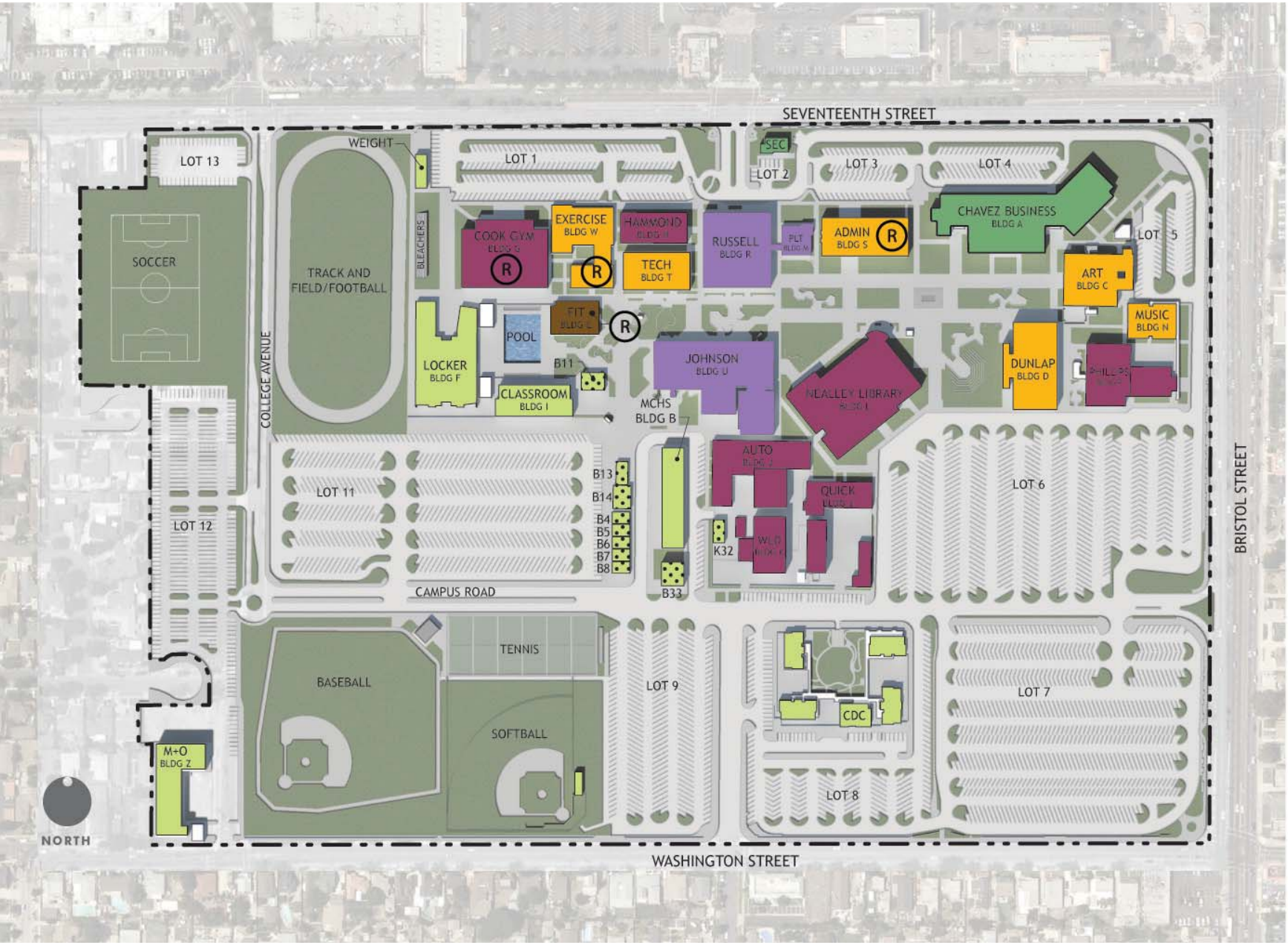
ENVIRONMENTAL CONDITIONS

CAMPUS DEVELOPMENT HISTORY

After moving to this site in 1947, Santa Ana College has been steadily expanding its building stock. Its buildings represent every decade from the 1940s to the 2010s, except for the 1980s.

Observations:

- Fitness Building E opened in 1948. It was remodeled recently.
- Phillips Hall and Music Building N have major issues due to age.
- Building J and K also have issues due to age.



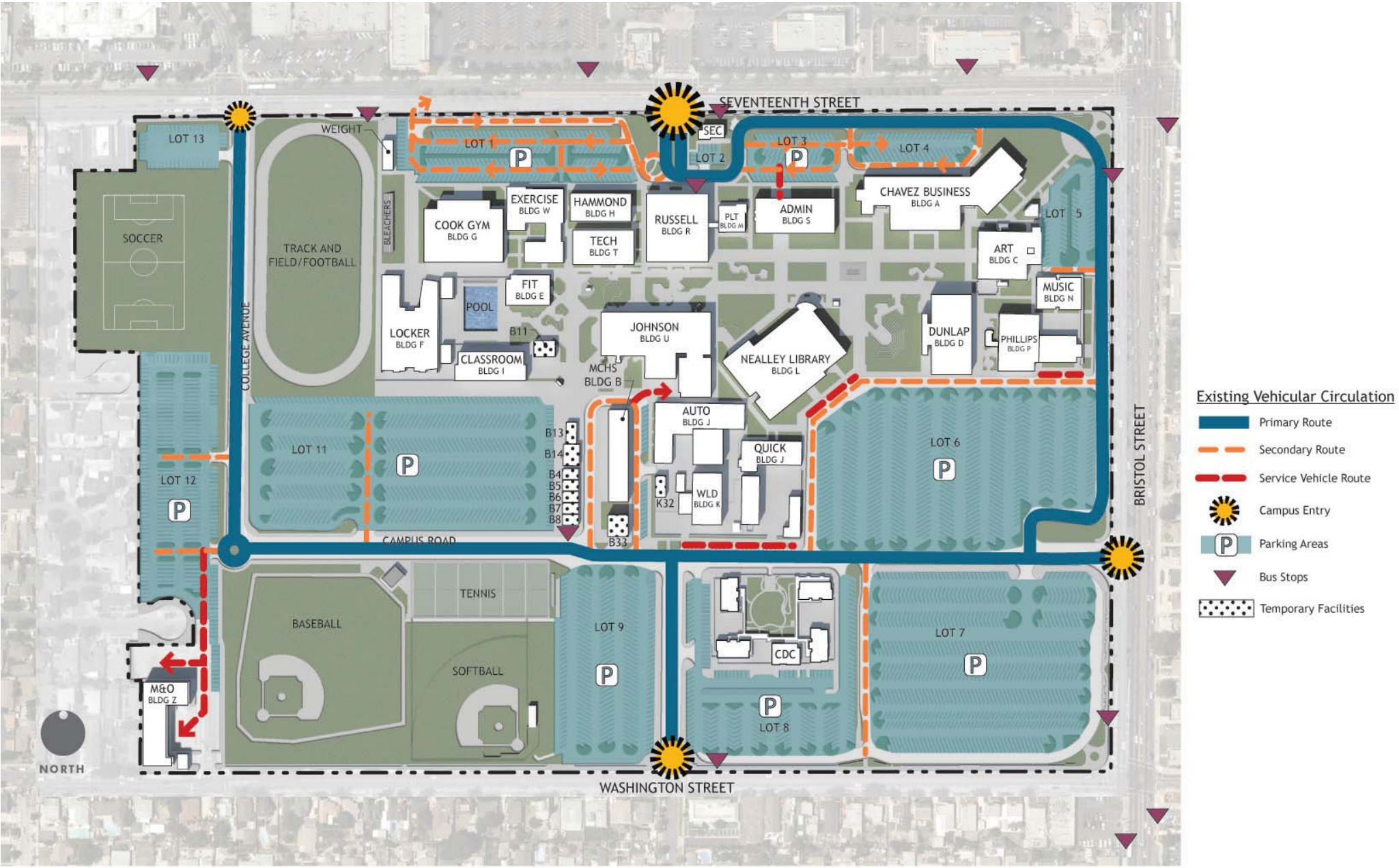
CAMPUS DEVELOPMENT

VEHICULAR CIRCULATION

The primary campus entries are located on Seventeenth Street, Bristol Street and Washington Street. Primary vehicular traffic is accommodated by internal streets.

Observations:

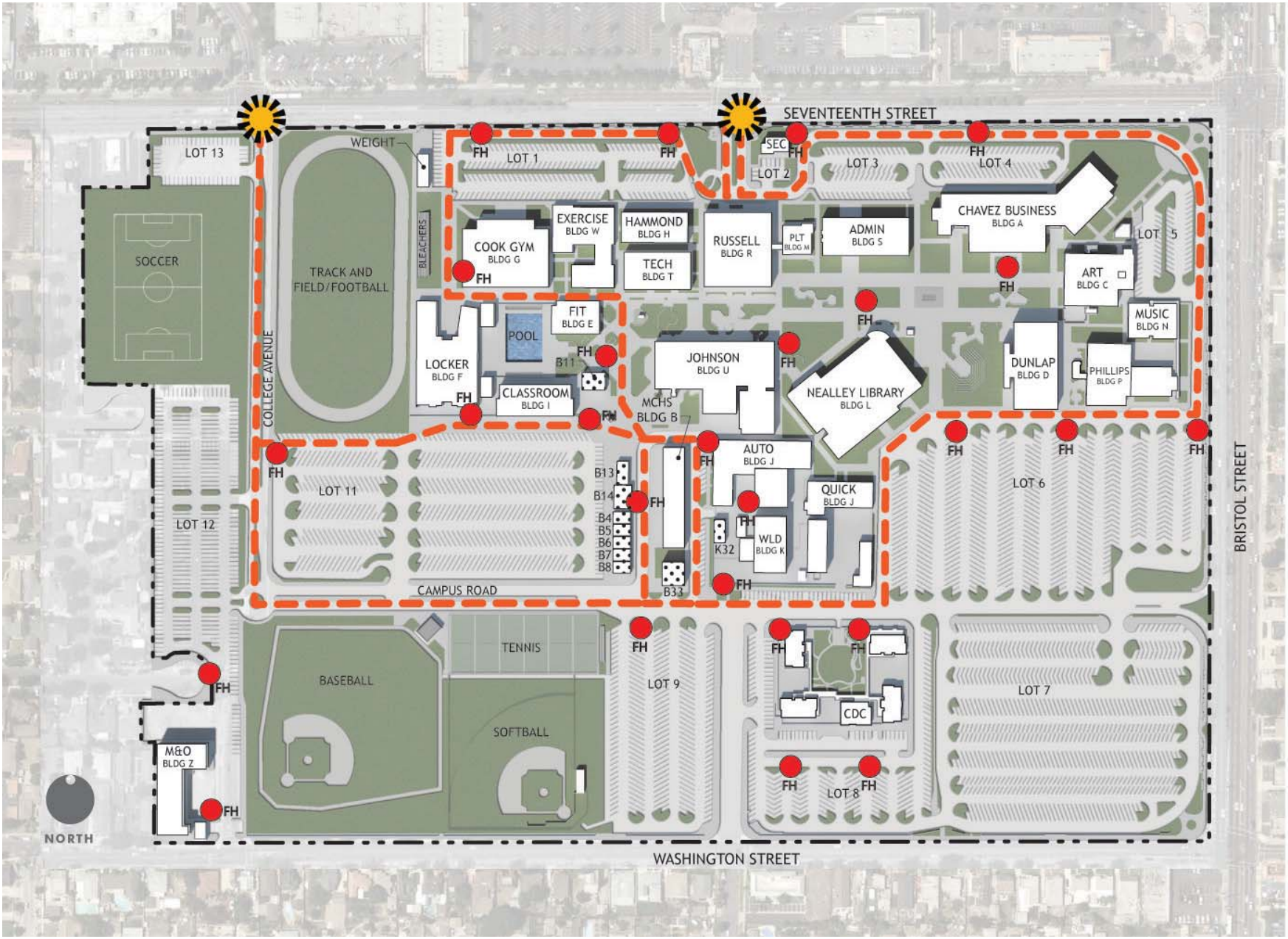
- The Santa Ana College Entry is impacted by delivery trucks, school buses, passenger loading, and visitors stopping at the Campus Security Building.
- Exiting to Seventeenth Street via the driveway at the west end of Parking Lot 1 is complicated by limited sight lines.
- Large delivery trucks and pedestrians use the same path, west of Middle College High School.
- In fall 2009, the ratio of parking spaces to students was 1 to 6.5, showing a need to plan for additional parking.
- The circulation and parking adjustments for the recently-opened Child Development Center has yet to be designed.



VEHICULAR CIRCULATION

EMERGENCY CIRCULATION

The fire water lines and hydrants have been recently upgraded in accordance with the requirements of the Santa Ana Fire Department. Fire hydrants located outside of the Central Mall will be used, including those along Seventeenth and Bristol Streets, Campus Road, and Parking Lot 6.


SEVENTEENTH STREET
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SOCCER
TRACK AND FIELD/FOOTBALL
WEIGHT
BLEACHERS
COOK GYM BLDG G
EXERCISE BLDG W
HAMMOND BLDG H
TECH BLDG T
RUSSELL BLDG R
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ADMIN BLDG S
CHAVEZ BUSINESS BLDG A
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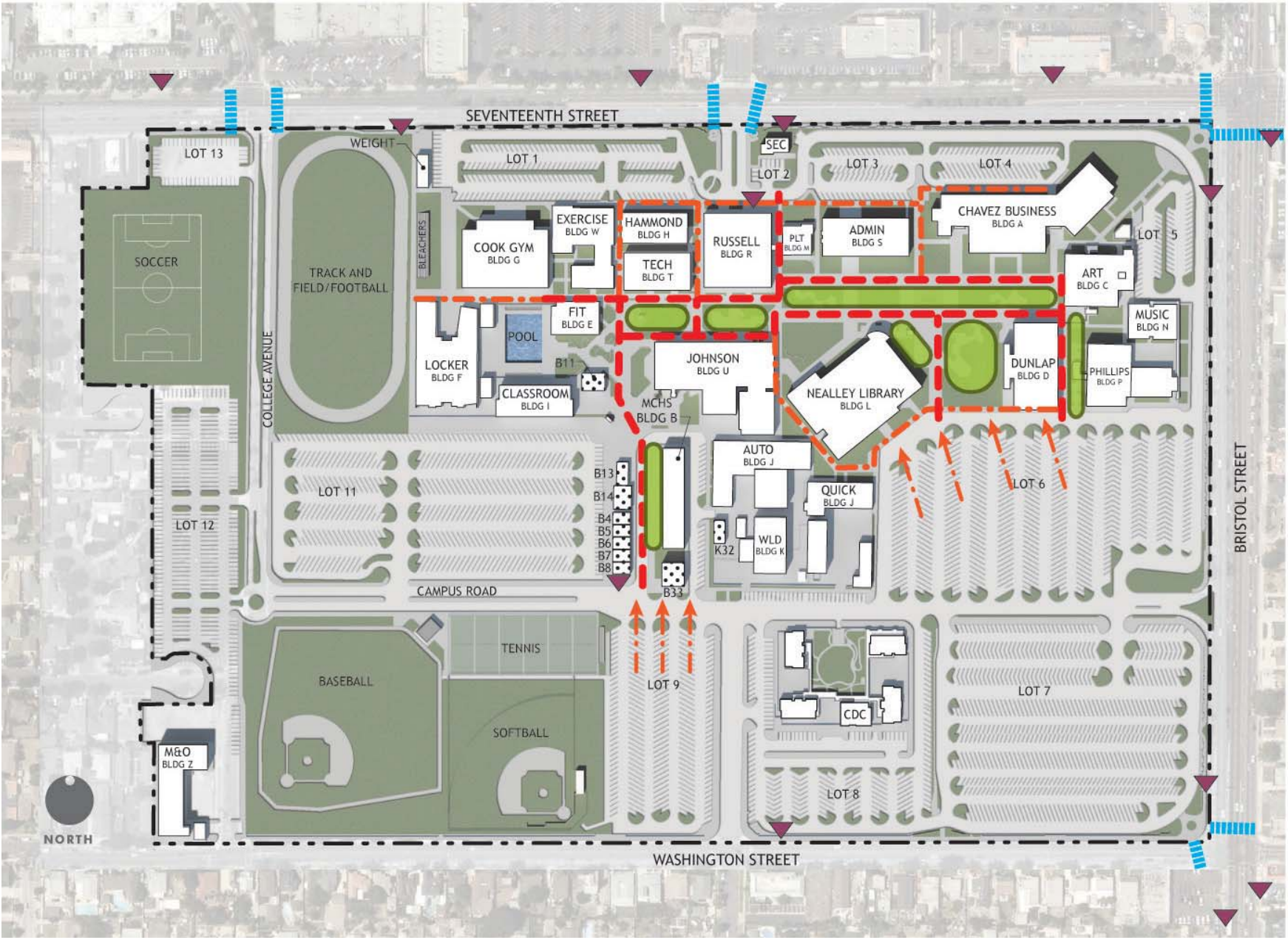
MUSIC BLDG N
PHILLIPS BLDG P
DUNLAP BLDG D
NEALLEY LIBRARY BLDG L
JOHNSON BLDG U
AUTO BLDG J
QUICK BLDG J
WLD BLDG K
MCHS BLDG B
FIT BLDG E
POOL
LOCKER BLDG F
CLASSROOM BLDG I
M&O BLDG Z
CDC
TENNIS
BASEBALL
SOFTBALL
B11
B13
B14
B4
B5
B6
B7
B8
B33
K32
SEC
FH
NORTH
Existing Emergency Access
Fire Lane
Campus Entry
Fire Hydrant
Temporary Facilities

PEDESTRIAN CIRCULATION

Pedestrians flow into campus from the surrounding community, from bus stops, and from the well used parking lots and passenger loading zones. Both pedestrian and vehicular traffic are heavy in the early evening hours with reduced visibility.

Observations:

- Conflicts with vehicular traffic arise from the unchanneled pedestrian flow from parking lots across Campus Road and through the gaps in the property line wall along Bristol and Seventeenth Streets.
- The entrance of the new CDC faces away from the campus core, and needs an accessible connecting path.
- Public sidewalks along Seventeenth and Bristol Street are narrow and constrained by the property line walls.
- Pedestrian paths between Nealley Library, Johnson Center and Buildings J and K are isolated and narrow.



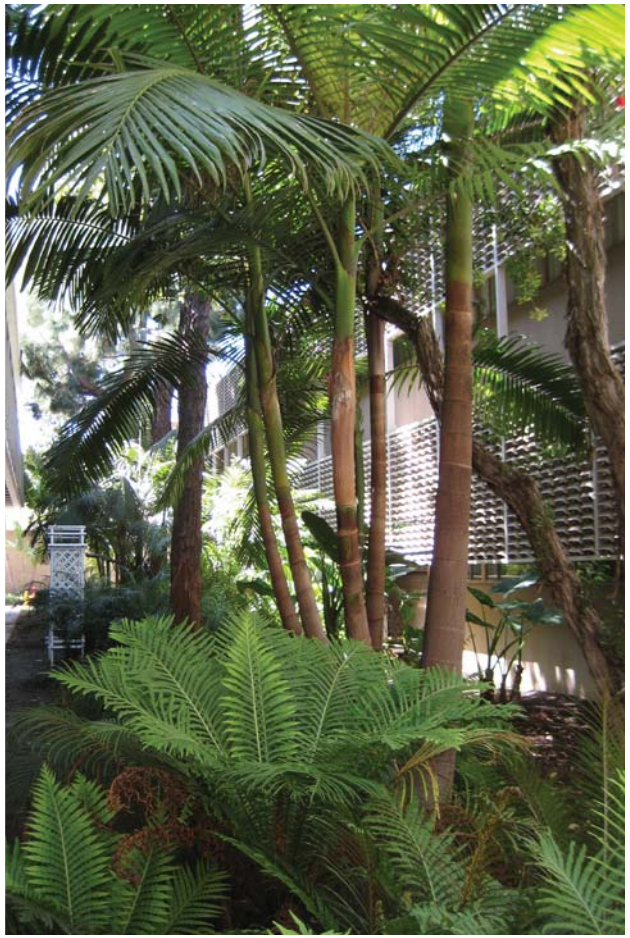
PEDESTRIAN CIRCULATION

CAMPUS LANDSCAPING

Santa Ana College has developed unique and beautifully landscaped open spaces using floral color, informal seating areas, and shade trees. The well scaled and proportioned Central Mall is especially loved by the College community. The College wishes to develop its diverse collection of trees into a community resource.

Observations:

- The Central Mall is hidden from the Community's view.
- Landscaping at the campus entrances and edges could do more to improve the College's image to the community and aid wayfinding.
- Landscaping in transition areas between the Central Mall and parking lots could do more to facilitate circulation and support programming.



Santa Ana College Arboretum Project 2010

Legend

▲ Arboretum Location

Existing Campus Landscape

- Residential Edge
- Community Edge
- Campus Mall
- Walks & Courts
- Transitional Spaces
- Parking Islands
- Athletics & Recreation
- Interior Streets
- Campus Entry
- Temporary Facilities

CAMPUS LANDSCAPING

CAMPUS ZONING

Over time, the zoning of functions has lost some clarity due to the need to locate or expand programs in available space. The expansion of the campus to the south and the west offers the opportunity to revisit and refresh campus zoning.

Observations:

- Functions such as Student Services and Library/Tutorial Support are distributed among several buildings.
- Vocational technology programs are distributed among several building and are located in the center of campus.
- The new Child Development Center changes the southern portion of campus and needs to be considered in the overall master plan.
- There is a need to optimize the use of the athletic field sector.
- The new M&O Building is on the edge of campus, and there is a need for a small centralized custodial support facility.

Existing Campus Zoning

- Administration
- Child Development Center
- Instructional
- Library / LRC
- Middle College High School
- Physical Education/Activities
- Services
- Student Services/Activities
- Temporary Facilities
- Community Use

CAMPUS ZONING

Appendix

APPENDIX

- Preliminary Options
- Solution Development
- Central Plant Study
- Infrastructure Master Plan

PRELIMINARY OPTIONS

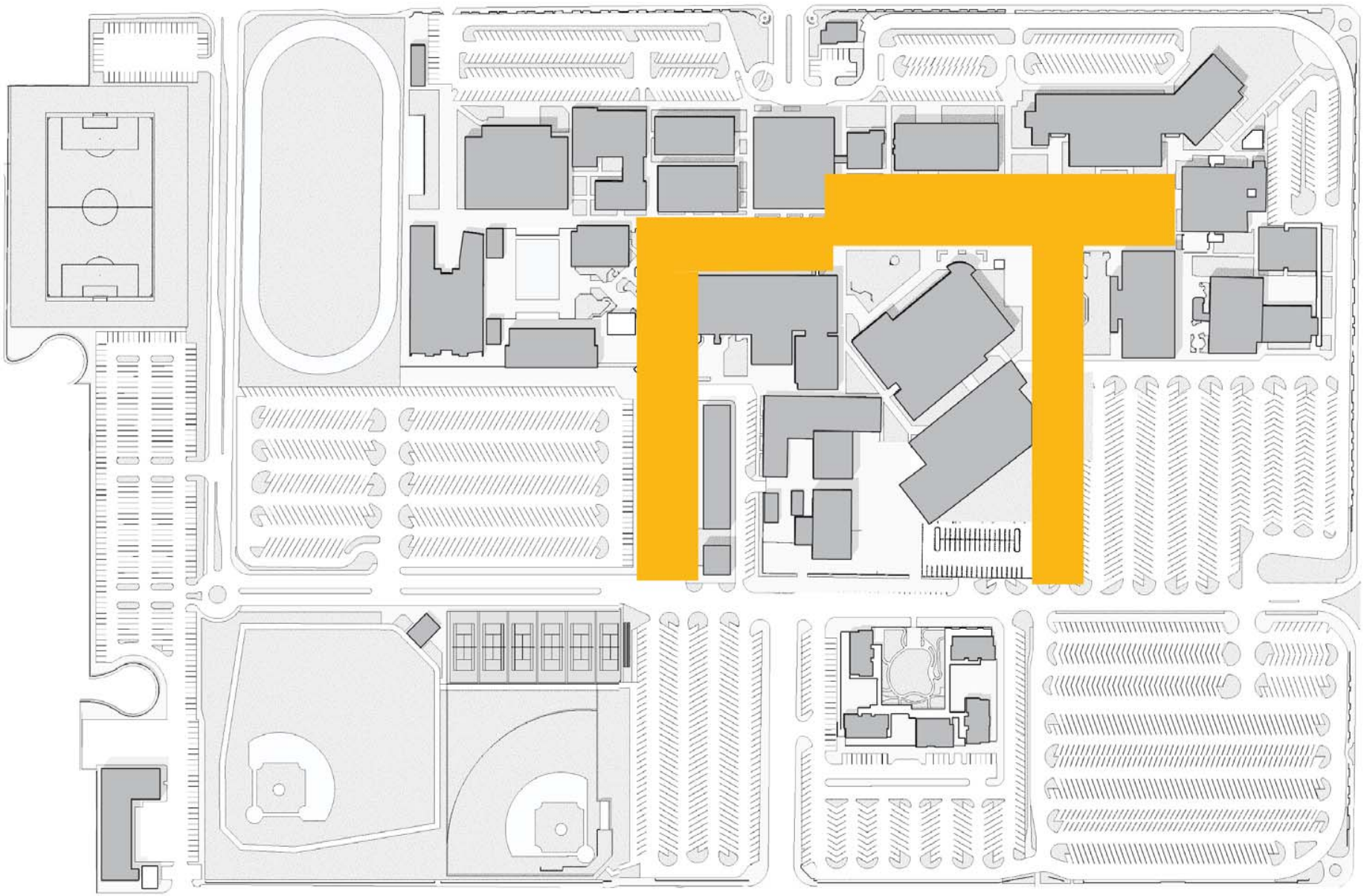
Following the analysis of existing conditions, the planning process included the review of several options which identified potential locations of new permanent facilities to accommodate growth, and replace aging facilities and temporary buildings.

- Physical Framework
- Student Services and Activities Zoning
- Johnson Center Rezoning
- Open Space Concepts
- Zones of Opportunity

Physical Framework

A new framework for future development was developed to reinforce entry points, extend circulation into new zones of development, and create gathering spaces to support gathering.

- Connections Across Campus
- Expansion of the Campus Core
- Quality of Student Spaces
- Public Image of Campus



PHYSICAL FRAMEWORK

Student Services and Activities Zoning

Existing Student Services, Student Activities and Library functions were mapped. The demonstrated need for additional space led to the proposal for a new building which will house all Student Services functions, as well as additional instructional space. Student Activities space will be expanded and rezoned in Johnson Center, which will also house faculty support space. Tutorial Support Services will be located in Nealley Library, which will be renovated to efficiently house all library and learning resources.

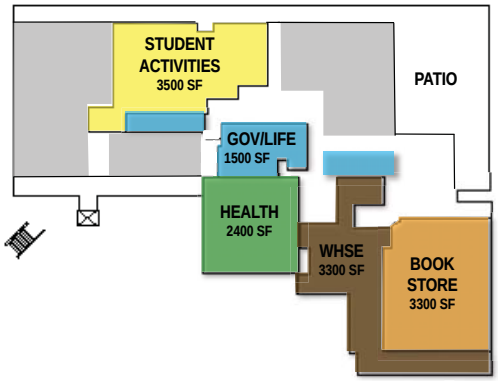
Existing Multi-Building Zoning

Proposed Multi-Building Zoning

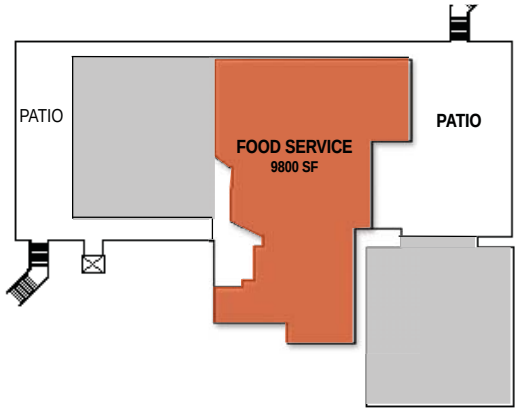
Johnson Center Rezoning

The existing zoning was mapped, and Student Services and Library functions were identified for relocation in other buildings. A proposed zoning scheme was developed for the remaining Student Activities and Faculty Support Services.

