AGENDA

BOARD OF SUPERVISORS, COUNTY OF MONO
STATE OF CALIFORNIA

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Mammoth Lakes BOS Meeting Room, 3rd Fl. Sierra Center Mall, Suite 307, 452 Old Mammoth Rd., Mammoth Lakes, CA 93546

Regular Meeting
January 20, 2015

TELECONFERENCE LOCATIONS: 1) First and Second Meetings of Each Month: Mammoth Lakes CAO Conference Room, 3rd Floor Sierra Center Mall, 452 Old Mammoth Road, Mammoth Lakes, California, 93546; 2) Third Meeting of Each Month: Mono County Courthouse, 278 Main, 2nd Floor Board Chambers, Bridgeport, CA 93517. Board Members may participate from a teleconference location. Note: Members of the public may attend the open-session portion of the meeting from a teleconference location, and may address the board during any one of the opportunities provided on the agenda under Opportunity for the Public to Address the Board.

NOTE: In compliance with the Americans with Disabilities Act if you need special assistance to participate in this meeting, please contact the Clerk of the Board at (760) 932-5534. Notification 48 hours prior to the meeting will enable the County to make reasonable arrangements to ensure accessibility to this meeting (See 42 USCS 12132, 28CFR 35.130).

Full agenda packets are available for the public to review in the Office of the Clerk of the Board (Annex I - 74 North School Street, Bridgeport, CA 93517), and in the County Offices located in Minaret Mall, 2nd Floor (437 Old Mammoth Road, Mammoth Lakes CA 93546). Any writing distributed less than 72 hours prior to the meeting will be available for public inspection in the Office of the Clerk of the Board (Annex I - 74 North School Street, Bridgeport, CA 93517). **ON THE WEB**: You can view the upcoming agenda at www.monocounty.ca.gov . If you would like to receive an automatic copy of this agenda by email, please send your request to Bob Musil, Clerk of the Board: bmusil@mono.ca.gov .

UNLESS OTHERWISE SPECIFIED BY TIME, ITEMS SCHEDULED FOR EITHER THE MORNING OR AFTERNOON SESSIONS WILL BE HEARD ACCORDING TO AVAILABLE TIME AND PRESENCE OF INTERESTED PERSONS. PUBLIC MAY COMMENT ON AGENDA ITEMS AT THE TIME THE ITEM IS HEARD.

9:00 AM Call meeting to Order

Pledge of Allegiance

1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

on items of public interest that are within the subject matter jurisdiction of the Board.

(Speakers may be limited in speaking time dependent upon the press of business and number of persons wishing to address the Board.)

2. APPROVAL OF MINUTES

A. Board Minutes

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on January 6, 2015.

3. RECOGNITIONS - NONE

4. BOARD MEMBER REPORTS

The Board may, if time permits, take Board Reports at any time during the meeting and not at a specific time.

5. COUNTY ADMINISTRATIVE OFFICE

CAO Report regarding Board Assignments
Receive brief oral report by County Administrative Officer (CAO) regarding work activities.

6. DEPARTMENT/COMMISSION REPORTS

7. CONSENT AGENDA

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

A. Approval of Undersheriff At-Will Contract

Departments: County Administrator's Office/Sheriff's Office

Proposed resolution approving a contract with Michael Moriarty as Undersheriff, and prescribing the compensation, appointment and conditions of said employment.

Recommended Action: Adopt Resolution #R15-_____, approving a contract with Michael Moriarty and prescribing the compensation, appointment and conditions of said employment.

Fiscal Impact: Assuming a start date of Feb. 1, the cost of this position for the remainder of FY 14/15, with and expected start date of January 20, 2015 is approximately $75,715 of which $54,405 is salary; $8,395 is the employer portion of PERS, and $12,915 is the cost of the benefits and is included in the FY 2014-2015 adopted County Budget. Annual cost will be $181,716 and the contract cost for three years would be $545,148.

B. Approval of DA Investigator Chris Callinan's Contract

Proposed resolution approving a contract with Chris Callinan as Deputy DA Investigator and prescribing the compensation, appointment and conditions of said employment.

Recommended Action: Approve Resolution #R15-_____, approving a contract

with Chris Callinan and prescribing the compensation, appointment and conditions of said employment. Authorize the Board Chair to execute said contract on behalf of the County.

Fiscal Impact: For the remainder of the 2014/2015 fiscal year approximately $50,064.00 in salary and $64,282.00 in benefits. The yearly total for salary and benefits combined is $228,692.00. This amount is accounted for in the DA Department's FY 2014-2015 budget.

C. Hiring Freeze Variance - Vacancy in Crowley

Departments: Public Works

Due to an upcoming departure in Road Area I (Crowley) there will exist a Maintenance Worker II-III vacancy. Public Works has followed the Mono County protocol to fill the vacancy created. This vacancy is a full-time position in the Crowley area and requires an in-county recruitment first for Public Works Maintenance Worker employees and if no requests to transfer were received then the position would be advertised out-of-county.

Recommended Action: Authorize Public Works Director, in consultation with Human Resources, to recruit in-county to fill the upcoming vacancy in Road Area I. If no requests are received in-county then recruit out-of-county to fill same vacancy. Provide any desired direction to staff.

Fiscal Impact: The funding source for this position is full-time out of the Road Fund. Maintenance Worker II - The total cost for remainder of fiscal year 14/15 is $18,575 and a full fiscal year is $55,726 of which $36,456 is salary. Maintenance Worker III - The total cost for remainder of fiscal year 14/15 is $19,181 and a full fiscal year is $57,574 of which $38,304 is salary.

D. Budget Amendment to Replace Layoffs with Furloughs

Departments: Finance

Budget Amendment to replace layoffs with furloughs.

Recommended Action: Approve budget amendments to replace layoffs with furlough budget reductions, recognize additional revenue from the Sheriff's trust, and appropriate difference of $57,098 from contingencies to balance the overall budget.

Fiscal Impact: No net effect on the general fund. Net reduction of $93,024 to non general fund budgets.

E. 2015 Calendar of Regular Meetings of the Board of Supervisors

Departments: Clerk of the Board

Rule 3 of the Mono County Board Rules of Procedure specifies that: an annual calendar of meetings shall be adopted by the Board at their first meeting in January. The calendar will include all known regular meetings. Any meeting may be canceled upon the order of the Chair, or by a majority of Board members.

Recommended Action: Approve proposed calendar of regular meetings for 2015. Cancel meeting regularly scheduled for December 1.

Fiscal Impact: None.

8. CORRESPONDENCE RECEIVED (INFORMATIONAL)

All items listed are located in the Office of the Clerk of the Board, and are available for review.

A. Department of Fish and Game Notice of Completion

Departments: Clerk of the Board

Notice of Completion from the Department of Fish and Wildlife, received January 12, 2015 regarding Phasing of Nonlead Ammunition Requirement.

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9. REGULAR AGENDA - MORNING

A. Caltrans Request for Truck Restrictions on SR 108

Departments: County Administrator's Office

30 Minutes (15 minute presentation;15 minute discussion)

(Terry Erlwein, Caltrans) - Presentation by Terry Erlwein regarding truck traffic on State Route 108(Sonora Pass).

Recommended Action: Receive presentation from Caltrans staff on request to restrict large trucks from SR 108 from Mile Post (PM) 0.0 in Mono County to PM 4.6. Provide any desired direction to staff.

Fiscal Impact: There is no fiscal impact from receiving the presentation. Should the Board direct staff to initiate the ordinance process, staff time from various departments will be incurred.

B. Highway 6 Safety Improvements

Departments: Board of Supervisors

30 minutes (5 minute presentation; 25 minute discussion)

(Supervisor Fred Stump) - Discussion of speed and safety issues along Highway 6 in the Tri Valley portion of Mono County.

Recommended Action: 1. The Board could direct staff to work with Caltrans to seek a legislative solution namely seek a bill to lower the speed limit on the section of Highway 6 which is of concern; 2. The Board could direct staff to monitor the issue and seek enhanced enforcement by California Highway Patrol at current speed limit levels. 3. Provide staff with any additional direction.

Fiscal Impact: There is no fiscal impact from this item.

C. Authorization to Apply for the Energy Partnership Program Grant

Departments: CAO, Community Development, Finance, Public Works

10 minutes

(Megan Mahaffey and Vianey White) - The California Energy Commission (CEC) Energy Partnership Program (EPP) offers services to help identify the most cost-effective energy saving opportunities for facilities. There is no cost to participate in the program which offers technical assistance services of up to $20,000 of the CEC consultant's costs. The EPP is an annual program and there is no cap on the number of submissions for Technical Assistance. $20,000 in EPP funding covers approximately 150,000 square feet in facility energy audits, depending on the depth with which the County choses to conduct the audits.

Recommended Action: Approve the Energy Partnership Program Resolution and submission of the Energy Partnership Program Grant Application to the California Energy Commission to receive an award of $20,000 in contract services towards Energy Audits for Mono County Facilities. Provide any desired direction to staff.

Fiscal Impact: Minimal staff time to manage the California Energy Commission's consultant performing the energy audits on 150,000 -200,000 square feet of Mono County Facilities that will result in cost estimates and cost benefit analysis to implement energy efficiency improvements.

D. Mono County Strategic Planning Update and 2015 Goal setting

Departments: County Administrator's Office

1 hour (20 minute staff presentation; 45 minute discussion)

(Jim Leddy) - Presentation by Strategic Planning Steering Committee regarding Mono County Strategic Planning effort.

Recommended Action: 1) Receive update on Strategic Planning effort; 2) Review and amend as appropriate Draft Planning document; 3) Direct staff to circulate draft Strategic Planning document through County regional Planning Advisory Committees for feedback and then return back to Board of Supervisors.

Fiscal Impact: There is no fiscal impact at this time.

10. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

on items of public interest that are within the subject matter jurisdiction of the Board. (Speakers may be limited in speaking time dependent upon the press of business and number of persons wishing to address the Board.)

11. CLOSED SESSION

A. Closed Session--Human Resources

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Marshall Rudolph, John Vallejo, Leslie Chapman, and Jim Leddy. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff

Department's Management Association (SO Mgmt). Unrepresented employees: All.

12. REGULAR AGENDA AFTERNOON- NONE

ADJOURN

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: Clerk of the Board

TIME REQUIRED

SUBJECT Board Minutes

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Approve minutes of the Regular Meeting held on January 6, 2015.

