



CHABOT-LAS POSITAS COMMUNITY COLLEGE DISTRICT

INFORMATION TECHNOLOGY MASTER PLAN

ITS DETAILED SPECIFICATIONS

Updated 2010

This document presents the updated state of the Information Technology Infrastructure at all three CLPCCD sites: the District Office, Chabot College and Las Positas College. This document has been assembled from the collective inputs of District ITS staff and College Computer Services departments. The information herein includes detailed descriptions of servers, desktops, network cabling, wireless, network switches and routers, as updated from the original configurations documented in the 2005 ITMP.

Given the level of detail that is presented, this information, if used improperly, could place CLPCCD in a vulnerable position with respect to viruses and other threats that could debilitate the IT infrastructure. As such, this document will be circulated to a limited set of District IT and College Computer Services staff, and is considered “For ITS Limited Distribution only” to those individuals who have a need to know this information in performance of their daily jobs.

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Updated: March 2005
Updated: May 2006
Updated: December 2008
Updated: October 2010



1.0 LPC INFORMATION TECHNOLOGY (IT) BUILDING CONSTRUCTION AND COMMISSIONING

The LPC IT Building (1900) completed substantial construction in December of 2009. Serving both CLPCCD District ITS and LPC Technology, this 10,200 square foot building is comprised of offices, Test Labs, Training room, Administrative Computer room, LPC Server room and Network room.

Concurrent with the IT Building construction, a number of sophisticated systems were also added to the Campus MPOE/MDF, now called Building 1900A, so that a robust operating environment was made available for the Server and Network rooms and the MPOE/MDF. These systems addressed the following areas:

- HVAC control
- Humidity control
- Power (UPS and Generator)
- Fire Suppression (Inergen)
- Control and monitoring

Each area is documented in more detail below.

HVAC Control for IT Building Server and Network Rooms and B1900A

The Heating, Ventilating and Air Conditions systems for the network and server rooms in the IT building consist of the following:

- **Primary Air Handler Unit (AHU-2A):** This supplies the heating/cooling for the Administrative computer room, Network room and LPC Server rooms. This unit is fed from the Central Utility Plant.
- **Secondary Air Handler Units (AHU-2B):** This unit is a redundant unit that also supplies heating/cooling for the Administrative computer room, Network room and LPC Server rooms. This unit is fed from the Central Utility Plant. This unit is activated if a failure of the Primary AHU-2A occurs.
- **Supplemental Five (5) Ton System:** In addition to the Primary and Secondary AHU systems, a ceiling mounted HVAC system is installed in the Administrative Computer room. In the event of a temperature rise in the computer room, this unit triggers into operation at an elevated temperature of 78 degrees. This provides additional cooling directed towards the IBM Enterprise Server air intake vents.



The water source for the HVAC systems comes from the Central Utility Plant (CUP). The CUP is equipped with a primary and secondary pump/chiller. The primary pump/chiller operates during the day to deliver cold water from ice storage to the IT Building systems and the rest of the LPC campus on the CUP loop. This primary system operates from 6am to 10pm. In the event of a failure of the primary pump/chiller, the secondary pump/chiller initiates into service. At 10pm, the secondary pump/chiller initiates into operation while the rest of the CUP transfers to ice-making mode. During ice-making mode, if the secondary pump/chiller fails, the primary pump/chiller initiates back into service.

If both these CUP systems fail, the IT Building is equipped with a Backup Chiller. The Backup Chiller automatically initiates into service to feed the AHU2A/2B. Typically, this would occur in the following scenarios:

- CUP chillers (primary *and* secondary) fail.
- Power failure on campus which takes down the CUP equipment.
- EMS panel in the IT building loses connectivity to the main monitoring system.

Except for planned power outage needed for maintenance and/or construction, it is not expected that the Backup Chiller would run regularly. Monthly testing is scheduled to insure correct operation.

HVAC Control for Building 1900A MPOE/MDF

In Building 1900A, a series of new HVAC units are installed. This consists of a 10 ton unit which directs airflow towards the MPOE end of the building. Two five (5) ton units provide airflow directed at the MDF end of the building. In the event of a failure of one of the units, the remaining units can continue to provide cooling to building, while repairs are initiated. These systems operate independently of the CUP.