Existing Johnson Center Zoning

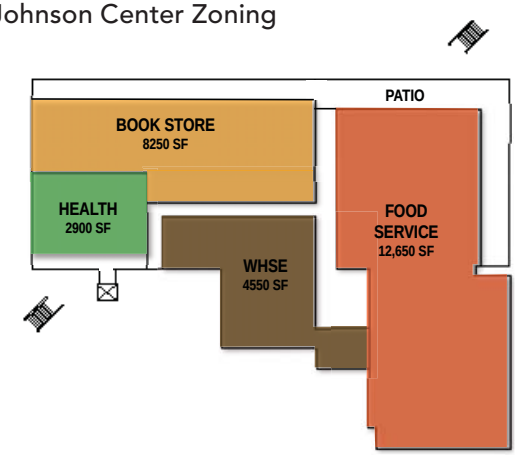


1ST FLOOR

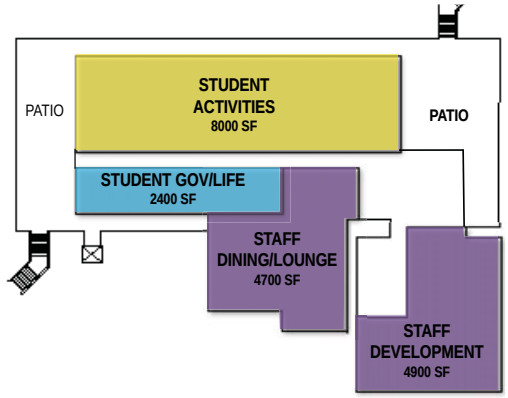


2ND FLOOR

Proposed Johnson Center Zoning



1ST FLOOR



2ND FLOOR

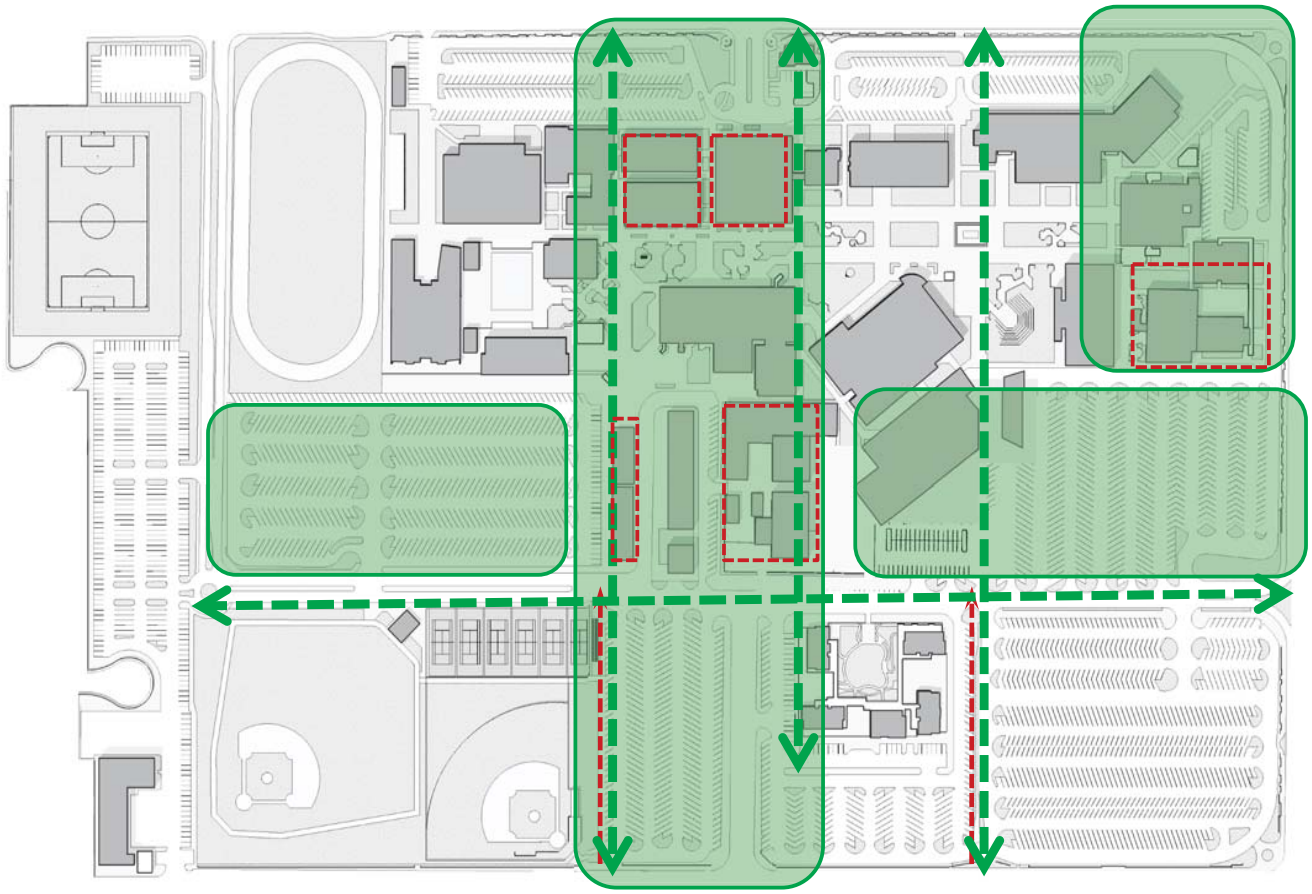
Open Space Concepts

Open space concepts were reviewed.

- Linear Tree Arboretum
- Bioswale Parking
- Expansion of Campus Core
- Distinctive Tree Walks
- Rain Garden Study Areas
- Quality of Student Spaces
- Collaboration Gardens
- Shaded Plug-in Areas
- Tree Grove Entrances
- Flower Tree Walks

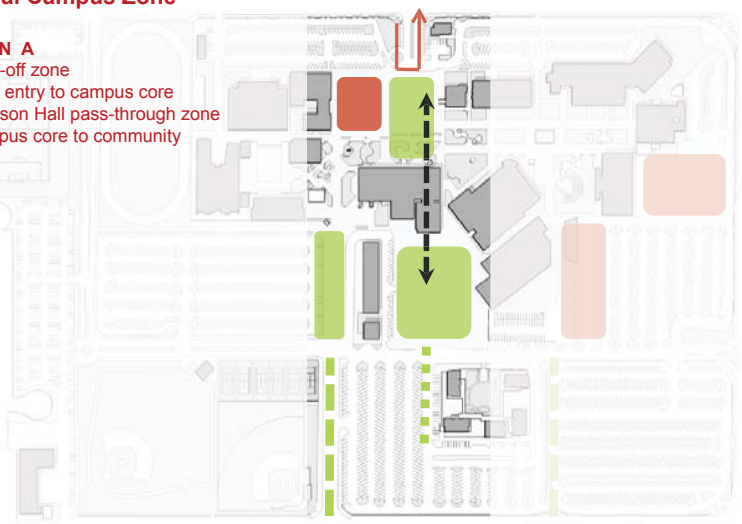
Zones of Opportunity

Campus zones with a potential to benefit from redevelopment were identified. Conceptual options for each zone were presented.



OPPORTUNITIES
Central Campus Zone

OPTION A
- Drop-off zone
- Main entry to campus core
- Johnson Hall pass-through zone
- Campus core to community

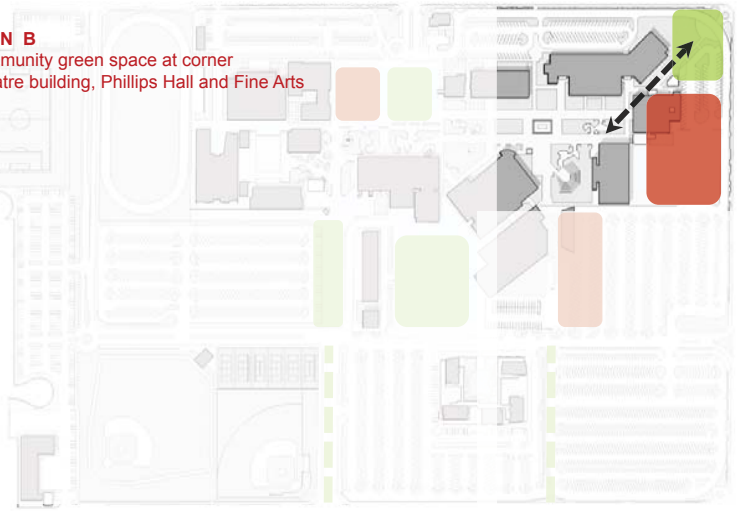


OPPORTUNITIES
East-west Zone

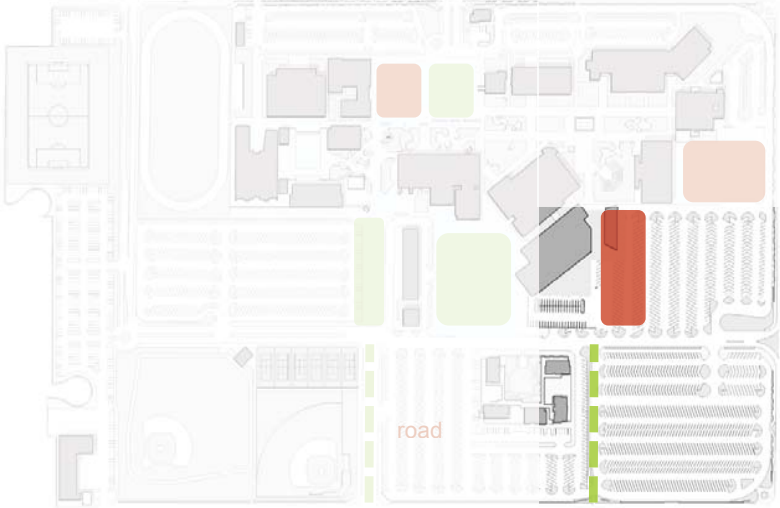
OPTION A
- Parking structure at both ends
- Central green
- Science zone on east
- M&O and HS on west

OPPORTUNITIES
Arts Zone

OPTION B
- Community green space at corner
- Theatre building, Phillips Hall and Fine Arts



OPPORTUNITIES
Science Zone



ZONES FOR POTENTIAL CHANGE

SOLUTIONS DEVELOPMENT

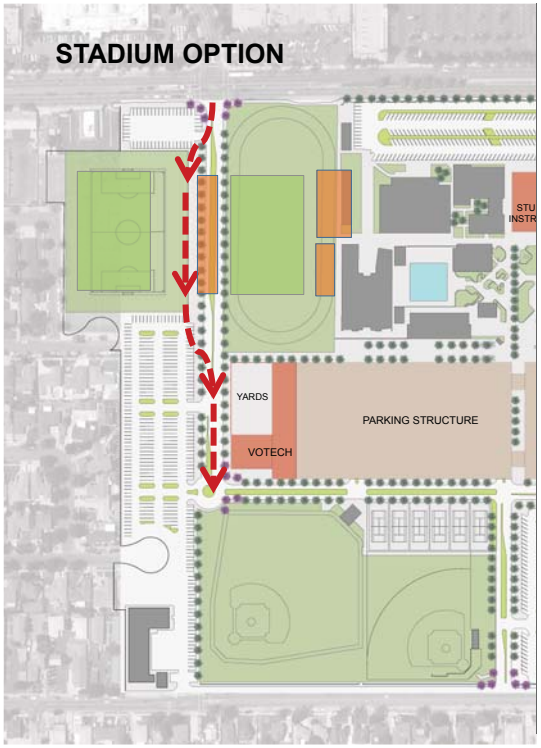
Following the identification of the physical framework and zones of opportunity, options for future development were presented. As part of this process, the following considerations were reviewed.

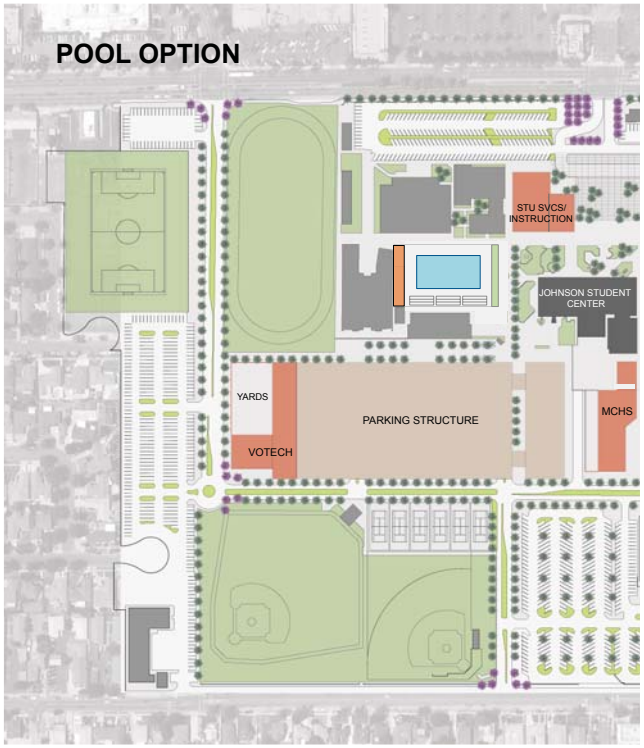
- Recreation Zone Options
- Campus Entry Options
- Parking Structure Aesthetics
- Storm Water Management

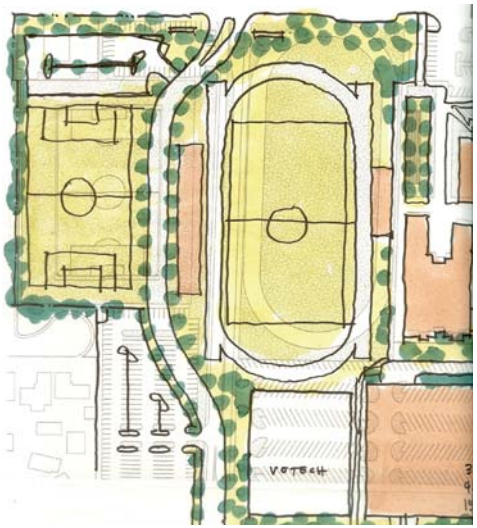
Recreation Zone Options

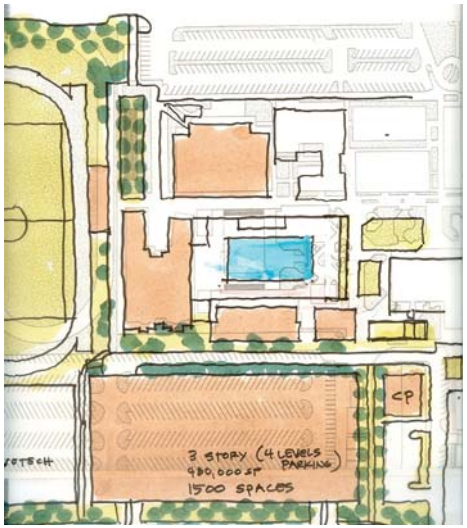
Two options for athletic facilities were presented.

- An option to convert the track and field to a stadium venue with bleacher seating added to the west of the field. The space for this addition would be gained by realigning College Avenue and adjusting the plans for the planned soccer field.
- An option to replace the swimming pool with a 50 meter pool supported by energy and water efficient mechanical and heating systems. The space for the larger pool would by gained by replacing Building E and relocating those functions to newer facilities.



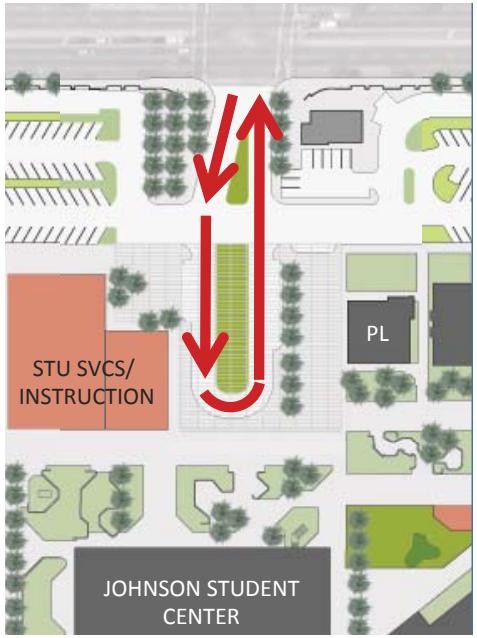


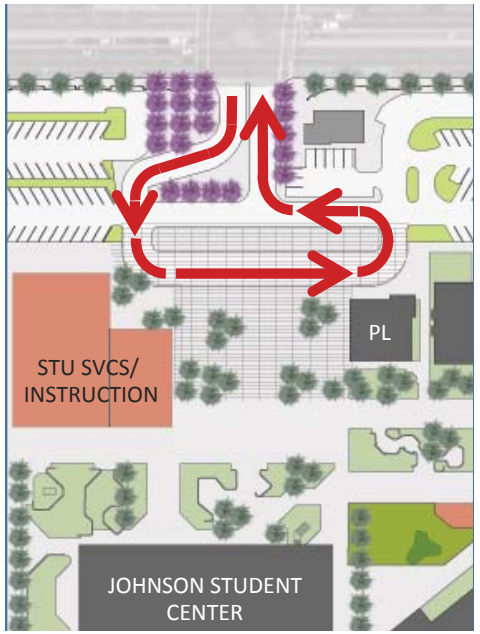




Campus Entry Options

A solution is needed to provide space for student drop-off, delivery vehicles and buses bringing visitors to the Tessmann Planetarium, with a minimum of interference with through traffic on the campus driveway. Two options for a reordered campus entry were presented.





Parking Structure Aesthetics

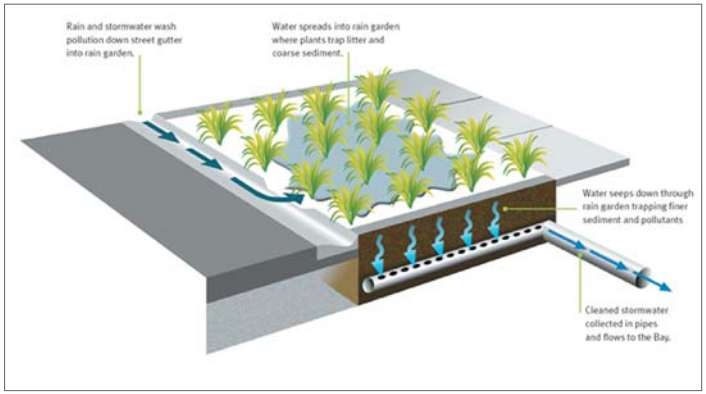
Examples of aesthetic quality achieved through design, including color and material selection and landscape screening, were presented. Examples of the integration of photovoltaic renewable energy systems were also presented.

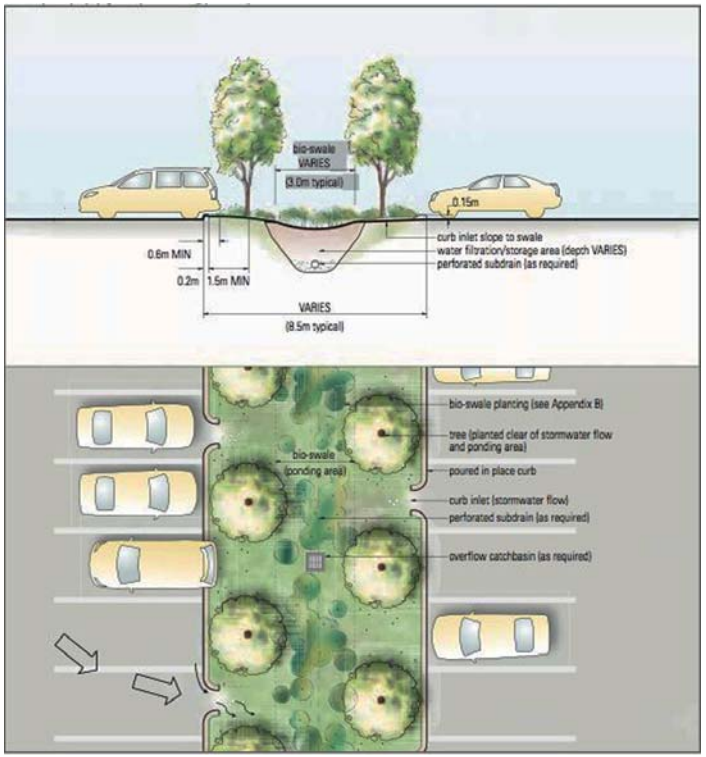
- Architectural Design Examples
- Landscape Screening Examples
- Photovoltaic Integration Examples

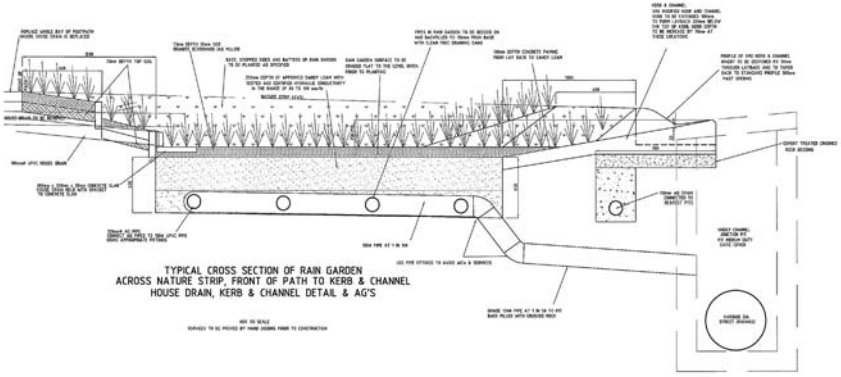
Storm Water Management

These integrated landscape strategies will help to retain, slow and filter storm water near the source, lessening the burden on the campus and municipal drainage systems. See Storm Water Management plate on page 55.

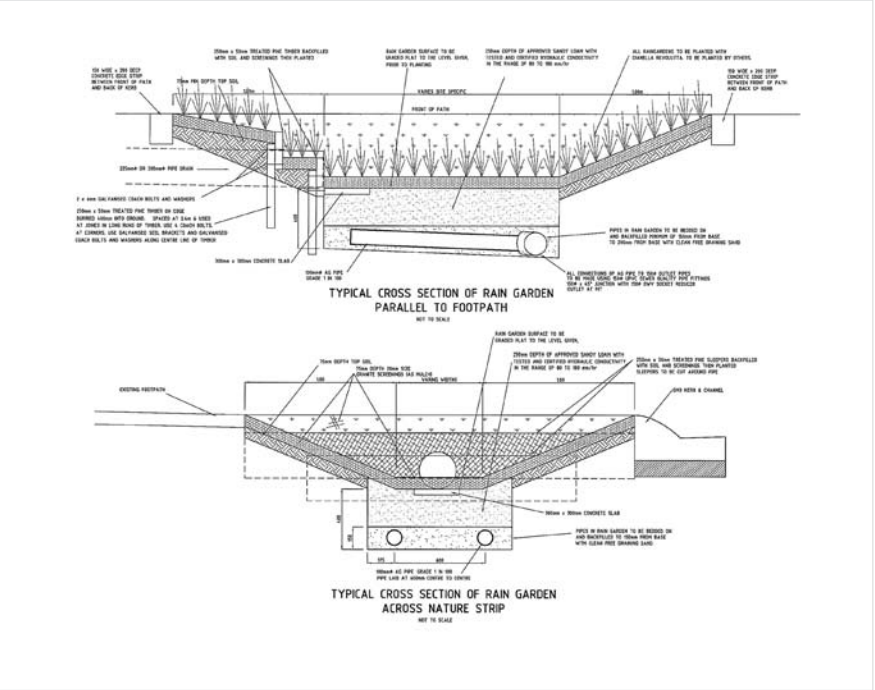
- Bio-swales - Bio-swales will be incorporated in the medians and sides of campus streets and in the edges and islands of parking lots.
- Rain Gardens - Rain Gardens will be incorporated into seating areas, especially near the entrances of buildings. They will receive water from roof drains and impervious plazas, and provide outdoor space for study and collaboration.







TYPICAL CROSS SECTION OF RAIN GARDEN
ACROSS NATURE STRIP, FRONT OF PATH TO KERB & CHANNEL
HOUSE DRAIN, KERB & CHANNEL DETAIL & AG'S



TYPICAL CROSS SECTION OF RAIN GARDEN
PARALLEL TO FOOTPATH

TYPICAL CROSS SECTION OF RAIN GARDEN
ACROSS NATURE STRIP

CENTRAL PLANT STUDY

The centralized or district cooling plant is a highly effective strategy to reduce the College's energy use and carbon footprint. The full text of the Santa Ana College Central Plant Study is provided in digital form on the accompanying disc. The proposed conceptual plan for a chilled water distribution loop is shown on page 201.

Executive Summary

This study looked at the feasibility of constructing a new central cooling plant for Santa Ana College (SAC). We concluded the campus will best be served by a plant with 1000-tons of chiller capacity and 8,700-ton-hours of thermal energy storage. The new plant will be located on campus. The plant will consist of a two story chiller & pump building and a cylindrical thermal energy storage tank. There also will be an underground chilled water distribution pipe system installed to connect the campus buildings to the central plant. The proposed central plant will reduce energy cost with better operating efficiency and reduced peak energy demand as compared to the existing systems.

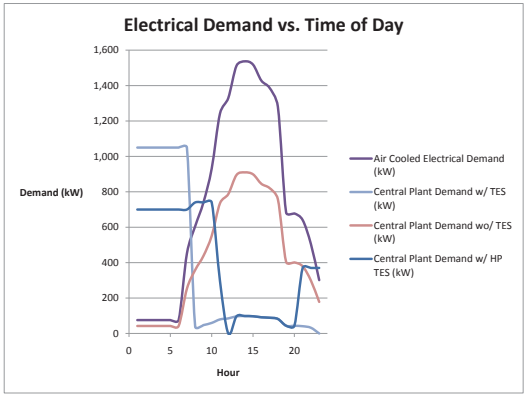
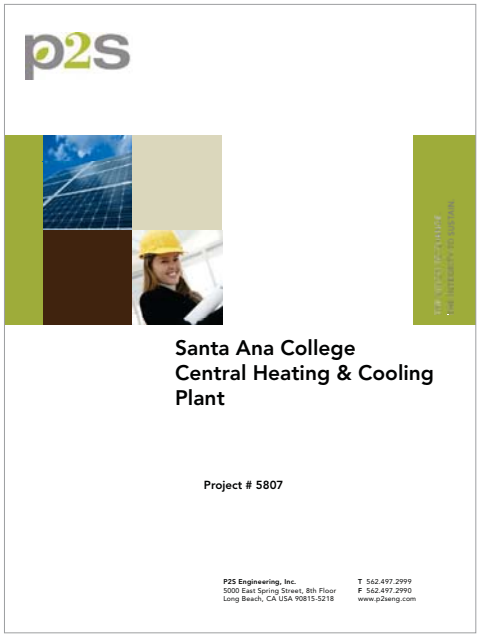


Figure 1-2.4 Graphical representation of the College's cooling load profile and energy demand. Note that the systems with TES reduced peak demand from over 1500kW to about 100kW.

We estimated the energy, operating, and construction costs for a central plant to connect to ten of the existing campus buildings and seven new buildings. We compared three different plant designs against the existing systems on campus. We determined that a plant designed with a thermal energy storage capacity sized to cover the peak electrical demand period to be an optimal design.

The available space on campus to locate a central plant is limited. We propose that a two level plant be built to reduce the footprint of the building. The central plant can have a footprint as Santa Ana College Central Plant August 2010 as small as 55ft x 35ft. The lower level will house two chillers and four chilled water pumps. The upper level will have the two cooling towers and two condenser water pumps. The upper level will not have a roof. The thermal energy storage tank will be 60ft in diameter and 45ft tall.

Most of the buildings are due for HVAC upgrades, because the equipment is at the end of its service life. Our buildings' report details what must be done at each building to convert it to central plant operations. The improvement to the buildings to central plant operations will reduce the maintenance efforts needed in each building and will better indoor space conditions. The amount of work needed in each building is reflected in our cost estimate.



INFRASTRUCTURE MASTER PLAN

Santa Ana College has integrated the planning for infrastructure development into the 2011 Facilities Master Plan. The existing infrastructure for the following systems were documented and analyzed, and phased plans to support the master planned development were prepared.

