Campus Physical Planning Committee

February 20, 2014
KL 232
3 pm - 5 pm

1. Call to Order

Business Items

2. Approval of Minutes

Discussion Items

3. 2020 Project Update
4. Central Plant/Telecommunications Reliability Upgrade Project Advisory Committee
5. Merced Vernal Pools and Grasslands Reserve Storage Facility Proposal
6. Temporary Storage Facility Site Selection Criteria

Reports

7. Report from the Department of Design and Construction
8. Report from the Department of Physical and Environmental Planning

Campus Chilled Water 2014/2015

Temporary Chillers and Load Shedding

OUTLINE

- Central Plant - Functions
- Central Plant - Overview
- Central Plant – Critical Limitations
- Chilled Water Demand
- Curtailment Plan
- Additional Cooling
- Costs
- Two chillers Result Summary
- Load Profile Result Summary

Central Plant - Functions

- **Chilled water for building cooling**
- Heating hot water for building space conditioning and for domestic/industrial hot water
- Process steam for laboratory use
- Manage and distribute incoming electrical from PG&E and solar
- Centralized control room monitoring building cooling, heating, lighting and ventilation

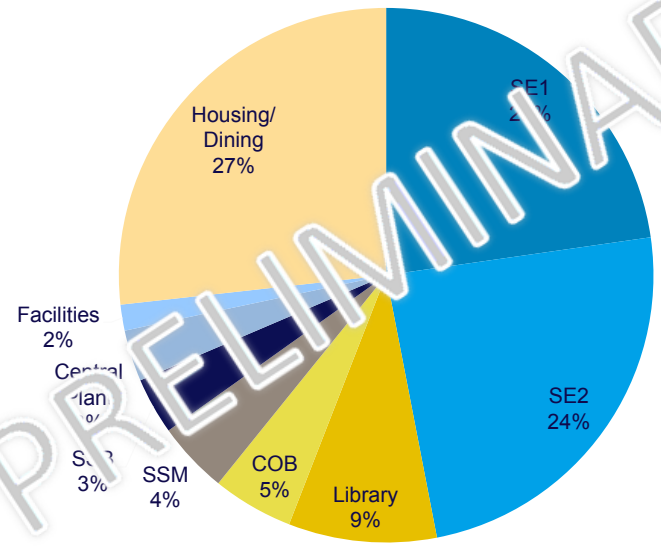
Central Plant - Overview

- Completed: August 2005
- Construction Cost: $27 million
- Awarded: LEED Gold – Mar 2007
- Size: ~20,100 GSF
- Thermal Energy Storage (1) : 2,000,000 gallons
- Chillers (3): 2 @ ~1,100 tons, 1 @ 1,366tons
- Cooling Towers (5): 1,735 GPM
- Hot Water Boilers (3):
  2 @ 14,650 MBTU/h
  1 @ 8,370 MBTU/h
- Steam Boilers (2): 7,000 MBTU/h
- Reverse Osmosis (RO) system
- Pumps: Ranging from 10hp – 100hp on VFD's
- Electrical switch gear with dual 12.47kV feeders from PG&E
- Diesel Generators (2): 1mW

Central Plant – Critical Limitations: Campus cooling

- Central Plant's Cooling Capacity is at maximum
- SE2 and SSB come online in 2014 and are additional loads to the 2013 cooling level
- COB2 comes online in 2016
- Equipment designed for cooling 800,000 square feet; current campus is ~1,100,000 square feet and growing to 1,200,000 sq ft
- Extreme outdoor temperatures in the summer months combined with high humidity can disable the Central Plant cooling equipment
- Chillers were selected for condenser water supply temp of 75F and nighttime operation
- 103F Dry Bulb temp
- 68F Wet Bulb temp