Humidity

Each of the Network and Computer rooms in the IT Building are equipped with a Humidifying system which senses and releases moisture to maintain the proper humidity range.

Power for IT Building Server and Network Rooms

The IT Building 1900 and Building 1900A has been equipped with new Eaton Powerware UPS systems for power-protection. These systems deployed are as follows:



- Powerware 9355 UPS – This UPS is a dedicated 20 kVA UPS to provide service to the IBM Enterprise Servers supporting the Banner System, which is located in the Administrative Computer Room. It connects to the electrical panel UR1, which serves the electrical circuits to the IBM Enterprise Servers. This UPS is sized to support a 40 minute uptime, which is the time it takes for the execution of a script to do a clean shutdown of the IBM Enterprise Servers.
- Powerware 9395 UPS – This 225 kVA UPS provides service to the LPC Server Room, Network room, and the remaining Administrative Computer Systems. It connects to the electrical panels UR1-4, which serve the electrical circuits to the rooms just listed, and a select number of power outlets in certain rooms in the IT building.
- Powerware 9390 UPS – This 50 kVA UPS provides service to the B1900A network electronics and HVAC systems. This UPS is sized to support a 10 minute uptime.

The UPS systems are equipped with controller software that can be used to trigger customized scripts on each server, in the event of battery drain.

These UPS systems are all powered by a 400 kVA Backup Generator. The Generator is housed in the lot immediately beside the IT building. A 400 gallon fuel tank feeds the generator. In the event of a power failure, an automatic transfer switch (ATS) initiates the generator to start. The generator is fully running to supply power to the UPS systems in less than 60 seconds. The fuel tank is sized to provide 12 hours of runtime for the fully deployed Network and Computer rooms. CLPCCD M&O maintains an open PO with a refueling company who will come onsite to refuel the tank on a scheduled or emergency basis. The Generator is tested monthly to insure correct functionality.

Fire Suppression

The Network and Server rooms are equipped with the Inergen fire suppression system. The Inergen is controlled in three zones: Administrative Computer room, Network room and LPC Server. Building 1900A has its own separate Inergen system.

Control and Monitoring

There are several levels of control and monitoring:

- **Electrical Panel Triggering** - The electrical panels installed in the IT Building are designed for individual control and shutdown. In the event of a localized electrical failure or fire incident, the electrical panels can be shut down for only the affected area. This offers a high degree of control.



- **UPS Control and Monitoring** – The UPS systems are equipped with SNMP network cards to provide web access for monitoring. They are also equipped with temperature probes to measure the temperature in the B1900A, and the Administrative Computer room (two locations). In the event of a power or temperature issue, the UPSes have been configured to email a distribution list with the details of the issue. The UPS trigger for high temperature alerts is currently set for 78 degrees F.
- **Security Monitoring** - The AMAG security system monitors temperature probes in the Network and Computer room using Enviro-Alert stations. In the event of a high temperature situation (currently set for 74 degrees F), the AMAG server triggers a visual and audible alarm to the monitoring staff. The monitoring staff then alerts District ITS and LPC Technology via urgent phone calls to address the high-temperature malfunction. A low temperature threshold of 55 degrees F is also configured.
- **Allerton Monitoring** - The Las Positas campus uses an Allerton system as the comprehensive monitoring system for building automation systems. This system receives alerts from the EMS panel, HVAC devices and status probes in the IT Building. Response to alerts of abnormal functionality trigger emails and telephone contact for action by M&O staff.

Since many of these alerts are generated by equipment malfunctions, CLPCCD M&O is contacted as the first responders. CLPCCD District ITS is contacted secondarily so to be ready in the event that the situation cannot be corrected, and the servers and equipment need to be shut down.