- Domestic Water
- Fire Protection Water
- Sanitary Sewer
- Storm Water
- Electrical
- Communications
- Natural Gas
- Chilled Water

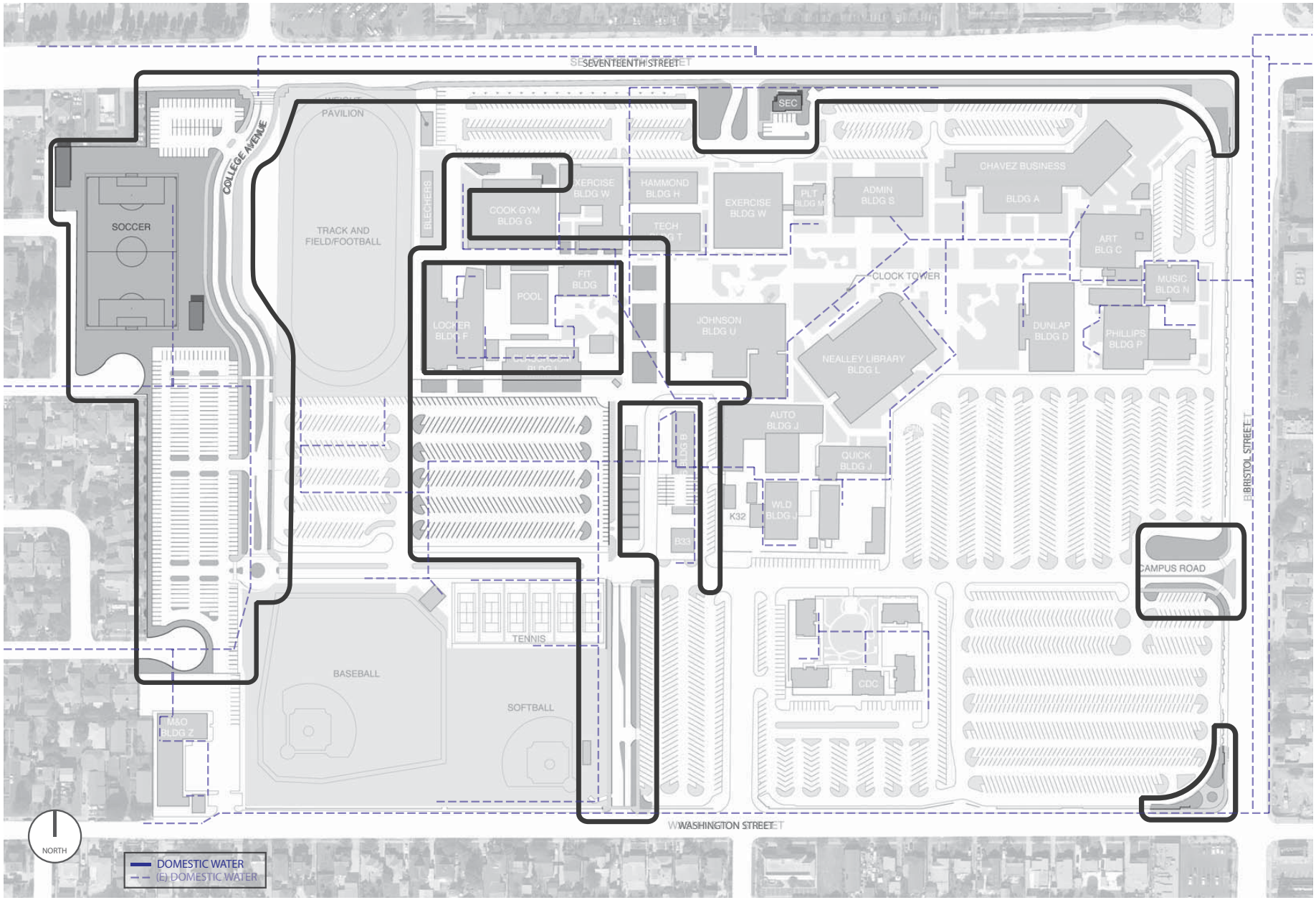
Domestic Water

Existing Conditions

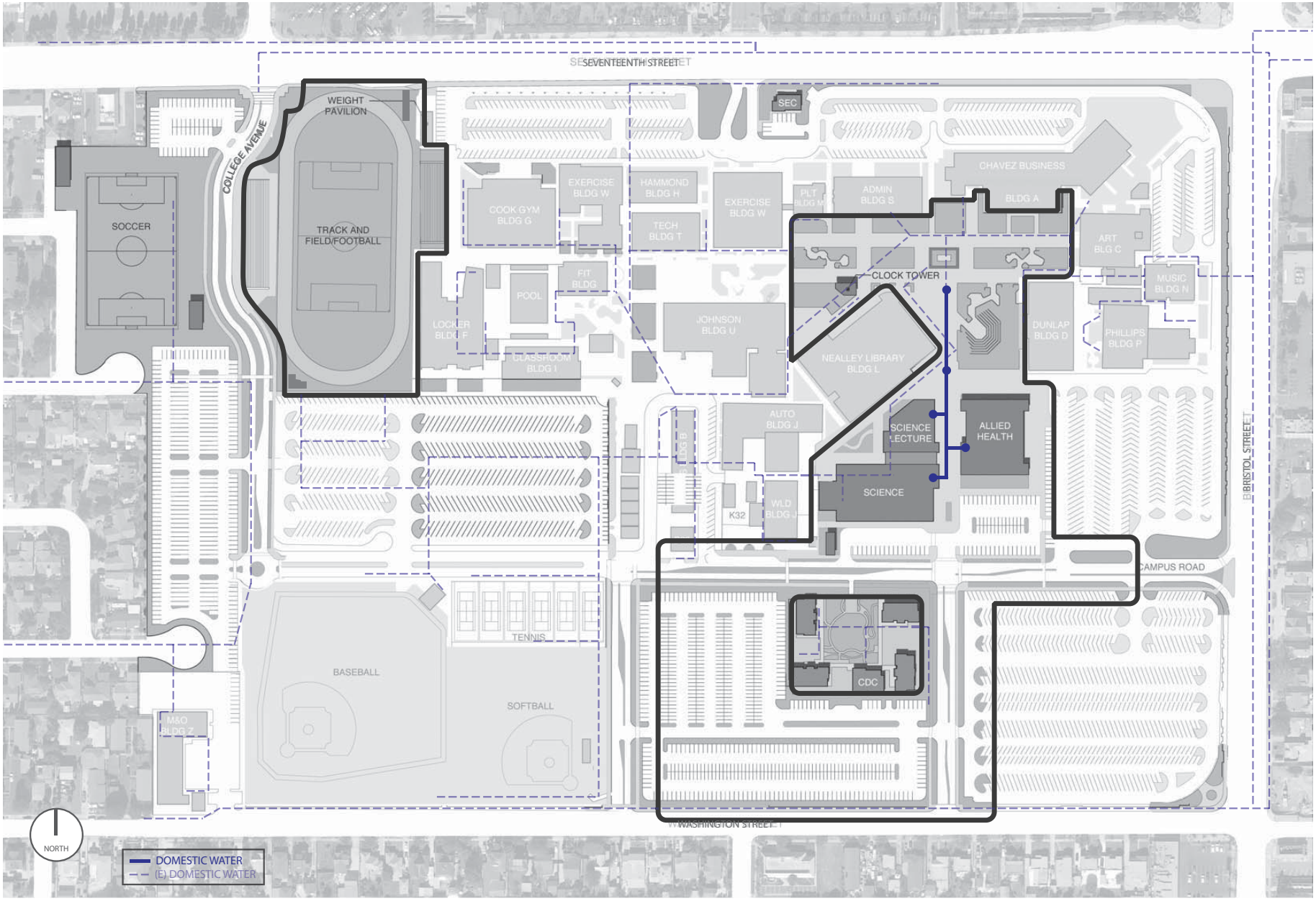
The Domestic Water system at Santa Ana College was developed over the years as the campus expanded. There are small water meter connections (3-inch) on both 17th Street and Bristol Street to serve the North end of campus. To the East end of Campus Road lies a 12-inch abandoned water main that used to provide City water to the neighborhood. The abandoned line runs from Bristol down Campus Road to Pacific Avenue and back to Washington Avenue. When the City did upgrades on Bristol Avenue a few years this line was abandoned in place. To the South there is a 3-inch water meter off Washington Avenue to serve the softball field for both domestic and irrigation purposes. The newly constructed M&O building at the south end of College Avenue has a water meter connection to the main line that exists in Martha Lane. The City water main on Martha Lane comes through campus on College Avenue, heads northward and then loops back West on 15th Street. The baseball field and Tennis courts are fed by a connection from College Avenue. The old CDC building at the corner of College and 15th is served by a water meter on 15th Street. Please note there is no reclaimed water on-site.

Proposed Conditions

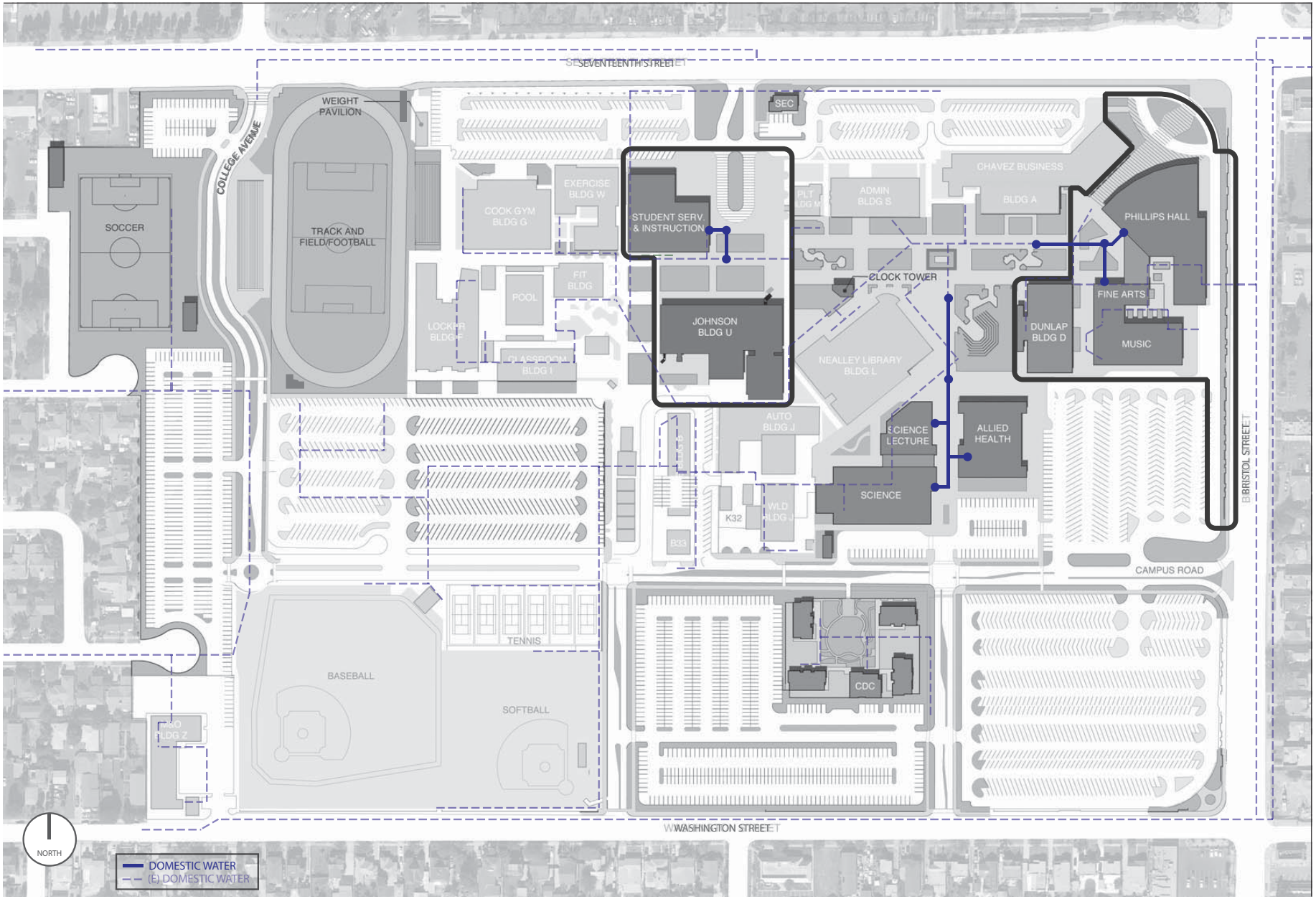
The campus master plan proposes several new buildings to the East side of the campus, all of which can be served by extending water service over from the core of campus.



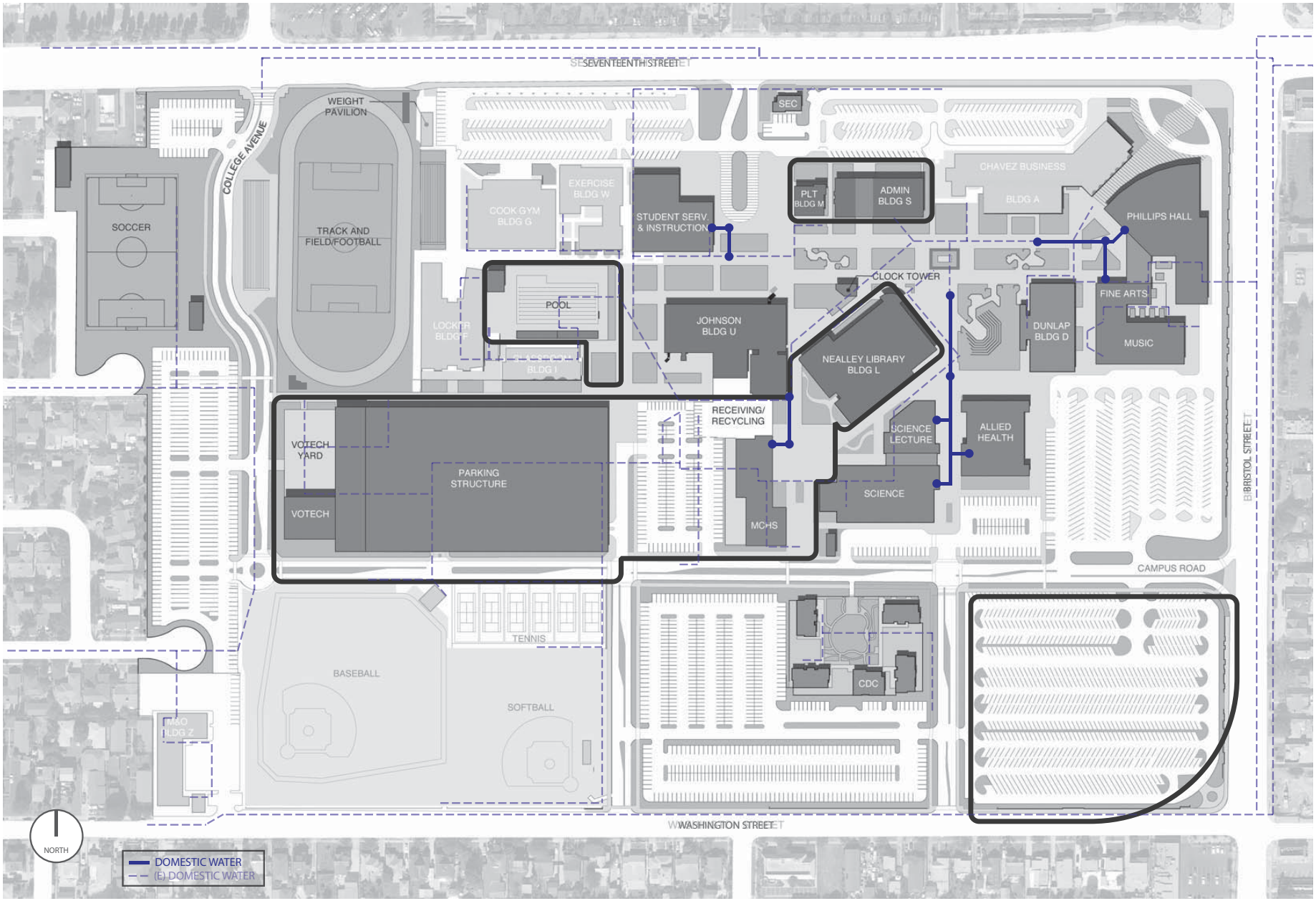
Domestic Water - Phase 1



Domestic Water - Phase 2



Domestic Water - Phase 3



Domestic Water - Phase 4

Landscape Irrigation

Existing Conditions

The landscape irrigation system has been upgraded over the years. Some parts of campus have automatic irrigation controllers. Some controllers and irrigation lines are in need of repair, and existing controllers are made by different manufacturers.

Proposed Upgrade

The master plan proposes a unified system to serve the entire campus. A standard will be established and will specify irrigation controllers with smart timers that can be accessed through the internet. The conversion to these standards will be incorporated into the various phases of the master plan. Outdated and non-functioning devices will be replaced, and areas currently being watered manually will be connected to the automated campus irrigation systems.

This upgrade will take advantage of modern technology, standardize the irrigation system, maintain the campus appearance, and conserve water.

Fire Protection Water

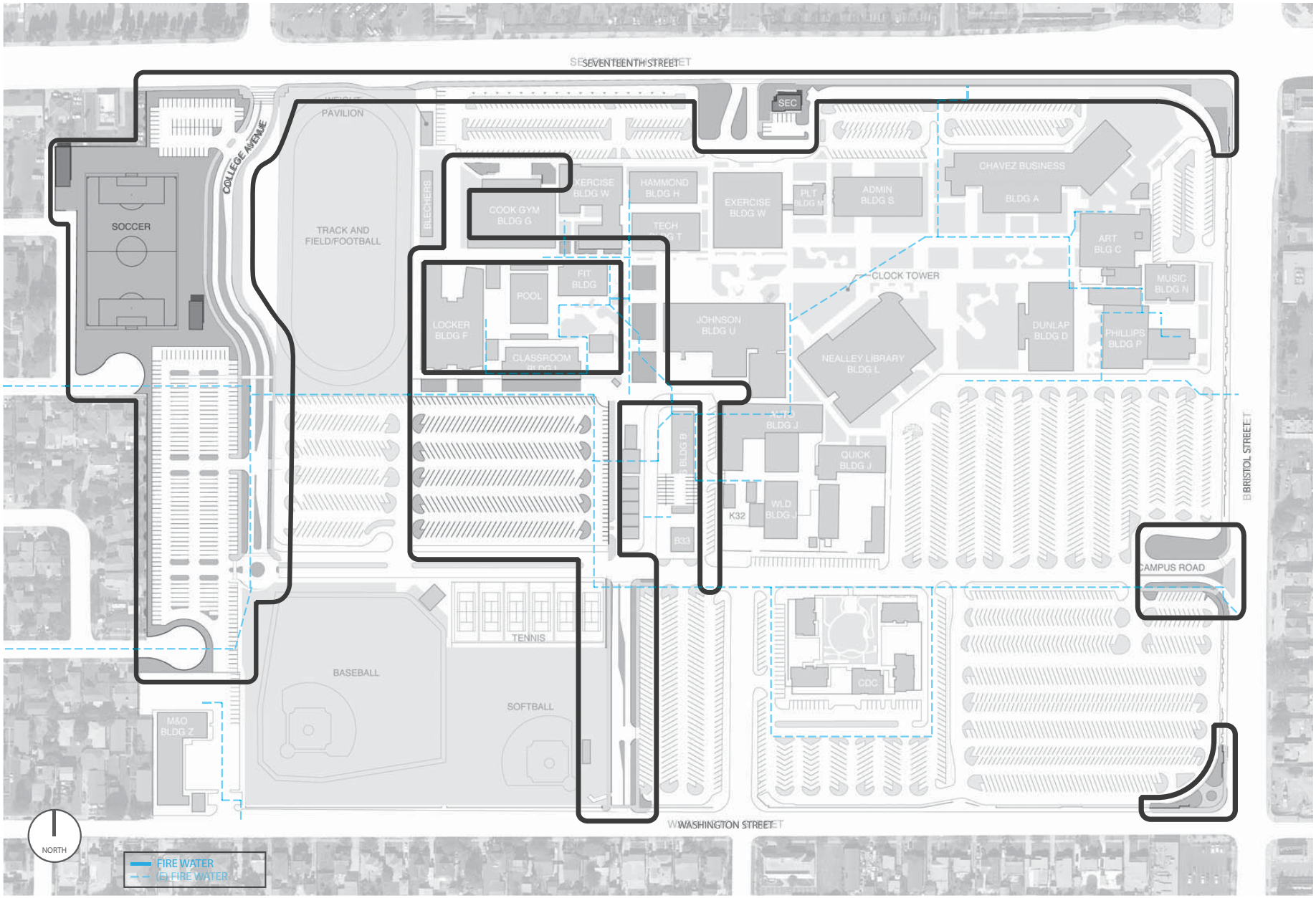
Existing Conditions

The fire water protection system on the Santa Ana College campus has undergone significant changes over the past two years. Initially, the system was served by a single 8-inch line off Bristol Avenue that then meandered through the campus core, mostly in 6-inch line, feeding fire hydrants and buildings. When the system was flow tested four to five years ago, only 1,200 gpm was observed in many of the 6-inch lines. The Santa Ana Fire Prevention Bureau suspended approvals on all future projects until a newer more substantial system could be installed.

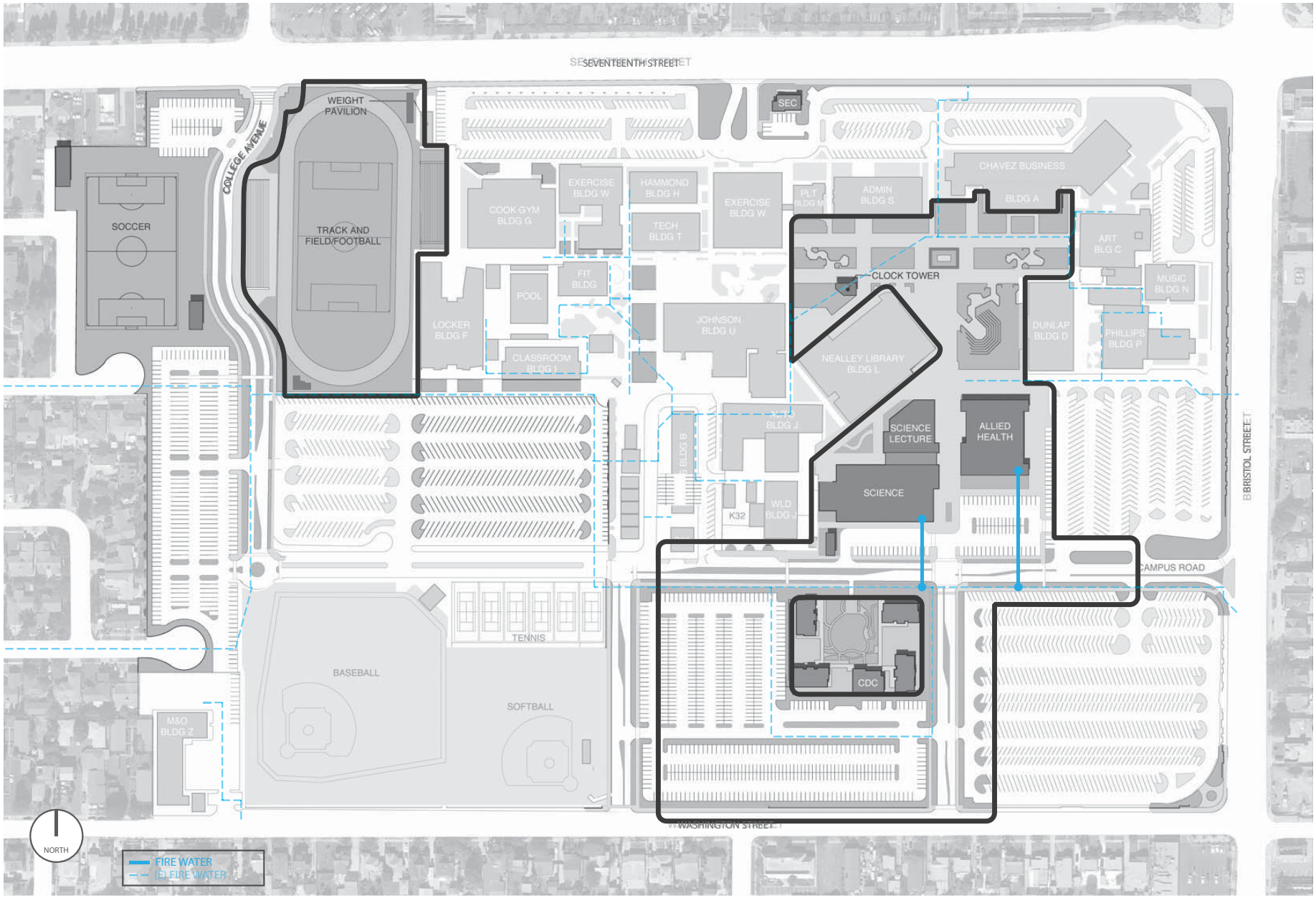
Over the last three years the new fire water system was installed in two phases. Phase 1 included a new 10-inch fire water line off College Avenue which headed due East and cross connected to the existing 6-inch line near Johnson Center. New 6-inch lines were run off the 10-inch main North to serve Cook Gym building and two adjacent buildings. Then in Phase 2, a new 12-inch fire main was run from Bristol Street (at Campus Road) West on Campus Road in front of the new Child Development Center, and further West to the existing soccer field. At this point it turned northward and cross connected to the 10-inch main. The connections on Bristol (at Campus Road) and on College Avenue, each have a master Fire Department Connection (FDC) which allows the system to be back fed from the City main line hydrants. The system is now "looped" and flow rates of up to 4,500 gpm were observed and tested on the 12-inch main portion.

Proposed Conditions

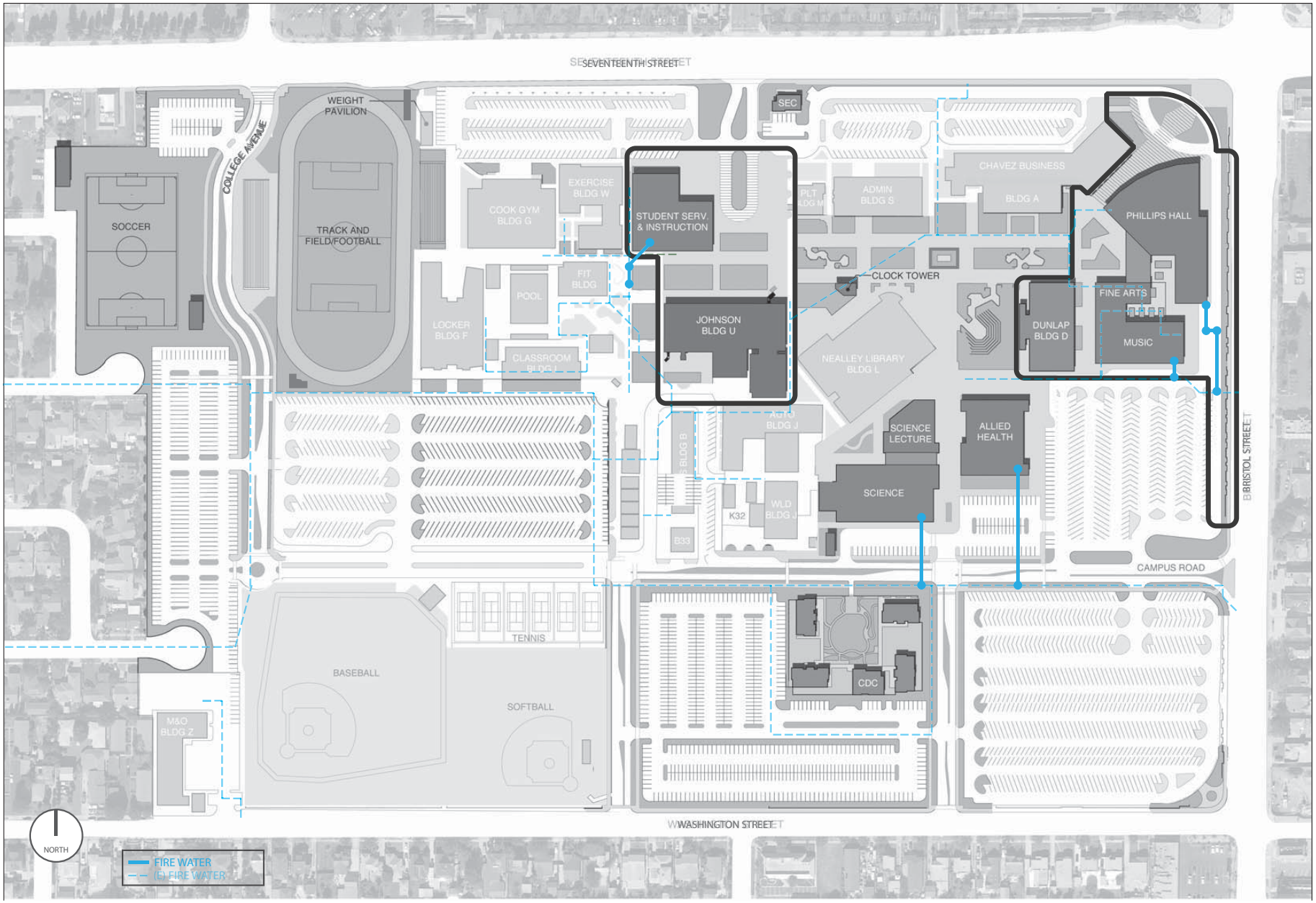
The master plan proposes numerous new buildings to the East side of the campus and one very large parking structure to the West side of campus. All of these structures can be served via the newly installed 10-inch and 12-inch fire water lines.