RECOMMENDED ACTION:

FISCAL IMPACT:

CONTACT NAME: Shannon Kendall

PHONE/EMAIL: x5533 / skendall@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

Click to download

☐ 01-06-15 Draft Mins

History

Time	Who	Approval
1/14/2015 9:03 AM	County Administrative Office	Yes
1/13/2015 5:33 PM	County Counsel	Yes
1/14/2015 8:29 AM	Finance	Yes

DRAFT MEETING MINUTES
BOARD OF SUPERVISORS, COUNTY OF MONO
STATE OF CALIFORNIA

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Board Chambers, 2nd Fl., County Courthouse, 278 Main St., Bridgeport, CA 93517

Regular Meeting
January 6, 2015

Flash Drive	#1005
Minute Orders	M15-01 to M15-08
Resolutions	R15-01
Ordinance	Ord14-07 NOT USED

9:00 AM Meeting called to Order by Outgoing Chairman Johnston.

Supervisors present: Alpers, Fesko, Johnston, Stump and Supervisor Elect Corless.
Supervisors absent: None.

Break: 10:30 a.m.
Reconvene: 10:40 a.m.
Closed Session/Lunch: 12:28 p.m.
Reconvene: 2:03 p.m.
Adjourn: 3:03 p.m.

Pledge of Allegiance led by Supervisor Johnston.

Ceremonial Swearing in of Newly Elected Officials
Judge Eller will administer the oath of office to Assessor Barry Beck, District Attorney Tim Kendall, Sheriff-Coroner Ingrid Braun, District 1 Supervisor Larry Johnston and District 5 Supervisor Stacy Corless.

1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

Bishop Commander introduced CHP Commander Jeff Holt:

- Spoke a few words.

2. APPROVAL OF MINUTES

A. Board Minutes

Departments: Clerk of the Board

Action: Approve minutes of the Regular Meeting held on December 9, 2014, as corrected.

Alpers moved; Fesko seconded
Vote: 5 yes; 0 no
M15-01

Supervisor Johnston:

- On p. 2 of draft minutes, under Supervisor Alpers Board report, should be "Dr. Johnson" not Johnston.
- On p. 3 and 4 of draft minutes the words Bio Mass is one word: "biomass".
- On p. 5 of draft minutes, item #7c, Vote should be: Fesko moved, Alpers seconded; Vote: 4 yes; 1 no: Johnston (with Johnston voting NO).
- On. P. 11 of draft minutes, under Opportunity for Public to Address Board delete "(if they do, change this)".

Supervisor Stump:

- On p. 11 of draft minutes, Item #9h, under his comments, "Land Management" should be capitalized.

B. Board Minutes

Departments: Clerk of the Board

Action: Approve minutes of the Regular Meeting held on December 16, 2014, as corrected.

Stump moved; Alpers seconded
Vote: 5 yes; 0 no
M15-02

Supervisor Stump:

- On p. 7 of draft minutes, Item #9a, under his comments, second bullet point, should read, "…..we can see a complete list of proposed projects."
- On p. 9 of draft minutes, item #9c, under his comments, last bullet point add, ", and continue to be fiscally cautious."

Supervisor Johnston:

- On p. 2 of draft minutes, under item 2a (approval of December 2nd minutes), his second bullet point, 'neighboring' should be 'neighborhood' (needs to be changed on December 2nd minutes as well).

Supervisor Corless:

- On p. 2 of draft minutes, Item #3a, spelling Dick "Noles", not Knolls (check rest of minutes for additional occurrences of Dick Noles and change where applicable).

3. RECOGNITIONS

A. Election of New 2015 Board Chair

Departments: Clerk of the Board

(Outgoing Board Chair) - The outgoing Board Chair will call for nominations to elect the Chair of the Board for 2015.

Action: Elect Supervisor Timothy E. Fesko as the new Chair of the Board for 2015.
Alpers nominated Supervisor Fesko for Chairman, then a vote was taken
Vote: 5 yes; 0 no
M15-03
Supervisor Alpers:

- Nominated Supervisor Fesko.

B. Election of New 2015 Vice-Chair to the Board

Departments: Clerk of the Board

(Newly Elected Board Chair) - The newly-elected Board Chair will call for nominations to elect the Vice Chair of the Board for 2015.

Action: Elect Supervisor Fred Stump as the new Vice-Chair of the Board for 2015.
Alpers moved; Corless seconded
Vote: 5 yes; 0 no
M15-04

C. Election of New 2015 Chair Pro-tem

Departments: Clerk of the Board

(Board Chair) - The newly-elected Chair will call for nominations to elect the Chair Pro-tem of the Board for 2015.

Action: Elect Supervisor Stacy Corless as the new Chair Pro-tem of the board for 2015.
Stump moved; Alpers seconded
Vote: 5 yes; 0 no
M15-05

D. Presentation to Outgoing Chairman Johnston

Departments: Clerk of the Board

(Board Chair) - Presentation to Chairman Johnston by newly elected Board Chair honoring Supervisor Johnston's service to the Board in 2014.

Action: None.
Supervisor Fesko:

- Read and presented outgoing Chairman Johnston with a plaque.

Supervisor Stump:

- Thanked Supervisor Stump for putting up with him for a whole year.

Supervisor Alpers:

- Expressed gratitude to Supervisor Johnston and thanked him for his service.

4. BOARD MEMBER REPORTS

Supervisor Alpers:

- Spoke with Brian Winzenread of Caltrans, June Lake Loop temporarily closed; asked that county be kept briefed regarding creek flow issue. He had a lot of calls from constituents.

- Spoke with Carl Williams re: update at June Lake ski area; didn't quite make budget over holidays but they did much better than last year. Ski schools were full.
- Department of Fish and wildlife – retired employee, former hatchery manager called in alarm regarding hatchery system in California and the eastern sierra in particular; stocking size of trout will go from ½ pound to ¼ pound. Requested Jim Leddy call Fish and Game (Mr. Erdman) and maybe have him come do a presentation.
- Bennett Kessler passed away who had been battling cancer. She was an accurate reporter and an asset.

Supervisor Corless:

- Successful winter holiday period for Mammoth;
- Activities: attended CSAC new supervisors' institute classes and will continue with ongoing training/earning the supervisors' certification; FPPC ethics training complete; Participating in Eastern Sierra Recreation Collaborative and following Inyo National Forest plan revision process, working with Mammoth Lakes Town Council member John Wentworth; attended broadband consortium board meeting in early December and participating in broadband forum in Ridgecrest on Jan 22.
- Strategy: this was something I emphasized in my campaign; it's the subject of training that fellow board members and I will put into practice following through with the work employees have done on strategic plan; The instructor of the "Thinking Strategically in Trying Times" course at CSAC noted "Successful people in the public sector embrace accountability" and that "strategy creates accountability" and I plan to put these skills and ideas to good use. This effort deserves a considerable amount of time and attention.
- Other Important issues for me:
    - Communication: enabling citizen involvement, facilitating transparency; better inter-agency communication and action – connecting the dots between points that are already there.
    - Recreation: Last week's MT editorial said that "No other area of discussion is more important than recreation. It is interlaced with different policies, all fused by different priorities, promulgated by user groups, federal agencies, state agencies and our own local governing bodies." It's complex and needs to be examined at a strategic level, and Mono County can lead on this issue, working to set policy.
    - Facilities: short and long term plan for our buildings—where and how we are going to work.
    - Technology: this is the biggest economic development opportunity we have and there's still much work to do—I'd like to be involved with the next steps.
    - Education, Arts and Culture: I am on the board of the Mono Council for the Arts and believe that the county plays an important role in fostering arts programs.
- Request to adjourn the meeting in memory of Benett Kessler.

Supervisor Fesko:

- Wished everyone a Happy New Year.
- Dec 17 Attended the County Holiday celebration in Lee Vining. This was well attended and really great to see south and north county employees interacting. Great holiday celebration!
- Dec 18 Attended a Bodie Road mtg. County staff, Calif. Park service, BLM, and others were present. Discussion was on the current road condition, the road has deteriorated somewhat since the last time the county repaired the road. Plan of action from this point forward is to discuss short-term and long-term solutions on the Bodie road.
- Dec 30 Conferenced call with staff on the Agenda Review meeting.
- Asked Board members to work on getting written board reports to Shannon to help ensure accuracy.
- It is with sadness that he reports that long time Antelope Valley resident, Effie Hershey, passed away in December. She has been an active member in the valley for many years. She is well known for her cooking and baking skills. She is survived by her

husband Clint, her children and grand children. Asked fellow board members to close meeting today in honor of Effie Hershey.

Supervisor Johnston:

- Attended all employee Christmas party on 12/17.
- Met with new Caltrans director and had lunch with him.
- Attended Town/County Liaison on 12/18.
- Attended ESCOG meeting on 12/19.
- Did a lot of travelling over Christmas.
- Attended Mammoth Lakes Housing meeting last night – good organization going there. Town still hasn't fully funded; they are now down to about $300,000.
- Thanked staff for Christmas decorations at courthouse here – it looks really good.

Supervisor Stump:

- Attended various holiday events, including all-employee party and others.
- Thanks to Road Department who worked Christmas Day clearing snow; thanked Leslie Chapman and Gerry LeFrancois regarding issue of formalizing a certain lot line adjustment.
- RACE Communications conversation, grant for high speed internet in his district – completed their preliminary engineering documents. Good news. Touched base on newly submitted grants. They'd still like support letters for funding.
- Suggested we close meeting in honor of Bennett Kessler.

5. COUNTY ADMINISTRATIVE OFFICE

CAO Report regarding Board Assignments

Receive brief oral report by County Administrative Officer (CAO) regarding work activities.

Jim Leddy:

- All employee holiday party December 17th; no county funds used.
- Attended Town/County Liaison meeting, continued solid waste issue discussion.
- Attended ESCOG meeting with former Supervisor Hunt on December 19th.
- 12/22 and 12/23, held a couple lunches for employees.
- Participated in Cultural Center discussion, may have someone come and talk to the board.
- Strategic Planning Steering Committee meeting this week; working on draft to come before the board on 1/20. Will take all previous board's comments and ideas and incorporate them. Need to also talk about 2015 Board goals on 1/20.
- In May, there will be an all-employee appreciation BBQ event in Lee Vining.
- Mentioned upcoming Employee Roundtables both in North and South County.
- Reminder that Supervisor Hunt's retirement party will be Friday night at 6:00 p.m. at Snowcreek Athletic Club.
- Fishing Issue – spoke with Dana in Bigelow's office: trying to see if legislature can do some oversight; he'll put in the request for a presentation.

