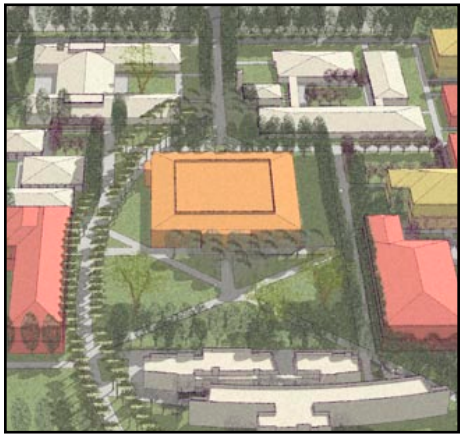


CAMPUS INFRASTRUCTURE AND UTILITY SYSTEM PLANS AND GUIDELINES

CAMPUS INFRASTRUCTURE AND UTILITY SYSTEM PLANS AND GUIDELINES

INTRODUCTION

There are a number of campus systems that support the effective and safe operation of the campus and campus activities. The maintenance, replacement, upgrading and expansion of campus infrastructure and utility systems is anticipated and integrated into the provisions Oxnard College Facilities Master Plan 2004 as articulated in this chapter. A number of utility system replacements, upgrades and expansions delineated in the Facilities Master Plan 2004 are projects that are directly supportable through Measure S funding. This is true for those systems that are of a general nature serving the entire campus such as upgrades to the campus electrical system and also applies to those systems that will be implemented as part of specific new building projects such as the Campus Learning Center, Student Services Complex or LRC Renovation. This chapter presents the analyses, concept plans and/or guidelines needed for the development for upgraded and new infrastructure and utility systems for Oxnard College. These topical areas are listed below. A more detailed description of the conditions of the existing systems is given in Chapter 2. Background information and a more comprehensive description of the proposed drainage, water, sewer and gas distribution plans is given in the Appendices 4-7.

Chapter 8 Contents:

DRAINAGE PLAN

Penfield & Smith analyzed the needs for addressing future storm water management for the Oxnard College site. The analysis was undertaken to identify future drainage facilities needed to accommodate the construction of the Measure S and build-out campus facilities. It is not the intent of the Facilities Master Plan to remediate the regional drainage issues discussed in the existing drainage conditions. The analysis led to a focus on the importance of addressing two storm water management issues for new developments at Oxnard College: 1) Reducing storm water flows from new developments to be consistent with existing drainage conditions which emanate from the 10 year frequency storm event; and 2) provide storm water runoff quality that is consistent with the requirements of the local jurisdictions—in this case the City of Oxnard and the County of Ventura.

The watershed framework for the analysis of Oxnard College included 111 acres of the Oxnard College site and roughly 60 acres of area in the vicinity of the City of Oxnard College Park site to the north of the campus. The analysis made certain generalized assumptions about the demarcation of the future watershed division on the Oxnard College campus with areas to the east of the proposed campus loop road tributary to and discharging directly into the VCWPD Rice Road Drain, while areas to the west of the loop road, including a majority of the proposed campus improvements, would be tributary to the City of Oxnard Rose Avenue drain facility. These areas are illustrated on the Watershed Analysis and Potential Storm water and Water Quality Improvements exhibit. Alternatively, a portion of the new parking areas on the south side of the campus could be directed towards the east so that they would enter the VCWPD Rice Road Drain.

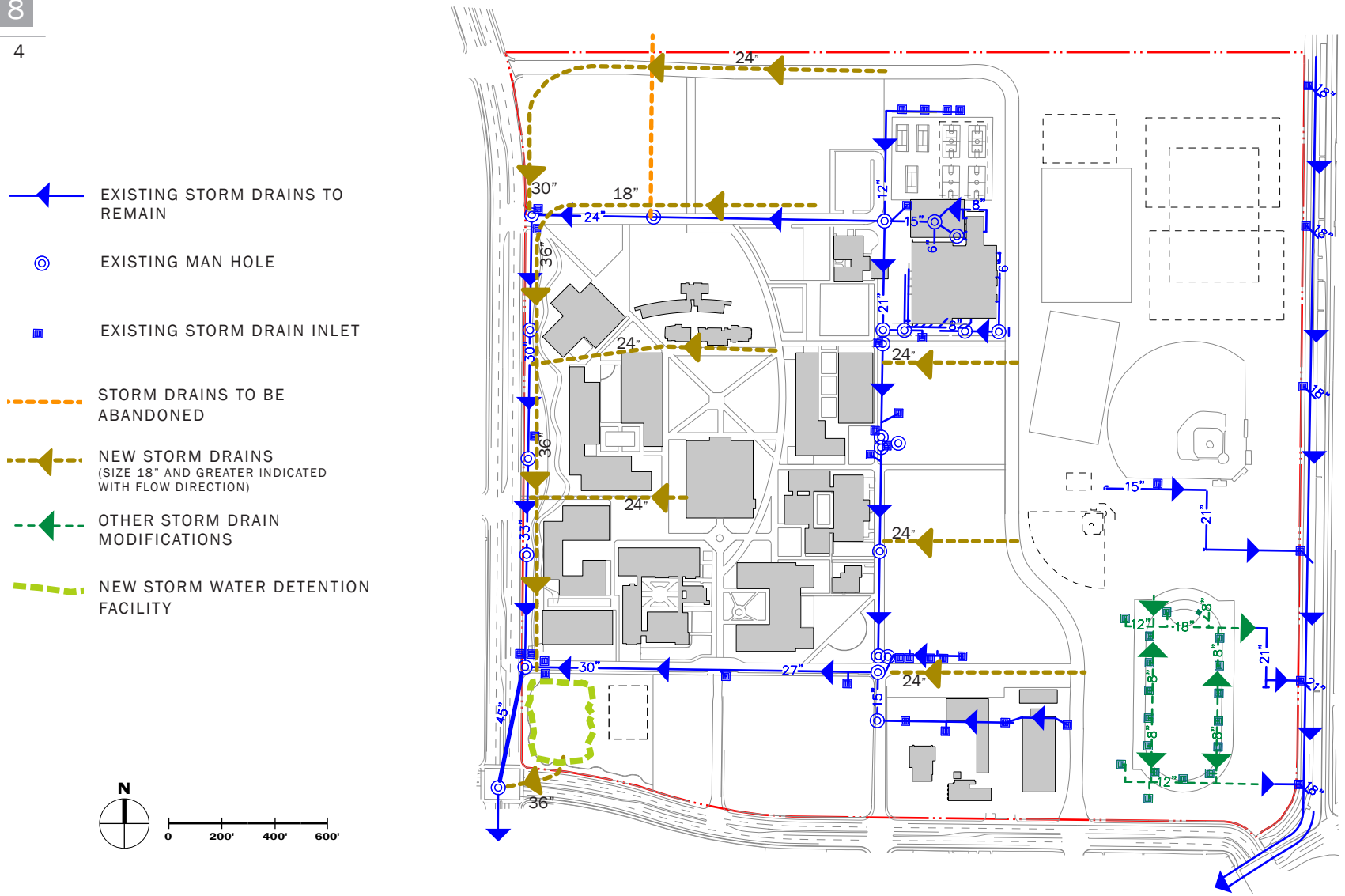
In conjunction with the above-mentioned storm water management objectives, the development of the storm water conveyance facilities led to a conceptual layout of the potential primary drainage infrastructure features of which are summarized below. Given the timing set for master plan adoption by the VCCCD Board of Trustees, the lack of key site specific geotechnical information for the site (including verified water table surface levels and subsurface soils percolation rates), and estimated storm water performance estimates for the proposed north parking facility, the concept described here is subject to modification that could significantly affect its size, configuration and cost. Conceptual approach goals to the development of the west campus drainage system, including potential facilities and configurations follow:

1) Identify source control measures that will reduce or eliminate the possibility of storm water coming into contact with a pollutant:
   - Policies and ordinances (zoning, development controls, standards)
   - Activities (operations and maintenance activities, schedules)
   - Programs (public education/ participation)

2) Provide conveyance infrastructure and structural treatment control measures to adequately deliver storm water runoff to its receiving body and to produce the required storm water quality.
   - Infiltration strips, swales and landscape areas
   - Configuration of drains to maximize flow time
   - Pipe conveyance infrastructure
   - Storm water detention basin and/or proprietary storm water treatment control devices for discharge attenuation and water quality

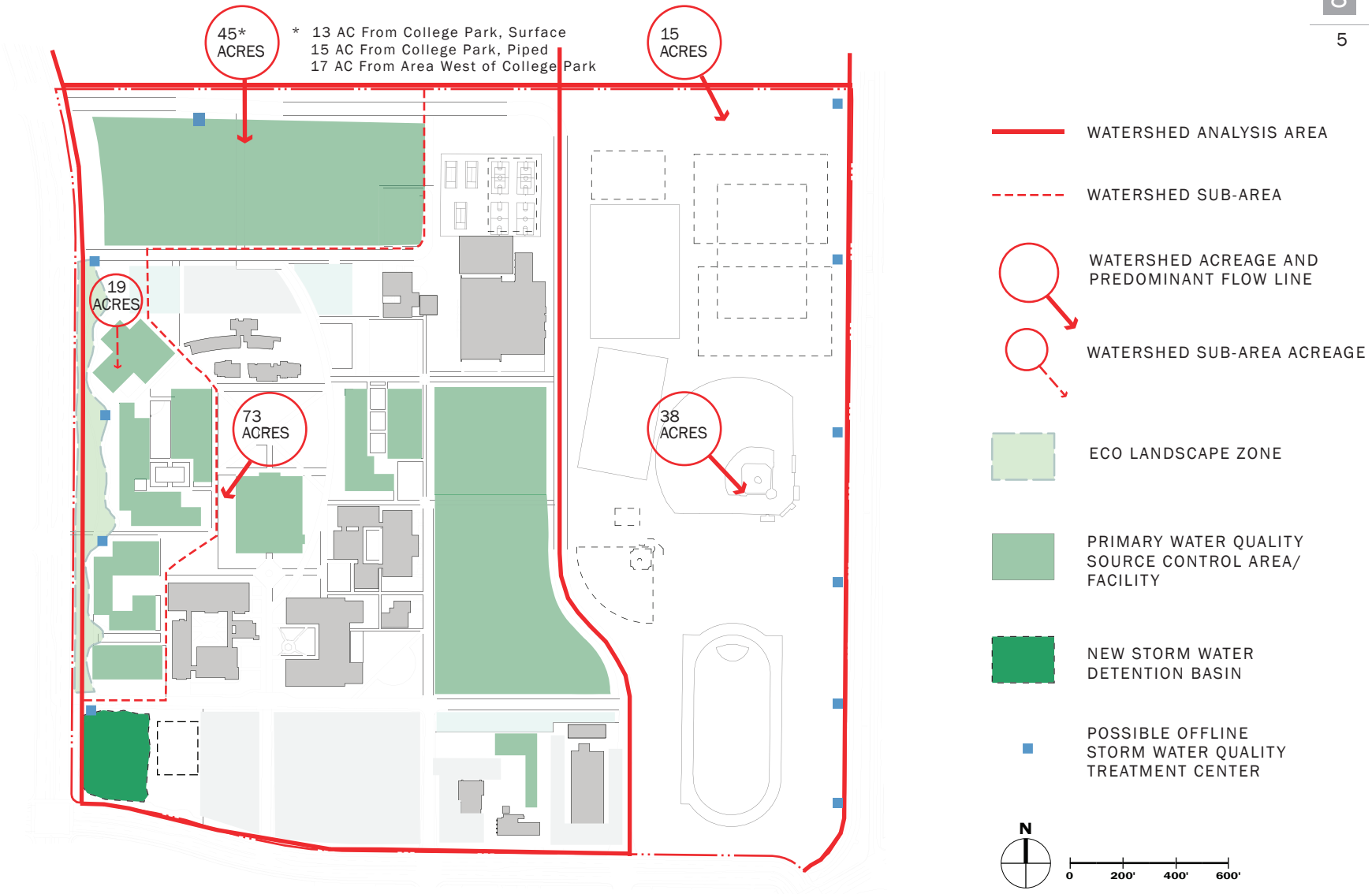
See Appendix 5 for a detailed description of the methodology and analysis.