Chilled Water Demand 2014



UC Merced Energy Conservation Measures during a Heat Storm

Building Type	Buildings and Building Spaces	Curtailment of Campus Cooling: Actions taken by Occupants[1]	Turn-off Non-Essential Lighting	Adjust Building Temperature Upwards to 78°F	Turn-Off Cooling Capability[2]
	Living Spaces and Student Housing		**Stage I**		**Stage II**
	Valley Terraces				
3	Calaveras	✓	✓	✓	1st Off
3	Fresno	✓	✓	✓	1st Off
3	Kings	✓	✓	✓	1st Off
3	Kern	✓	✓	✓	[illegible]
3	Madera	✓	✓	✓	
3	Merced	✓	✓	✓	1st O[illegible]
3	San Joaquin	✓	✓	✓	[illegible] Off
3	Stanislaus	✓	✓		[illegible]
3	Tulare	✓	✓		
	The Summits				
3	Tenaya Hall	✓	✓	✓	2nd O[illegible]
3	Cathedral Hall	✓	[illegible]	✓	2nd Off
	Half Dome				
3	Housing Unit 4				2nd Off
	Sierra Terraces				
3	Mariposa	✓	✓	✓	3rd Off
3	Tuolumne	✓	✓	✓	3rd Off
	Building Spaces [illegible] Comfort				
	Joseph E. [illegible] Wellness				
1	Recre[illegible]	✓	✓	✓	1st Off
1	Dynamic	✓	✓	✓	Triage Center
1	Student Acti[illegible] Center	✓	✓	✓	2nd Off
2	Student Services	✓	✓	✓	2nd Off
3	Terrace Center	✓	✓	✓	2nd Off
4	College Store	✓	✓	✓	2nd Off
5	Visitors Center	✓	✓	✓	2nd Off
6	Academic Office Annex	Not connected to campus chilled water			
6	Facilities Services A	✓	✓	✓	1st Off
6	Facilities Services B	✓	✓	✓	1st Off

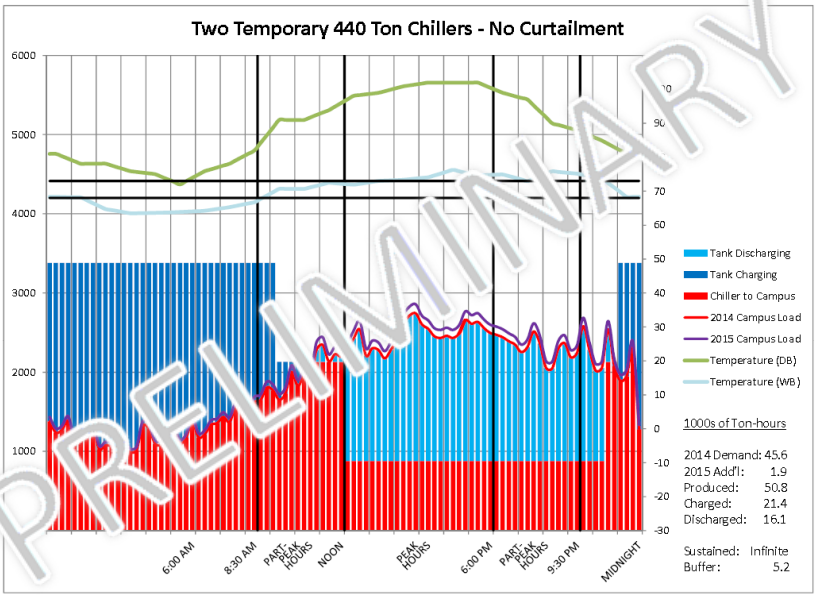
Building Type	Buildings and Building Spaces	Curtailment of Campus Cooling: Actions taken by Occ[illegible]	Turn-off Non-[illegible] Lighting	Adjust Temperature Upwards to 78°F	Turn-Off Cooling Capability[2]
	Central Utility Plant				
6	Offices	[illegible]	✓	✓	1st Off
8	Boiler Room	✓	✓	✓	1st Off
8	Chiller Room	✓	✓	✓	1st Off
8	Basement Pump Room		✓	✓	1st Off
	Pump House				
8	Pump Room	✓	✓	✓	1st Off
8	Ele[illegible] Room	✓	✓	✓	3rd Off
9	Stadi[illegible] and Ma[illegible] nt Buildi[illegible]	✓	✓	✓	2nd Off
	Classroom [illegible] ce Buildi[illegible]				
	[illegible] General Use[illegible] oms and [illegible]	✓	✓	✓	2nd Off
	[illegible] Half-Walls [illegible] ng Cente[illegible]				
	[illegible] Room	✓	✓	✓	
	Kit[illegible]	✓	✓	✓	Area of Refuge
	Building S[illegible] with Sensitive Activities		**Stage I**		**Stage II**
	[illegible] o & Dottie Kolligian Library				
	Main Area and Study Rooms	✓	✓	✓	3rd Off
	Science & Engineering Building I				
18	Chemistry, Biology and Physics Laboratories	✓	✓	✓	3rd Off
19	Engineering Laboratories	✓	✓	✓	3rd Off
	Science & Engineering Building II				
18	Chemistry, Biology and Physics Laboratories	✓	✓	✓	3rd Off
19	Engineering Laboratories	✓	✓	✓	3rd Off
	Building Spaces with Critical or High-Value Activities				
22	Joseph E. Gallo Wellness Center	✓	✓		3rd Off
24	Campus Police	Not connected to campus chilled water			
	Classroom & Office Building				
21	Electrical Inverter Rooms	✓	✓	✓	
21	Central Utility Plant, Electrical Room	✓	✓		
25	Early Childcare and Education Center	Not connected to campus chilled water			
	Leo & Dottie Kolligian Library				
26	Rare Book Room	✓	✓		
	Science & Engineering I				
51	Vivarium	Excluded from Curtailment			
	Building Spaces that Impact Fire and Life Safety				
33	Telecomm Building				