Commissioning

During the early months of 2010, CLPCCD District ITS worked with Enovity and contractors to ensure the integrated operation of the environmental control, power and fire detection systems. Enovity provided a detailed interconnection matrix for the IT Building systems, and focused the commissioning testing. This detailed testing was used to proof the integration of these systems so that in the event of an emergency, the integrated functionality would perform as expected. The commissioning included:

- Correct operation of Inergen system with simulated one-sensor and two-sensor triggers.
- Correct operation of UPSes with appropriate battery loads to demonstrate correct uptime.
- Correct operation of the generator during simulation of PG&E service outage.
- Testing of all interconnections between the Inergen, Fire Alarm and electrical subsystems



- Adjustments as needed for the Allerton control program, in support of correct sequencing of normal operations and backup system initiation in the event of a failure.

In addition to the IT building, Enovity was engaged for commissioning of the Central Utility Plant (CUP). Since the CUP chillers are a key element in the correct operation of the IT Building, Enovity has provided important knowledge and continuity for addressing interconnections and functionality anomalies during daily operations in 2010.

2.0 LPC IT BUILDING SECURITY

The LPC IT Building is provisioned with multiple levels of security to ensure a well-protected environment suitable to the critical nature of equipment and resources in the building, as follows:

- **Exterior Doors** – The exterior doors are always locked. This includes the District ITS main door on the loop road, the LPC Technology entrance facing the parking lot and the door by shipping. All staff who work in the building are issued personalized access cards to use with card readers on the exterior doors. The building auto-arms for internal motion sensing and exterior door access at 11pm. The building can also be manually armed as needed. In the morning, the first staff person must enter a disarm code to enable access into the building. No keys are used to access the building, although Campus Police and the Chief Technology Officer (CTO) are issued a master key.
- **Service Windows** – Both the CLPCCD ITS and the LPC Technology doors have service windows so that visitors can be seen when they come to the building, and given access as needed.
- **District ITS Area Card Readers** - A second set of card readers is placed on the doors leading to the District ITS offices. Only District ITS staff and limited other staff are authorized for access into these areas.
- **Server and Network Room Access** – Access into the server and network rooms requires two-factor authentication using an authorized card AND a matching pin. The doors to these rooms are also secured on the inside with Handle Guards to prevent someone from fishing underneath the door frame and opening the doors from the inside.

The security is based on the AMAG ACAMS system monitored by Campus Police. During off-hours, alerts are real-time monitored for intrusive activity, and also coupled to the temperature sensors in the computer rooms in the event of HVAC issues.



3.0 NEW IBM ENTERPRISE SERVERS FOR THE BANNER SYSTEM

In the Chabot Computer Room, CLPCCD District ITS maintained an IBM p670 system as the primary Enterprise System for the Banner and business applications. With the construction of a new Administrative Computer Room in the LPC IT Building, CLPCCD District ITS initially intended to move this system to the new building. Procured in 2003, the growing application requirements on the existing Banner system consumed it to its peak capacity. Coupled with a requirement to improve redundancy and failover of the system, it became apparent that an upgrade to this system was necessary.

Following a public bidding process, CLPCCD District ITS was able to procure two p570 IBM systems to serve as primary and failover/development systems. The new systems were received at the new LPC IT Building in January of 2010. The CLPCCD District ITS staff worked to install the new systems with:

- AIX 6.1 (former system used 5.3.1)
- Upgraded Cobol compiler 5.1.4
- Upgraded C compiler 9.0 with 10.1 runtime version
- Banner 8 (same as former system)
- Oracle 10.203 (same as former system)

In April of 2010, CLPCCD District ITS converted to the new Banner system housed in the new LPC IT Building. End-users experienced a transparent conversion, with minor changes required to some reporting and display elements. Concurrent with the conversion to the new Banner system, the following related servers were moved to the LPC IT Building:

- INB servers
- Class Web (new hardware/installation with AIX 6.1 and Oracle 10.12.0.2)
- Luminus 4.0
- DegreeWorks
- CollegeNet
- R25 Scheduling

CLPCCD District ITS was able to decommission the old IBM system and trade it in to the new system supplier for recycling in July of 2010.

Further work is underway and will extend into 2011, for the implementation of DataGuard for Oracle database shadowing and replication, and Vision Solutions Echo Cluster and Echo Stream software for OS level replication. These tools will provide near real-time transfer of data from the primary Banner system to the backup Banner



system. CLPCCD will then be able to fail over to a fully functional backup system if an event occurs that takes the primary system offline.