6. DEPARTMENT/COMMISSION REPORTS

Joe Blanchard:

- Old hospital update: water main broke for the third executive year; repaired again. Line is slowly deteriorating. Spoke about inside leaks. They are keeping building held together. At same time working on "campus" concept and hopefully making the old hospital cold storage only.

Stacey Simon:

- County was dismissed from litigation relating to the Thermal Project as of December 4th.
- Temporary Urgency Change Application filed back in December by Walker River Irrigation District: has been withdrawn but our letter was received.

7. CONSENT AGENDA - NONE

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

8. CORRESPONDENCE RECEIVED (INFORMATIONAL)

All items listed are located in the Office of the Clerk of the Board, and are available for review.

A. Devil's Postpile National Monument

Departments: Clerk of the Board

Letter from Deanna M. Dulen, Superintendent of Devil's Postpile, requesting approval to increase campground fees to align the monument's recreation fees with NPS policy for comparable rates in nearby areas as required by FLREA.

B. Department of Transportation - Caltrans

Departments: Clerk of the Board

Letter from Bryan Winzenread of Caltrans dated December 22, 2014, regarding a request for a future agenda item recommending truck size restrictions for State Route 108.

Supervisor Johnston:

- This is something that's been going on with LTC; he wants Board to support this. This letter is a good step in the right direction.
- Disagrees about combining the Highway 6 issue with this issue. One at a time is better.

Supervisor Stump:

- Wants this dovetailed with reducing speed limit on Highway 6 to 45 mph to help with traffic control. Also wants request for CHP for more truck enforcement on Highway 6.
- He does support the SR 108 proposal as well, just doesn't want the other issues forgotten. If agenda item is created, needs to include all of this.
- Doesn't mind if they occur separately but wants it done on the same date at least.

Supervisor Fesko:

- Doesn't have a problem initially putting these two issues together. Maybe agendize as one and then decide whether to do two separate items.
- His preference is to do agenda item and then decide whether they should be dealt with together or separately.

Supervisor Corless:

- Agrees with Supervisor Fesko.

Jim Leddy:

- The highway 6 issue has already been brought up.
- Explained how the agenda item is progressing; that it is in the works, the board needs to give it a couple of weeks.

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The Board acknowledged receipt of the correspondence.

9. REGULAR AGENDA - MORNING

A. Reappointment of Mono Basin Regional Planning Advisory Committee Members

Departments: Community Development Department

(Scott Burns) - Consider reappointment of six members to the Mono Basin Regional Planning Advisory Committee.

Action: Reappoint Zane Davis, Duncan King, Chris Lizza, Ilene Mandelbaum, and Bartshe Miller to the Mono Basin Regional Planning Advisory Committee. These are two year terms that will expire on 12/31/2016. Direct CDD to advertise for the one vacancy.

Alpers moved; Johnston seconded

Vote: 5 yes; 0 no

M15-06

Scott Burns:

- This is a routine item; we're asking to reappoint a majority of the members. There are six up for reappointment.
- Supervisor Alpers has been communicating with these individuals.

Supervisor Alpers:

- Understands that Supervisor Johnston pulled from consent; asked him to explain.
- He does have concerns with the makeup of the RPAC. Gave a bit of history on formation of RPACs.
- Has a potential issue with the reappointment of Katie Bellomo, not to take away from her past involvement.
- In the past he's had sit down meetings with each re-appointee. Has met with all of them including Katie Bellomo.
- At this particular time, based on the meeting and the past year of this RPAC, he feels it's in the RPAC's and Ms. Bellomo's best interests for her NOT be up for reappointment but he supports everyone else. Ms. Bellomo has indicated she'd work as a public member if necessary.

Supervisor Johnston:

- Issues involved a lot of the appointees; feels it's time for a change.
- It's about looking out for the *other* members on the committee.
- Mono Basin has one of the best sets of bylaws of all RPACS.

Supervisor Fesko:

- He thinks the RPACs are a great idea; defers to the district Supervisor.
- Asked about filling the position Ms. Bellomo will vacate.

Supervisor Stump:

- Asked about how the chair is appointed.

Chris Lizza (RPAC member):

- Spoke of Ms. Bellomo and the fact that she's been able to point out a lot of issues that he didn't see.
- Her profession makes her more of an advocate; she can be confrontational which is inappropriate and makes things uncomfortable.

B. Pumice Valley Landfill Purchase Agreement with Los Angeles Department of Water and Power

Departments: Public Works / Solid Waste Division

(Tony Dublino) - Proposed resolution authorizing the Chairman to enter, on behalf of Mono County, a Purchase Agreement with the Los Angeles Department of Water and Power to Purchase the Pumice Valley Landfill site.

Action: Approve Resolution #R16-5-01, authorizing the Chairman to enter, on behalf of Mono County, a Purchase Agreement with the Los Angeles Department of Water and Power for the purchase of the Pumice Valley Landfill,

approving the CEQA Addendum and findings, authorizing the Director of Public Works to accept Title, and authorizing the Solid Waste Superintendent to sign a declaration relating to the property. Amend the 2014-15 Board Approved Solid Waste budget to decrease appropriation in Operating Transfers out by $51,500 and increase appropriation in Land and Improvements by $51,500 with no net effect to total expenditures (4/5ths vote required). Amend the 2014-15 Board Approved Solid Waste budget to decrease appropriation in Operating Transfers out by $51,500 and increase appropriation in Land and Improvements by $51,500 with no net effect to total expenditures (4/5ths vote required).

Johnston moved; Alpers seconded

Vote: 5 yes; 0 no

R15-01

Tony Dublino:

- Explained item and requested action.
- This has been discussed at length with the Board previously.

Supervisor Stump:

- Asked about last minute change previously emailed to the board.
- There's a question of "why is the county buying this?" We need to prepare a press release at some point.

Stacey Simon:

- Explained changes to resolution; the revised documents weren't ultimately uploaded. These are really only formatting changes.
- The board's approval is first; we will still need DWP approval although there is no reason to think there will be any issues.

Supervisor Alpers:

- We have been over this repeatedly for a long time.
- This is in the best interest of the county and he's in support of it.

Supervisor Johnston:

- Thanked Staff; this is a rarity that DWP sells property.

Supervisor Fesko:

- This could help us in the long run.

Stacy Corless:

- Thanked Tony for his work.
- Thinks this is best for county but that conversations still need to take

C. Mono County Board Rules of Procedures Annual Review and Adoption

Departments: CAO

(Jim Leddy) - Annual review and adoption of Board of Supervisors Rules of Procedures.

Action: None. Discuss Mono County Board Rules of Procedures and provide direction to staff on possible changes and/or additions. If no changes suggested, adopt Mono County Board Rules of Procedures as accurate for 2015.

Jim Leddy:

- This should look very familiar to the board; they have the existing rules in place.
- Nothing new proposed by staff to be changed.
- We bring this back every year in case the Board has any issues.
- Rule 33 has not yet been utilized.
- Changes will be brought back in the next couple meetings as consent item. It can then be voted on.

Supervisor Fesko:

- Add Chair Pro-Tem to election process on TOC.
- General discussion regarding Rule 7 and Rule 33.

Supervisor Alpers:

- He plans to take to Mono Basin RPAC and June Lake CAC as examples of the efforts being made. Wants them to know the leadership example being set.
- Far cry from the days when things were just free flow.
- He's pleased with the document.
- Agrees now we should leave as-is. Willing to look at this every year.

Supervisor Corless:

- Commented on the commitment to civility; she's personally very committed to leading civil discourse within the board.
- If standard rules of procedure are up for discussion, why change them?

Supervisor Stump:

- Convert Appendix B to laminated cards, that would be very helpful for him.
- Rule 33 discussion.

Supervisor Johnston:

- Noted same changes as Supervisor Fesko.
- Discussion regarding Rule 15b, Rule 33, Rule 38, Rule 40, Rule 43, Appendix A.

Marshall Rudolph:

- Commented about Rule 33, Rule 40, Rule 43.

D. Supervisors' Appointments to Boards, Commissions and Committees

Departments: Clerk of the Board

(Board Chair) - Mono County Supervisors serve on various boards, commissions, and committees for one-year terms that expire on December 31st. Each January, the Board of Supervisors makes appointments for the upcoming year.

Action: Appoint Supervisors to boards, commissions and committees for 2015.
Johnston moved; Stump seconded
Vote: 5 yes; 0 no
M15-07

Scott Burns:

- Explained the Airport Land Use Commission and its purpose.

Stacy Corless:

- Asked about MAG meetings.

Jim Leddy:

- MAG is at the staff level.

E. 2015 Mono County Legislative Agenda

Departments: County Administrator's Office

(Jim Leddy) - Review of Mono County 2015 draft Legislative Platform and consideration for adoption.

Action: None.

Taken second in afternoon session.

Jim Leddy:

Power point presentation:

- There has a been a removal of the Land Exchange
- Platform Development Process
- Platform Elements

- General Guidelines
- State Priorities
- Federal Priorities
- Requested Actions

Supervisor Johnston:

- Discussion on various items: Item #3a – Sustainable Funding for State Parks, not sure that is as imminent at this time. Maybe need to revise? Doesn't think OHV belongs in this section.
- Item #3c - Support Bio-energy Action Plan – we have made progress on this; need to add funding for construction to description. Just needs some updating.
- Item #5 – Support rehabilitation of the Bodie Road (Highway 270): not sure we are endorsing the paving all the way.
- Item #5b – CARB: not sure the dollar amount should be on here, doesn't think we really *know* what that figure is.
- Discussion regarding Items #6c and 6d.

Federal:

- Item #1d – Biomass, Solar, Wind and Geothermal Development Block Grant (CDBG); add essence and history of our county wording.
- Item #5a – Ensure federal transportation formulas support rural road infrastructure: asked about MAP-21 and whether it's current?
- Item #1g(i) – Ensure access to federal public lands which support tourism:

Stacy Corless:

- What about OHV Grant Funding? We should add this to the State Park section if it's going to be revised.
- Item 1g(i): idea about funding and public lands, maybe as separate bullet?
- Item #2a – CEQA Reform, remove some wording? Does it all still apply?
- Item #3d, typo.
- Item #1a – needs to be exact copy of general priority.
- Item #2 – use wording again in the general priority statement.

Supervisor Fesko:

- Maybe using "under funding" concept on State Parks section.
- Taking the paving sentence out regarding Bodie Road.
- Maybe do an estimate amount for CARB, reword how it's written.

Supervisor Stump:

- Item #3b – Protect our Communities from Forest Fires: Needs to say we don't support the SRA fee.

Supervisor Alpers:

- Agrees that CARB amount needs to be in the platform, the wording could be different.
- Protecting the State Hatchery system important and the Lahontan Cutthroat Trout program important.
- Massage access issue.

10. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

Joe Parrino:

- Update on the off road/motocross industry; last weekend the season for super cross started in Anaheim. Gave some information on the event.
- Informed that there are motocross tracks all the way from Irvine to Corona area.
- Gave information on upcoming events.
- Supervisor Fesko: he'd love to see the Mammoth track open, still on his radar.

11. CLOSED SESSION

There was nothing to report out of closed session

Item #9e moved to afternoon session at request of staff due to other commitments.

A. Closed Session--Human Resources

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Marshall Rudolph, John Vallejo, Leslie Chapman, and Jim Leddy. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

B. Closed Session - Conference With Legal Counsel

CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION. Significant exposure to litigation pursuant to paragraph (2) of subdivision (d) of Government Code section 54956.9. Number of potential cases: 1. Facts and circumstances: Steve Maris claim for damages CL 14-11.

C. Closed Session - Conference with Legal Counsel

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Subdivision (a) of Government Code section 54956.9. Name of case: Worker's compensation claim of David O'Hara.

D. Closed Session - Conference with Legal Counsel

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: US v. Walker River Irrigation District, et. al.

E. Closed Session - Conference With Legal Counsel

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: Mono County v. Schat.net.

12. REGULAR AGENDA CONTINUED

A. Claim for Damages (Maris)

Departments: County Counsel, Risk Management

(John-Carl Vallejo) - Claim for damages 14-11 filed by Steve Maris.

Action: Reject claim for damages presented by Steve Maris in its entirety to the extent it refers to events or occurrences on or after November 25, 2013, and direct county counsel to notify claimant of the Board's action. Take no action and direct county counsel to return said claim to the claimant to the extent it refers to

events or occurrences prior to November 25, 2013, because it was not presented within the time required by law.

Alpers moved; Stump seconded
Vote: 5 yes; 0 no
M15-09

John Vallejo:

- Explained that the recommended action has changed a little and read the changes to the Board.

ADJOURN at 3:03 p.m. in memory of Bennett Kessler and Effie Hershey, recently passed away Mono County residents.

ATTEST

_____
TIMOTHY E. FESKO
CHAIRMAN

_____
SHANNON KENDALL
ASSISTANT CLERK OF THE BOARD

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: County Administrator's Office/Sheriff's Office

TIME REQUIRED

SUBJECT Approval of Undersheriff At-Will Contract

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Proposed resolution approving a contract with Michael Moriarty as Undersheriff, and prescribing the compensation, appointment and conditions of said employment.

RECOMMENDED ACTION:

Adopt Resolution #R15-_____, approving a contract with Michael Moriarty and prescribing the compensation, appointment and conditions of said employment.

FISCAL IMPACT:

Assuming a start date of Feb. 1, the cost of this position for the remainder of FY 14/15, with and expected start date of January 20, 2015 is approximately $75,715 of which $54,405 is salary; $8,395 is the employer portion of PERS, and $12,915 is the cost of the benefits and is included in the FY 2014-2015 adopted County Budget. Annual cost will be $181,716 and the contract cost for three years would be $545,148.

CONTACT NAME: Jim Leddy

PHONE/EMAIL: (760) 932-5414 / jleddy@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY 32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☑ YES ☐ NO

ATTACHMENTS:

Click to download

☐ Approval of at-will contract for Undersheriff

- [ ] Resolution
- [ ] Undersheriff At-will Contract

History

Time	Who	Approval
1/14/2015 9:03 AM	County Administrative Office	Yes
1/13/2015 5:36 PM	County Counsel	Yes
1/14/2015 11:34 AM	Finance	Yes

COUNTY OF MONO – County Administrative Office

P.O. BOX 696, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5412 ☐ FAX (760) 932-5411

Jim Leddy
County Administrative Officer
760.932.5414 / 760.924.1703

Director of Human Resources/Risk Management

To: Honorable Board of Supervisors
From: Jim Leddy, County Administrator
Date: January 11, 2015

Subject: At-Will Employment Agreement of Michael Moriarty as Mono County Undersheriff

Recommendation: Approve the At-Will Employment Agreement of Michael Moriarty, in the position of Undersheriff, at a salary of $10,881 per month with a three year term from January 20, 2015 to January 20, 2018.

Background: Sheriff Ingrid Braun requested the recruitment of a new Undersheriff to join her administration. A recruitment was authorized by the Board in December of 2014 and launched on December 12th. It concluded on January 2, 2015 with only two applicants. One applicant failed to meet minimum qualifications to be considered for the position. Sheriff Braun requested the County Administrator to bring to the Board a negotiated At-will contract for the qualified candidate. This contract, if approved, would take effect upon completion of all legally required background checks for public safety officers and to the satisfaction of the County.

Discussion: The approval of this contract would employ Michael Moriarty as the Undersheriff for a term of three years. As with all new At-will contracts, there is no car allowance nor performance pay as they have been ended for At-Will employees.

Fiscal Impact: Assuming a start date of Feb. 1, the cost of this position for the remainder of FY 14/15, with and expected start date of January 20, 2015 is approximately $75,715 of which $54,405 is salary; $8,395 is the employer portion of PERS, and $12,915 is the cost of the benefits and is included in the FY 2014-2015 adopted County Budget. Annual cost will be $181,716 and the contract cost for three years would be $545,148.

If you have any questions about this contract renewal, please feel free to contact Jim Leddy at (760) 932-5414.

RESOLUTION NO. R15-

A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS APPROVING AN EMPLOYMENT AGREEMENT WITH MICHAEL MORIARTY AND PRESCRIBING THE COMPENSATION, APPOINTMENT, AND CONDITIONS OF SAID EMPLOYMENT

WHEREAS, the Mono County Board of Supervisors has the authority under Section 25300 of the Government Code to prescribe the compensation, appointment, and conditions of employment of County employees;

NOW, THEREFORE, BE IT RESOLVED by the Mono County Board of Supervisors, that the Agreement re Employment of Michael Moriarty, a copy of which is attached hereto as an exhibit and incorporated herein by this reference as though fully set forth, is hereby approved and the compensation, appointment, and other terms and conditions of employment set forth in that Agreement are hereby prescribed and shall govern the employment of Michael Moriarty. The Chairman of the Board of Supervisors shall execute said Agreement on behalf of the County.

PASSED AND ADOPTED this ____ day of _____, 2015, by the following vote:

AYES :
NOES :
ABSTAIN :
ABSENT :

ATTEST: _____ _____
Clerk of the Board Timothy E. Fesko, Chair
Board of Supervisors

APPROVED AS TO FORM:

COUNTY COUNSEL

AGREEMENT RE EMPLOYMENT
OF MICHAEL MORIARTY

This Agreement shall be deemed entered into this 20th day of January, 2015, by and between Michael Moriarty and the County of Mono.

I. RECITALS

The County wishes to employ Michael Moriarty as the Undersheriff on a full-time basis on the terms and conditions set forth in this Agreement. Mr. Moriarty wishes to accept continued employment with the County on said terms and conditions.

II. AGREEMENT

1. The term of this Agreement shall be January 20, 2015, until January 20, 2018, unless earlier terminated by either party in accordance with this Agreement. The County shall notify Mr. Moriarty in writing no later than July 20, 2017, whether it intends to negotiate a renewal of this Agreement. In the event the County fails to provide such notice, Mr. Moriarty shall notify the County in writing of its breach of this provision of the Agreement and County shall be allowed 30 days from the receipt of that notice to cure the breach. If County cures the breach and notifies Mr. Moriarty that it does not intend to negotiate a renewal of the Agreement, then this Agreement shall terminate six months after said notification and no additional compensation or damages shall be owing to Mr. Moriarty as a result of the cured breach. If County does not cure the breach, then the Agreement shall automatically renew for another three years on the same terms in effect at the time of renewal.

2. Commencing as of the date that the County's background check process for Mr. Moriarty is completed and he is eligible to commence employment under POST rules, as determined by the County, or as of such later date as may be mutually agreed to by the County and Mr. Moriarty (hereinafter "Mr. Moriarty's start date"), Mr. Moriarty shall be employed by Mono County as the Undersheriff, serving at the will and pleasure of the Mono County Sheriff in accordance with the terms and conditions of this Agreement. Mr. Moriarty accepts such employment. The Sheriff shall be deemed the "appointing authority" for all purposes with respect to Mr. Moriarty's employment.

3. Mr. Moriarty's initial salary shall be $10,881 per month (prorated for his first month of employment if Mr. Moriarty's start date is not on the first day of the month). Mr. Moriarty understands that he is responsible for paying the employee's share of any retirement contributions owed to the Public Employees Retirement System (PERS). The Board may unilaterally increase Mr. Moriarty's

compensation in its discretion at any time while this Agreement is in effect. Should a wage increase be granted under the MOU with the Deputy Sheriff's Association (DSA), this Agreement will be reopened for discussion and potential re-negotiation with respect Mr. Moriarty's salary. During such negotiations the County shall consider and discuss the issue of increased compensation with Mr. Moriarty in good faith, but the County's decision whether or not to grant such additional compensation shall be final and non-appealable. In addition, this Agreement will also be reopened within the first 30 days of the third year of the Agreement for discussion and possible renegotiation with respect to Mr. Moriarty's salary or any other provision of this Agreement that the parties may mutually wish to discuss. After considering and discussing such issues in good faith, the County's decision shall be final and non-appealable.

4. Mr. Moriarty shall earn and accrue vacation and sick leave in accordance with the County's Management Benefits Policy and in accordance with any applicable County Code provisions not in conflict with said Policy. Also pursuant to said Policy, in recognition of the fact that his employment will be exempt from the payment of overtime or compensatory time-off under the Fair Labor Standards Act, he shall be entitled to 80 hours of merit leave (aka administrative leave) during each year of service under this Agreement. Mr. Moriarty understands that said merit leave does not accrue from one calendar year to the next; rather, it must be used by December 31st of each calendar year in which it is provided or it is lost. (Note: Mr. Moriarty's merit leave for 2015 shall be pro-rated based on Mr. Moriarty's start date.)

5. To the extent deemed appropriate by the Sheriff, the County shall pay the professional dues, subscriptions, and other educational expenses necessary for Mr. Moriarty's full participation in applicable professional associations, or for his continued professional growth and for the good of the County.