KNOWN DRAINAGE SYSTEM IMPROVEMENTS



WATERSHED ANALYSIS AND POTENTIAL STORM WATER AND WATER QUALITY IMPROVEMENTS

(SEE TEXT FOR EXPLANATION)



CONCEPT WATER SERVICE PLAN

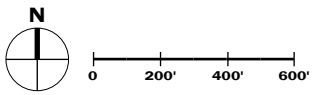
PROPOSED WATER LINE
(DIAMETER INDICATED)

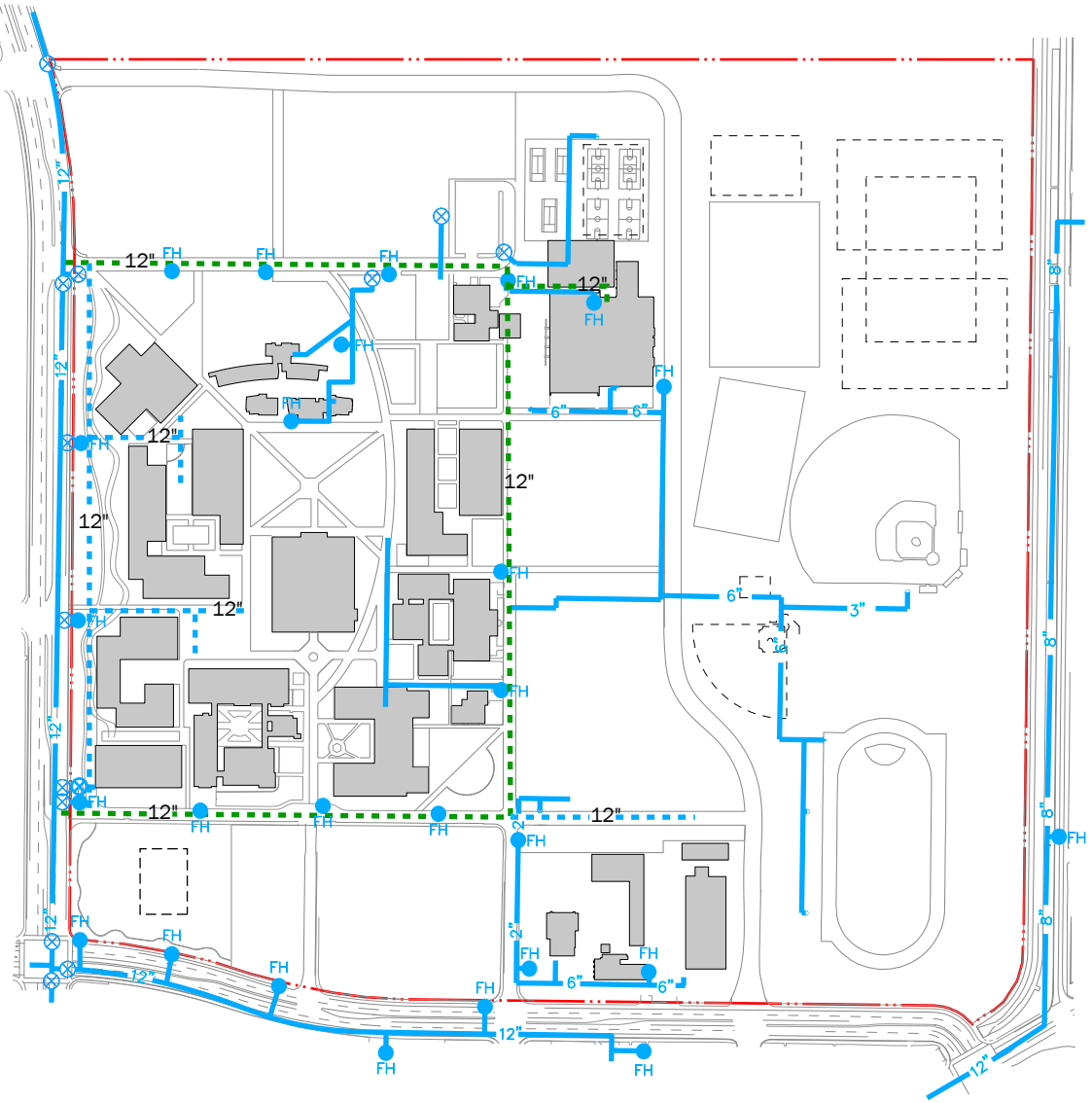
EXISTING WATER LINE TO REMAIN

REMOVE EXISTING WATER LINE FOR REPLACEMENT/UPGRADE

FH
EXISTING FIRE HYDRANT

EXISTING SHUT OFF VALVE





CONCEPT WATER DISTRIBUTION PLAN

Penfield & Smith of Camarillo, CA prepared the concept water distribution plan illustrated here. Their research and analysis was based on records and discussions with the following public agencies as well as site verification and survey work: Oxnard College, the City of Oxnard, City of Oxnard Fire Department, Division of the State Architect (DSA) and the County of Ventura. The base line concept development criteria and assumptions used to develop the concept water distribution plan are listed here:

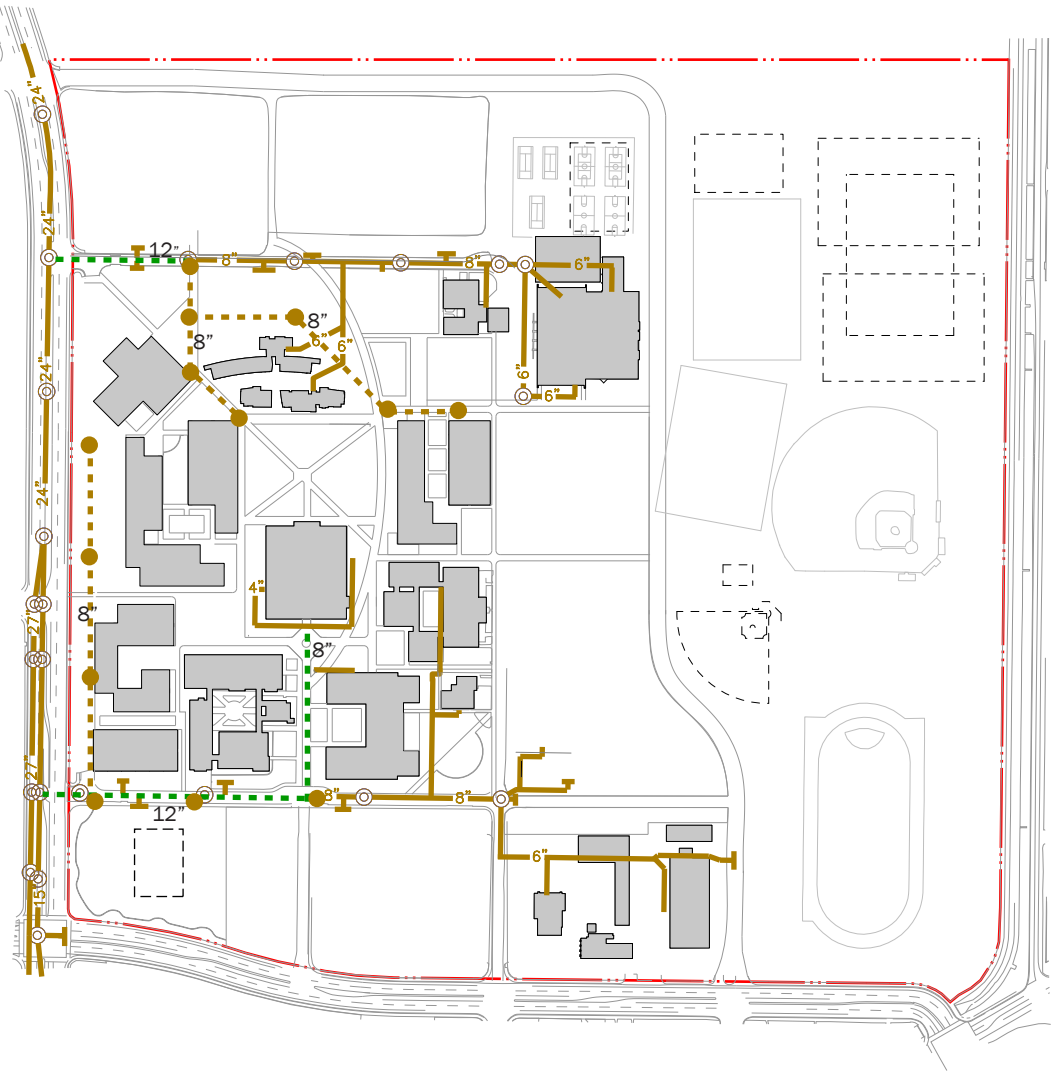
- Campus Population = 20,500 Head count (ultimate build-out)
- Water Demand = 20-gpm/capita/day (per City of Oxnard Standards)
- Max Day Demand Based on Peaking Factor = 4
- Fire Flow = 4,000-gpm min @ 20 psi residual (per California Fire Code, based on UBC Building Type: IV-H.T./V-One-HR)
- HGL in Rose Ave.=160-ft, pressure=55-psi (per City of Oxnard)

PROPOSED WATER DISTRIBUTION SYSTEM IMPROVEMENTS

Based on the future build-out campus population, the maximum-day (max-day) demand is projected to be approximately 1,000-gpm. The fire flow requirement would be 4,000-gpm at a residual pressure of 20-psi. The system will be designed to deliver max-day plus fire flow, which is 5,000-gpm. The existing 8-inch backbone water system is not capable of delivering such flows. To meet the new flow requirements, the 8-inch backbone system must be replaced with 12-inch waterlines. As an alternative, a 10-inch waterline could be installed parallel to the existing 8-inch line, but this is not recommended. Instead, it is recommended that the existing 8-inch waterline be replaced with a 12-inch waterline due to cost, service and existing pipe longevity considerations. The domestic and irrigation water demands are and will remain relatively small in comparison to the fire flow requirements. New water line extensions and replacements are assumed to be made of PVC.

Most of the buildings proposed in Facilities Master Plan 2004 will be located on the Western edge of the college site. In order to serve these buildings, it is recommended to install a new 12-inch waterline parallel to Rose Avenue. The building service connections and the new hydrant connections would connect to this new line. An alternative to this “parallel” waterline would be to connect the services and hydrant runs directly to the existing 12-inch water main located in Rose Avenue. However, the costs associated with that alternative are expected to far exceed the parallel 12-inch alternative after accounting for hot tap connections, road repair and traffic control in Rose Avenue.

CONCEPT SEWER PLAN



EXISTING SEWER LINE TO REMAIN
(DIAMETER INDICATED)

EXISTING MAN HOLE

PROPOSED SEWER LINE
(DIAMETER INDICATED)

PROPOSED MAN HOLE

REMOVE EXISTING SEWER LINE FOR REPLACEMENT UPGRADE

N

0 200' 400' 600'

CONCEPT SEWER PLAN

Penfield & Smith of Camarillo, CA prepared the concept sewer plan illustrated here Their research and analysis was based on records and discussions with the following public agencies as well as site verification and site survey work: Oxnard College, the City of Oxnard, Division of the State Architect (DSA) and the County of Ventura.

The College has an existing backbone sewage collection system consisting of two 8-inch sewers and several 4- and 6-inch diameter service laterals that connect the buildings to the backbone system. The two 8-inch diameter sewers connect to 24- and 15-inch sewers in Rose Avenue, which are owned and maintained by the City of Oxnard.

The base line engineering concept development criteria and assumptions used to develop the concept sewer plan are listed here:

- Ultimate Campus Population = 20,500 Head count (Build-out)
- Sewage Generation = 20-gpm/capita/day (per City of Oxnard Standards)
- Maximum depth to Diameter ratio, d/D = 0.67 (per City of Oxnard Standards)
- Peaking Factor = 4
- New sewers will be PVC (Manning's n=0.011 per City of Oxnard Standards.)