4.0 NETWORK SERVER MIGRATION

Along with the decommissioning of the old IBM system, CLPCCD District ITS migrated the Chabot DHCP and District DNS network services to new servers. A new District DNS server was installed to supply host name resolution and forward lookup for the CLPCCD District servers. This new server is now hosted in the Administrative Computer room in the LPC IT Building.

Related to the DNS migration was the transference of the DNS lookup for external addressing of CLPCCD District servers. The address resolution on IServer now redirects access to Banner-Web, email and other Internet-accessible hosts to the LPC CENIC access. This offers more efficient access, since the network connectivity does not need to transition over the Chabot network or internal WAN links to access the servers in the LPC Admin Data Center.

DHCP services for the Chabot College desktop clients were migrated to the Chabot College servers. It was felt that this change offered a more efficient processing of DHCP requests, by localizing traffic to the Chabot campus LAN.

5.0 NETWORK SWITCHING UPGRADES

Upon construction completion, CLPCCD District ITS worked with College staff for the provisioning of new Cisco switches in each building. In most buildings, this represented as substantial increase in connectivity with the new network wiring provisioned in the construction project. The connectivity included:

Building	Equipment
Chabot IOB	Four (4) 3560-48 switches
Chabot CSSC	Two (2) 4506 switches, four (4) 3560-48 switches
Chabot 1900	One (1) 3560-48 switch
Chabot 2200	One (1) 4506 switch
LPC CCA	One (1) 4506 switch, four (4) 3560-48 switches
LPC Secondary Effects	Additional 3560-48 switches as needed.
LPC IT Building	One (1) 4506 switch, one (1) 6509 switch.



The switches deployed in the LPC IT Building were configured to provide a separation of functionality between the District’s Administrative Data Center and the LPC Campus Networks, as follows:

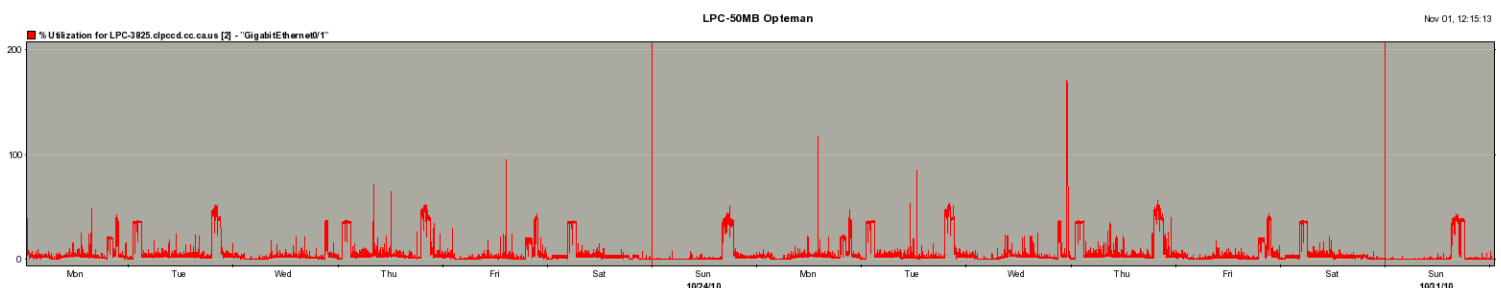
- LPC 4506 - This switch trunks to the 6509 core switch in the B1900A MPOE/MDF. It acts like a standard VTP client switch with a Gigabit uplink. This switch is configured with 10/100/1000 blades for connectivity to the servers housed in the LPC Server room. The supervisor engine on this switch houses a 10GE interface which can be implemented as an uplink in the future, should the Gigabit connection become saturated.
- Data Center 6509 – This switch acts as a standalone routing switch for the data center VLANs 81-85 and 71-75, and the CLPCCD District ITS VLAN 80. Equipped with 10/100/1000 interface cards with Distributed Forwarding Cards (DFC), this switch provides the highest performing switch/route environment for the CLPCCD District Servers. Additional security enhancements were configured to protect from campus network intrusions that could adversely effect the access and network performance of the Banner and Administrative applications.