6. To the extent not inconsistent with the foregoing or any other provision of this Agreement, Mr. Moriarty shall be entitled to the same general benefits provided by the County to other management-level employees, as described more fully in the County's Management Benefits Policy. Such benefits include but are not limited to CalPERS retirement benefits (3% at 55 for Mr. Moriarty), CalPERS medical insurance, County dental and vision coverage, and life insurance. Any and all references in this Agreement to the County's Management Benefits Policy shall mean the "Policy Regarding Benefits of Management-level Officers and Employees," amended most recently by Resolution R4-54 of the Mono County Board of Supervisors and as the same may be further amended from time to time and unilaterally implemented by the County.

7. Mr. Moriarty understands and agrees that his receipt of compensation or benefits

of any kind under this Agreement or under any applicable County Code provision or policy – including but not limited to salary, insurance coverage, and paid holidays or leaves – is expressly contingent on his actual and regular rendering of personal services to the County or, in the event of any absence, upon his proper use of any accrued leave. Should Mr. Moriarty cease rendering such services during this Agreement and be absent from work without any accrued leave to cover said absence, then he shall cease earning or receiving any additional compensation or benefits until such time as he returns to work and resumes rendering personal services; provided, however, that the County shall provide any compensation or benefits mandated by state or federal law. Furthermore, should Mr. Moriarty's regular schedule ever be reduced to less than full-time employment, on a temporary or permanent basis, then all compensation and benefits provided by this Agreement or any applicable County policies shall be reduced on a pro-rata basis, except for those benefits that the County does not generally pro-rate for its other part-time employees.

8. Consistent with the "at will" nature of Mr. Moriarty's employment, the Sheriff may terminate Mr. Moriarty's employment at any time during this agreement, without cause. In that event, this Agreement shall automatically terminate concurrently with the effective date of the termination. Mr. Moriarty understands and acknowledges that as an "at will" employee, he does not have a property interest in his employment and will not have permanent status nor will his employment be governed by the County Personnel System (Mono County Code Chapter 2.68) except to the extent that System is ever modified to apply expressly to at-will employees. Nevertheless, the parties understand that Mr. Moriarty has rights under the Public Safety Officers Procedural Bill of Rights Act (California Government Code section 3300) and that such rights cannot be waived by Mr. Moriarty's entry into this Agreement. The County shall ensure that Mr. Moriarty receives such rights but the parties agree that the County is not required to provide Mr. Moriarty with any form or level of administrative appeal procedures beyond those required by the Public Safety Officers Procedural Bill of Rights Act (California Government Code section 3300. Said procedures will be set forth in a document distinct from this Agreement, to be developed by the County.

9. In the event that such a termination without cause occurs more than twelve months after Mr. Moriarty's start date (i.e., after the first twelve months of employment), Mr. Moriarty shall receive as severance pay a lump sum equal to six months' salary or, to the extent that fewer than six full calendar months remain (as of that effective date) before this Agreement would have expired, Mr. Moriarty shall instead receive a lesser amount equal to any remaining salary payments he would have received before expiration of the Agreement had he not been terminated. Notwithstanding the foregoing, Mr. Moriarty shall receive

severance pay equal to six months' salary in the event that termination occurs after the County has notified Mr. Moriarty that it intends to negotiate a renewal of this Agreement but before this Agreement expires. In no event shall the parties' failure or inability to arrive at mutually acceptable terms of a renewed agreement trigger the payment of severance pay. Note: for purposes of severance pay, "salary" refers only to base compensation.

10. Notwithstanding the foregoing, Mr. Moriarty shall not be entitled to any severance pay in the event that the Sheriff has grounds to discipline him on or about the time he gives him notice of termination. For purposes of this provision, grounds for discipline include but are not limited to those specified in Section 2.68.230 of the County Code or any successor Code provision, as the same may be amended from time to time. Mr. Moriarty shall also not be entitled to any severance pay in the event that he becomes unable to perform the essential functions of his position (with or without reasonable accommodations) and his employment is duly terminated for such non-disciplinary reasons.

11. Mr. Moriarty may resign his employment with the County at any time. His resignation shall be deemed effective when tendered, and this agreement shall automatically terminate on that same date, unless otherwise mutually agreed to in writing by the parties. Mr. Moriarty shall not be entitled to any severance pay or additional compensation of any kind after the effective date of such resignation.

12. This Agreement constitutes the entire agreement of the parties with respect to the employment of Mr. Moriarty.

13. The parties agree that the Board of Supervisors' approval of this Agreement on behalf of the County is a legislative act and that through this agreement, the Board of Supervisors is carrying out its responsibility and authority under Section 25300 of the Government Code to set the terms and conditions of County employment. It is not the parties' intent to alter in any way the fundamental statutory (non-contractual) nature of Mr. Moriarty's employment with the County nor to give rise to any future contractual remedies for breach of this Agreement or of an implied covenant of good faith and fair dealing. Rather, the parties intend that Mr. Moriarty's sole remedy in response to any failure by the County to comply with this Agreement shall be traditional mandamus.

14. Mr. Moriarty acknowledges that this Agreement is executed voluntarily by him, without duress or undue influence on the part or on behalf of the County. Mr. Moriarty further acknowledges that he has participated in the negotiation and preparation of this Agreement and has had the opportunity to be represented by counsel with respect to such negotiation and preparation or does hereby

knowingly waive his right to do so, and that he is fully aware of the contents of this Agreement and of its legal effect. Thus, any ambiguities in this Agreement shall not be resolved in favor of or against either party.

III. EXECUTION:

This Agreement shall be deemed executed as of January 20, 2015, regardless of when actually approved and signed by the parties.

MICHAEL MORIARTY

_____

THE COUNTY OF MONO

_____
By: Timothy E. Fesko, Chair
Board of Supervisors

APPROVED AS TO FORM:

_____
MARSHALL RUDOLPH
County Counsel

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

TIME REQUIRED

SUBJECT Approval of DA Investigator Chris Callinan's Contract

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Proposed resolution approving a contract with Chris Callinan as Deputy DA Investigator and prescribing the compensation, appointment and conditions of said employment.

RECOMMENDED ACTION:

Approve Resolution #R15-_____, approving a contract with Chris Callinan and prescribing the compensation, appointment and conditions of said employment. Authorize the Board Chair to execute said contract on behalf of the County.

FISCAL IMPACT:

For the remainder of the 2014/2015 fiscal year approximately $50,064.00 in salary and $64,282.00 in benefits. The yearly total for salary and benefits combined is $228,692.00. This amount is accounted for in the DA Department's FY 2014-2015 budget.

CONTACT NAME: Tim Kendall

PHONE/EMAIL: 760 932-5550 / tkendall@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☑ YES ☐ NO

ATTACHMENTS:

Click to download

- ☐ Staff Report
- ☐ Resolution Callinan
- ☐ At Will Contract Callinan

History

Time	Who	Approval
1/9/2015 12:22 PM	County Administrative Office	Yes
1/14/2015 9:01 AM	County Counsel	Yes
1/13/2015 4:53 PM	Finance	Yes

County of Mono
Office of the District Attorney

www.monocountydistrictattorney.org

Bridgeport Office:
Main St. Court House, P.O. Box 617
Bridgeport, CA. 93517
Tel:(760)932-5550 fax: (760)932-5551

***Tim Kendall* - District Attorney**

Mammoth Office:
Sierra Center Mall, P.O. Box 2053
Mammoth Lakes, CA. 93546
Tel:(760)924-1710 fax: (760)924-1711

TO: Honorable Board of Supervisors

FROM: Tim Kendall, District Attorney

DATE: January 5, 2015

Request for Consent Agenda Item.
Board of Supervisors approved "At Will" contract with Chris Callinan.

Subject
At-Will Contract with Chris Callinan for the District Attorney Investigator Position.

Recommendation
Approval of said Contract with Chris Callinan.

Discussion
On September 2, 2014, Frank Smith was promoted into the Chief Investigator position leaving the District Attorney Investigator I position vacant. The Board approved the recruitment and filling of the position in November 2014.

An open recruitment took place for 3 weeks with a first review set December 1, 2014. Recruitment was to remain open until position filled. After the December 1st review, 4 applications were received of which 1 was not qualified. 3 applicants were invited to interview on December 18, 2014. No other applications were received before or after the December 18th interview date. On the day of interviews 1 applicant did not show and therefore the remaining 2 applicants were interviewed. An interview panel was comprised of both Mono County representatives and as well as members from outside the County. During the process, the panel was clear on its choice which was supported by each panel members scoring.

Chris Callinan has been a Sheriff's Deputy for the past 6 years and was with the United States Marines for 9 years previous to that. Along with handling the normal responsibilities as a Deputy Sheriff, Mr. Callinan also was an investigator for the past 3 years and worked a major case load and closed more investigations than in other within his department. Mr. Callinan's knowledge, skills and experience is highly valued and he will be a tremendous resource for other allied agencies.

Mr. Callinan has shown that he is a loyal and valued county employee and will be a great representative for the County of Mono and the Office of the District Attorney.

Fiscal Impact

For the remainder of the 2014/2015 fiscal year approximately $50,064.00 in salary and $ 64,282.00 in benefits. The yearly total for salary and benefits combined is $228,692.00. This amount is accounted for in the DA Department's FY 2014-2015 budget.

RESOLUTION NO. R15-

A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS APPROVING AN EMPLOYMENT AGREEMENT WITH CHRISTOPHER CALLINAN AND PRESCRIBING THE COMPENSATION, APPOINTMENT, AND CONDITIONS OF SAID EMPLOYMENT

WHEREAS, the Mono County Board of Supervisors has the authority under Section 25300 of the Government Code to prescribe the compensation, appointment, and conditions of employment of County employees;

NOW, THEREFORE, BE IT RESOLVED by the Mono County Board of Supervisors, that the Agreement re Employment of Christopher Callinan, a copy of which is attached hereto as an exhibit and incorporated herein by this reference as though fully set forth, is hereby approved and the compensation, appointment, and other terms and conditions of employment set forth in that Agreement are hereby prescribed and shall govern the employment of Christopher Callinan. The Chairman of the Board of Supervisors shall execute said Agreement on behalf of the County.

PASSED AND ADOPTED this ____ day of _____, 2015, by the following vote:

AYES :
NOES :
ABSTAIN :
ABSENT :

ATTEST: _____
Clerk of the Board

_____
Timothy E. Fesko, Chair
Board of Supervisors

APPROVED AS TO FORM:

COUNTY COUNSEL

Agreement Re Employment
Of Christopher Callinan

This Agreement is entered into this 12th day of January, 2015, by and between Christopher Callinan and the County of Mono.