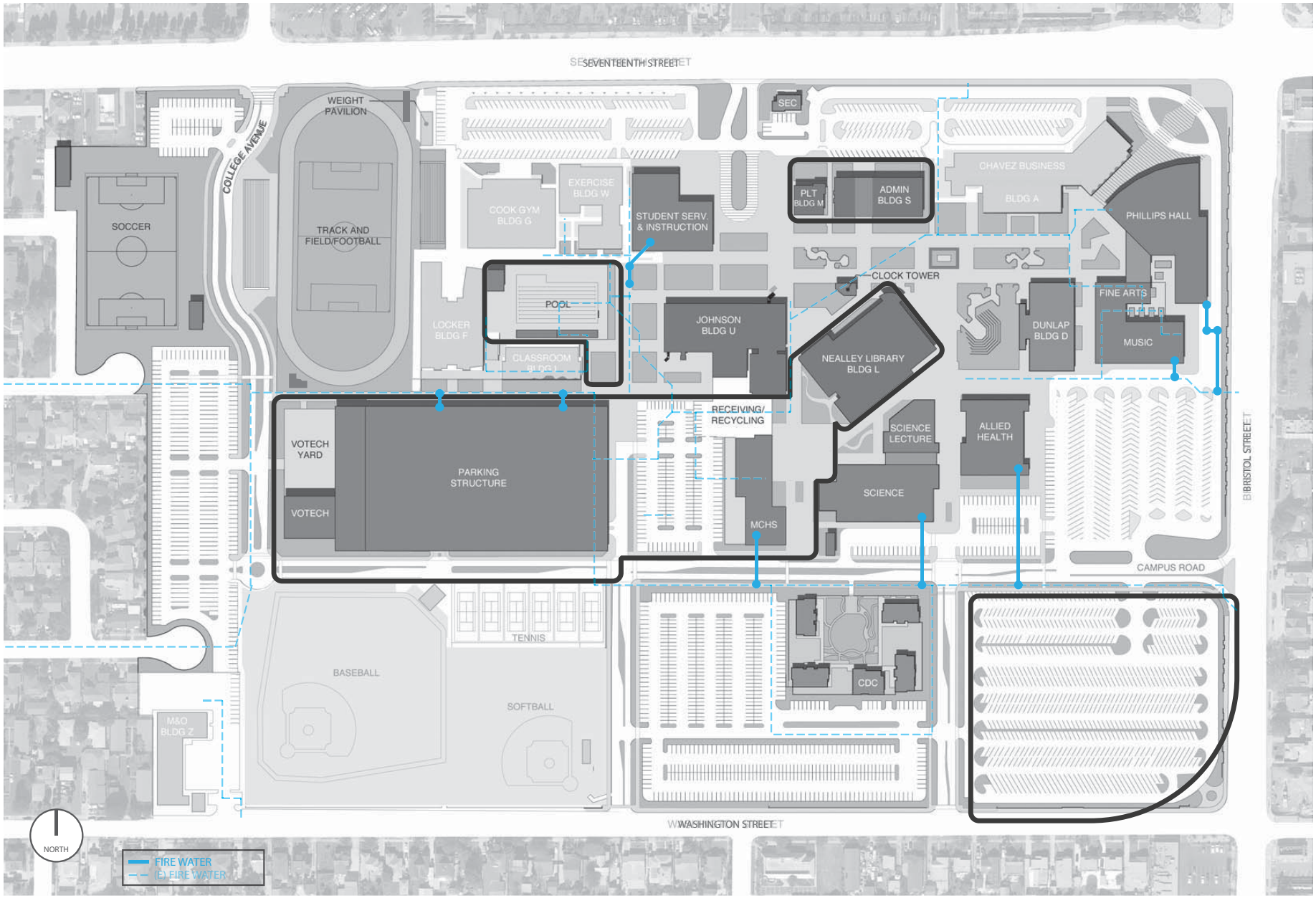
Fire Protection Water - Phase 1



Fire Protection Water - Phase 2



Fire Protection Water - Phase 3



Fire Protection Water - Phase 4

Sanitary Sewer

Existing Conditions

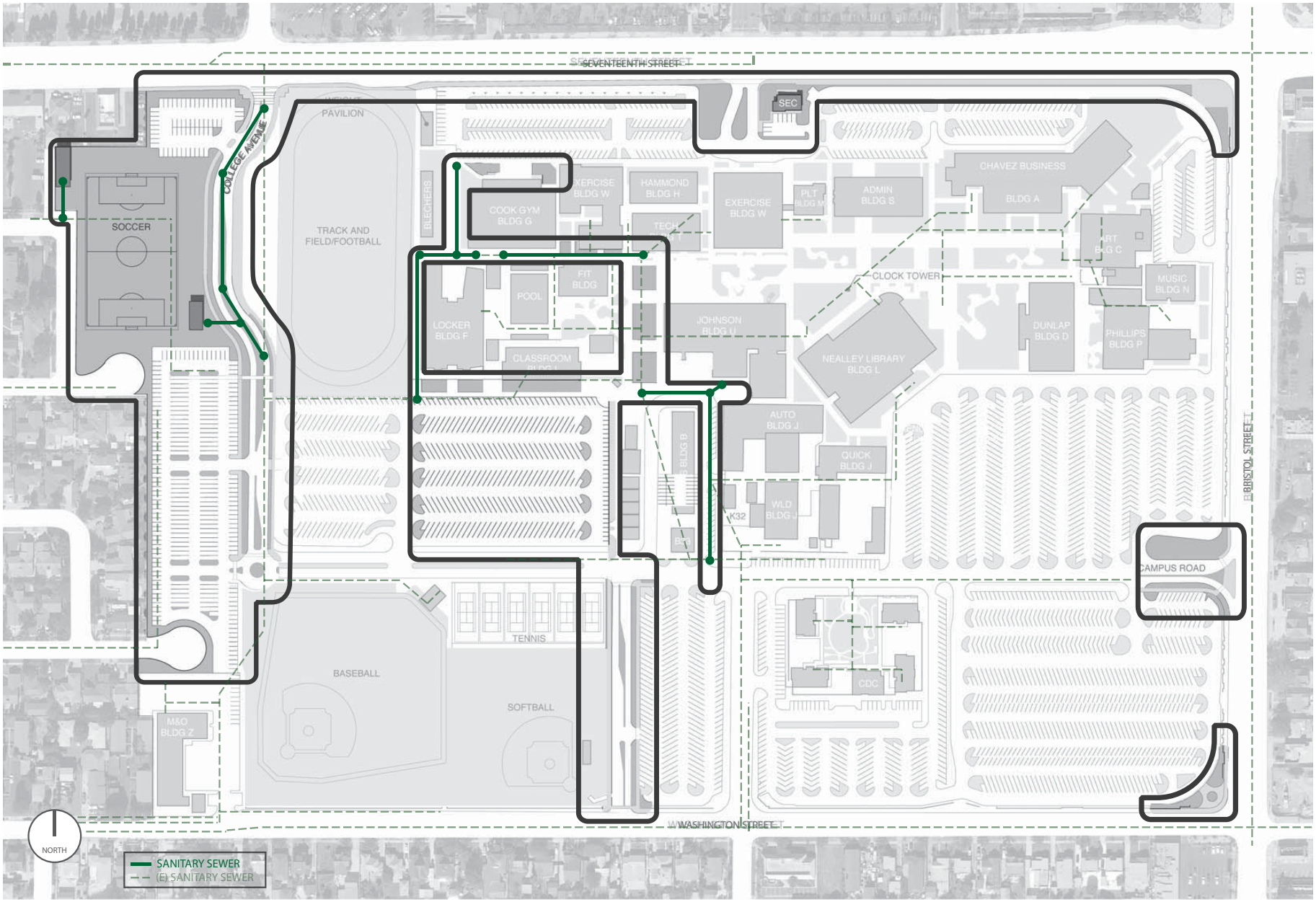
Santa Ana College has a few connections to the City Sanitary Sewer main lines. The City has a 12-inch sewer main that runs down the length of College Avenue and connects to a main line on Washington Steet that runs in an Westerly direction. The West end of campus connects to this main, as well as the Locker Building F and the new Classroom Building I. There are some improvements under way that will also connect Cook Gym (Bldg. G) to this main line.

The core of campus is fed by 6-inch lines that all run down to Pacific Avenue and connect to the City main line on Washington Avenue. There used to be City sewer flow going through campus in a 10-inch main line on Campus Road, which paralleled the water main running from Bristol Avenue down Campus Road to Pacific Avenue and south to Washington Avenue. In the City project a few years ago, the City severed their main line connection on Bristol Street. However the line on Campus Road is intact, and the City ceded the main line to the College for their private use.

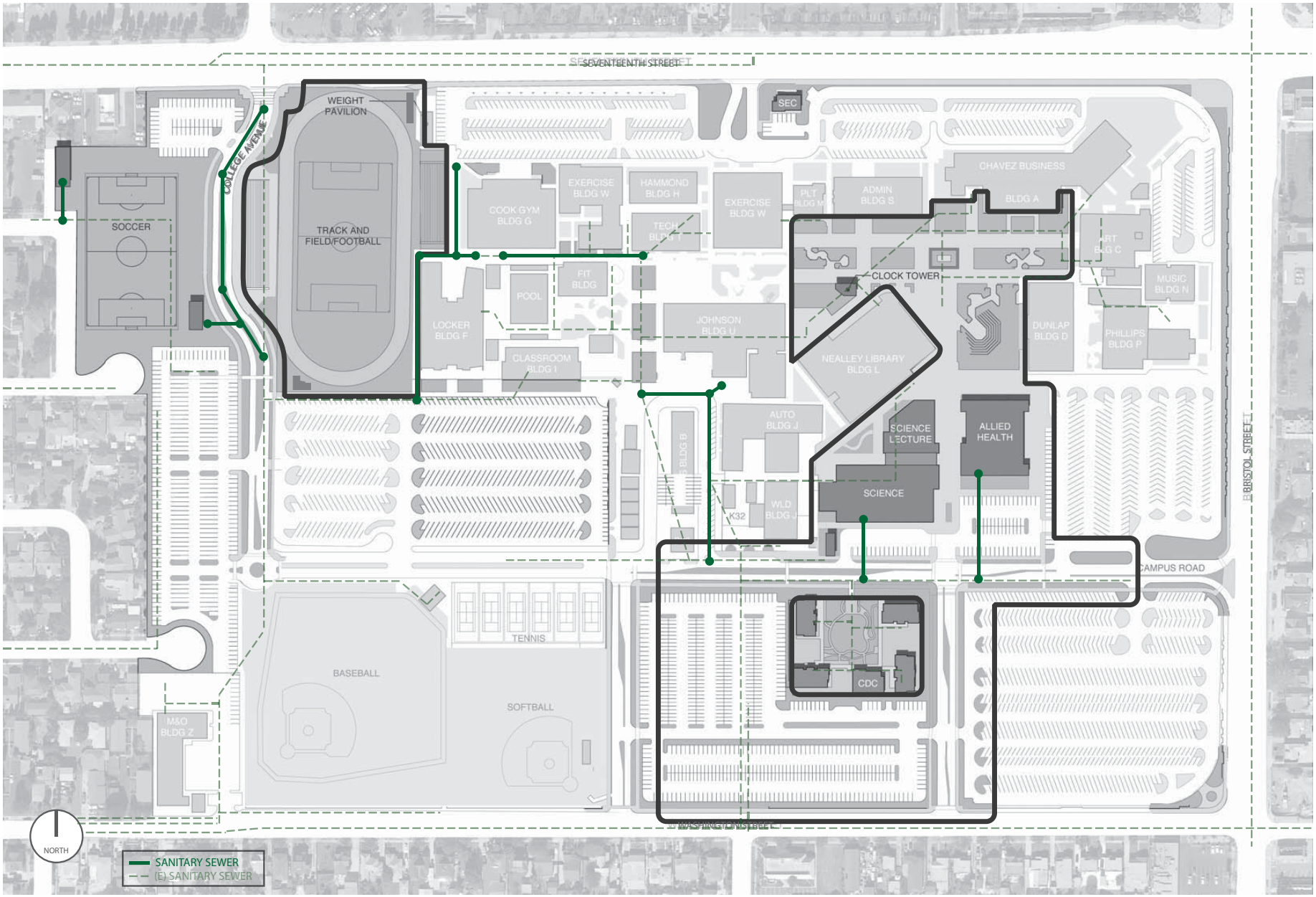
The new concessions building at the Softball field off Washington Street parallels Washington and runs down to the M&O yard for a connection to the main line running down College Avenue.

Proposed Conditions

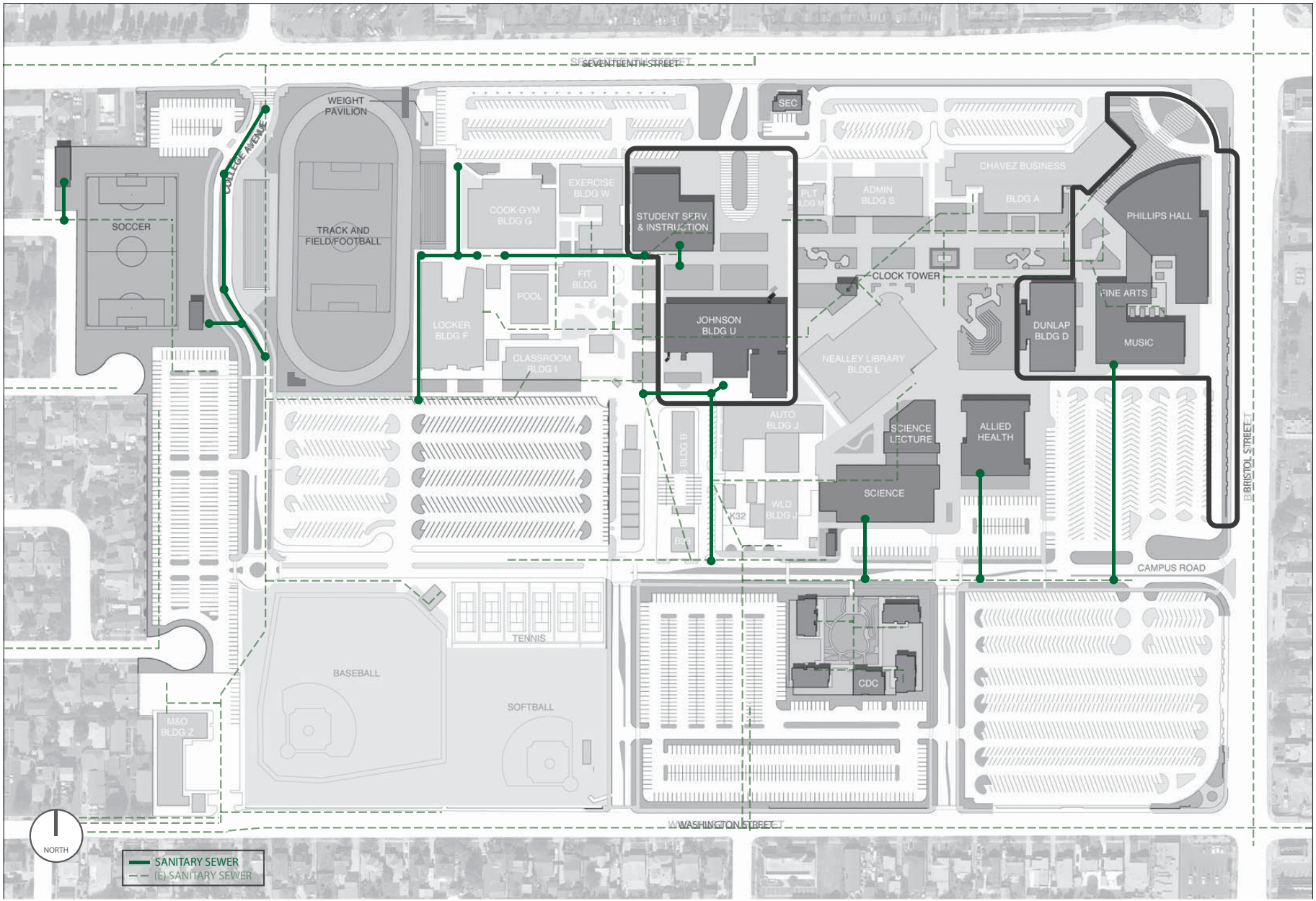
In Phase 1 College Avenue will be realigned, and the 12-inch sewer main line will need to be realigned with the road. The snack building in the new soccer compound will be able to connect directly to the existing 6-inch main in the adjacent Artesia Street. Other components of Phase 1 include the re-routing of the Cook Gym Bldg. G connection and re-routing of the main line around the middle school. Phase 2, 3 and 4 includes localized connections of the new buildings to the existing sewer infrastructure on campus.



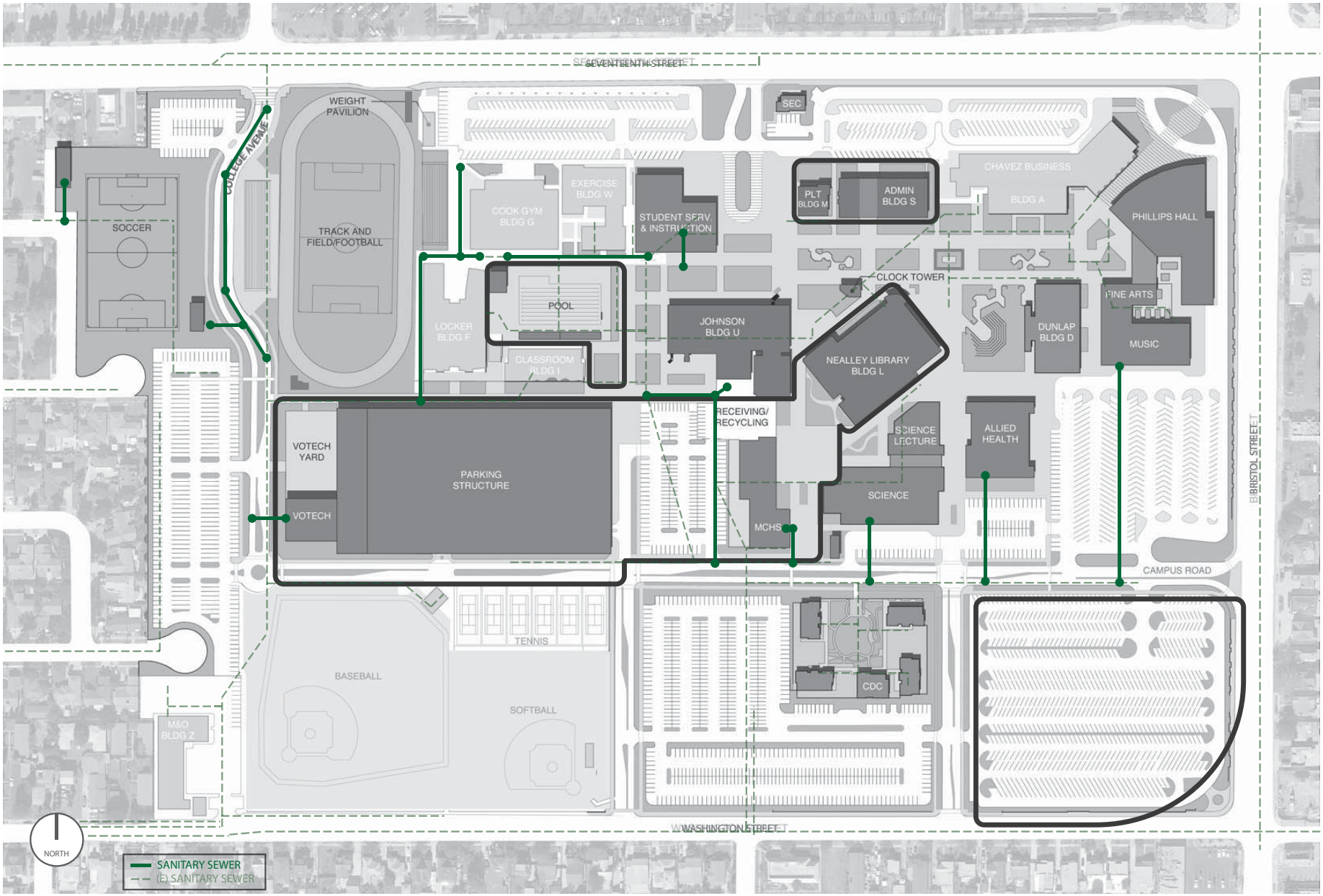
Sanitary Sewer - Phase 1



Sanitary Sewer - Phase 2



Sanitary Sewer - Phase 3



Sanitary Sewer - Phase 4

Storm Water

Existing Conditions

Santa Ana College lies in a relatively flat area of the City, and the entire campus drains to the Santa Ana River Channel. The Channel has been known to reach flooding conditions, which then propagates backward through the City system, flooding streets along the way. Washington Street is susceptible to this sort of flooding, and has been observed in the past for the street to be flooded up to the sidewalk. The City installed a large box culvert down the middle of Washington Street in the recent past to help alleviate some of these problems.

The Campus has a small box culvert on-site running from the service road West of Middle College High School, South under the tennis courts and softball field, then connecting to the large box culvert in Washington Street. The core of campus has 4 and 6-inch storm drain lines collecting storm water that is discharged through the face of curb nearby Johnson Center, and runs south on the surface of the service road to enter the small box culvert via a catch basin.

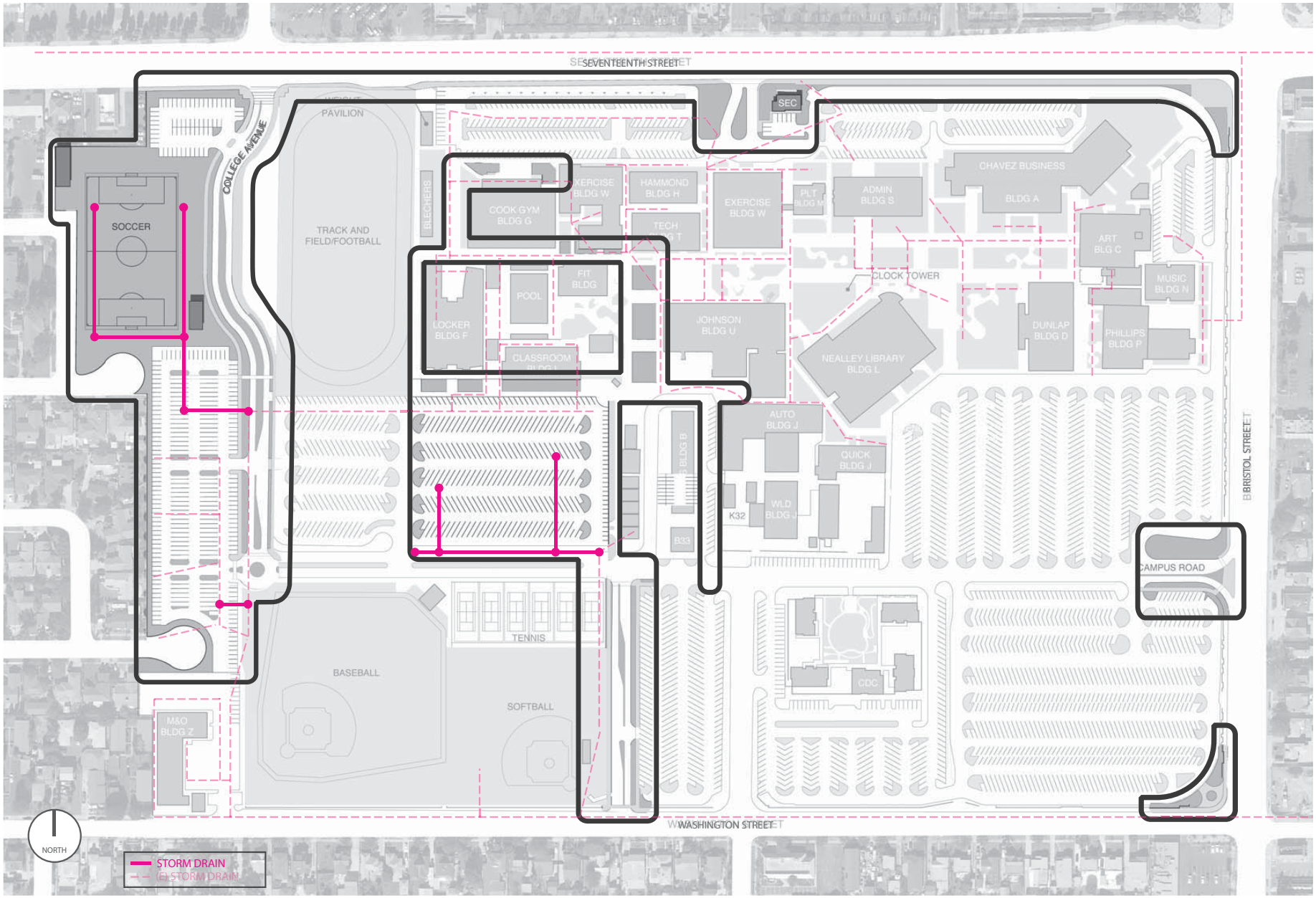
With the development of the M&O Building and Parking Lot 12 along College Avenue, a new 18-inch storm drain line was installed in College Avenue running from the box culvert on Washington Street, north up College Avenue, to where it currently terminates at 15th Street. This storm drain also runs East to drain the Locker Room Building F and the new Classroom Building I. Parking Lot 12 along College Avenue also drains to the 18-inch storm drain main in College Avenue.

The entire East side of campus is also surface drained by sheet flow over the parking lots via shallow valley gutters. These valley gutters all flow southwest toward Washington Avenue, connecting to small catch basins which in turn connect to the large box culvert in Washington Avenue.