6.0 OPTEMAN UPGRADE

Coincident with the migration of the Banner and Administrative Servers to the LPC IT Building was a rebalancing of the OptEMAN connections between the campus and District Office. Prior configurations provided the highest bandwidth (20Mbps) to the Chabot campus, since that was the location of the Admin Servers and a primary path for Internet access. Once the move to LPC occurred, addition network traffic was directed inbound to LPC’s OptEMAN connection for Banner access. Coupled with attractive AT&T bandwidth pricing, the OptEMAN was reconfigured for LPC as follows:

Location	Prior Bandwidth	Upgraded Bandwidth
LPC	10 Mbps	50 Mbps
Chabot	20 Mbps	20 Mbps
District	10 Mbps	10 Mbps
Dublin	10 Mbps	10 Mbps

Typical utilization during the school session does not consume the available bandwidth, although evening and weekend backups across the OptEMAN typically consume all available bandwidth.

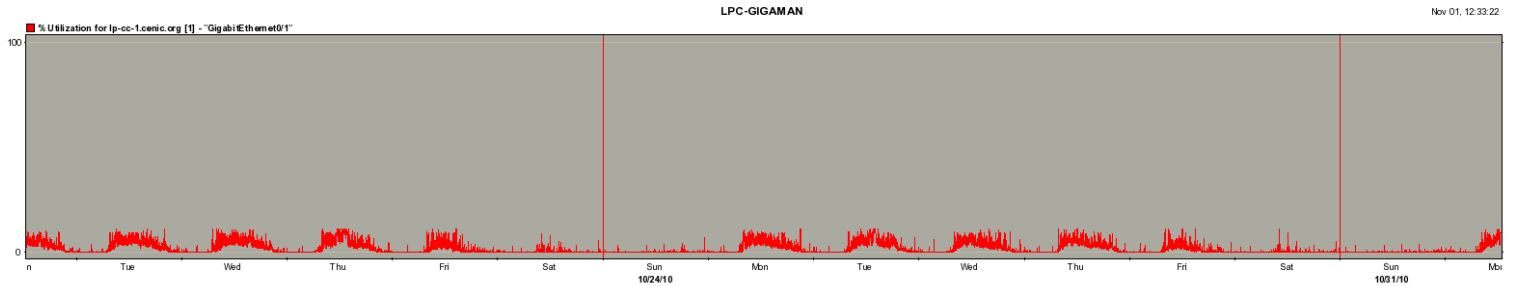




7.0 GIGAMAN UPGRADE AT LAS POSITAS CAMPUS

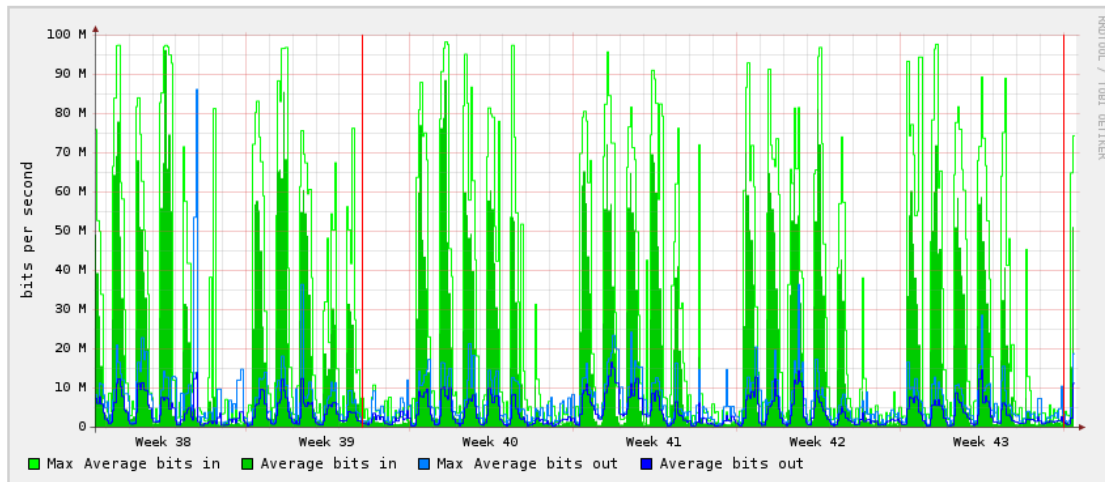
As provisioned from the CENIC network which provides Internet access, the LPC campus was able to upgrade from the 45 Mbps DS3 Internet access to a Gigabit Ethernet connection. The DS3 connection remains as a redundant connection to the production Gigabit Ethernet access. Performance graphs show that the new Gigabit Ethernet connection has ample bandwidth available for growth.