I. RECITALS

The County currently employs Mr. Callinan as a deputy sheriff/coroner. Effective January 12, 2015, the County wishes to employ Mr. Callinan as a DA Investigator I on a full-time basis on the terms and conditions set forth in this Agreement. Mr. Callinan wishes to accept continued employment with the County on said terms and conditions.

II. AGREEMENT

1. The term of this Agreement shall be January 12, 2015, until January 12, 2018, unless earlier terminated by either party in accordance with this Agreement. The County shall notify Mr. Callinan in writing no later than July 12, 2017, whether it intends to negotiate a renewal of this Agreement. In the event the County fails to provide such notice, Mr. Callinan shall notify the County in writing of its breach of this provision of the Agreement and County shall be allowed 30 days from the receipt of that notice to cure the breach. If County cures the breach and notifies Mr. Callinan that it does not intend to negotiate a renewal of the Agreement, then this Agreement shall terminate six months after said notification and no additional compensation or damages shall be owing to Mr. Callinan as a result of the cured breach. If County does not cure the breach, then the Agreement shall automatically renew for another three years on the same terms in effect at the time of renewal.

2. Commencing January 12, 2015, Mr. Callinan shall be employed by Mono County as a DA Investigator I, serving at the will and pleasure of the District Attorney in accordance with the terms and conditions of this Agreement. Mr. Callinan accepts such continued employment. The District Attorney shall be deemed the "appointing authority" for all purposes with respect to Mr. Callinan's employment.

3. Effective January 12, 2015, Mr. Callinan's salary shall be $8,344 per month (pro-rated for the month of January 2015 based on the start date). The Board may unilaterally increase Mr. Callinan's compensation in its discretion at any time while this Agreement is in effect. Should a wage increase be granted under the MOU with the Deputy Sheriff's Association (DSA), this Agreement will be reopened for discussion and potential re-negotiation with respect Mr. Callinan's salary. During such negotiations the County shall consider and discuss the issue of increased compensation with Mr. Callinan in good faith, but the County's

decision whether or not to grant such additional compensation shall be final and non-appealable. In addition, this Agreement will also be reopened within the first 30 days of the third year of the Agreement for discussion and possible renegotiation with respect to Mr. Callinan's salary or any other provision of this Agreement that the parties may mutually wish to discuss. After considering and discussing such issues in good faith, the County's decision shall be final and non-appealable.

4. Mr. Callinan's employment is not exempt from the payment of overtime or compensatory time-off under the Fair Labor Standards Act, and he shall therefore be entitled to earn overtime or compensatory time-off for work in excess of 40 hours per week in accordance with applicable state and federal laws and County policies. Because he is not an exempt employee, Mr. Callinan understands that he will not receive Merit Leave (Administrative Leave).

5. To the extent deemed appropriate by the District Attorney, the County shall pay the professional dues, subscriptions, and other educational expenses necessary for Mr. Callinan's full participation in applicable professional associations, or for her/his continued professional growth and for the good of the County.

6. To the extent not inconsistent with the foregoing or any other provision of this Agreement, Mr. Callinan shall be entitled to the same general benefits provided by the County to other management-level employees, as described more fully in the County's Management Benefits Policy. Such benefits include but are not limited to CalPERS retirement benefits (currently 3% at 50 for Mr. Callinan), CalPERS medical insurance, County dental and vision coverage, and life insurance. Any and all references in this Agreement to the County's Management Benefits Policy shall mean the "Policy Regarding Benefits of Management-level Officers and Employees," adopted by Resolution R14-54 of the Mono County Board of Supervisors, as the same may be amended from time to time and unilaterally implemented by the County.

7. Mr. Callinan understands and agrees that this receipt of compensation or benefits of any kind under this Agreement or under any applicable County Code provision or policy – including but not limited to salary, insurance coverage, and paid holidays or leaves – is expressly contingent on his actual and regular rendering of personal services to the County or, in the event of any absence, upon his proper use of any accrued leave. Should Mr. Callinan cease rendering such services during this Agreement and be absent from work without any accrued leave to cover said absence, then he shall cease earning or receiving any additional compensation or benefits until such time as he returns to work and resumes rendering personal services; provided, however, that the County shall provide any compensation or benefits mandated by state or federal law.

Furthermore, should Mr. Callinan s regular schedule ever be reduced to less than full-time employment, on a temporary or permanent basis, then all compensation and benefits provided by this Agreement or any applicable County policies shall be reduced on a pro-rata basis, except for those benefits that the County does not generally pro-rate for its other part-time employees (e.g., medical insurance).

8. Consistent with the "at will" nature of Mr. Callinan's employment, the District Attorney may terminate Mr. Callinan's employment at any time during this agreement, without cause. However, should there be a change in the incumbent holding the office of District Attorney, Mr. Callinan's employment shall continue for six (6) months following such change (i.e., following the date when the new District Attorney takes office), unless termination for grounds as specified in Section 2.68.230(B) of the County Code or any successor Code provision, as the same may be amended from time to time, is determined by the County Administrative Officer under advice of County Counsel, subject to review with the Board of Supervisors in closed session. In either event, this Agreement shall automatically terminate concurrently with the effective date of the termination. Mr. Callinan understands and acknowledges that as an "at will" employee, he will not have permanent status nor will his employment be governed by the County Personnel System (Mono County Code Chapter 2.68) except to the extent that System is ever modified to apply expressly to at-will employees. Among other things, he will have no property interest in his employment, no right to be terminated or disciplined only for just cause, and no right to appeal, challenge, or otherwise be heard regarding any such termination or other disciplinary action the District Attorney may, in his discretion, take during Mr. Callinan's employment. Mr. Callinan further understands that any termination of his at-will employment under this Agreement will not entitle him to resume his former County employment or to be placed in any other County employment.

9. In the event that such a termination without cause occurs after January 12, 2016 (i.e., after the first twelve months of employment), Mr. Callinan shall receive as severance pay a lump sum equal to three months' salary. In the event that such a termination without cause occurs after January 12, 2017 (i.e., after the first twenty-four months of employment), Mr. Callinan shall receive as severance pay a lump sum equal to six months' salary or, to the extent that fewer than six full calendar months remain (as of that effective date) before this Agreement would have expired, Mr. Callinan shall instead receive a lesser amount equal to any remaining salary payments he would have received before expiration of the Agreement had he not been terminated. Notwithstanding the foregoing, Mr. Callinan shall receive severance pay equal to six months' salary in the event that termination occurs after the County has notified Mr. Callinan that it intends to negotiate a renewal of this Agreement but before this Agreement expires. In no

event shall the parties' failure or inability to arrive at mutually acceptable terms of a renewed agreement trigger the payment of severance pay. Note: for purposes of severance pay, "salary" refers only to base compensation.

10. Notwithstanding the foregoing, Mr. Callinan shall not be entitled to any severance pay in the event that the District Attorney has grounds to discipline him on or about the time he gives him notice of termination. For purposes of this provision, grounds for discipline include but are not limited to those specified in Section 2.68.230 of the County Code or any successor Code provision, as the same may be amended from time to time. Mr. Callinan shall also not be entitled to any severance pay in the event that he becomes unable to perform the essential functions of his position (with or without reasonable accommodations) and his employment is duly terminated for such non-disciplinary reasons.

11. Mr. Callinan may resign his employment with the County at any time. His resignation shall be deemed effective when tendered, and this agreement shall automatically terminate on that same date, unless otherwise mutually agreed to in writing by the parties. Mr. Callinan shall not be entitled to any severance pay or additional compensation of any kind after the effective date of such resignation.

12. This Agreement constitutes the entire agreement of the parties with respect to the employment of Mr. Callinan. Consistent with Mr. Callinan's uninterrupted employment status, this Agreement shall have no effect on any sick leave or vacation time that Mr. Callinan may have accrued as of the effective date of this Agreement nor on his original date of hire or total years of service as a County employee, to the extent the same may be relevant in determining such accruals or Mr. Callinan's date of eligibility for or vesting of any non-salary benefits or for any other purpose.

13. The parties agree that the Board of Supervisors' approval of this Agreement on behalf of the County is a legislative act and that through this agreement, the Board of Supervisors is carrying out its responsibility and authority under Section 25300 of the Government Code to set the terms and conditions of County employment. It is not the parties' intent to alter in any way the fundamental statutory (non-contractual) nature of Mr. Callinan's employment with the County nor to give rise to any future contractual remedies for breach of this Agreement or of an implied covenant of good faith and fair dealing. Rather, the parties intend that Mr. Callinan's sole remedy in response to any failure by the County to comply with this Agreement shall be traditional mandamus.

14. Mr. Callinan acknowledges that this Agreement is executed voluntarily by him, without duress or undue influence on the part or on behalf of the County. Mr.

Callinan further acknowledges that he has participated in the negotiation and preparation of this Agreement and has had the opportunity to be represented by counsel with respect to such negotiation and preparation or does hereby knowingly waive his right to do so, and that he is fully aware of the contents of this Agreement and of its legal effect. Thus, any ambiguities in this Agreement shall not be resolved in favor of or against either party.

III. EXECUTION:

This Agreement shall be deemed executed as of January 12, 2015.

CHRISTOPHER CALLINAN **THE COUNTY OF MONO**

_____ _____

By: Timothy E. Fesko, Chair
Board of Supervisors

APPROVED AS TO FORM:

_____
MARSHALL RUDOLPH
County Counsel

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: Public Works

TIME REQUIRED

SUBJECT Hiring Freeze Variance - Vacancy in Crowley

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Due to an upcoming departure in Road Area I (Crowley) there will exist a Maintenance Worker II-III vacancy. Public Works has followed the Mono County protocol to fill the vacancy created. This vacancy is a full-time position in the Crowley area and requires an in-county recruitment first for Public Works Maintenance Worker employees and if no requests to transfer were received then the position would be advertised out-of-county.

RECOMMENDED ACTION:

Authorize Public Works Director, in consultation with Human Resources, to recruit in-county to fill the upcoming vacancy in Road Area I. If no requests are received in-county then recruit out-of-county to fill same vacancy. Provide any desired direction to staff.

FISCAL IMPACT:

The funding source for this position is full-time out of the Road Fund. Maintenance Worker II - The total cost for remainder of fiscal year 14/15 is $18,575 and a full fiscal year is $55,726 of which $36,456 is salary. Maintenance Worker III - The total cost for remainder of fiscal year 14/15 is $19,181 and a full fiscal year is $57,574 of which $38,304 is salary.