Central Plant – Engineered Solution: Additional cooling

- Rent two 440-ton air cooled chillers and one 2MW generator for the Summers of 2014, 2015 and 2016(TBD); located at the Central Plant
- Install points of connection to the campus chilled water loop
- Eliminates the need to initiate campus chilled water load shedding during high wet bulb events

Central Plant – Engineered Solution: Costs

Summer Cooling 2014				
ITEM	**QTY**	**TIME**	**COST**	**TOTAL**
Chillers, cooling towers, generator - Rental for 4 months (June-Sept.)	4	Month	$ 50,000	$ 200,000
Fuel for Diesel (15 days runtime /24 hrs per day - 3 months)	3	Month	$ 55,000	$ 165,000
Points of Connection	1	Ea	$ 45,000	$ 45,000
TOTAL:				**$ 410,000**



Load Profile Results Summary

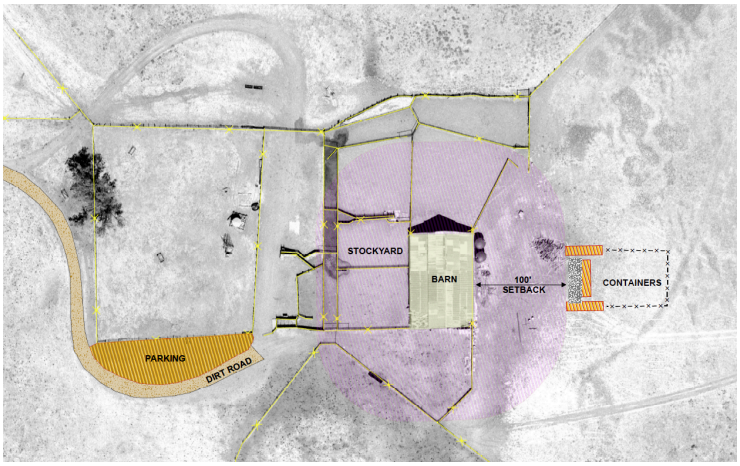
Operation Strategy		Produced (ton-hrs)	Curtailment Level: None	I	II-1st	II-2nd	II-3rd	All ton-hrs in 1000s
			45.6	43.4	40.5	27.9	Emergency Only	2014 Demand (ton-hrs)
			1.9	1.8	1.8	1.8		2015 (ton-hrs)
	Five Cooling Towers	26.3	12.0	12.7	13.8	17.4		Charged (ton-hrs)
			31.3	29.9	28.0	19.0		Discharged (ton-hrs)
			0	1	1	5+		Days Sustained
			-19.3	-17.1	-14.2	-1.6		Buffer (ton-hrs)
	Bypass Chiller	29.7	11.9	12.6	13.6	17.3		Charged (ton-hrs)
			27.8	26.3	24.4			Discharged (ton-hrs)
			1	1	1	Infi		Days Sustained
			-15.9	-13.7	-10.	1.8		Buffer (ton-hrs)
	Three Chillers	38.1	20.4	21.0	22.1			Charged (ton-hrs)
			27.8	26.3	1.4	15.		Discharged (ton-hrs)
			1			finite		Days Sustained
			-7.4	-5	-2	3		Buffer (ton-hrs)
	Temporary Cooling Towers	33.8	13	14	15.8	21.2		Charged (ton-hrs)
				24.	2.5	15.3		Discharged (ton-hrs)
			1	1		Infinite		Days Sustained
			-11.		-6.7	5.9		Buffer (ton-hrs)
	Temporary Cooling Towers and Thr Chille	0.6	0.2	31.	27.9	38.0		Charged (ton-hrs)
			1	24.0	22.5	15.3		Discharged (ton-hrs)
			Infi	nfinite	Infinite	Infinite		Days Sustained
			5.	7.2	5.5	22.8		Buffer (ton-hrs)
	ry 4 ller	40.2	.4	17.1	18.3	23.0		Charged (ton-hrs)
			21.8	20.3	18.5	10.6		Discharged (ton-hrs)
			2	4	5+	Infinite		Days Sustained
			-5.3	-3.2	-0.2	12.4		Buffer (ton-hrs)
	Tw mporar Ton hillers	50.8	21.4	22.2	23.6	29.0		Charged (ton-hrs)
			16.1	14.8	13.3	6.0		Discharged (ton-hrs)
			Infinite	Infinite	Infinite	Infinite		Days Sustained
			5.2	7.4	10.4	22.9		Buffer (ton-hrs)