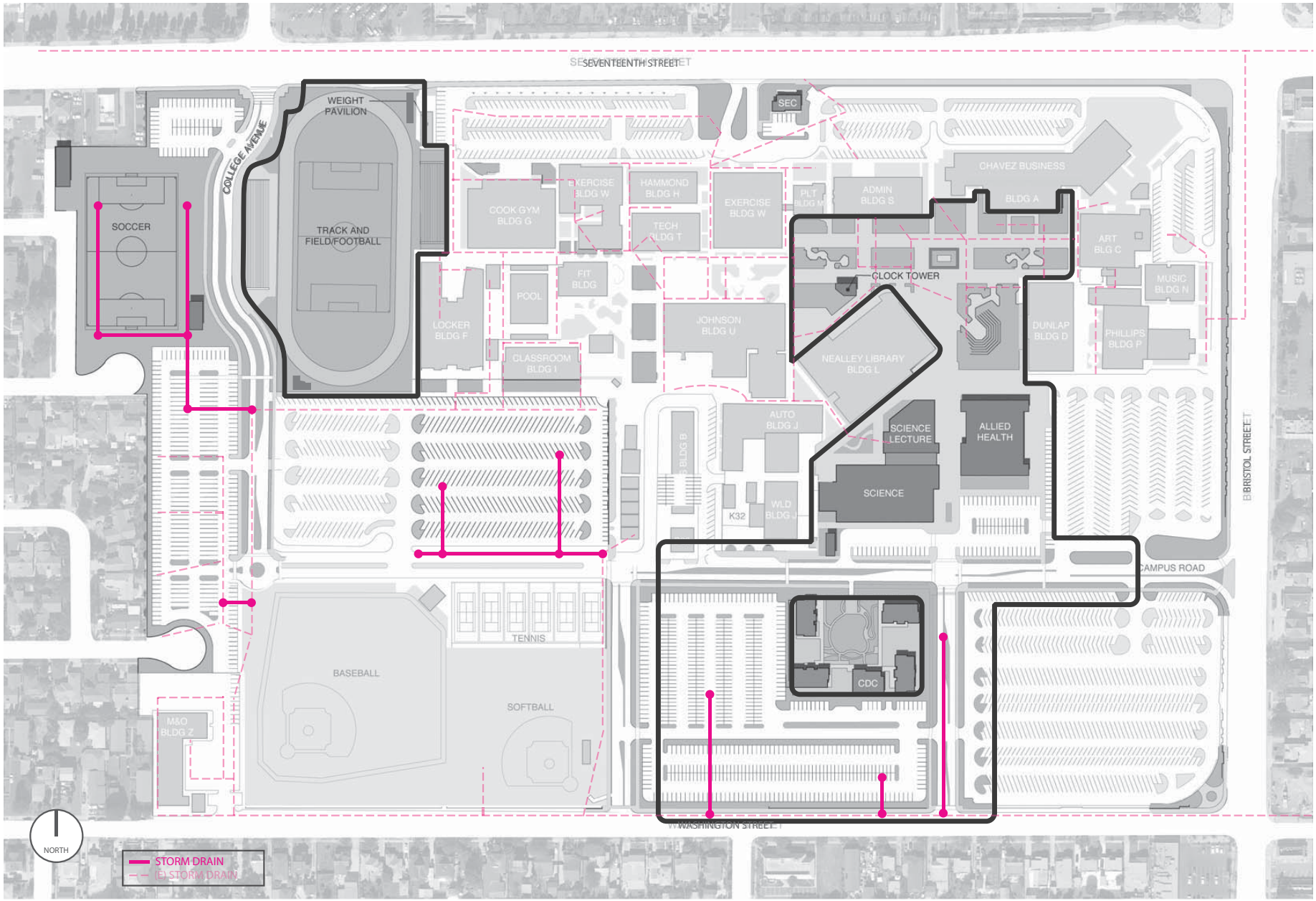
Please note that it has been observed that storm water overtops the curb on Bristol Avenue and enters campus along the Eastern edge near Phillips Hall, flowing through the campus, and exiting at the baseball field.

Proposed Conditions

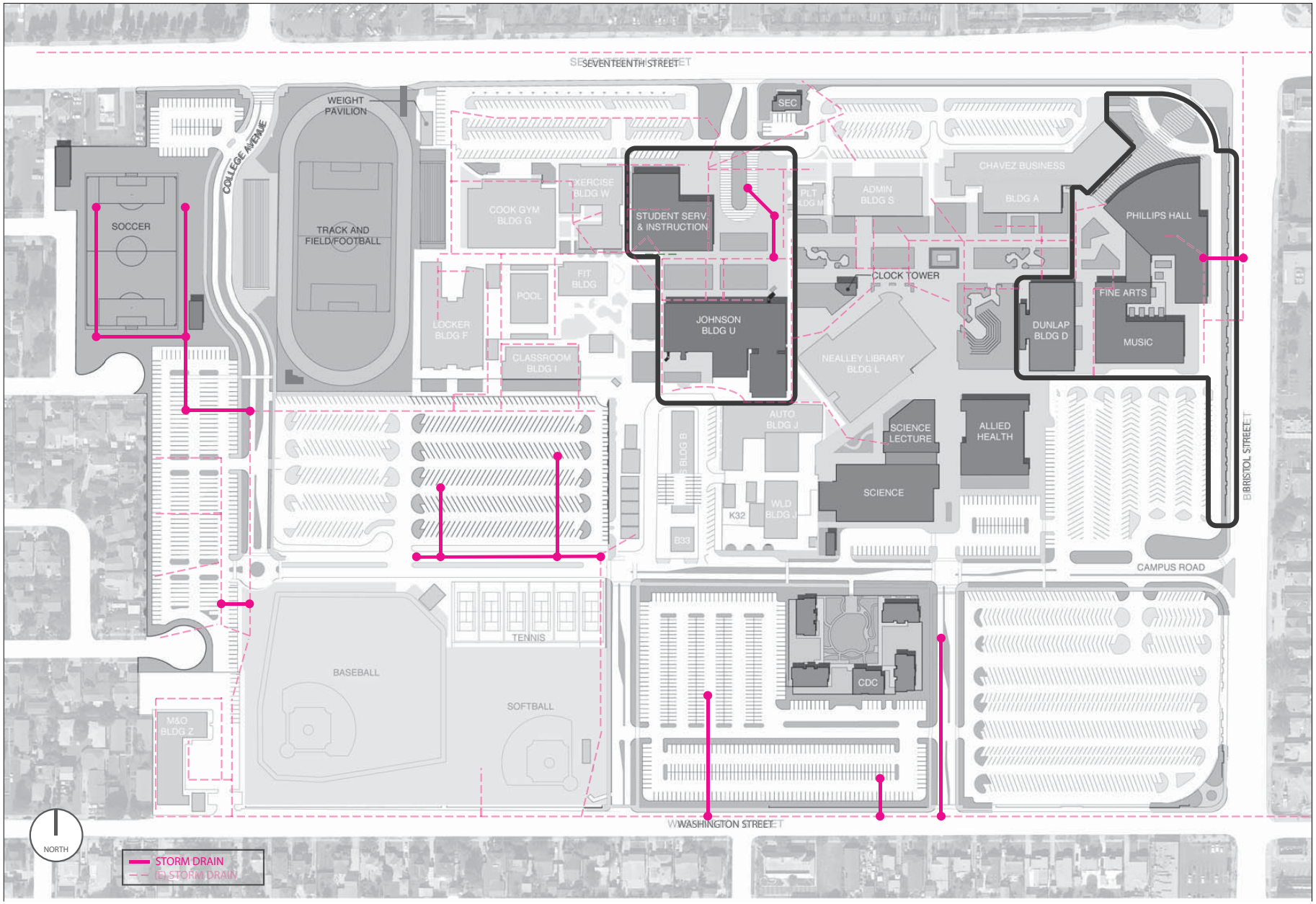
Phase 1 includes extending the storm drain main up College Avenue to serve the proposed soccer field and additional parking lot. It also includes a local connection to the Parking Lot 11 Extension into the old soccer field location. Phases 2, 3 and 4 include local storm drain connections to the adjacent storm drain main lines. The connection to Washington Avenue will be done on-site through the existing curb catch basis, to avoid directly connecting to the existing large box culvert in Washington Avenue.



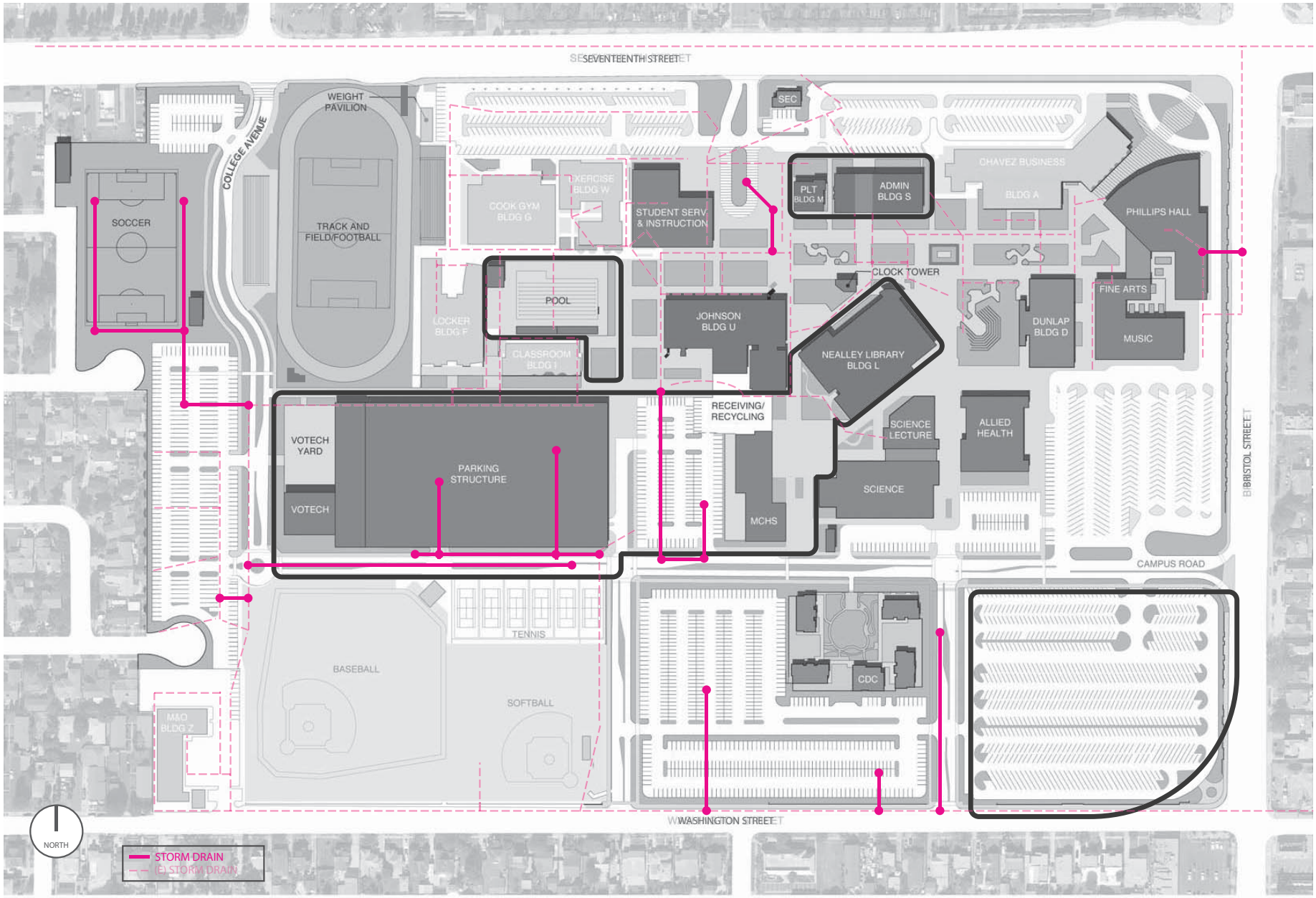
Storm Water - Phase 1



Storm Water - Phase 2



Storm Water - Phase 3



Storm Water - Phase 4

Electrical

System Description

Santa Ana College campus is currently served from a 4.16kV, 1200A 3phase, 3wire switchgear that derives its service from a 4.16kV switchgear located in a main electrical room south of the existing 'J' building. The switchgear comprises of a main 1200A 5kV breaker with a SCE main meter section and five 5kV 600A fused switches. The service is metered at 4.16kV and distributes power to substations in each building on campus through a series of selector switches, manholes and medium voltage duct banks. The main switchgear was installed in the late 1960's with a main 1200A 5kV breaker and five 600A 5kV fused switches. The main breaker however was replaced in December 2010. Power to each building on campus is served through a series of manholes and medium voltage duct banks originating from the main switchgear. The medium voltage duct banks are routed through selector switches either located inside or outside the buildings to facilitate disconnection of individual buildings.

Main 5KV Switchgear

Typical 5-KV Air Switches

Feeders 'HV-1', 'HV-2', 'HV-3' and 'HV-4' originate from the main switchgear and are routed through duct banks and manholes to form a loop system around the campus and serve each building on campus. Feeders 'HV-1', 'HV-2', HV-'3' and 'HV-4' are comprised of 3# 500kcmil EPR cables and are routed through 15kV selector switches to form a loop system around the campus. Feeder 'HV-5' comprises of a radial feeder and serves a substation in building 'K'.

A 4.16kV electrical upgrade project undertaken by the campus in 2001 replaced and upgraded the existing 5kV cables and the old oil fused cut outs.

The 5kV feeders traverse through a series of above ground, outside pad mounted and indoor mount sectionalizing switches. The sizes of these switches range from 200A to 600A, 15 KV rated. All switches date back to inception and are in fair condition. The isolation switches enable the facilities personnel to switch loads between different feeders and to isolate a portion of the existing system for maintenance and expansion.

Typical Pad Mount Transformers

Typical 15KV Selector Switch in Building

Typical Pad Mount 15KV Selector Switch

Electrical (cont'd)

While majority of the buildings still have the original transformer substations and load centers, a number of facilities have new transformer substations and distribution switchboards. The individual buildings have transformers with 4,160V primary and 480V/208V and 120/208V, secondary voltages.

The following is a brief description of each of the feeders and their routing to serve each building on campus.

Feeders 'HV-1' and 'HV-2' originating from the main switchgear 'MS' form a loop around the campus and serve buildings primarily located on the west side of the campus. Feeders 'HV-3' and 'HV-4' originating from the main switchgear 'MS' form a loop around the campus and serve buildings primarily located on the east side of the campus. Feeder 'HV-1' traverses north to serve selector switch 'OS-8' located in 'U' building yard. Radial feeders originating from selector switch 'OS-8' serve multiple substations in building 'U'. A radial feeder originating from PB#21 also serves building 'B' substation. The feeder then traverses north to serve selector switch 'OS-7' located in room 103 of 'E' building. Radial feeders originating from this selector switch serve buildings 'F', 'R' and the maintenance building. The feeder then continues east to serve selector switch 'OS-6' located in 'T' building room T112. Radial feeders originating from this switch serve buildings 'T', 'H', 'W', and 'G'. The feeder then travels back south and terminates in selector switch 'OS-9' located in a yard west of the Publications Center. Radial feeders originating from selector switch 'OS-9' serve buildings 'J' and 'K'. 'HV-2' feeder terminates in 'OS-9' to form the west loop at the campus.

Feeders 'HV-3' and 'HV-4' originating from the main switchgear 'MS' form a loop around the campus and serve buildings primarily located on the east side of the campus Feeder 'HV-4' traverses east to serve selector switch 'OS-1' located in Library room L-125. Radial feeders originating from this switch serve buildings 'L' and 'D'. Feeder 'HV-3' then traverses east to serve selector switch 'OS-2' located in building 'P' yard. Radial feeder originating from the selector switch serves building 'P'. The feeder then travels north to serve selector switch 'OS-3' located in building 'C' yard. Radial feeders originating from the switch serve building 'C' and 'N'. The feeder then continues north and then east to serve selector switch 'OS-5' located in a yard on the east side of building 'A'. Radial feeder originating from the switch serves substation in building 'A'. The feeder then continues east to serve selector switch 'OS-4' located on the east side of building 'S'. Radial feeder originating from this switch serves substation in building 'S'. 'HV-3' feeder terminates in 'OS-4' to form the east loop at the campus.

The following Table 7-1 provides installed capacities by substations and feeders. Approximate demands of the buildings are calculated at 30% of the installed capacities in absence of a metered data available.

Table 7-1: Installed Capacities by Substation/Feeders

FEEDER	BUILDING	INSTALLED CAPACITY IN KVA	DEMAND IN KVA
Feeder 'HV-1' /Feeder 'HV-2'	Campus Center (Building 'U')	950kVA	285kVA
	Modular Building 'B'	225kVA	67.5kVA
	Russell Hall (Building 'R')	1000kVA	300kVA
	Men's Locker (Building 'F')	1500kVA	450kVA
	Maintenance Building	500kVA	150kVA
	Technical Arts (Building 'T')	800kVA	240kVA
	Hammond Hall (Building 'H')	225kVA	67.5kVA
	Cook Gym and Pool (Building 'G')	150kVA	45kVA
	Physical Education (Building 'H')	337.5kVA	101.25
	Auto Shop (Building 'J')	300kVA	90kVA
	Weld Shop (Building 'K')	467kVA	140.1kVA
	Publications Center (Building 'J')	100kVA	30kVA
Total		**6554.5kVA**	**1966.35kVA**
Feeder 'HV-3'/Feeder 'HV-4'	Business/Computer (Building 'A')	2000kVA	600kVA
	Administration (Building 'S')	500kVA	150kVA
	Humanities/Art (Building 'C')	525kVA	157.5kVA
	Music (Building 'N')	225kVA	67.5kVA
	Phillips Hall (Building 'P')	500kVA	150kVA
	Dunlap Hall (Building 'D')	1005kVA	301.5kVA
	Library (Building 'L')	1050kVA	315kVA
Total		**5805kVA**	**1741,5kVA**
Feeder '5'	Maintenance (Building 'K')	75kVA	22.5kVA
Total		**75kVA**	**22.5kVA**

Electrical (cont'd)

Methodology

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

- A critical aspect in the evaluation of the existing electrical system serving a facility is a detailed and accurate field investigation of the existing system. A detailed survey of the electrical system currently serving the Santa Ana College campus was undertaken, and existing conditions, together with potential problems, were identified. The surveyed information was verified through available record drawings and meetings with the campus facilities staff.
- A load flow study of the existing and future loads was developed, and existing and proposed capacity requirements were developed. A watts/sqft of proposed facilities was assumed in our load studies. For all existing buildings, existing installed capacities of the substations/transformers were taken to estimate the total loads.
- The Electrical system was then evaluated for capacity, functionality, reliability, ease of maintenance, age, and its ability to serve the present and future needs of the campus.
- Recommendations were developed for alterations/upgrades/modifications to support new buildings, major renovations, and building retrofits that were identified in the proposed campus facilities master plan.
- Costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

Analysis of Existing System

A review of the existing 4.16kV, electrical distribution revealed the following:

The main switchgear was installed in the late 1960's with a main 1200A 5kV breaker and five 600A 5kV fused switches. The main switchgear and the main switch fused units thus are at the end of their useful life. The main breaker however was replaced in December 2010.

Power to each building on campus is served through a series of manholes and medium voltage duct banks originating from the main switchgear. The medium voltage duct banks are routed through selector switches either located inside or outside the buildings to facilitate disconnection of individual buildings.

A 4.16kV electrical upgrade project undertaken by the campus in 2001 replaced and upgraded the existing 5kV cables and the old oil fused cut outs. The existing feeders 'HV-1' 'HV-2' 'HV-3' and 'HV-4' were replaced. The electrical power distribution system at the campus is thus in good condition and is adequately sized to serve the existing loads of the campus.

Electrical (cont'd)

Majority of the 15kV rated switches ranging from 200A to 600A date back to inception, are at the end of their useful life.

The original building transformers/distribution boards with 4,160V primary and 480V/208V and 120/208V secondary voltages have outlived their useful life.

System Evaluation

The peak demand seen by the campus is approximately 2.85MW. Therefore, the existing switchgear and SCE substation have adequate spare capacity to accommodate proposed facilities planned as part of the facilities master plan.

Analysis of Future Needs

An analysis of the current 4160V distribution system was conducted to evaluate a) existing spare capacities available in each substations/feeders b) the impact of the proposed facilities on the existing electrical distribution system and c) modifications required to support the future build out of the campus. The current electrical distribution was also analyzed for electrical duct-banks/manholes that will be in conflict with the proposed facilities and will require relocation. A campus site plan identifying electrical duct-banks/manholes that require demolition/relocation and extension of feeders to new facilities to serve the planned facilities is provided in our proposed electrical site plan.

An evaluation of the master plan revealed that additional 328,000 square feet of buildings is planned at the campus with approximately 170,000 sq ft of building being demolished. The completion of the master plan will bring the total square footage of the campus to approximately 690,000 sq ft. This excludes the proposed parking structure that is being located on the south west side of the campus and just accounts for academic buildings. A review of these proposed facilities and their usage revealed that the campus would add an additional installed capacity of 4800kVA to their existing installed capacity. Based on a demand factor of 30%, the campus will see an additional demand of1440kVA making the total demand of 4291kVA.

Electrical (cont'd)

A review of future installed capacity and current demand of the campus revealed that the main 4.16kV switchgear is adequately sized to meet the demands of existing and future facilities. The campus currently has a peak demand of 2851kVA with an assumed power factor of 0.8 (Current peak demand of the campus per SCE is 2.85MW) that is expected to grow to approximately 4291kVA with the addition of new facilities and additions. This future estimate is projected based on the campus current ratio of installed capacity versus its current demand.

The following Table 7-2 depicts projected installed capacities and demand of proposed facilities shown in the 2011 Facilities Master Plan. The capacities are calculated based on standard industry watts/sqft in absence of a design for these facilities.

Table 7-2: Installed Capacities/Demand of Future Facilities

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @30% of Installed Capacity
Science and Science Lecture	Academic/Lab	2015	62,900	12	750	225
Allied Health	Academic	2015	55,138	12	750	225
Fine Arts and Music	Academic	2017	45,000	12	500	150
Performing Arts (Philips Hall)	Academic	2017	40,000	12	500	150
Student Services and Instruction	Academic	2017	60,000	12	750	225
Parking Structure	-	2020	470,000	2	750	225
Middle College High School	Academic	2020	30,000	12	300	90
Vocational Technology	Academic	2020	35,000	12	500	150
Total Capacity Addition			**798,038**		**4800**	**1440**

Electrical (cont'd)

The following Tables 7-3 to 7-5 depict campus installed capacity and demand progression over time due to proposed buildings per the Master Plan Update.

Table 7-3: Installed Capacities by Substation/Feeders - 2015 (Phase 2)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Science and Science Lecture	Academic/Lab	2015	62,900	12	750	300
Allied Health	Academic	2015	55,138	12	750	300
Total Capacity Addition			**118,038**		**1500**	**600**

Table 7-4: Installed Capacities by Substation/Feeders - 2017 (Phase 3)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Fine Arts and Music	Academic	2017	45,000	12	500	200
Performing Arts (Philips Hall)	Academic	2017	40,000	12	500	200
Student Services and Instruction	Academic	2017	60,000	12	750	300
Total Capacity Addition			**145,000**		**1750**	**700**

Table 7-5: Installed Capacities/Demand of Future Facilities - 2020 (Phase 4)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Parking Structure	-	2020	470,000	2	750	200
Middle College High School	Academic	2020	30,000	12	300	120
Vocational Technology	Academic	2020	35,000	12	500	200
Total Capacity Addition			**535,000**		**1550**	**520**

Findings and Recommendations

A critical aspect in evaluating the reliability of a system is to study the failure rates from the utility and failure rates internal to the campus in the past. Discussions with the campus maintenance staff revealed that there have been minimum failures in the campus owned 5kV distribution system.

The campus needs to have a complete, redundant system to help isolate each building on campus, and also allow maintenance on a feeder without affecting power service to each building on campus.

In order to provide the campus with redundancy and capability of scheduling maintenance on high voltage equipment without interrupting power to the campus, a combination of closed loop configuration and primary selective system is recommended.

Both these systems would provide the campus with the ease of isolating faults within the campus distribution system and minimize power interruptions to the buildings during maintenance on the medium voltage distribution system.

Below is a brief description of each of these systems

- Primary loop system with isolating switches at each building.
- Primary selective system with isolating switches at each building.

Following is a description of each of the above systems that were evaluated as part our study.

Electrical (cont'd)

Primary Loop System

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 Selective System

The primary selective system is comprised of two separate feeders that originate from the main switchgear and run to each isolating switch located at each building thereby providing a source of normal and alternate source of power. Upon failure of the normal source, the building is switched to the alternate source. Switching can be either automatic or manual, but there will be an interruption until load is transferred to the alternate source. Cost is higher for these systems as compared to a loop system because of the duplication of the primary cable and switchgear.

An evaluation of both the above systems and the current layout of the electrical distribution at the campus revealed that the existing primary loop system at the campus should be retained and extended to serve new proposed facilities at the campus. The primary loop system would be economical and will provide the campus with reliable service, and the ability to isolate faults easily without interrupting power to the entire campus.

An evaluation of the capacities of the existing feeders revealed that the existing feeders 'HV-1', 'HV-2', 'HV-3', 'HV-4' and 'HV-5' are adequately sized to meet the loads of the proposed facilities at the campus.

Following are thus our recommendations to upgrade the existing electrical infrastructure at the campus to (a) 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 the addition of new buildings, as well as renovations 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.

- Provide new 5kV, 1200A, 3P switchgear with vacuum circuit breakers to replace the existing aged 5kV switchgear.
- Replace existing selector switches currently located outdoors and inside buildings with new 15kV selector switches at the following locations:
  - Building 'D'
  - Building 'I'
  - Building 'L'
  - Building 'U'

Electrical (cont'd)

- Replace old 5kV substations in following buildings:
  - Building 'D'
  - Building 'I'
  - Building 'L'
  - Building 'U'
  - Building 'W'
- Provide new 15kV switches close to each proposed building to enable isolation of feeders during a fault condition and restore existing loop system at the campus.
- Conduct a shot circuit analysis of the proposed system.
- Conduct a coordination study of the proposed system to effectively coordinate all protective devices in the campus.
- Provide sub metering at each building to monitor demand at each building.

Our proposed single line diagram and electrical site plan is included at the end of the section.

The following are our recommendations for serving the proposed facilities as they are being added in various phases to the existing campus electrical distribution system.

Phase 2 - 2015

The following table provides facilities that are provided in phase 2 along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that the existing substations/feeders can support the power demand of these facilities. Names of substations and feeder designations that will be used to serve these proposed facilities are provided in Table 7-9 below. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and also complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as provide a means of isolating building substations. These switches will be served from the nearest existing manhole located close to the proposed facility as shown in our proposed site plan. The loops will be completed by extending existing duct-banks/feeders using 4" electrical duct banks with 8kV, 3#500kcmil Cu. EPR cables. Radial feeders originating from these selector switches will serve substations in each of the facilities. Existing 5kV duct banks will need to be relocated as shown on the proposed electrical site plan. Existing selector switches serving existing buildings will be demolished.

Table 7-6: Installed Capacities by Substation/Feeders - 2015 (Phase 2)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Science and Science Lecture	Academic/Lab	2015	62,900	12	750	300
Allied Health	Academic	2015	55,138	12	750	300
Total Capacity Addition			**118,038**		**1500**	**600**

Electrical (cont'd)

Phase 3 – 2017/Phase 4 - 2020

The following table provides facilities that are provided in phase 3 and phase 4 along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that the existing substations/feeders can support the power demand of these facilities. Feeder designations that will be used to serve these proposed facilities are provided in Table 7-9. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and also complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as provide a means of isolating building substations. These switches will be served from the nearest existing manhole located close to the proposed facility as shown in our proposed site plan. The loops will be completed by extending existing duct-banks/feeders using 4" electrical duct banks with 8kV, 3#500kcmil Cu. EPR cables. Radial feeders originating from these selector switches will serve substations in each of the facilities. Existing 5KV duct banks will need to be removed and relocated as shown on the proposed site plan to accommodate the proposed facilities. In addition, the existing building 'A' substation will need to be relocated to accommodate the new Performing Arts Center. The existing switch serving the existing 'P' building will be demolished and feeders will need to be relocated to retain the loop system at the campus.