CONTACT NAME: Jeff Walters

PHONE/EMAIL: 760.932.5459 / jwalters@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

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☐ Hiring Freeze Variance - Vacancy in Crowley

History

Time	Who	Approval
1/9/2015 9:44 AM	County Administrative Office	Yes
1/9/2015 2:49 PM	County Counsel	Yes
1/13/2015 5:00 PM	Finance	Yes

MONO COUNTY
DEPARTMENT OF PUBLIC WORKS

POST OFFICE BOX 457 • 74 NORTH SCHOOL STREET • BRIDGEPORT, CALIFORNIA 93517
760.932.5440 • Fax 760.932.5441 • monopw@mono.ca.gov • www.monocounty.ca.gov

Date: January 20, 2015

To: Honorable Chair and Members of the Board of Supervisors

From: Jeff Walters, Public Works Director / Director of Road Operations and Fleet Services

Subject: Hiring Freeze Variance – Maintenance Worker II-III Vacancy in Road Area I

Recommended Action:

Authorize Public Works Director, in consultation with Human Resources, to recruit in-county to fill an existing Maintenance Worker II-III vacancy in Road Area I (Crowley). If no requests are received in-county then advertise out-of-county to fill same vacancy. Provide any desired direction to staff.

Fiscal Impact:

The funding source for this position is full-time out of the Road Fund.

Maintenance Worker II - The total cost for remainder of fiscal year 14/15 is $18,575 and a full fiscal year is $55,726 of which $36,456 is salary.

Maintenance Worker III - The total cost for remainder of fiscal year 14/15 is $19,181 and a full fiscal year is $57,574 of which $38,304 is salary.

Discussion:

Due to an upcoming departure (January 30, 2015) of a Maintenance Worker III there will exist a vacancy for a Maintenance Worker II-III in Road Area I. Public Works (PW) has followed the Mono County Public Employees MOU protocol to fill that vacancy.

Road Area I staff are responsible for maintaining over 182 miles of roadways in areas including Swall Meadows, Paradise, Crowley, Sunny Slopes, Hilton Creek, and the access road to the Mammoth Yosemite Airport among others.

During summer months this employee will work with the other staff in Road Area I and maintain over 79 miles of paved and 103 miles of dirt roads. During winter 83 miles of snow removal and 26 miles of spring opening snow removal are under their responsibility.

This position is critical in ensuring day-to-day operations of road maintenance and snow removal operations in Road Area I.

If this position is not filled it will require additional help from other districts (when possible) during winter and summer for snow removal, traffic control, road maintenance and other tasks. One fewer snow removal operator directly results in slower response times and a reduction in level of service to constituents.

If you have any questions regarding this item, please contact Jeff Walters at 932-5459.

Respectfully submitted,

Jeff Walters
Public Works Director/Director of Road Operations and Fleet Services

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: Finance

TIME REQUIRED

SUBJECT Budget Amendment to Replace Layoffs with Furloughs

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Budget Amendment to replace layoffs with furloughs.

RECOMMENDED ACTION:

Approve budget amendments to replace layoffs with furlough budget reductions, recognize additional revenue from the Sheriff's trust, and appropriate difference of $57,098 from contingencies to balance the overall budget.

FISCAL IMPACT:

No net effect on the general fund. Net reduction of $93,024 to non general fund budgets.

CONTACT NAME: Leslie Chapman

PHONE/EMAIL: 760-932-5494 / lchapman@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

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- ☐ Staff Report
- ☐ GF Budget Amendment
- ☐ NGF Budget Amendment

History

Time	Who	Approval
1/14/2015 11:17 AM	County Administrative Office	Yes
1/14/2015 1:21 PM	County Counsel	Yes
1/14/2015 11:10 AM	Finance	Yes

DEPARTMENT OF FINANCE
COUNTY OF MONO

Leslie L. Chapman, CPA
Finance Director

Assistant Finance Director
Treasurer-Tax Collector

P.O. Box 495
Bridgeport, California 93517
(760) 932-5480
Fax (760) 932-5481

Roberta Reed
Assistant Finance Director
Auditor-Controller

P.O. Box 556
Bridgeport, California 93517
(760) 932-5490
Fax (760) 932-5491

To: Honorable Board of Supervisors

From: Leslie Chapman

Date: January 20, 2015

Subject:

Budget amendment to replace layoffs with furloughs.

Recommendation:

Approve budget amendments in the general fund as follows: increase salaries and benefits to reverse layoffs ($307,048), reduce salaries and benefits for furloughs ($173,785), increase revenues in Sheriff's budget ($85,000), increase general fund contribution to roads ($8,835), and decrease contingencies ($57,098). There is no net effect to the general fund total budget. (4/5ths vote required)

Approve amendments in non-general fund budgets to reverse layoff in road ($51,683), reduce salaries and benefits in various funds ($135,872), and increase general fund contribution to road ($8,835). The net decrease to non-general fund budgets is $93,024. (4/5ths required)

Background:

As your Board will recall, when the budget was originally presented to you, it included 9 layoffs. This was because the union agreements were not in place by the deadline to adopt a budget. After the budget was adopted, MCPE agreed to take 48 hour mandatory furloughs and some people volunteered extra hours to balance the budget and avoid all but one layoff. The DSA agreed to 40 hour furloughs and used $85,000 in trust money to fill the gap. With this agreement in place, I present to you these budget amendments to reflect the changes. Since the savings from furloughs is not as much as the savings from layoffs, I am requesting $57,097 from contingencies to fill the gap. You may recall that 8 layoffs was not enough to balance the budget and 9 created an excess of about $35,000 that went into contingencies. I am asking to use that savings along with an additional $22,000 to balance the general fund budget. There will be a balance left in contingencies of $362,248.

Detailed adjustments are on attached schedule.

Fiscal Impact:

There is no fiscal impact to the general fund and there is a net reduction of $93,024 to non-general fund budgets.

COUNTY OF MONO
Furlough Budget Adjustment Detail

GENERAL FUND

Account Number	Account Name	Board-Approved Budget	Furlough Adjustment	Layoff Adjustment	Budget with Proposed Adjustments
DEPT 020: ADMINISTRATIVE OFFICER					
100-11020-21100-000000(	SALARY AND WAGES	304,514	(1,305)		303,209
100-11020-22100-000000(	EMPLOYEE BENEFITS	153,624	(336)		153,288
DEPT 070: DEPARTMENT OF FINANCE					
100-12070-21100-000000(	SALARY AND WAGES	970,855	(11,808)		959,047
100-12070-22100-000000(	EMPLOYEE BENEFITS	539,477	(3,039)		536,438
DEPT 100: ASSESSOR					
100-12100-21100-000000(	SALARY AND WAGES	559,721	(10,070)		549,651
100-12100-22100-000000(	EMPLOYEE BENEFITS	360,590	(2,592)		357,998
DEPT 120: COUNTY COUNSEL					
100-13120-21100-000000(	SALARY AND WAGES	535,446	(886)		534,560
100-13120-22100-000000(	EMPLOYEE BENEFITS	284,627	(228)		284,399
DEPT 180: COUNTY CLERK/RECORDER					
100-27180-21100-000000(	SALARY AND WAGES	291,248	(2,530)		288,718
100-27180-22100-000000(	EMPLOYEE BENEFITS	145,781	(651)		145,130
DEPT 190: ECONOMIC DEVELOPMENT					
100-19190-21100-000000(	SALARY AND WAGES	225,604	(1,429)		224,175
100-19190-22100-000000(	EMPLOYEE BENEFITS	135,607	(368)		135,239
DEPT 240: COUNTY FACILITIES					
100-17240-21100-000000(	SALARY AND WAGES	700,915	(18,611)	98,771	781,075
100-17240-22100-000000(	EMPLOYEE BENEFITS	456,725	(4,790)	39,596	491,531
DEPT 300: INFORMATION TECHNOLOGY					
100-17300-21100-000000(	SALARY AND WAGES	733,206	(18,589)		714,617
100-17300-22100-000000(	EMPLOYEE BENEFITS	428,606	(4,784)		423,822
DEPT 330: CONTINGENCIES					
100-10330-91010-000000(	CONTINGENCIES	420,054	(57,098)		362,956
DEPT 425: VICTIM/WITNESS					
100-56425-21100-000000(	SALARY AND WAGES	78,893	(1,623)		77,270
100-56425-22100-000000(	EMPLOYEE BENEFITS	51,339	(418)		50,921
DEPT 430: DISTRICT ATTORNEY-PROSECUTION					
100-21430-21100-000000(	SALARY AND WAGES	754,668	(1,521)		753,147
100-21430-22100-000000(	EMPLOYEE BENEFITS	579,553	(391)		579,162

Account Number	Account Name	Board-Approved Budget	Furlough Adjustment	Layoff Adjustment	Budget with Proposed Adjustments
DEPT 440: SHERIFF					
100-22440-18100-000000(	OPERATING TRANSFERS IN	3,864	(85,000)		88,864
100-22440-21100-000000(	SALARY AND WAGES	2,025,620	(34,631)	127,819	2,118,808
100-22440-22100-000000(	EMPLOYEE BENEFITS	1,445,713	(8,913)	40,861	1,477,661
DEPT 520: ADULT PROBATION SERVICES					
100-23520-21100-000000(	SALARY AND WAGES	500,382	(1,353)		499,029
100-23520-22100-000000(	EMPLOYEE BENEFITS	624,182	(348)		623,834
DEPT 560: BUILDING INSPECTOR					
100-27560-21100-000000(	SALARY AND WAGES	161,417	(1,914)		159,503
100-27560-22100-000000(	EMPLOYEE BENEFITS	86,066	(493)		85,573
DEPT 600: EMERGENCY SERVICES					
100-27600-21100-000000(	SALARY AND WAGES	103,608	(1,768)		101,840
100-27600-22100-000000(	EMPLOYEE BENEFITS	77,499	(455)		77,044
DEPT 660: PLANNING & TRANSPORTATION					
100-27660-21100-000000(	SALARY AND WAGES	485,561	(17,761)		467,800
100-27660-22100-000000(	EMPLOYEE BENEFITS	272,016	(4,571)		267,445
DEPT 661: HOUSING DEVELOPMENT					
100-27661-21100-000000(	SALARY AND WAGES	3,482	(147)		3,335
100-27661-22100-000000(	EMPLOYEE BENEFITS	2,159	(38)		2,121
DEPT 664: CODE ENFORCEMENT					
100-27664-21100-000000(	SALARY AND WAGES	68,006	(2,101)		65,905
100-27664-22100-000000(	EMPLOYEE BENEFITS	35,704	(541)		35,163
DEPT 666: LAFCO					
100-27666-21100-000000(	SALARY AND WAGES	5,042	(145)		4,897
100-27666-22100-000000(	EMPLOYEE BENEFITS	2,664	(37)		2,627
DEPT 680: ANIMAL CONTROL					
100-27680-21100-000000(	SALARY AND WAGES	185,983	(3,999)		181,984
100-27680-22100-000000(	EMPLOYEE BENEFITS	137,176	(1,029)		136,147
DEPT 720: PUBLIC WORKS					
100-17720-21100-000000(	SALARY AND WAGES	469,340	(5,463)		463,877
100-17720-22100-000000(	EMPLOYEE BENEFITS	250,994	(1,407)		249,587
DEPT 855: PARAMEDIC PROGRAM					
100-42855-21100-000000(	SALARY AND WAGES	1,607,901	(557)		1,607,344
100-42855-22100-000000(	EMPLOYEE BENEFITS	1,199,164	(143)		1,199,021
DEPT 999: OPERATING TRANSFERS					
100-00999-60100-000000(	OPERATING TRANSFERS OUT	2,068,265		8,835	2,077,100
TOTAL GENERAL FUND ADJUSTMENTS			***(315,883)***	***315,883***	***0***