Intermapper Monitoring Graph



CENIC Monitoring Graph

[/utilization/community-colleges/lp-cc-1/gigabitethernet0_1\(to oak-dc2, g4/0/2\)](#)



CLPCCD also plans to upgrade the edge firewalls to redundant ASA 5500s for improved packet processing.



8.0 WIRELESS UPGRADES

To enhance management and performance, CLPCCD District ITS upgraded the wireless infrastructure to use centralized wireless controllers and 802.11 a/b/g/n access points. A Cisco 5508 wireless controller was purchased for each campus. These controllers, each licensed for 50 APs, but expandable as needed, provide centralized configuration and operational management of the Cisco access points. New 1141 access points were purchased to provide expanded wireless coverage at each campus. Existing 1131 and 1240 access-points will be converted from standalone IOS to LWAPP versions to be compatible with the 5508 controllers.

9.0 NETWORK INFRASTRUCTURE ACTIVITIES

CLPCCD District ITS has continued to participate in the design and design review for new and modernized buildings at the Chabot and Las Positas campuses. The main areas of activity have been:

- Design input to architect teams for current infrastructure.
- Review of IDF spaces: location, size and access.
- Review of voice/data station outlet placement: location, cable density, outlet quantity.
- Conformance to CLPCCD Standards: Category 6A cabling to voice/data outlets, single mode fiber backbones.
- On-site construction review: inspections, punchlists, manufacturer’s review and certification, acceptance.

During the 2010 year, the principal construction projects are listed in the following sections.

9.1 Chabot Campus Construction

Name	Scope	CLPCCD ITS contribution
B1400/1600	Modernization of B1400 and selected parts of B1600	<ul style="list-style-type: none"> - Review of design drawings. - Specification of PBX upgrade to replace Fujitsu connectivity. - Coordination with Program Management team for Pre-qualified Contractor process - Contractor qualifications review. - Project commenced October of 2010



B300	Modernization of Buildings 300	<ul style="list-style-type: none"> - Review of revised design documents. - Discussion of Data Center uptime, HVAC and power (UPS & generator) requirements during construction. - Fiber backbone rerouting and B200 MPOE improvements - Network equipment relocating to allow for uninterrupted network service during building renovation
B1900	Modernization of Building 1900/Planetarium	<ul style="list-style-type: none"> - Construction walkthroughs, inspections, responses to RFIs. - Punchlist, acceptance. - Installation of network equipment for wired and wireless connectivity. - Completed June of 2010
B2200	First Floor renovations for Dental Program	<ul style="list-style-type: none"> - Construction walkthroughs, inspections, responses to RFIs. - Punchlist, acceptance. - Installation of network equipment for wired and wireless connectivity. - Completed June of 2010
B4000	New Strength/Fitness building	<ul style="list-style-type: none"> - Construction commenced summer of 2010
IOB (B400)	New Instructional Office Building	<ul style="list-style-type: none"> - Construction walkthroughs, inspections, responses to RFIs. - Punchlist, acceptance. - Installation of network equipment for wired and wireless connectivity. - Completed March of 2010
CSSC (B700)	New Community & Student Services Building	<ul style="list-style-type: none"> - Construction walkthroughs, inspections, responses to RFIs. - Punchlist, acceptance. - Installation of network equipment for wired and wireless connectivity. - Completed March of 2010
B1200/1300	Music/PAC Plaza Modernization	<ul style="list-style-type: none"> - Review of SD and DD drawings - Coordination with A&E team for data backbone interim connectivity for B1300
B1700/1800	Math/Science	<ul style="list-style-type: none"> - Review of SD and DD drawings - Coordination with A&E team for voice/data/video connectivity