Table 7-7: Installed Capacities by Substation/Feeders - 2017 (Phase 3)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Fine Arts and Music	Academic	2017	45,000	12	500	200
Performing Arts (Philips Hall)	Academic	2017	40,000	12	500	200
Student Services and Instruction	Academic	2017	60,000	12	750	300
Total Capacity Addition			**145,000**		**1750**	**700**

Table 7-8: Installed Capacities by Substation/Feeders - 2020 (Phase 4)

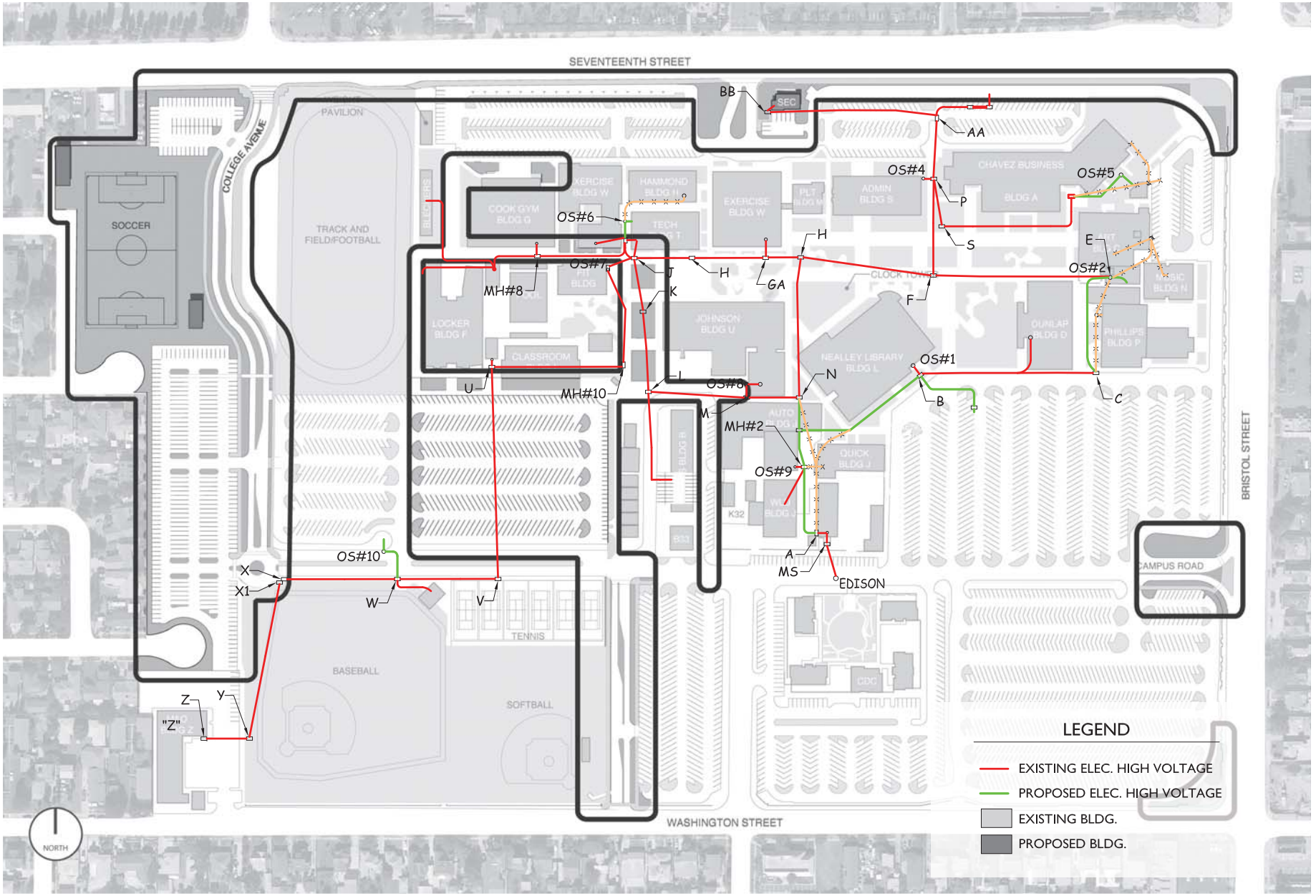
Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	Load Factor w/sqft	Required Capacity in kVA	Demand In kVA @40% of Installed Capacity
Parking Structure	-	2020	470,000	2	750	200
Middle College High School	Academic	2020	30,000	12	300	120
Vocational Technology	Academic	2020	35,000	12	500	200
Total Capacity Addition			**535,000**		**1550**	**520**

Electrical (cont'd)

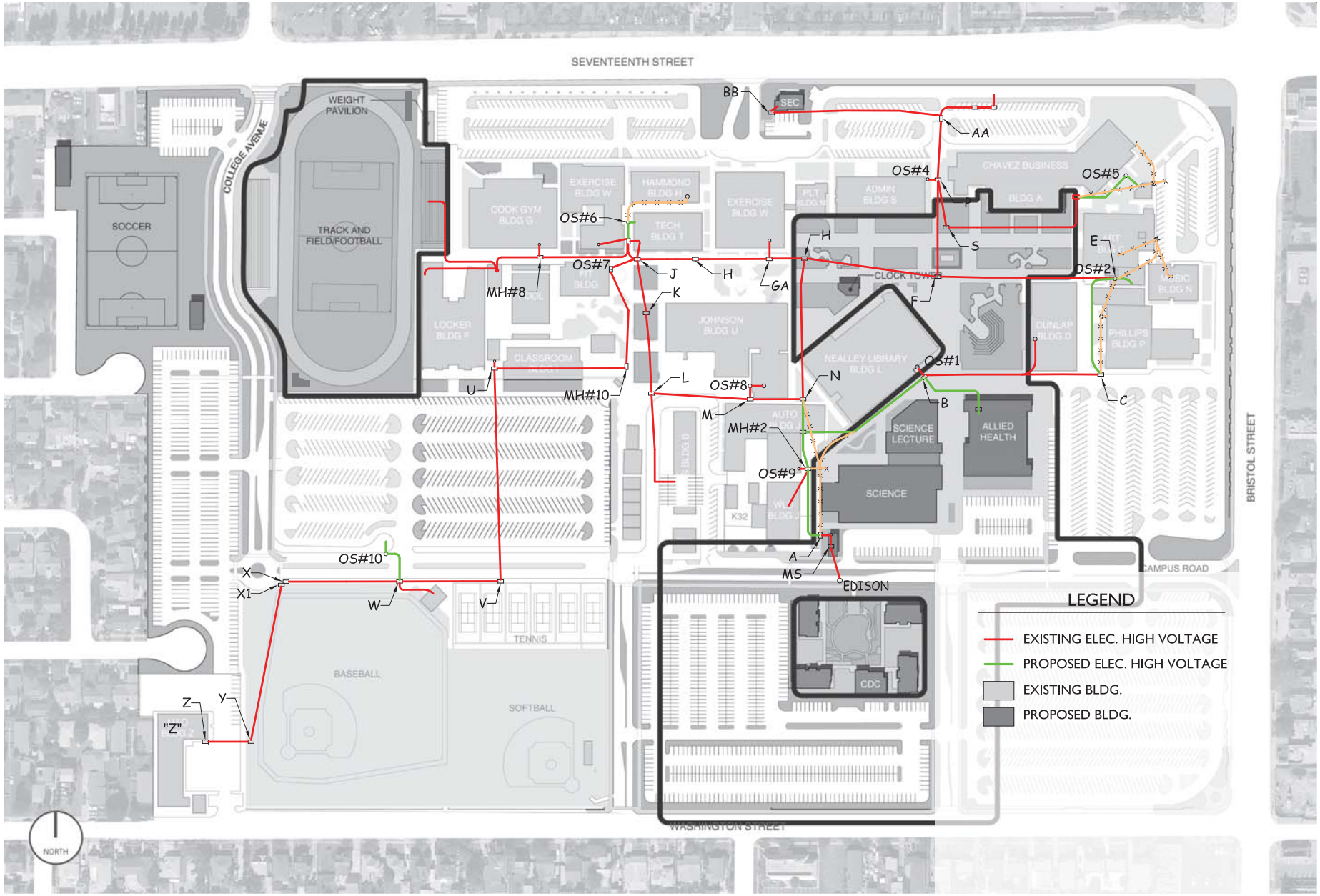
The following table provides approximate installed capacities and demand on each substation/feeder after implementation of the planned master plan.

Table 7-9: Installed Capacities by Substation/Feeders

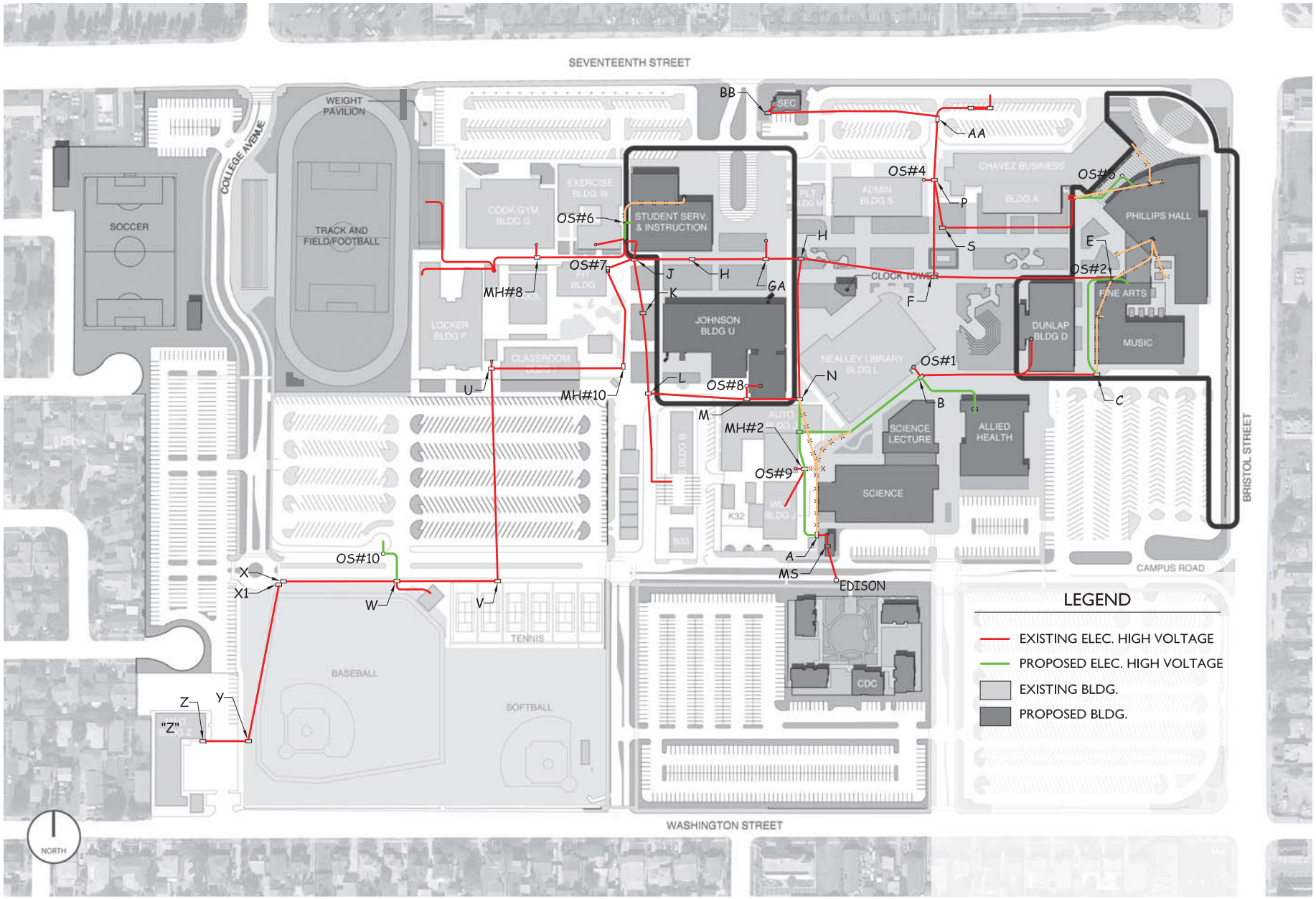
FEEDER	BUILDING	INSTALLED CAPACITY IN KVA	DEMAND IN KVA
Feeder'HV-1' /Feeder 'HV-2'	Campus Center (Building 'U')	950kVA	285kVA
	Modular Building 'B'	225kVA	67.5kVA
	Russell Hall (Building 'R')	1000kVA	300kVA
	Men's Locker (Building 'F')	1500kVA	450kVA
	Maintenance Building	500kVA	150kVA
	Hammond Hall (Building 'H')	225kVA	67.5kVA
	Cook Gym and Pool (Building 'G')	150kVA	45kVA
	Physical Education (Building 'W')	337.5kVA	101.25kVA
	Parking Structure	**750kVA**	**225kVA**
	Vocational Technology	**500kVA**	**150kVA**
	Science and Science Lecture	**750kVA**	**225kVA**
	Middle College High School	**300kVA**	**90kVA**
Total		**7187.5kVA**	**2156.25kVA**
Feeder 'HV3' /Feeder 'HV-4'	Business/Computer (Building 'A')	2000kVA	600kVA
	Administration (Building 'S')	500kVA	150kVA
	Dunlap Hall (Building 'D')	1005kVA	301.5kVA
	Library (Building 'L')	1050kVA	315kVA
	Performing Arts Building	**500kVA**	**150kVA**
	Fine Arts and Music Building	**500kVA**	**150kVA**
	Allied Health (Russell Hall Replacement)	**750kVA**	**225kVA**
Total		**6305kVA**	**1891.5kVA**



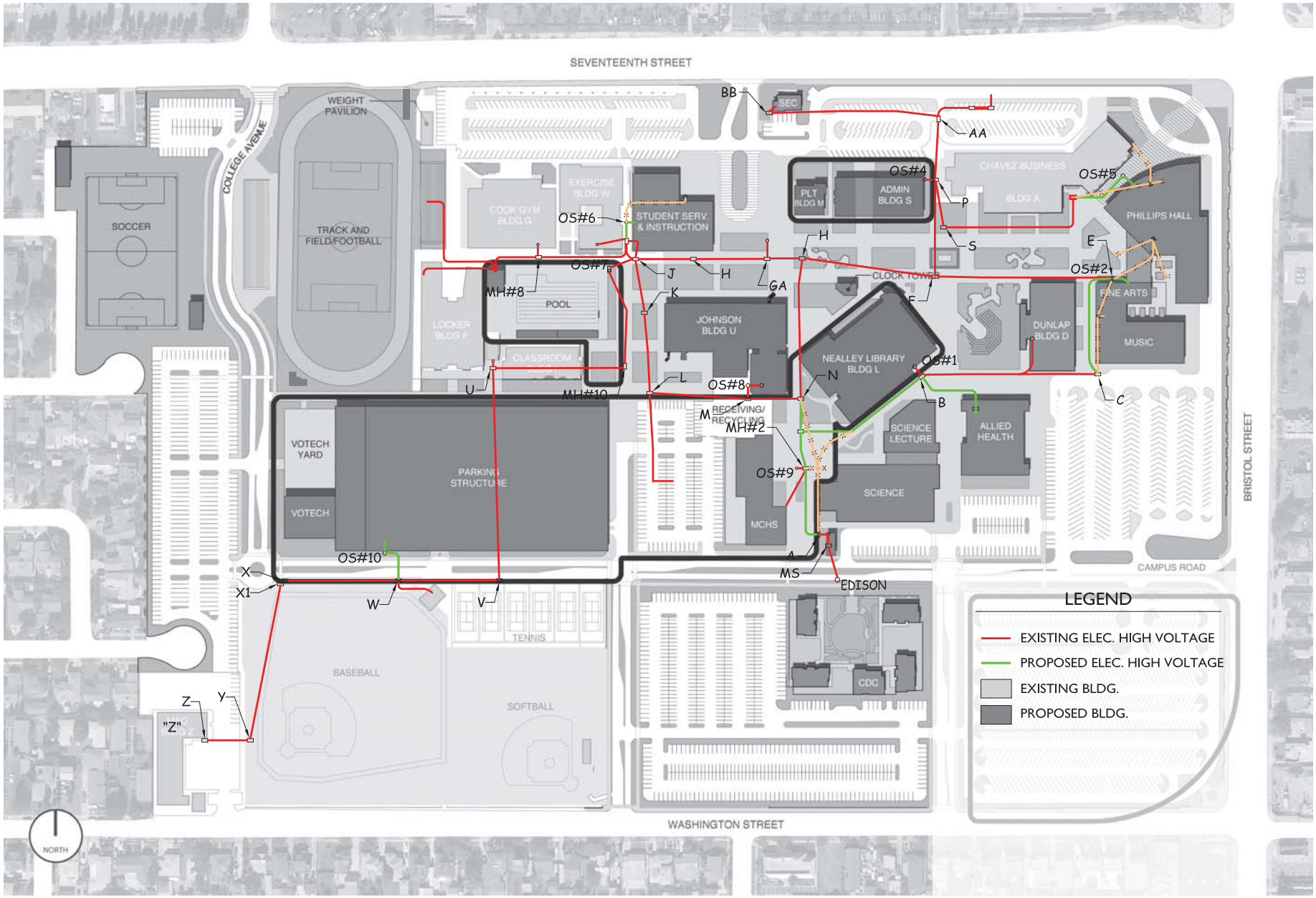
Electrical - Phase 1



Electrical - Phase 2



Electrical - Phase 3



Electrical - Phase 4

Communications

System Description

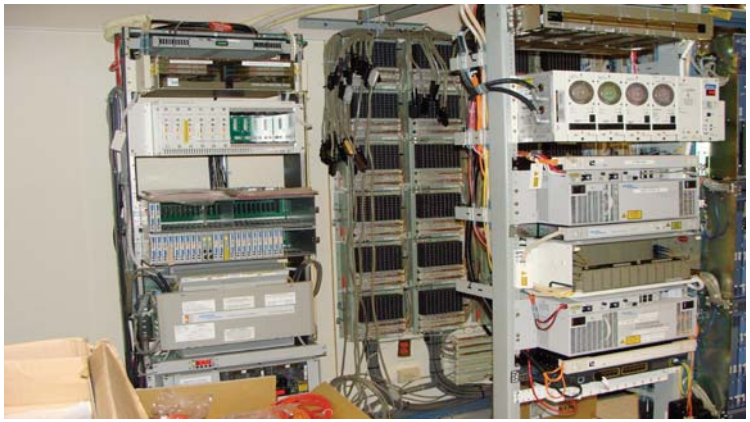
Santa Ana College has a Network Operations Center (NOC) in the Cesar Chavez Business/Computer Center Building. The actual room where the Data and Voice Networks are housed is approximately 16' X 38' and is air conditioned. Adjacent to the NOC is the 18' X 40' room where the Data Server Racks are kept. The third room that is part of the Center is larger than either of the other two rooms and has storage area, a work area, two overflow server racks and the UPS. The 160 KVA Eaton UPS unit serves all the NOC operations. There is an emergency generator for the area. It has a capacity of 500 Amps at 480 volts. The Data Center Room has a floor-mounted 8.5 ton Liebert HVAC unit that does not seem adequate for the server room. There is a similar 8.5 ton Liebert in the NOC and it seems to be adequate for the heat load.

The Minimum Point of Entry (MPOE) for AT&T is located in the NOC. AT&T has a light span rack and a DS3 rack in the NOC. The light span has a derived 1500 pairs plus there is an AT&T copper cable that brings in 300-pairs. The protectors for all of these pairs are on the south wall of the NOC. SAC has converted to Voice over IP (VoIP), so the 1500 pairs from the light span are no longer needed. The 300 pair provides copper for analog services on campus.

The College's VoIP system is a Cisco-based system. A number of 7800 series data switches provide the call management, unity messaging, and 911 services. The College also has "meet me plus" for conferencing, fax server "berbies" and all the standard VoIP features. They also have some VG switches for analog conversions, they still use some analog copper pairs for certain services. There are approximately 3500 users (some are voice mail users only) and approximately 1850 phone set users on the system. The horizontal cabling in all the building seems to be Category 5e or better, so the VoIP cabling is not a problem.

The Data Network is based on a 6500 Series Data Switch for the campus plus another 6500 Series switch for the District services. These are both housed in the NOC. They have a 10 Gigabit fiber tie between the two data switches.

Communications (cont'd)



The campus fiber network is divided into two parts. There are fiber cables to Russell Hall that are then distributed to other buildings. The pathways to Russell are congested, but not as bad as the east run. The other part of the fiber network basically serves the east side of the campus. However, the pathway that has to be used to distribute the east run is very complicated and congested. It starts by having three 2" conduits go through part of the Chavez Center and outside from the NOC. The conduits then go into the Fine Arts Building to serve its Telecom Room and then through that building to an electrical room at the south end of the building. From that room they leave the building and go to a pull box at the northwest corner of Phillips Hall. From that pull box the fiber service is distributed to the following buildings: Music, Phillips Hall, Dunlap Hall, Diesel Auto Shop, and Building J and the Publications Center.

The other building served by the east side fiber network is the Administration Building. The fiber to it goes through Cesar Chavez to a pull box on the west side of the building and then into the Administration Building. The same path through the Chavez Building also takes the fiber cables to Russell Hall. They loop around the Administration Building and then back north and into the east side of Russell Hall.

It can be detected from the pathway descriptions that the IT Group has had to cope with some obstacles in distributing their fiber. It is to their credit that they have a robust data network that can distribute the new VoIP System as well as the Data Network.

The IT Group has distributed multi-mode fiber throughout most of the campus, but single-mode has only been distributed to some buildings when it has been necessary due to distance. For instance, the new M & O Building Z has 12 multi-mode and 12 single-mode fiber cables serving it. There is a 25-pair copper cable

for analog services. Generally, the campus has some copper available at each building despite the VoIP conversion. These are for alarms, faxes, modems, elevator phones, etc.

There is one underground pathway on campus that is in good condition. The original MPOE was at Russell Hall on the west side of the building. The old MPOE room is still used today for a fiber hub from which the west side of the campus is served as mentioned earlier. There are two 6" conduits, each with an 1800-pair copper cable, six 4" and four 4" conduits between Russell Hall and the NOC. Other than the 6" conduits, the others are virtually vacant. These conduits are no longer needed to extend the MPOE to the NOC since AT&T relocated the MPOE. These conduits leave the NOC on the northeast side of Chavez and go through five large pull boxes along the south side of the northern parking lots (Lots 2, 3 and 4). Just west of the north Campus entry, the conduits terminate in a pull box. From there the same number of conduits go south into the west side of Russell and the same number keeps going west to another pull box northwest of Hammond Hall. The conduits terminate at a pull box at the northwest corner of the PE Multi Purpose Building W.

The new M and O Building Z was built at the southwest corner of the campus. It is at the intersection of College Ave and Washington Street. The entrance conduits into the new site are (4) 4" conduits. There is a new 4' X 6' pull box on the east side of the building. However, the 2' X 3' pull box that serves the site is at the west side of the Baseball third base dugout noted as "Box 11" and it has only a 2" conduit serving it from the main campus. From this same pull box 11, new conduit has been laid along the north side of the property line along Washington to the Softball concession stand. There are two 17" X 30" pull boxes along the route.

One last item to mention is the emergency phone distributed around the campus parking lots. They seem to be working well and probably do not require any changes. They are solar –powered and wireless, so getting conduits for power and telecom to them is a non-issue.

Communications (cont'd)

Methodology

The College has a very nice NOC in the Chavez Building, but because of existing facilities they have had to divide their fiber infrastructure into two parts. The existing fiber hub at the old MDF or MPOE in Russell Hall serves a number of buildings on the west side of the campus. The east side of the campus is generally served by the NOC at the Chavez Building. It has not been possible to rearrange all the fiber to the NOC due to conduit limitations. So, the core switching is in good condition, but the "pipeline" is congested.

The campus voice system is converted to Voice over IP, so they are not dependent on copper cable. Copper cables exist from the previous PBX cable routes and they can be used for analog services such as faxes, modems or alarms.

Analysis of Existing System

The campus needs additional conduit pathways and new up-dated single-mode and multi-mode fiber cables to all buildings. All cables should be centralized at the NOC in the Chavez Building. There is a very good section of conduit that leaves the NOC and goes on the north side of the campus as described in the existing conditions. This needs to be maintained with some connections from it to new conduit runs.

There are some existing conduit runs into the new Building Z and to the Softball Concession Stand, for instance, that need to remain. However, the conduit pathway serving the manhole in that southwest corner of the campus needs to be reinforced. There is also a short run of conduit around the new I Building and new conduits into the new Child Development Center that should remain. Both of these conduit pathways need to be reinforced.

Beyond these conduit areas, the rest of the campus is in need of new conduit pathways. The current conduits between buildings are congested and, in many cases, too small and limited in number.

Analysis of Future Needs

By distributing fiber in the current "north" run of conduit and in new pathways that cover the perimeter of the campus for potential growth, a long-term, flexible infrastructure can be maintained for a period of 20 to 25 years. Utilizing the latest fiber version will provide flexibility to handle the anticipated increased future demand, including video, fire alarm circuits, EMS circuits, security circuits, the current Voice over IP plus future technology that may require conduit space.

The conduit infrastructure should be located to avoid future building sites, yet be in close enough proximity to future buildings to allow for short conduit connections. The conduit should be sized accommodate needs for the next 20 to 25 years or more.

Communications (cont'd)

Findings and Recommendations

The College has a number of good technology systems in place. There is a very good Network Operating Center with a server room, MPOE and fiber hub. The College successfully converted to Voice over IP. The fiber network is operational despite very limited conduit pathway.

In order for the campus to keep the data network robust and to prepare for future growth, additional conduit pathways are needed to accommodate up-dated fiber in both multi-mode and single-mode configurations.

We recommend the addition of conduits from the Chavez Building going to the east to the perimeter road along Bristol. Just south of Phillips Hall, the duct bank should turn to the west to a point just east of Nealley Library. There, it should turn south down to the roadway west of Lot 6 and south to Campus Road. The duct bank would then continue west along Campus Road until it reaches the east side of College Avenue.

These proposed east and south conduit runs will provide the updated infrastructure for new and existing buildings along the eastern and southern parts of the campus.

On the north side of the campus, the existing duct bank that runs along the south side of the parking areas from the PE Multi-Purpose Building W to the Cesar Chavez Building will form the backbone for the northwest side of the campus. Additional conduits running south between Hammond Hall and Building W will be needed for Phase 3. That south run can stop just north of the B Bungalows and turn west and cross College Avenue. When Phase 4 starts, the south run will be extended to serve the new parking structure.

For the southwest part of the campus, the conduit run should continue south from College Ave. to provide an adequate pathway to the new M & O Facility. The existing entrance conduits from the new pull box into the M & O Building Z are adequate. There is also sufficient conduit along the Washington Street side to the ball field concession stand. But, the main conduit pathway serving the M & O pull box and the conduits to the concession stand needs to be supplemented.

The main backbone conduit runs can be up to nine 4" conduits with a tapering down to six 4" near the end of the runs.

See Communications Phases 1 through 4 for illustration of existing and proposed conduit paths.

We recommend a standard for the number of conduits that should be placed into new or remodeled buildings. The recommended numbers are listed in the next paragraph. We also recommend that new multi-mode and single-mode fiber cables be placed to serve all new and remodeled buildings. We also recommend the same for existing buildings, but the existing infrastructure should be analyzed before a final size or type of fiber is planned. The recommended multi-mode fiber is 50 micron, laser optimized OM3 in order to provide OM3 transmission that allows 10 gigabit speed. This same OM3 fiber can be used for 40 gigabit and 100 gigabit speeds by using multiple strands. The single-mode fiber provides distance and further flexibility for such services as video and any future technology. A limited amount of copper cable is needed in each building for analog circuits that are not Voice over IP.

The proposed number of new entrance 4" conduits into buildings is (3) 4" for buildings under 50,000 square feet and (4) 4" for buildings over 50,000 but less than 100,000 square feet. Buildings over 100,000 square feet should have six 4" conduits. Existing buildings will need to be connected to the new conduit infrastructure and have up-dated fiber installed. The proposed entrance conduit rule would apply to these existing buildings as well.