PROPOSED SEWER SYSTEM IMPROVEMENTS

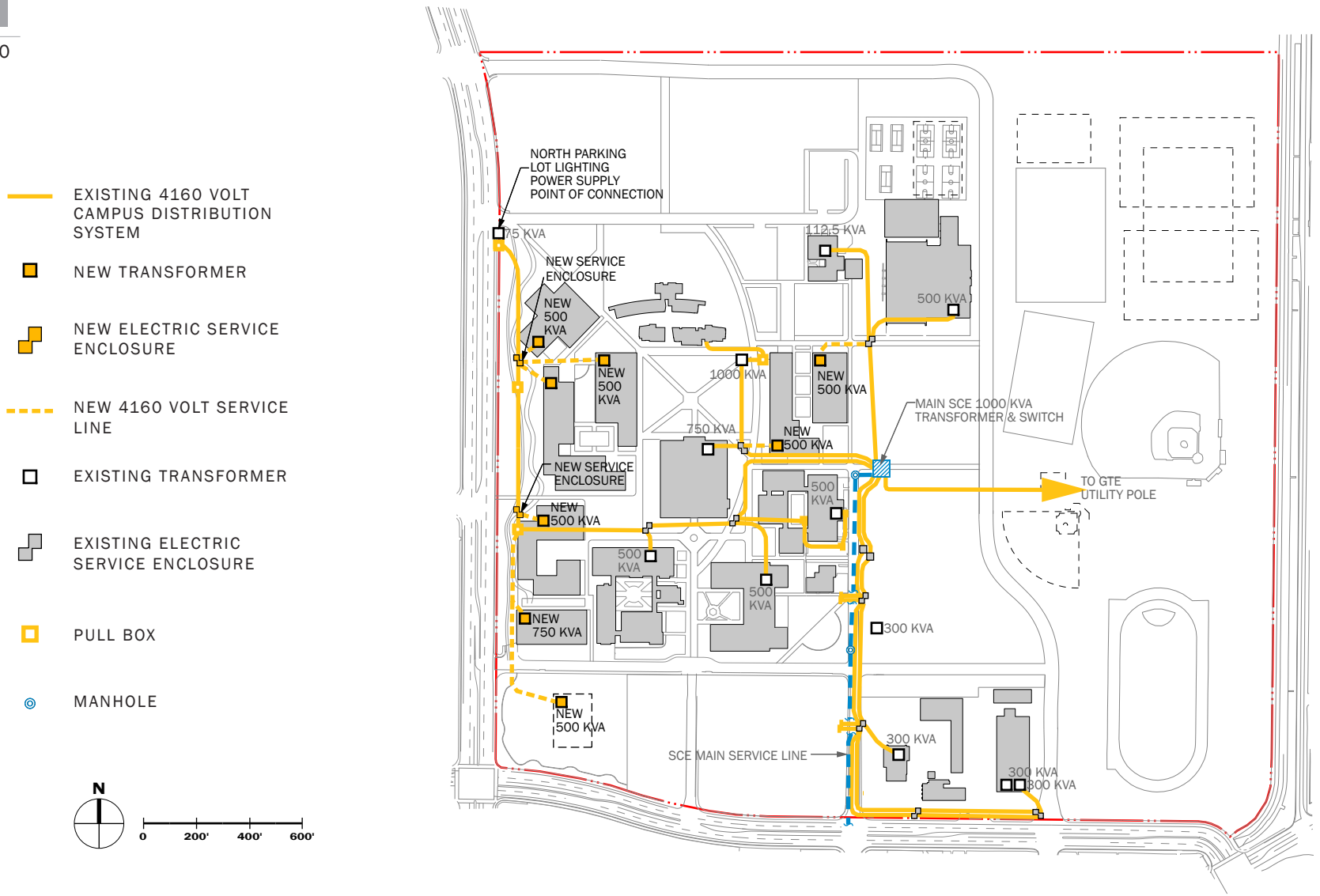
Currently, the College generates approximately 160,000-gallons of sewage each day. After the interim (11,400 head count) and ultimate expansion of the College, the approximate sewage generation will be 250,000-gallons and 410,000-gallons each day, respectively. Similarly, the current peak flow to the City's collection system is 444-gpm and the interim and ultimate peak flow will be 694-gpm and 1139-gpm respectively.

The total daily flows were distributed to various buildings based on square footage. By doing this, it is then possible to determine how the flows would be distributed across the campus.

In order to accommodate the projected increase in sewage flows, most of the existing 8-inch backbone sewer system will require replacement with a 12-inch collection system. As an alternative, a 10-inch sewer could be installed parallel to the existing 8-inch sewer, but this is not recommended due to cost, service and existing line longevity considerations.

8
10

CONCEPT POWER PLAN



ELECTRICAL POWER PLAN

The existing electrical distribution system consists of an underground manhole, ductbank, sectionalizing switch, radial 4160Y/2400 volt, 3 phase, 4 wire configuration. As new buildings are added to the campus a new step down transformer is added which supplies facility voltage of 480Y/277V or 208Y/120V, depending on the buildings' needs. The new concept power plan for Oxnard College continues this same radial feed design concept. In addition to the current layout, a fourth 4160 volt circuit and feeder is being proposed to feed the new buildings which are located on the west side of the campus. In locations where new buildings have been added to existing interior areas of the campus, these buildings are fed from new transformers connected to the existing distribution system.

Currently, the campus peak electric demand is at the capacity of Southern California Edison's 1000KVA service transformer. Prior to the addition of any substantial new electrical load demand, SCE's service transformer capacity must be increased to accommodate the new load requirements. The proposed new site power plan is based on the addition of nine buildings and the expansion of two buildings- approximately 340,000 square feet of new academic facilities. The total projected new connected load would be 5000KVA. The projected demand load for SCE's system would be 2500KVA. At the time of Master Plan publication the SCE transformer upgrade project was scheduled for implementation in the summer of 2005.

GUIDELINES FOR THE POWER SYSTEM EXPANSION AND IMPLEMENTATION

- Campus electrical systems shall be designed with a minimum of 25% of spare capacity for future growth. All electrical systems shall be installed with a minimum clearance per National Electrical Code requirements. Access shall be provided to maintain all electrical devices.