Color Legend							
	-25	-15	-5	5	15	25	Buffer (ton-hrs)
	High Risk					Low Risk	
	Low Cost					High Cost	

Merced Vernal Pool and Grasslands Reserve

Three 20 foot containers

Merced Vernal Pool and Grasslands Reserve
Site Configuration



Challenge
Demand for storage facilities increasing campuswide

Tables and equipment storage

Audio/Visual Equipment storage

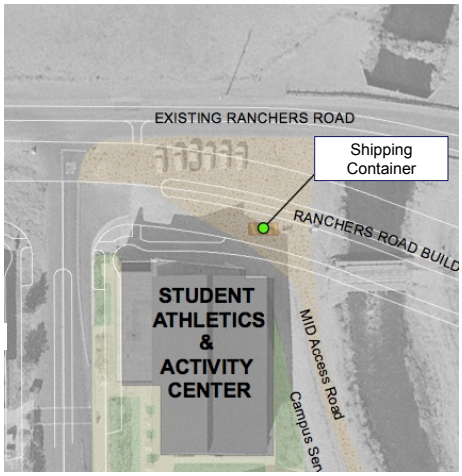
ATV and research equipment storage

Challenge
Temporary or modular storage requests

Existing (Red) or Proposed (Yellow)

Site examples that would not trigger CPPC review

Siting that would trigger CPPC review: Conflict with circulation



Future Ranchers Road Implications

Siting that would trigger CPPC review:
Conflict with open space

Aerial View

Perspective View

Proposal
Staff level review and evaluation process

Request from Proponent

Evaluation by Physical and Environmental Planning

Recommendation by Facilities Mgmt, Design and Construction and Physical and Environmental Planning

(5 year limitation)

Request includes

- Purpose
- Size
- Expected duration
- Statement of eventual location of permanent use

Proposed Criteria

- Consistency with LRDP
- Safety
- Circulation Impacts
- Consistency with adjacent or planned structures or right of ways
- Impact on building users

Extensions

- Can be granted for up to 10 years total
- Proponent responsible for removal

Appeals

Processed through Vice Chancellor for Planning and Budget to CPPC

Construction Updates

Student Services Building Complete

3-Story building opened for Spring Classes: January 21, 2014
Pavilion previously opened for Fall Classes: August 29, 2013

- **2nd Floor:** Center for Career and Professional Advancement, Ombuds Office and Disability Services moved into space January 16, 2014
- **3rd Floor:** Two Academic Support rooms that will be in part used for tutorial services
- **3rd Floor**: Tenant improvements being designed for Graduate Division and Undergraduate Education offices

Site Development and Infrastructure

Phase 4: 100% Complete

Little Lake Amphitheater

"Wallace-Dutra Amphitheater Celebrating the Class of 2009's Vision"

Science and Engineering 2

August 2014 Completion

Classroom Office Building 2

March 2016 Completion

-Out to bids February 4, 2014
-Open bids March 11, 2014
-Break Ground Mid April 2014

Report from Physical and Environmental Planning

Campus Barn coordination with University Advancement

Vernal Pool Interpretive Center

Coordination with Campus Stakeholders for Resources Legacy Fund Grant Proposal