Communications (cont'd)

The following tables provide our recommendations for proposed fiber and copper cables to serve the new or remodeled buildings by phase:

Table 8-1: Serving Telecom Cables - 2015 (Phase 2)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	SM Fiber	MM Fiber	Copper
Science and Science Lecture	Academic/Lab	2015	62,900	36	36	50
Allied Health	Academic	2015	55,138	24	24	50

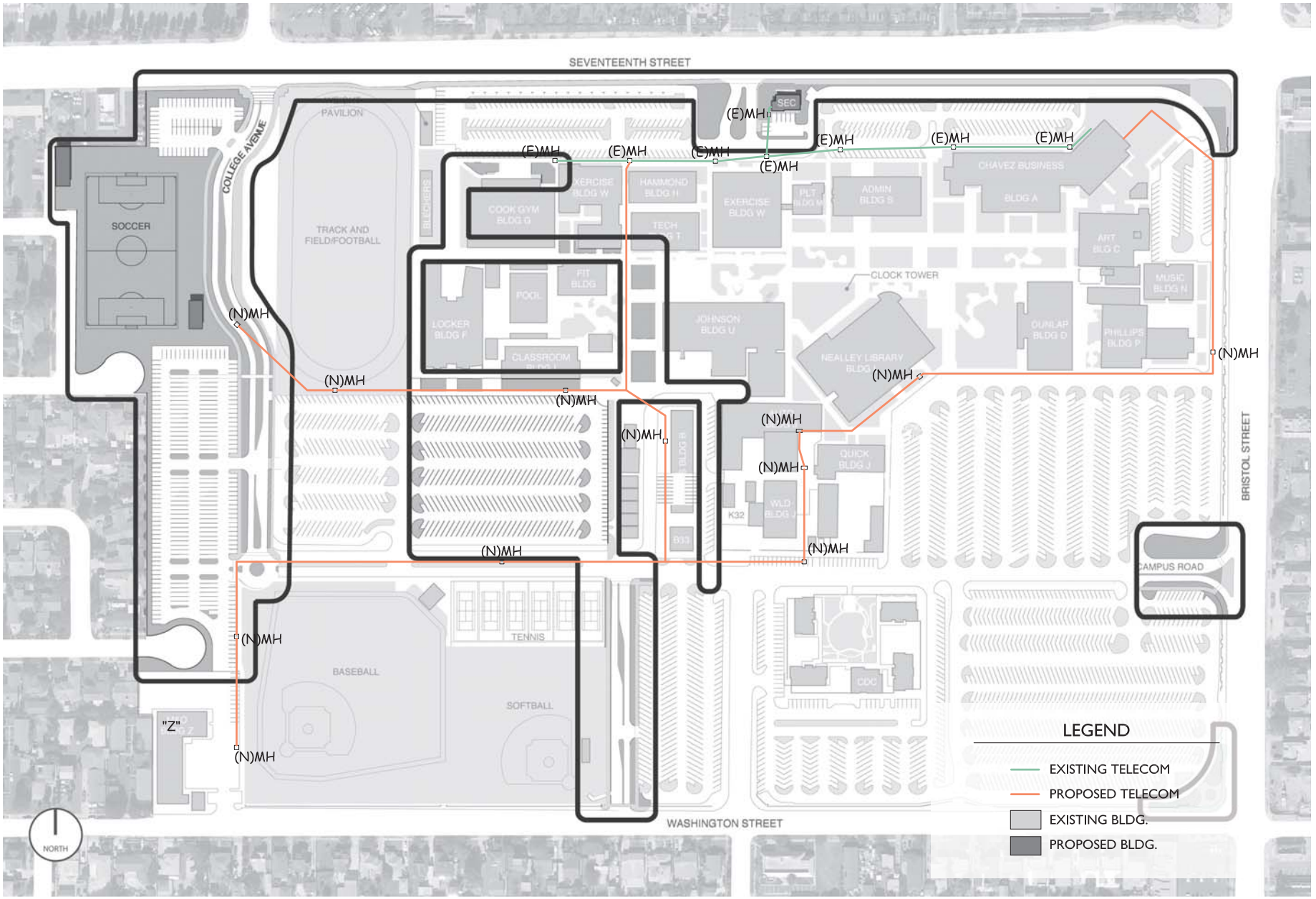
Table 8-2: Serving Telecom Cables - 2017 (Phase 3)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	SM Fiber	MM Fiber	Copper
Fine Arts and Music	Academic	2017	45,000	24	24	50
Performing Arts (Philips Hall)	Academic	2017	40,000	24	24	50
Student Services and Instruction	Academic	2017	60,000	24	24	50

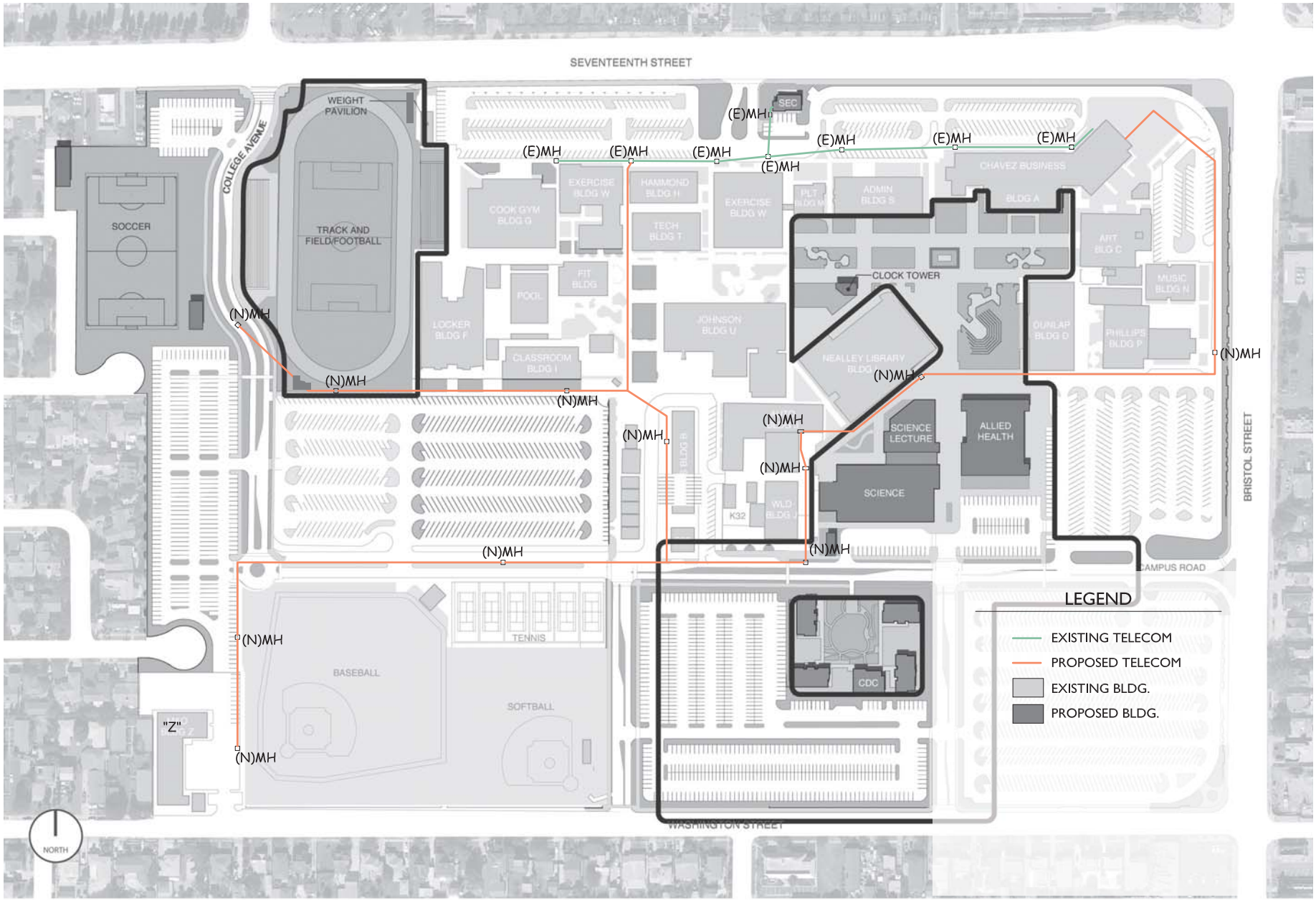
Table 8-3: Serving Telecom Cables - 2020 (Phase 4)

Building Name	Occupancy Type	Projected Construction Completion Year	Gross sqft	SM Fiber	MM Fiber	Copper
Parking Structure	-	2020	470,000	12	12	25
Middle College High School	Academic	2020	30,000	12	12	25
Vocational Technology	Academic	2020	35,000	12	12	25

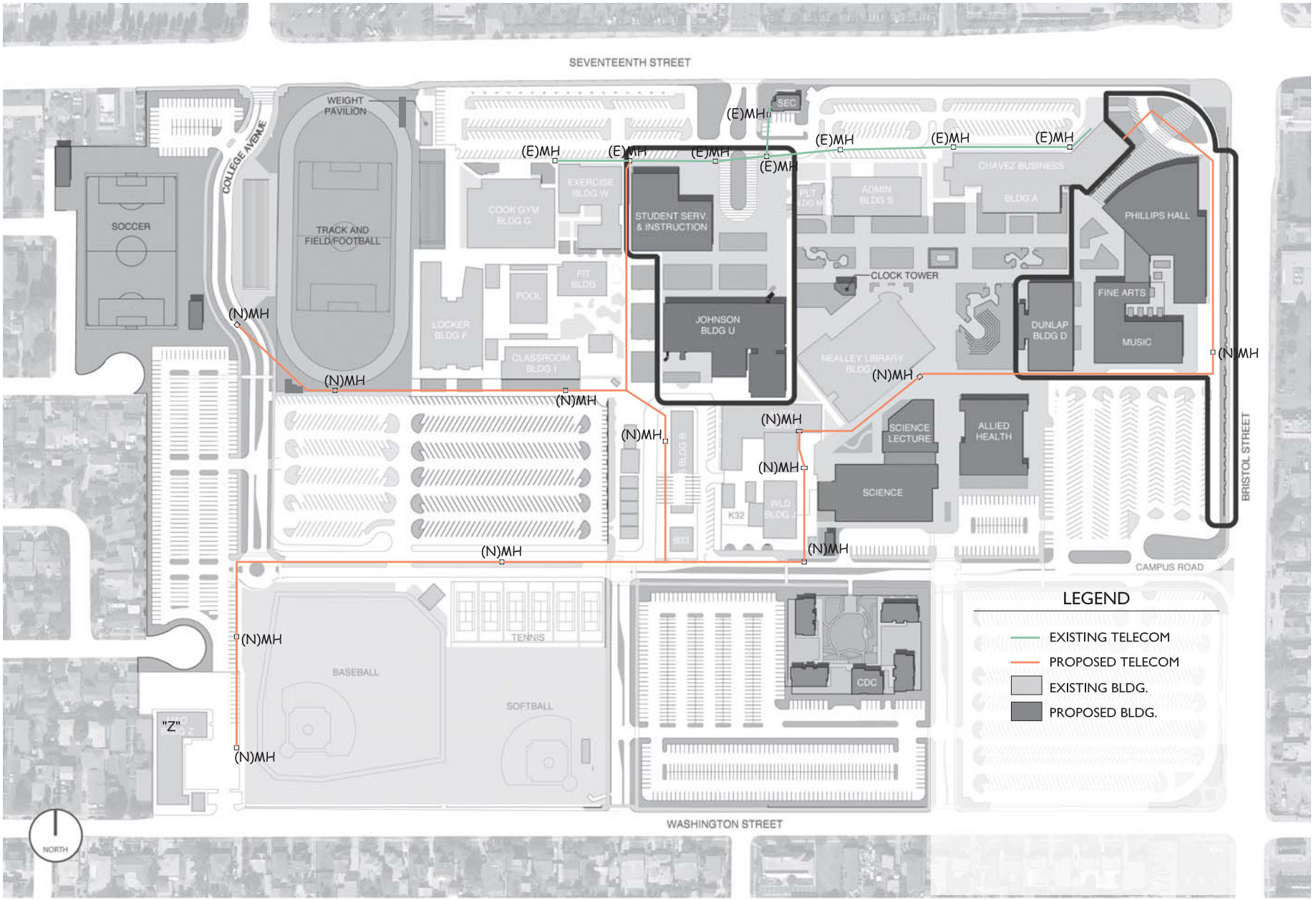
The normal fiber requirement would be 24 single-mode and 24 multi-mode with discretionary up- or down- sizing dependent on size or use of the building. Copper cable for analog services can be 50-pairs as a standard.



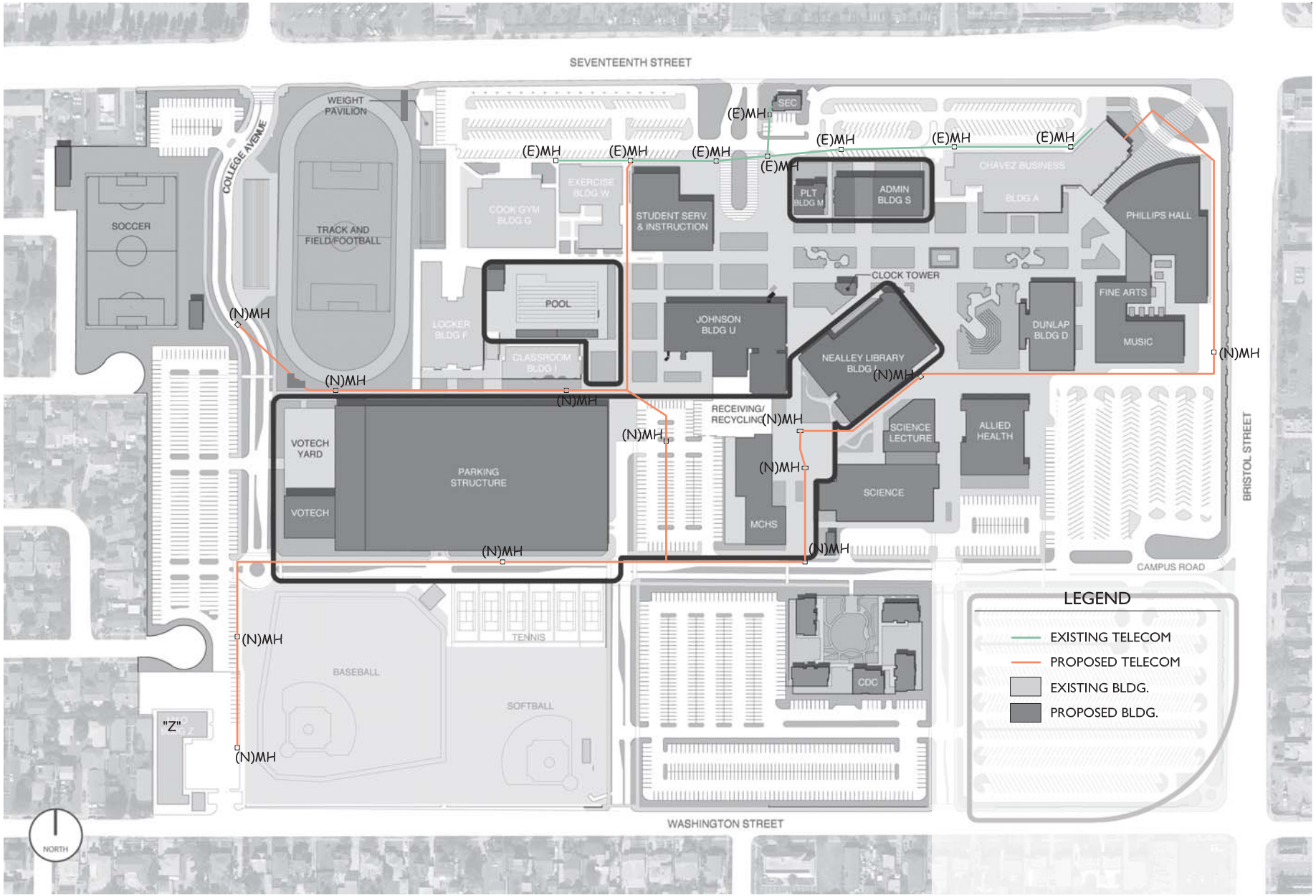
Communications - Phase 1



Communications - Phase 2



Communications - Phase 3



Communications - Phase 4

Natural Gas

System Description

Background and Scope

Santa Ana College is one of nine facilities within the Rancho Santiago Community College District (RSCCD). In 1915, Santa Ana Junior College opened its doors as a department of Santa Ana High School. It was the second junior college founded in Orange County, and the fourth oldest in California.

Objective

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

Natural Gas (cont'd)

Methodology

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

- A critical aspect in the evaluation of the existing Natural Gas system serving a facility is a detailed and accurate field investigation of the current system. Initial meetings and discussions were held with the campus personnel. A detailed survey of the existing Gas system at the Santa Ana College campus was undertaken, and existing conditions, together with potential problems, were identified. The surveyed information was verified through available record drawings and further meetings with the campus facilities staff.
- A study of the existing and future loads was developed using existing and proposed capacity requirements. In the absence of actual connected load information, a BTUH/sq.ft. assumed load was derived for the proposed and existing facilities.
- The Natural Gas system was then evaluated for capacity, functionality, reliability, ease of maintenance, age, and its ability to serve the present and future needs of the campus.
- Recommendations for system alterations/upgrade/modifications were developed to support new buildings, major renovations, and building retrofits that are identified in the facilities master plan.
- Costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

Analysis of Existing System

The Santa Ana College campus is currently served from four gas meters located in various locations. For the purpose of this report, the listed meter numbers mentioned throughout were assigned to depict its location in relation to the campus.

The first meter is located on the east side of the campus, in a masonry enclosure behind Art Building 'C', deriving gas service thru a 4" line from the city's high pressure main line running along Bristol Street. This system serves Art, Music, Philips Hall Auditorium, Dunlap Hall, Cesar Chavez Business/Computer Center, Administration, Nealley Library and Johnson Campus Center. The second meter is located on the opposite side of the campus, west of Cook Gym (Bldg. 'G') also inside a masonry enclosure and derives gas service thru a 2" line from the city's high pressure main line running along Seventeenth Street. This system serves Cook gym, the Locker/Shower Building 'F', the swimming pool equipment room, the classroom Building 'I', P.E. Multi-purpose Building 'W', Hammond Hall, Technical Arts, Russell Hall, Tessmann Planetarium, Fitness Center, Auto Shop, Welding and the publications center. Both of these systems are closed-ended and interconnected in order to having the ability for a system cross-over via manual underground isolation valves located between Johnson Campus Center and the Auto Shop. A third gas meter is located on the south side of campus deriving gas service thru a 1" line fed from the city's high pressure main running along Washington Street. This system serves the recently built building 'Z', Maintenance and Operations. The fourth meter is located on the north-west corner of the campus in the vicinity of Seventeenth Street and College Avenue which will serve the new Soccer field.

The current gas system controls atmospheric corrosion to the main steel pipes using cathodic protection rectifiers consisting of galvanic anodes. This equipment and components are located on the south side of Art Building 'C' and east side of the Fitness Center 'E' with the rectifier panel mounted to the walls and anodes underground in accessible concrete boxes.

Natural Gas (cont'd)

Natural Gas service is derived from Southern California Gas Company's high pressure service laterals leading into the campus. The distribution system throughout the campus has expanded over the years to accommodate campus expansions and additions. Gas mains are steel pipes ranging from 3/4 inch to 6-inches in diameter. The majority of the Campus gas infrastructure was installed in the early 1950's and appears to be in good condition, however recent events indicate that at some locations, replacement of lines may be required. Discussions with the campus maintenance facilities staff revealed that at some locations, pipe runs have been replaced with PVC pipe with some portions retrofitted with P.E. or steel pipe. PVC pipe is not the recommended plastic pipe material to be used for a natural gas distribution system.

Natural Gas downstream of the meters is 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 used for space heating, and to water heaters used for domestic hot water.

The total estimated combined gas load demand for the existing system served through all meters is approximately 39,640 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 39,975 CFH.

Figure 4a – Existing Utility Map – Natural Gas shows the existing natural gas meters throughout the campus.

Tables 4-1a, 4-1b, 4-1c and 4-1d provide approximate Heating and Domestic water connected load demands based on building square footage in absence of metered data in each proposed or future building.

SANTA ANA COLLEGE – UTILITY MASTER PLAN

OCTOBER, 2010 - *DRAFT*

Natural Gas (cont'd)

Table 4-1a: Existing Gas Demand Loads

METER 1 - Location: Bristol Avenue connection							
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)**
A	Cesar Chavez Business/Computer Center	Academic	53,000	35	1,855	925	2,780
B	Middle College High School	Academic	30,000	35	*Unknown if building derives gas service*		
C	Fine Arts/Art Gallery	Academic	45,000	35	*N/A*	*N/A*	*9,140
D	Dunlap Hall	Public Gathering	68,500	40	*N/A*	*N/A*	*1,900
L	Nealley Library	Library	50,475	30	*N/A*	*N/A*	*1,970
N	Music	Academic	7,875	35	*N/A*	*N/A*	*600
P	Philips Hall Theatre	Public Gathering	40,000	40	*N/A*	*N/A*	*930
Q	Concession	Retail	1,500	30	*No gas service to this building*		
S	Administration	Office	24,300	30	*N/A*	*N/A*	*1,000
	TOTAL						**18,320**

Indicated loads are estimated (based on BTUH/square foot)

***** *Indicates Actual connected load (based on as-built information and/or field verification of Installed equipment)*

Table 4-1b: Existing Gas Demand Loads

METER 2 - Location: Seventeenth Street connection							
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)**
E	Fitness Center	Gymnasium	5,280	45	*N/A*	*N/A*	*1,500
F	Locker/Shower rooms	Gymnasium	24,745	45	1,115	**500	1,615
G	Cook Gym	Gymnasium	34,600	45	*N/A*	*N/A*	*1,560
H	Hammond Hall	Academic	15,720	35	*N/A*	*N/A*	*1,220
I	Classroom Building	Academic	23,000	35	805	400	175
J	Auto Shop	Industrial	6,000	30	*N/A*	*N/A*	*2,545
J	Publications Center	Retail	1,500	20	*N/A*	*N/A*	*455
K	Welding	Industrial	2,170	30	*N/A*	*N/A*	*820
M	Planetarium	Academic	3,600	35	*N/A*	*N/A*	*320
R	Russell Hall	Public Gathering	58,665	40	*N/A*	*N/A*	*3,520
T	Technical Arts	Academic	18,210	35	640	320	960
U	Johnson Center - Cafeteria	Cafeteria	54,365	45	*N/A*	*N/A*	*2,200
U	Johnson Center - Bookstore	Retail	54,365	20	*N/A*	*N/A*	*565
W	Physical Education	Gymnasium	21,600	45	*N/A*	*N/A*	*600
X	Security Safety	Office	550	30	*No gas service to this building*		
	Pool Equipment room	Industrial	250	30	**2,050	Heating only	**2,050
	TOTAL						**21,135**

Indicated loads are estimated (based on BTUH/square foot)

***** *Indicates Actual connected load (based on as-built information and/or field verification of Installed equipment)*

****** *Indicates Anticipated load (based on anticipated Installed gas fired equipment)*

Natural Gas (cont'd)

Table 4-1c: Existing Gas Demand Loads

METER 3 - Location: Washington Street connection							
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)**
Z	Maintenance	Warehouse/Office	12,350	30	370	150	520
	TOTAL						**520**

Table 4-1d: Existing Gas Demand Loads

METER 4 - Location: Seventeenth Street & College Avenue connection							
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)**
CDC	Child Development	Academic	10,375	35	*Unknown if building derives gas service*		
	TOTAL						**0**
	GRAND TOTALS	*(Meter 1 - 4 combined)*					**39,975**

Indicated loads are estimated (based on BTUH/square foot)

Analysis of Future Needs

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

An evaluation of the facilities planned as part of the Utility Program master plan revealed that a net additional 798,038 square feet of buildings/spaces are planned at the campus. A review of these proposed facilities and their usage revealed that the campus would add an additional combined load of 18,135 CFH to the existing metered systems.

Table 4-2 provides approximate Heating and Domestic load demands of the proposed facilities that are being added to the campus and are depicted by Meter numbers. Meter number designations can be found on the Utility Plans. The demands are calculated based on building square footage.

Natural Gas (cont'd)

Table 4-2a: Future Construction Projects

METER 1 – *Additional load to existing system*								
Bldg. No.	**Building Name**	**Occupancy Type**	**Projected Construction Completion Year**	**Gross Area (Sq. Ft.)**	**Heating Load Factor (BTUH/sq.ft.)**	**Estimated Heating Load (CFH)**	**Estimated Domestic Load (CFH)**	**Total Gas Load (CFH)**
-	Science Bldg.	Academic/Lab	2015	62,900	35	2,320	1,160	3,480
-	Allied Health Bldg. (Russell Hall replacement)	Academic	2015	55,138	35	2,030	1,015	3,045
-	Fine Arts and Music	Academic	2017	45,000	35	1,660	830	2,490
-	Performing Arts (Philips Hall)	Academic	2017	40,000	35	1,475	735	2,210
	TOTAL			203,038				**11,225**

Indicated loads are estimated (based on BTUH/square foot)

Table 4-2b: Future Construction Projects

METER 2 – *Additional load to existing system*								
-	Student Services and Instruction	Academic	2017	60,000	35	2,210	1,105	3,315
-	Parking Structure	Parking	2020	470,000	*N/A*	*No gas service to this structure*		
-	Middle College High School	Academic	2020	30,000	35	1,105	555	1,660
-	Vocational Technology	Academic	2020	35,000	35	1,290	645	1,935
	TOTAL			595,000				**6,910**
	GRAND TOTALS	*(Meter 1 & 2 combined - future only)*		**798,038**				**18,135**

Indicated loads are estimated (based on BTUH/square foot)

Table 4-2: Future Gas Demand Loads

METER 3 – *No Additional load to existing system*								
	TOTAL							**0**

METER 4 – *No Additional load to existing system*								
	TOTAL							**0**

Natural Gas (cont'd)

Findings and Reccomendations

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

A review of the load demands of the future facilities and current load demands with loads of buildings to be demolished subtracted from the totals of the campus, revealed that the existing main medium pressure distribution lines are adequately sized to meet the demands of existing and future facilities on the campus.

The campus should upgrade the existing Natural Gas infrastructure to (a) improve system reliability (b) 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 and (c) to provide adequate capacity service lines to accommodate existing loads and planned future loads resulting from new building additions, as well as renovations of existing buildings.

The following is a summary of improvements needed to upgrade the existing natural gas system:

1. Underground steel gas line from Building G to Building E should be replaced with P.E. Provide means of isolation.

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

3. Buildings should 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.

Table 4-3 provides a description of the impact of work involved with the proposed locations of each building in relation to the existing campus Natural Gas system.

Table 4-3: Description of Impact

Bldg. No.	Building Name	Gross Area (Sq. Ft.)	Description
-	Science Bldg.	62,900	The proposed building does not interfere with the existing underground gas service lines. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #1. See Phase 2 information below for additional work involved.
-	Allied Health Bldg. (Russell Hall replacement)	55,138	The proposed building does not interfere with the existing underground gas service lines. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #1. See Phase 2 information below for additional work involved.
-	Fine Arts and Music	45,000	The proposed building interferes with an existing underground campus owned gas service line currently serving Phillips Hall Theater (Bldg. P) which is to be demolished. This line can be abandoned in place or removed. A supply line shall extend to serve this building. This building will derive its service from the new lines fed from relocated Meter #1. See Phase 3 information below for additional work involved.
-	Performing Arts (Philips Hall)	40,000	The proposed building interferes with the existing Meter #1 and the existing underground city owned gas service line leading into the campus from Bristol Street. This building will derive its service from the new lines fed from relocated Meter #1. See Phase 3 information below for additional work involved.
-	Student Services and Instruction	60,000	The proposed building interferes with an existing underground campus owned gas service line currently serving Bldgs. R & T which are to be demolished. This line will be directly buried by the proposed building. The portion of pipe under the building should be abandoned or removed. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #2. See Phase 3 information below for additional work involved.
-	Parking Structure	470,000	The proposed structure does not interfere with the existing underground gas service lines. The proposed structure will not require gas service.
-	Middle College High School	30,000	The proposed building does not interfere with the existing underground gas service lines. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #2. See Phase 4 information below for additional work involved.
-	Vocational Technology	35,000	The proposed building does not interfere with the existing underground gas service lines. A supply line shall extend to serve this building. This service will be extended from the existing system fed from Meter #2. See Phase 4 information below for additional work involved.

Natural Gas (cont'd)

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

Meter 1: Replace existing meter with a higher capacity meter having a max CFH output of no less than 20,000 CFH. Southern California Gas Company shall provide this service.

Meter 2: Although additional loads are being introduced to this system, total load is less than existing load therefore meter upgrade is not required and can remain.

Meter 3: There are no additional loads to this system. The system to remain as is.