- Electrical equipment rooms shall be inside the new structure or in a stand alone structure and shall be fire-rated if required and provided on grade level with 3'-0" wide, 8'-0" tall double doors. The electrical equipment rooms shall be ventilated to insure that the inside temperature does not exceed 25°C. Air intakes and exhausts should not be indoors and fire dampers shall be provided as required.

- All conductors shall be copper; ¾" conduit minimum above ground, 1" conduit minimum below ground. No MC, BX, or AC90 shall be utilized.

- All low voltage or communication cabling shall be installed in conduit or cable tray.

- All low voltage or communication cabling shall be installed in conduit, interduct or cable tray. All wire and cabling shall be identified with permanent heat shrink marker sleeves at each end and every pull or junction box. Every box and device shall be identified by system (i.e. fire alarm, data, HVAC control, etc.), circuit number, source and voltage. All unused conduits shall have metered pull strings with each end uniquely labeled.

- All conduits entering buildings or manholes shall be sealed to prevent the intrusion of water.

- Third party testing, reporting factory start-up, and training shall be specified for all new projects.

8
12

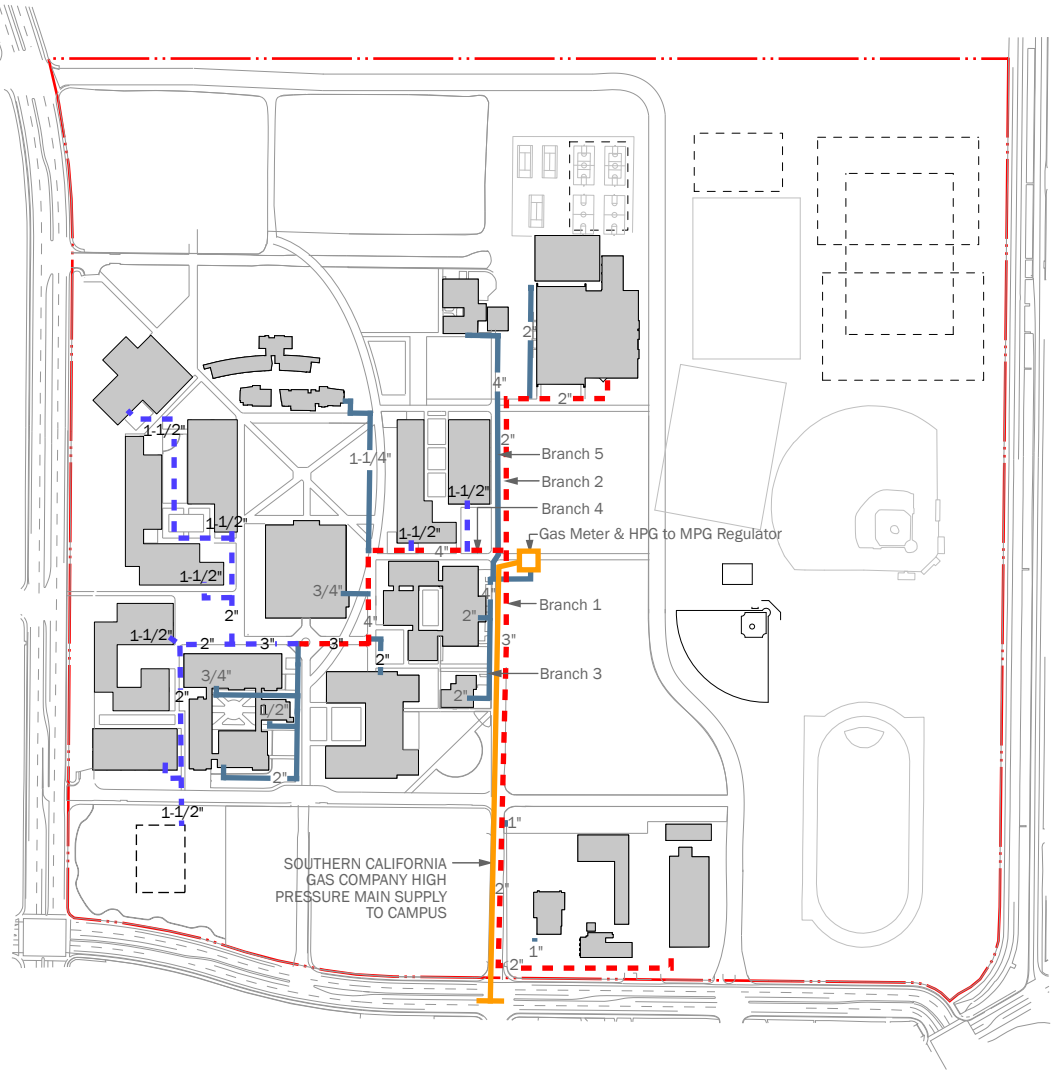
CONCEPT GAS DISTRIBUTION PLAN

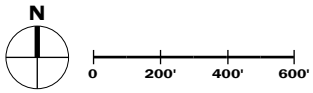
NEW MEDIUM PRESSURE GAS DISTRIBUTION LINE
(diameter indicated)

EXISTING MEDIUM PRESSURE GAS DISTRIBUTION LINE TO REMAIN

REPLACEMENT OF EXISTING DETERIORATED MEDIUM PRESSURE GAS DISTRIBUTION LINE

EXISTING HIGH PRESSURE GAS MAIN SERVICE LINE TO REMAIN





GAS DISTRIBUTION PLAN

Many of the existing buildings at Oxnard College including the Liberal Arts (LA), Letters & Science (L&S) and LRC are served by a 4 inch medium pressure gas (MPG) branch line that enters the campus near the main Southern California Gas Company gas meter and connection point. This gas branch line, identified as Branch 4, will be extended in 3 inch to 1 ½ inch segments to serve most of the projected future buildings on the campus. With all planned future buildings connected, the estimated total demand volume of this branch line is projected to be 15,275 Cubic Feet/Hour (CFH).

Additionally, since major portions of the existing older MPG distribution lines are deteriorated they must be replaced. These replacement lines include major lines or line segments serving the Maintenance and Operations/Auto Technology areas, the Gymnasium, the LA and the LRC.