9.2 Las Positas Campus Construction

Name	Scope	CLPCCD ITS contribution
CDC	Construction of new CDC building, provisioning of replacement fiber/copper backbones to Building 2200, new fire road conduits	<ul style="list-style-type: none">- Participation in construction meetings.- Comment and response to RFI documents.- Site inspection, punchlist.- Expected completion December 2010
IT Building	Construction of new IT Building	<ul style="list-style-type: none">- Development of commissioning documentation with Enovity.- Comment and response to RFI documents.- Site inspection, punchlist, observance and acceptance of commissioning process/results.- Completion of commissioning January 2010
CCA	College Center for the Arts and TeleData Reroute	<ul style="list-style-type: none">- Onsite coordination meetings, job walkthroughs, RFI responses during construction.- Site inspection, punchlist, acceptance.- Completion August 2010
Fire Alarm	Installation of new FA services, including fiber backbones	<ul style="list-style-type: none">- Review of submittals.- Creation of detailed specification section for inclusion in project bid.- Coordination of fiber installation and routing.- Construction walkthroughs with electrical and low voltage contractors- Comment and response to RFI documents.- Review of fiber backbone testing and loss results.
PE III	Construction of Track and Field House	<ul style="list-style-type: none">- Review of submittals.- Construction walkthroughs with electrical and v/d contractors- Comment and response to RFI documents.



		<ul style="list-style-type: none"> - Completion expected December 2010
Secondary Effects	Modernization and repurposing of B500, 600, 700, 1700 and Portable buildings in preparation for SSA	<ul style="list-style-type: none"> - Review of SD, DD and bid drawings - Review of submittals. - Construction walkthroughs with electrical and v/d contractors - Comment and response to RFI documents. - Construction and completion May-August 2010.
Security Phase 2	Construction of campus-wide AMAG access control, video monitoring, and Talk-a-phones.	<ul style="list-style-type: none"> - Review of 35% CD documents. - Bidding in October 2010.
Science	Modernization of existing and construction of new Science Buildings	<ul style="list-style-type: none"> - Review of SD, DD and bid drawings - Ongoing coordination with PM and A&E team for corrections to drawings. <p>Note: This project has been challenging to design and will present construction challenges because of the limited window of time for the existing building remodel</p> <ul style="list-style-type: none"> - Bidding in November 2010.
Student Services and Administration (SSA)	New building	<ul style="list-style-type: none"> - Review of SD, DD and bid drawings. - Design input documented to A&E team. - Bidding in November 2010.

10.0 ADDITIONAL DESIGN ACTIVITY

In addition to the projects described above, CLPCCD District ITS has provided additional expertise for the coordination of proper design/construction activities for:

AV systems: Although AV is the responsibility of the Chabot IT and LPC Technology, CLPCCD District ITS has been involved in discussions for this technology to ensure proper pathway and network connectivity is in place for operation of the AV systems.

Fire Alarm: The LPC Campus Fire Alarm interconnects over a multimode fiber backbone. CLPCCD District ITS has provided specifications and design knowledge for the provisioning of the multimode fiber backbone.



Security: The security cameras require fiber extensions for the connectivity to the ENVS panels. Talk-A-Phones require fiber cabling for the data connectivity for broadcasting. CLPCCD District ITS has provided specifications and design knowledge for the provisioning of the single mode fiber backbone cabling to service these connection requirements.

Chabot PBX: Associated with the B1400/1600 building modernizations at Chabot, CLPCCD District ITS has coordinated with Chabot IT and the telephone system provider for the cabling infrastructure and equipment designs for the upgrade of the B200 AVAYA phone system. This replaces the obsolete and unstable Fujitsu remote system that is currently housed in the B1600 IDF.

Solar Panels: As part of the parking lot renovations at each campus, solar panels were constructed. The solar panels communicated using Mod-Tap and 800 MHz wireless systems to transmit energy collection information to a server appliance placed on the CLPCCD network. This server appliance was networked to communicate to the Chevron main systems to transmit energy generation and other operational statistics. As part of the installation, a real-time energy utilization kiosk was available on each campus for viewing through a web interface. CLPCCD District ITS worked with contractor staff to ensure correct connectivity and communication from the Solar Panel server to the required resources.