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

Table 4-4: Existing/Future Gas Demand Loads

METER 1 - Meter Upgrade		
Bldg. No.	**Building Name**	**Combined Gas Load Heating/Domestic (CFH)**
EXISTING		
A	Cesar Chavez Business/Computer Center	2,780
B	Middle College High School	-
C	Fine Arts/Art Gallery	~~9,140~~
D	Dunlap Hall	1,900
L	Nealey Library	1,970
N	Music	~~600~~
P	Philips Hall Theatre	~~930~~
Q	Concession	-
S	Administration	1,000
	EXISTING LOAD FOR REFERENCE ONLY (from table 4-1a)	*18,320*
FUTURE		
	Science Bldg.	3,480
	Allied Health Bldg. (Russell Hall replacement)	3,045
	Fine Arts and Music	2,490
	Performing Arts (Philips Hall)	2,210
	TOTAL NEW LOAD	**18,875**

RED Indicates buildings to be Demolished. Loads are not considered as part of the 'TOTALL NEW LOAD.'

METER 2 - Meter Upgrade		
Bldg. No.	**Building Name**	**Combined Gas Load Heating/Domestic (CFH)**
EXISTING		
E	Fitness Center	~~1,500~~
F	Locker/Shower rooms	1,615
G	Cook Gym	1,560
H	Hammond Hall	~~1,220~~
I	Classroom Building	175
J	Auto Shop	~~2,545~~
J	Publications Center	~~455~~
K	Welding	~~820~~
M	Planetarium	320
R	Russell Hall	~~3,520~~
T	Technical Arts	~~960~~
U	Johnson Center - Cafeteria	2,200
U	Johnson Center - Bookstore	565
W	Exercise Science	600
X	Security Safety	-
	Pool Equipment room	2,050
	EXISTING LOAD FOR REFERENCE ONLY (from table 4-1b)	*21,135*
FUTURE		
	Student Services and Instruction	3,315
	Parking Structure	-
	Middle College High School	1,660
	Vocational Technology	1,935
	TOTAL NEW LOAD	**15,995**

The following gas line improvement schedule supports the phased implementation of the facilities master plan.

Phase 1 – 2012

Work included as part of this phase consists of the following:

1. Replace existing gas line currently running between Cook Gym and the pool from the meter lateral to Bldg. E. Replace with P.E. and include replacement of underground shut-off valves at all laterals supplied from this main.

2. Install new 3" P.E. line (Installment 1 of 2) to serve proposed Vocational Tech. Bldg. See Phase 4 for Installment 2 of 2. Provide new underground shut-off valve at lateral.

Phase 2 – 2015

The following table provides facilities that are provided in phase 2 along with their connected loads and demands. Work included as part of this phase consists of the following:

1. Replace an existing steel line portion with a new 3" P.E. line and extend to serve proposed Allied Health & Science Buildings.

Building Name	Occupancy Type	Projected Construction Completion Year	Gas Load (CFH)
Science Bldg.	Academic/Lab	2015	3,480
Allied Health Bldg.	Academic	2015	3,045
TOTAL			**6,525**

Natural Gas (cont'd)

Phase 3 – 2017

The following table provides facilities that are provided in phase 3 along with their connected loads and demands. Work included as part of this phase consists of the following:

1. Route new 4" P.E. line around proposed Student Services building and intercept existing line at the north of the building to continue serving existing Planetarium (M) and Exercise (W) buildings.
2. Meter (#1) to be re-located. The Gas company owned supply line should be extended to the new meter location, east of proposed Music Building.
3. Re-locate existing rectifier equipment to the exterior wall, east of the Music building.
4. Install new 2" P.E. line to serve the Performing Arts Building. Provide new underground shut-off valve at the lateral.
5. Install a new P.E. line and route around the Music building to intercept existing gas line north of existing Dunlap Hall.
6. Existing gas line serving Chavez Business building will be protected in place.

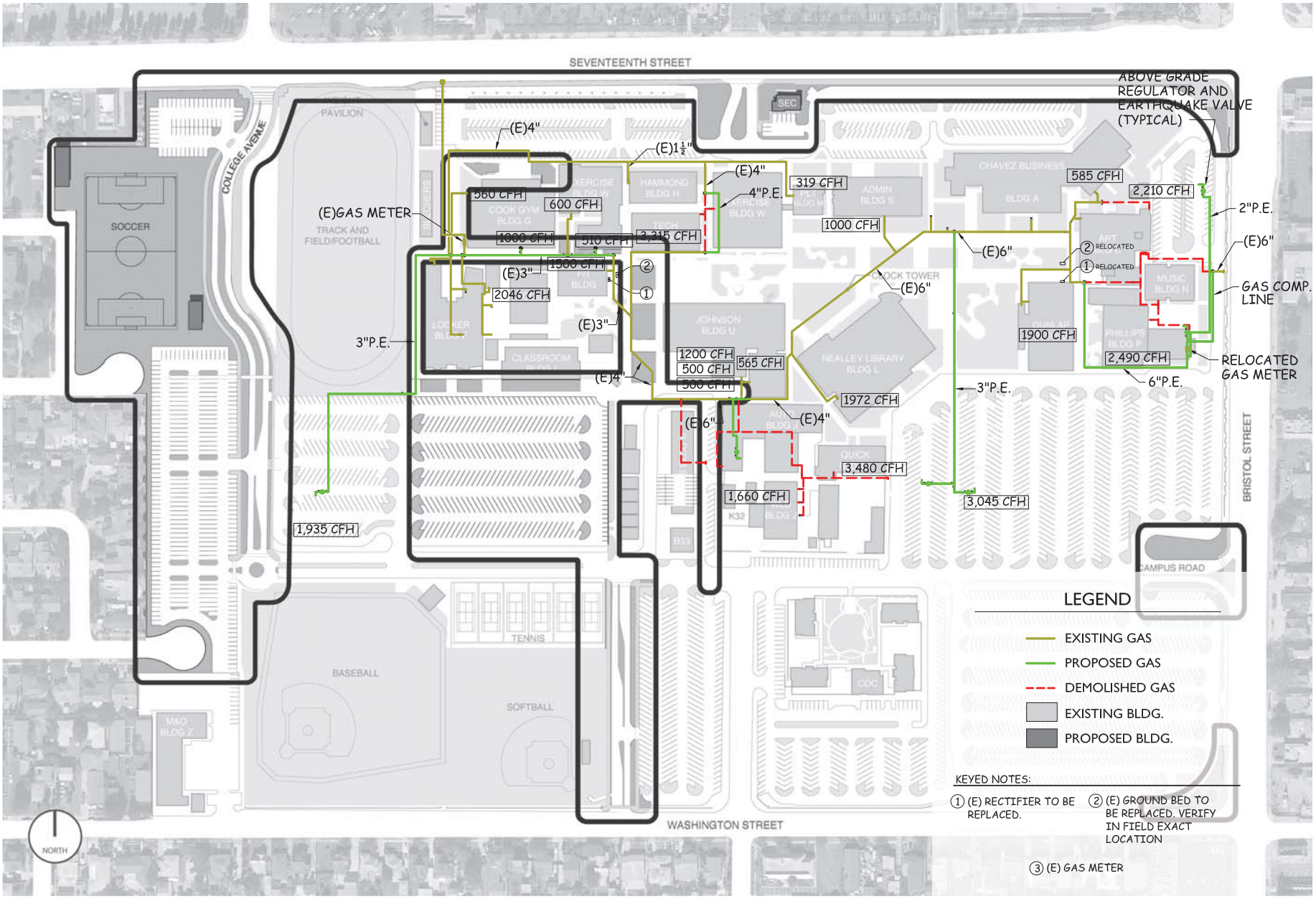
Building Name	Occupancy Type	Projected Construction Completion Year	Gas Load (CFH)
Fine Arts & Music	Academic	2017	2,490
Performing Arts	Academic	2017	2,210
Student Services	Academic	2017	3,315
TOTAL			**8,015**

Phase 4 - 2020

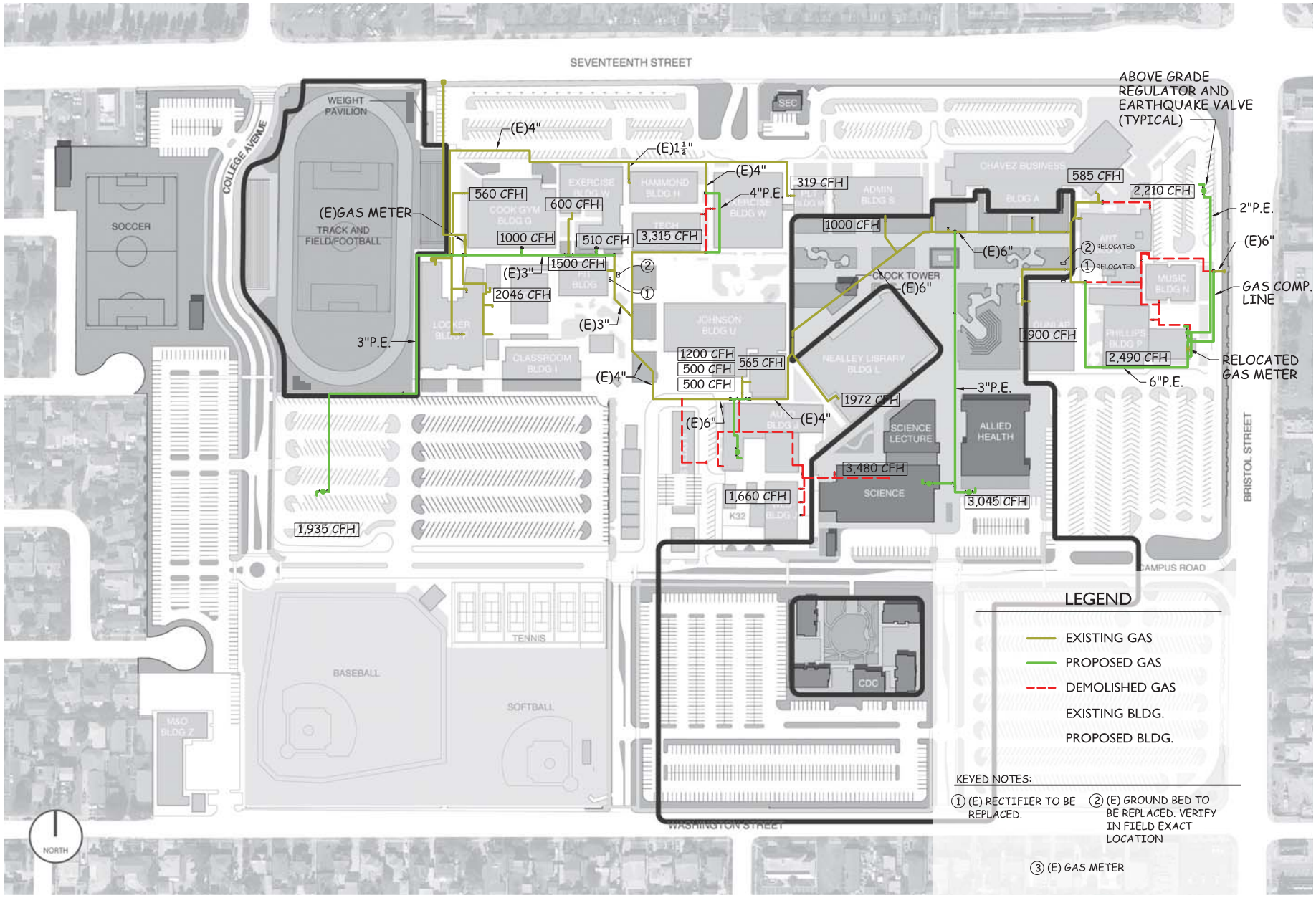
The following table provides facilities that are provided in phase 4 along with their connected loads and demands. Work included as part of this phase consists of the following:

1. Intercept 3" P.E. Installment 1 of 2 as described in Phase 1. Extend to serve proposed Vocational Tech. Bldg.
2. Install new 2" P.E. line to serve proposed Middle College High School. Point of connection is at existing 6". Provide new underground shut-off valve at lateral.

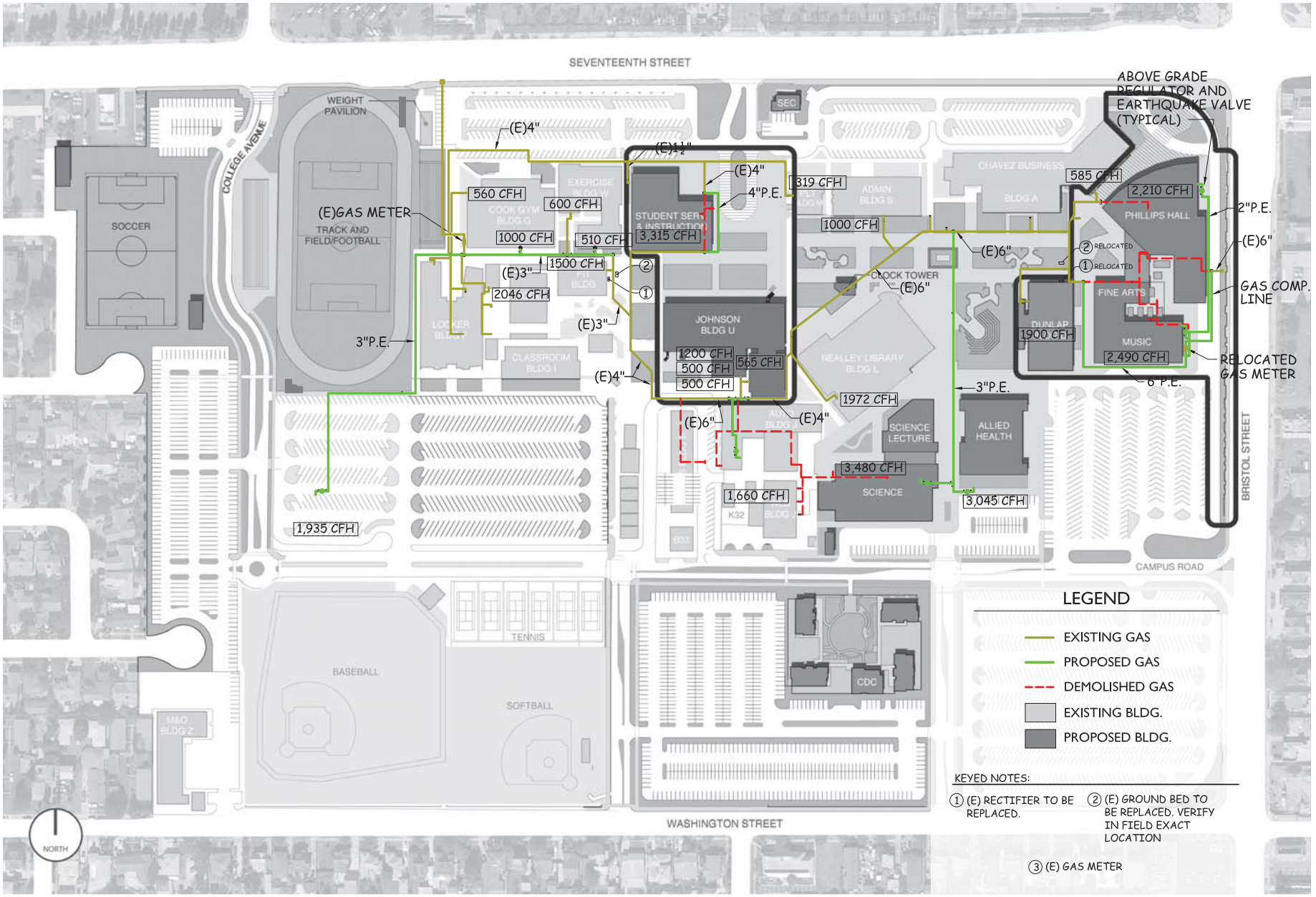
Building Name	Occupancy Type	Projected Construction Completion Year	Gas Load (CFH)
Middle College High School	Academic	2020	1,660
Vocational Technology	Academic	2020	1,935
TOTAL			**3,595**



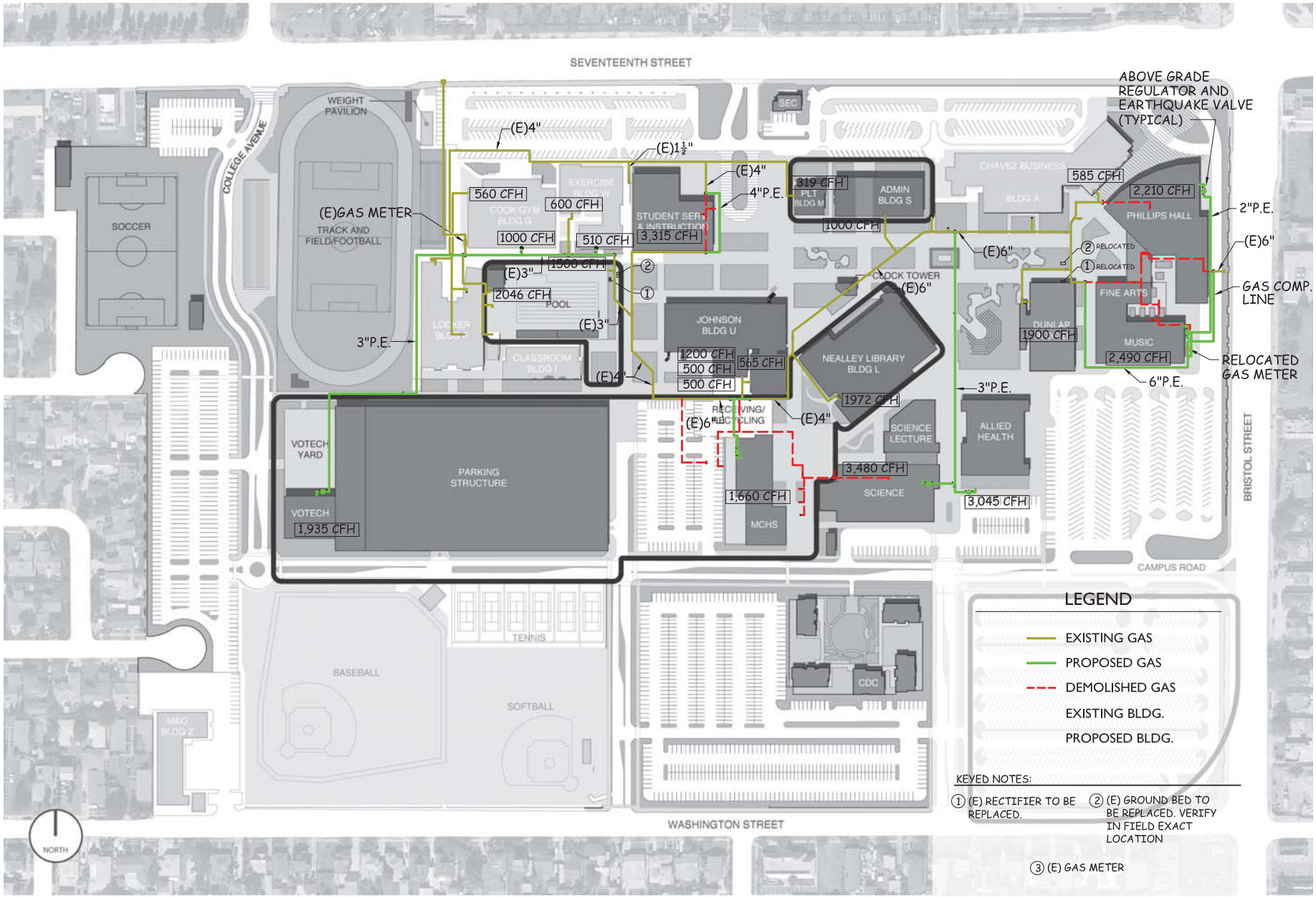
Natural Gas - Phase 1



Natural Gas - Phase 2



Natural Gas - Phase 3

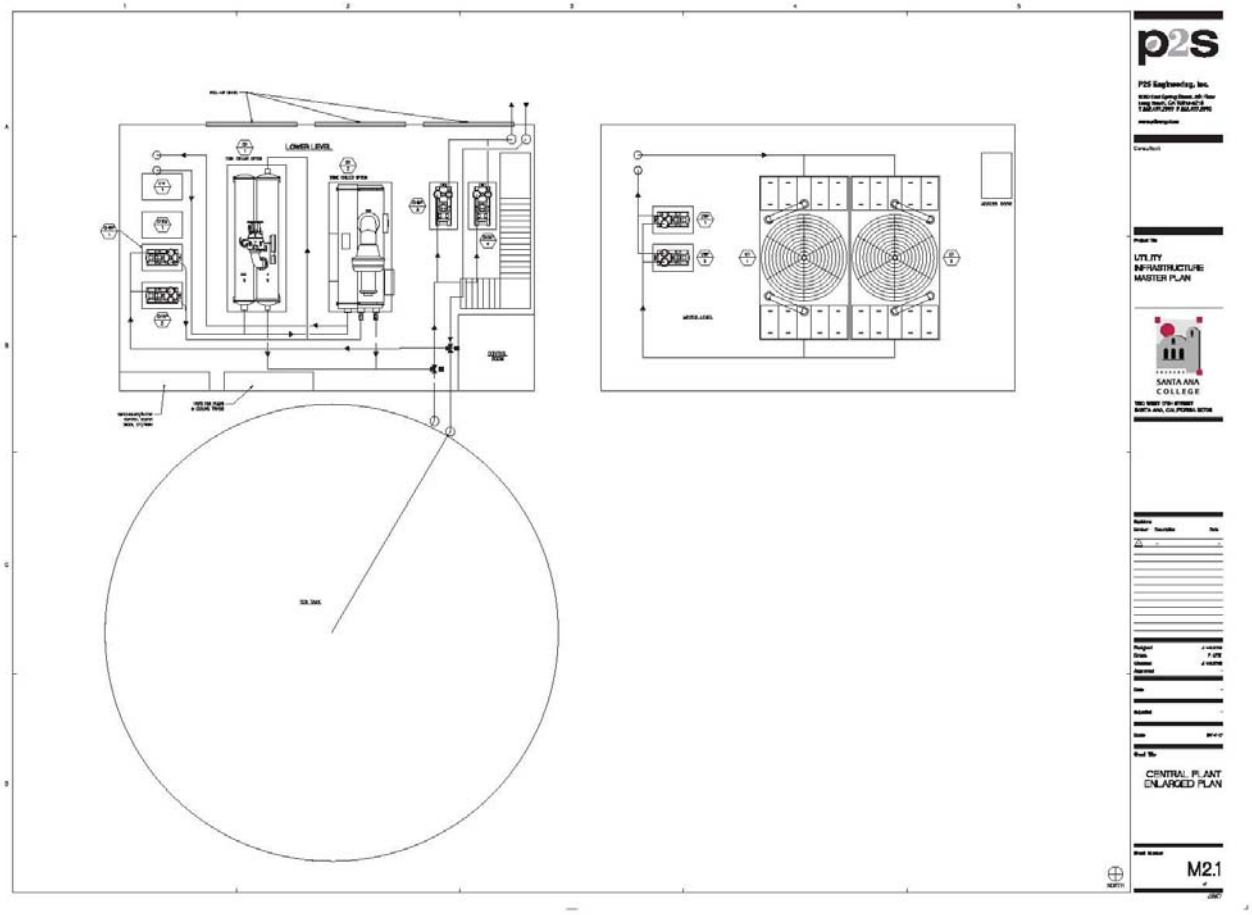


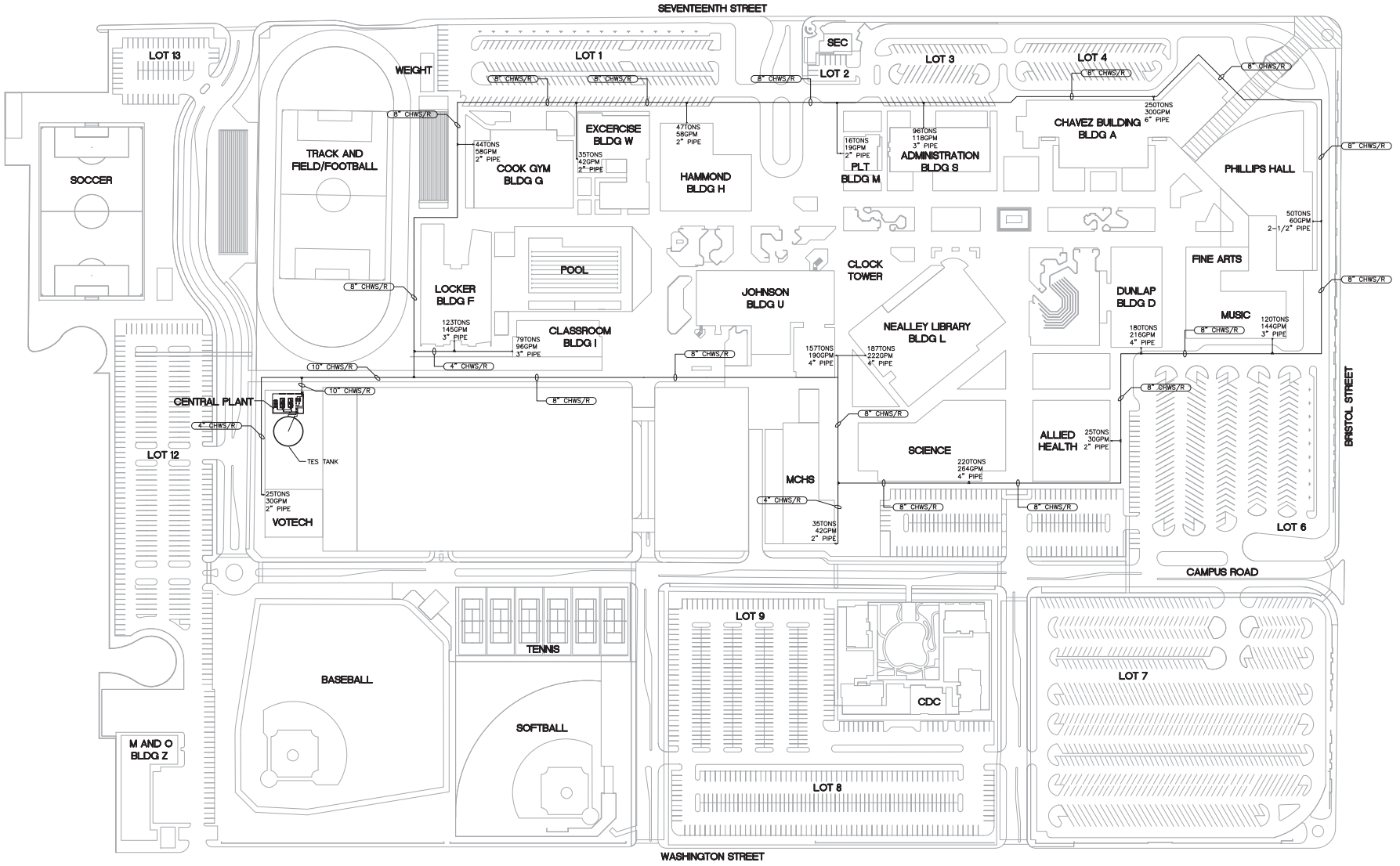
Natural Gas - Phase 4

Chilled Water

Implementation of a central cooling plant will require the installation of a two pipe chilled water distribution loop, buried below grade to connect the campus buildings to the central plant. Chilled water piping (below grade) shall be pre-insulated PVC pipe (AWWA C900) with high density polyethylene (HDPE) jacket and restrained joints. Insulation shall be factory applied 2" thick void free polyurethane foam.

See Appendix, Central Plant Study on page 112.




SEVENTEENTH STREET
LOT 13
WEIGHT
LOT 1
SEC
LOT 2
LOT 3
LOT 4
SOCCER
TRACK AND FIELD/FOOTBALL
COOK GYM BLDG G
EXCERCISE BLDG W
HAMMOND BLDG H
PLT BLDG M
ADMINISTRATION BLDG S
CHAVEZ BUILDING BLDG A
PHILLIPS HALL
FINE ARTS
MUSIC
LOCKER BLDG F
POOL
CLOCK TOWER
JOHNSON BLDG U
NEALLEY LIBRARY BLDG L
DUNLAP BLDG D
CLASSROOM BLDG I
CENTRAL PLANT
TES TANK
LOT 12
VOTECH
MCHS
SCIENCE
ALLIED HEALTH
BRISTOL STREET
LOT 6
CAMPUS ROAD
LOT 9
TENNIS
BASEBALL
SOFTBALL
CDC
LOT 7
M AND O BLDG Z
LOT 8
WASHINGTON STREET