Based on the size and type of building facilities identified for the future build-out of Oxnard College as depicted in Facilities Master Plan 2004, the total projected build-out demand volume for the campus is estimated at 36,095 CFH. The global campus future demand estimate is summarized here.

ESTIMATED BUILD-OUT GAS DEMAND VOLUMES	
Total Existing Buildings to Remain	22,230 CFH
Total New Buildings at Build-out:	13,865 CFH
Total Campus at Build-out:	**36,095 CFH**

SITE GAS PIPING GUIDELINES FOR NEW CONSTRUCTION AND REMODELS

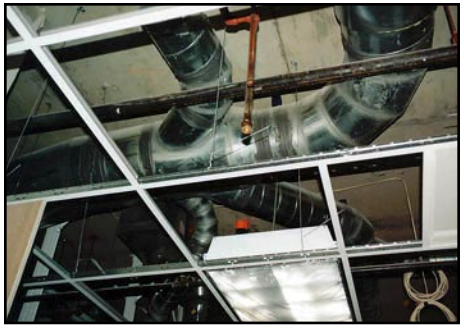
- New and replaced site gas piping shall be of a material, such as polyethylene, that is resistant to the corrosive nature of the Oxnard College soil and moisture conditions.
- All buildings shall have installed an approved earthquake shut-off valve.
- All natural gas pipe trenches shall receive tracer wire and caution tape.
- All site valve boxes and tees shall be located on an as-built plan prepared by a licensed surveyor.
- All pressure regulators and building shut-off valves shall be located above grade.
- Site gas isolation valves shall be located on an as-built plan produced by a licensed surveyor employed by the general contractor.

HVAC SYSTEMS GUIDELINES FOR NEW CONSTRUCTION AND REMODELS

1. College staff and consultants should develop standards for mechanical equipment as allowed by the State of California Public Contract Code. Mechanical standards should include package rooftop units, fans, variable frequency drives, chillers, boilers, and pumps. This will assist the maintenance department by limiting the number of parts required to be kept on site and by increasing the familiarity with each equipment item.
2. All mechanical systems shall be designed with ease of maintenance being one of the primary design considerations. Above ceiling equipment that requires regular maintenance and filter changing shall be avoided to the greatest extent possible. Equipment located in classrooms shall be avoided. Rooftop equipment or dedicated mechanical rooms shall be the design standard. Fewer pieces of equipment to service shall be the driving force in the mechanical design. Adequate interstitial space shall be provided for mechanical systems. Early in the design process, the mechanical engineer should provide a preliminary design to the facilities director demonstrating the compliance with these design criteria.
3. Large air handling systems shall have variable air flows. All systems shall meet or exceed the current State of California energy standards. The use of glass on east and west sides of the building shall be carefully evaluated to minimize overheating of these spaces. Systems shall allow the use of “free cooling” wherever possible. Custom high quality DX cooling units with hot water coils should be considered as the first choice. These units typically have better thought-out maintenance access and longer life than off-the-shelf package units.
4. Noise criteria for each building space shall be established at the beginning of each project. Critical areas, such as the Performing Arts Center, shall be designed with the assistance of a qualified acoustical consultant.
5. Specifications shall call for function testing of all equipment with written reports provided by contractor to engineer and the VCCCD.
6. Indoor Air Quality shall be a top design consideration for the remodeling and new construction of any building on campus. During the first year of building occupancy consideration should be given to increase fresh indoor air quantities to mitigate the contaminants that occur due to the off-gassing of the new building materials such as carpets and furniture. All buildings shall be provided with ventilation air quantities in compliance with applicable codes and American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) guidelines. Variable air volume system shall be in compliance with ventilation standards at all airflow rates. Main building systems shall have carbon dioxide sensors and/or airflow monitoring stations incorporated into the building automation systems with long term trending.
7. Laboratories and classrooms that have possible air containments from class activities shall be provided with adequate ventilation based on ASHRAE and American Conference of Governmental Industrial Hygienists guidelines. Fume hoods shall be tested to the latest code and ASHRAE requirements. Fume hood discharges shall be designed so as to not impact the indoor air quality of any building or cause objectionable odors or dangerous

fumes at any location. Chemical storage rooms shall be specifically designed to control contaminants from the chemicals being stored. Emergency power shall be provided for critical refrigeration and ventilation systems.

8. The architect shall provide adequate and safe access to the roof. Elevators and stairways are preferred. Vertical roof ladders with small hatches are not acceptable.



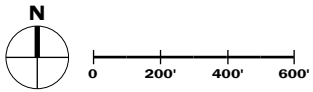
LIGHTING CONCEPT PLAN

EXISTING PEDESTRIAN LAMPS

EXISTING PARKING AREA LAMPS

NEW PEDESTRIAN LAMPS (PATHWAYS) OR OVERHEAD STREET LIGHTING (VEHICULAR DRIVES)

FUTURE PARKING AREA LIGHTING



LIGHTING PLAN CONCEPT

The concept exterior lighting plan for Oxnard College basically expands the existing systems into areas of the campus that will be developed as buildings, pathways, usable open spaces and parking. To simplify maintenance activities, new pedestrian and parking area lamps will in general be of a similar type, size and spacing (and if available, manufacturer) as the existing light standards and lamps. Removal of some campus pedestrian lamps east and southeast of the LRC will be needed so that the planned Paseo de Las Palmas pathway lights can be added. The long term plan also calls for the lighting of all play fields.

GUIDELINES FOR LIGHTING SYSTEMS

- All lighting systems shall meet or exceed current State of California Title 24 Energy Standards.
- All lighting systems shall be controlled by an ethernet based control system with master station programming and control at the facility's director's desktop personal computer. All light fixtures shall utilize long life fluorescent or HID lamps.
- All light fixtures shall be easily accessible for lamp replacement.
- Area lighting and parking lot lighting shall utilize shoebox type cutoff light fixtures on square poles. The campus standard for parking lots and general area lighting has been established with the development of the North Parking Lot facility: Holophane Bronze Finish MirroStar Rectangular 400MH/277-Volt Horizontal Luminaire or equivalent.
- Placement of bollard lighting along the Paseo is encouraged.
- Parking lot lighting shall be designed per City of Oxnard Lighting Ordinance and IESNA Illumination Level Guidelines. Area/pedestrian walkway lighting shall be designed per IESNA Illumination Level Guidelines.
- Third party testing, reporting factory start-up, and training shall be specified for all new projects.

TELECOMMUNICATIONS INFRASTRUCTURE

At the time of Facilities Master Plan 2004 preparation, the Ventura County Community College District (VCCCD) was in the process of assessing the current conditions of the telecommunications infrastructure for Oxnard College with a view towards developing a comprehensive plan for the upgrade, consolidation and accommodation of probable future campus telecommunications needs. The evolving Oxnard College telecommunications plan will address the upgrading of current systems and the implementation of Measure S projects. Initial assessment activities undertaken by the VCCCD Information Technology Department pointed to the need for the following improvements which are further described in separate headings below:

1. Creation of new, and remediation of existing major outside-plant distribution structures, and the creation of an Optical Signal Processor (OSP) standard for new structure premises entrance services.
2. Campus PBX replacement.
3. Consolidation of IT functions into a centrally located and suitably designed and constructed Information Technology Service Center.
4. Fiber optic backbone upgrades, including single-mode fiber.

PHYSICAL PLANT STRUCTURES AND FACILITIES

The campus's existing core physical infrastructure is fairly robust, and will continue to serve the foreseeable future of the campus, provided new buildings and new utility corridors are added in a manner consistent with the best existing methods found on the campus today. Individual edge structures range from moderately sufficient to moderately insufficient in terms of tapping into the core cable structures. To characterize the "best existing methods", the existing core OSP pathways consist of seven above-ground structures, generally referred to as ES (electrical/signal) buildings, which protect and provide access to the in-ground conduit chases which are laid adjacent the major road and pedestrian thoroughfares of the campus. These structures provide a major intersection service, allowing cables to be spliced, serviced, or accessed above ground in a secure, protected, and lit facility. Currently, any given ES building is equipped with nine 4" conduits interconnecting that ES into the core campus conduit system. Additional conduits of various size and count exit each ES building to service assigned buildings to that ES. Any new expansion of vacant, undeveloped areas of the campus should continue along these same lines, as these buildings are amongst the most serviceable OSP spaces in the district.

The best existing systems for building premises entrances includes combinations of multiple large diameter (4 inch) and small diameter (2 inch) conduits entering into a dedicated communications service room, or at the very least, a well designated and accommodating space within a building's electrical or mechanical room. The quantity of each class of conduits depending upon both the size of the building, as well as any secondary distribution functions the building holds in servicing adjoining buildings. Typically, two 4" conduits, along with four 2" conduits, will suffice for smaller end-of-run structures, while three or even four 4" conduits and as many as six 2" conduits would be advisable for larger or central-distribution structures. The goal for any prem-entrance being to accommodate a large UTP trunk-cable, an innerduct protected fiber optic cable, and dedicated and isolated CATV, EMS, security-alarm, fire-alarm, clock-control, and other control cables; while still retaining open conduits for future replacement parallel to existing services. There should be at least a one-half equivalent quantity of vacant conduits to facilitate future replacement installations without disruption of existing service.

Telecommunications rooms or spaces will require dedicated and isolated electrical service, ideally with an electrical sub-panel within the room and a dedicated ground-bus. If this room houses critical equipment or emergency office locations, a backup power source with access to locally generated power (generator plug-in with manual switchover or in-building generator with automatic switchover panel) should be considered in initial design. Lighting, air handling and security should all be addressed by design rather than by afterthought. These and other topics are addressed in the EIA/TIA 569 standards regarding pathways and spaces.

PRIVATE BRANCH EXCHANGE (PBX) REPLACEMENT AND DATA PROCESSING CENTER

Currently, all major locations of the VCCCD have Nortel SL1/Meridian PBX systems, originally installed in 1986, but with numerous partial or nominal upgrades over the years. This platform has been placed on an upcoming manufacturer end-of-life list, meaning that it will no new upgrade developments as of 2005, and no support as of 2009. Given this situation, the VCCCD intends on replacing the District-wide telephone network with more forward-looking equipment by summer of 2005. An integral voicemail/auto-attendant system will be included in this purchase.

At Oxnard College, the current PBX and telephone cross-connect is located in the LRC building and occupies the upper loft above the main electrical room, along with the room directly below that loft, adjacent the electrical room. Finally, a small office to the North of this room houses some data communications equipment and the current voice-mail system. All of this equipment is interrelated yet difficult to service given the distributed nature of the spaces. The space is difficult to access, difficult to support, and poorly lit and secured. The current data center of the campus is located in room OE-1 of the OE complex, across from the LRC. Many of the same concerns present with the LRC's phone equipment spaces also apply to OE-1. In particular storage, ventilation, power, and security are major issues for this work space.

As an answer to both applications a central IT service center would be an ideal solution. As the LRC contains the campus Main Distribution Frame (MDF), the PBX, and other equipment, it is logical home for a consolidated IT Service Center. The rooms just North of the electrical room seem suitable for all of these applications in that they are proximal to the existing conduit system, microwave head-end, and campus cable MDF. In addition, there is adequate ceiling height within the room and the above interstitial space to accommodate a storage/ service loft.

In designing this space, all of the same considerations to light, ventilation, access, and security should be considered as those described above. In addition, a high-capacity Uninterrupted Power Supply (UPS) with extended runtime capacity should be considered for prolonged power outages. If a loft space should be determined feasible, some form of equipment lift would be advisable for lifting heavy (50-100 Lb) components up to storage or work areas.

As to the replacement PBX and associated customer premises equipment (CPE); a centrally located PBX architecture will be retained, opposed to a distributive architecture. Other replacement and update equipment is expected to require a similar amount of space as that currently occupied. Other specifications are described in the Appendix.

CABLE INFRASTRUCTURE

Currently the campus is equipped with a reasonably flexible and accommodating multi-mode fiber system and a moderately available unshielded twisted pair (UTP) cable plant. The overall existing counts of both are fairly adequate, but not necessarily conveniently located. All new buildings should be equipped with a main feed fiber optic cable and copper pairs installed to VCCCD specifications as delineated in the Telecommunications section of the Appendix.