COUNTY OF MONO
Furlough Budget Adjustment Detail

NON-GENERAL FUND

Account Number	Account Name	Board-Approved Budget	Furlough Adjustment	Layoff Adjustment	Budget with Proposed Adjustments
FUND 103: SOCIAL SERVICES					
103-51868-21100-00000000	SALARY AND WAGES	1,281,028	(24,627)		1,256,401
103-51868-22100-00000000	EMPLOYEE BENEFITS	744,441	(6,338)		738,103
DEPT 875: SENIOR SERVICES - ESAAA					
103-56875-21100-00000000	SALARY AND WAGES	107,186	(1,958)		105,228
103-56875-22100-00000000	EMPLOYEE BENEFITS	64,027	(504)		63,523
FUND 104: BEHAVIORAL HEALTH					
104-41840-21100-00000000	SALARY AND WAGES	181,957	(1,878)		180,079
104-41840-22100-00000000	EMPLOYEE BENEFITS	105,935	(483)		105,452
DEPT 845: ALCOHOL & DRUG ABUSE SERVICES					
EXPENDITURES					
104-41845-21100-00000000	SALARY AND WAGES	220,936	(3,255)		217,681
104-41845-22100-00000000	EMPLOYEE BENEFITS	123,692	(838)		122,854
DEPT 800: PUBLIC HEALTH					
105-41800-21100-00000000	SALARY AND WAGES	1,099,183	(17,658)		1,081,525
105-41800-22100-00000000	EMPLOYEE BENEFITS	624,654	(4,545)		620,109
DEPT 173: MENTAL HEALTH SERVICES ACT MHS					
107-41173-21100-00000000	SALARY AND WAGES	744,265	(11,911)		732,354
107-41173-22100-00000000	EMPLOYEE BENEFITS	414,406	(3,066)		411,340
FUND 615: SOLID WASTE ENTERPRISE FUND					
615-44905-21100-00000000	SALARY AND WAGES	393,638	(7,133)		386,505
615-44905-22100-00000000	EMPLOYEE BENEFITS	226,562	(1,836)		224,726
FUND 650: MOTOR POOL					
650-10723-21100-00000000	SALARY AND WAGES	136,633	(2,807)		133,826
650-10723-22100-00000000	EMPLOYEE BENEFITS	89,624	(722)		88,902
FUND 700: ROAD FUND					
700-31725-18100-00000000	OPERATING TRANSFERS IN	448,317	(8,835)		439,482
700-31725-21100-00000000	SALARY AND WAGES	1,348,288	(34,077)	27,790	1,342,001
700-31725-22100-00000000	EMPLOYEE BENEFITS	915,334	(8,771)	23,893	930,456
FUND 783: BIO-TERRORISM-PUBLIC HEALTH					
783-41800-21100-00000000	SALARY AND WAGES	-	(2,756)		(2,756)
783-41800-22100-00001404	EMPLOYEE BENEFITS- PANDEMIC FLU	21,091	(709)		20,382
TOTAL NON-GENERAL FUND ADJUSTMENTS			***(144,707)***	***51,683***	***(93,024)***

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: Clerk of the Board

TIME REQUIRED

SUBJECT 2015 Calendar of Regular Meetings of the Board of Supervisors

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Rule 3 of the Mono County Board Rules of Procedure specifies that: an annual calendar of meetings shall be adopted by the Board at their first meeting in January. The calendar will include all known regular meetings. Any meeting may be canceled upon the order of the Chair, or by a majority of Board members.

RECOMMENDED ACTION:

Approve proposed calendar of regular meetings for 2015. Cancel meeting regularly scheduled for December 1.

FISCAL IMPACT:

None.

CONTACT NAME: Bob Musil

PHONE/EMAIL: x5538 / bmusil@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

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☐ Meeting Calendar Staff Report

☐ Calendar for BOS 2015

History

Time	Who	Approval
1/13/2015 2:32 PM	County Administrative Office	Yes
1/12/2015 3:59 PM	County Counsel	Yes
1/14/2015 9:22 AM	Finance	Yes

Larry Johnston ~ District One Fred Stump ~ District Two Tim Alpers ~ District Three
Tim Fesko ~ District Four Byng Hunt ~ District Five

BOARD OF SUPERVISORS
COUNTY OF MONO

P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5538 • FAX (760) 932-5531
Bob Musil, Clerk of the Board

To: Honorable Board of Supervisors

From: Bob Musil, Clerk of the Board

Date: January 20, 2015

Subject
2015 Calendar of Regular Meetings of the Board of Supervisors

Recommendation
Approve proposed calendar of regular meetings for 2015. Cancel meeting regularly scheduled for December 1.

Discussion
Rule 3 of the Mono County Board Rules of Procedure specifies that:

An annual calendar of meetings shall be adopted by the Board at their first meeting in January. The calendar will include all known regular meetings. Any meeting may be canceled upon the order of the Chair, or by a majority of Board members.

Attached is a proposed calendar of meetings for calendar year 2015. This calendar reflects the current practice of holding the third regularly scheduled meeting of each month in the Town of Mammoth Lakes.

It is recommended that the meeting regularly scheduled for December 1, 2015 be cancelled. This meeting coincides with the already scheduled conference of the California State Association of Counties, and multiple members of both the Board and staff will be away from the county during that time.

Fiscal Impact
None

Mono County Board of Supervisors
2015 Regular Meeting Calendar

January 6
January 13
January 20 – Mammoth Lakes

February 3
February 10
February 17 – Mammoth Lakes

March 3
March 10
March 17 – Mammoth Lakes

April 7
April 14
April 21 – Mammoth Lakes

May 5
May 12
May 19 – Mammoth Lakes

June 2
June 9
June 16 – Mammoth Lakes

July 7
July 14
July 16 – Mammoth Lakes

August 4
August 11
August 18 – Mammoth Lakes

September 1
September 8
September 15 – Mammoth Lakes

October 6
October 13
October 20 – Mammoth Lakes

November 3
November 10
November 17 – Mammoth Lakes

December 1 – No Meeting – CSAC ?
December 8
December 15 – Mammoth Lakes

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: Clerk of the Board

TIME REQUIRED

SUBJECT Department of Fish and Game Notice of Completion

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Notice of Completion from the Department of Fish and Wildlife, received January 12, 2015 regarding Phasing of Nonlead Ammunition Requirement.

****

RECOMMENDED ACTION:

FISCAL IMPACT:

CONTACT NAME: Shannon Kendall

PHONE/EMAIL: x5533 / skendall@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY 32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

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☐ DFW Notice

History

Time	Who	Approval
1/12/2015 1:46 PM	Clerk of the Board	Yes

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Director's Office
1416 Ninth Street, 12th Floor
Sacramento, CA 95814
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

Notice of Completion

Draft Environmental Document

Adding Section 250.1, Amending Sections 311, 353, 464, 465, 475, and 485, as well as Repealing Section 355 of Title 14 California Code of Regulations

Phasing of Nonlead Ammunition Requirement

Note to County Clerks: Pursuant to the Public Resources Code Section 21092.3 and Section 15087(d), Title 14, California Code of Regulations, the Notice of Completion must be posted within 24 hours of receipt and must remain posted for a period of at least 30 days

Project Location: Statewide

Lead Agency: California Fish and Game Commission

Review Period: January 7, 2015 – February 23, 2015

Project Description: AB 711, which became effective January 1, 2014 (Stats. 2013, ch 742, § 2, adding Fish & G. Code, § 3004.5) requires the use of nonlead ammunitions statewide not later than July 1, 2019 when taking any wildlife with a firearm. More specifically as to the advanced phasing that is a subject of the Proposed Program, Section 3004.5 requires that by July1, 2015, the Commission must promulgate regulations that phase in the statute's requirements, and that, if any of the statutes requirements can be implemented practicably, in whole or in part, in advance of July 1, 2019, the Commission shall implement those requirements (Fish & G. Code § 3004.5(j)).

The Proposed Program is the phasing-in of the nonlead requirement not later than July 1, 2019. In the first phase, effective July 1, 2015, nonlead ammunition will be required when taking all wildlife on state Wildlife Areas and Ecological Reserves. In addition, nonlead ammunition will be required for hunters taking Nelson bighorn sheep in California's desert areas. In phase two, effective July 1, 2016, nonlead ammunition will be required when taking upland game birds with a shotgun, except for dove, quail, and snipe, and any game birds taken under the authority of a licensed game bird club as provided in sections 600 and 600.4, Title 14, California Code of Regulations. In addition, nonlead ammunition will be required for the take of resident small game mammals, furbearing mammals, nongame mammals, nongame birds, and any wildlife for depredation purposes, with a shotgun statewide. In the final phase, effective July 1, 2019, pursuant to Fish and Game Code 3004.5 only nonlead ammunition may be used when taking any wildlife with a firearm for any purpose in California.

Anticipated Environmental Effects: The Proposed Program is not anticipated to have any significant effects on the environment.

Submission of Comments: For those interested, written comments or questions concerning this Draft EA should be submitted within this review period and directed to the name and address

listed below. Submittal of written comments via e-mail (Microsoft Word format) would be greatly appreciated.

California Department of Fish and Wildlife
Attn: Craig Stowers
Phasing of Nonlead Ammunition Requirement
Draft ED Comments
1812 9th Street
Sacramento, CA 95811
Phone: 916-445-3553
Email: Wildlifemgmt@wildlife.ca.gov

All documents mentioned herein or related to this Program can be reviewed online at the Program Website (https://www.dfg.ca.gov/wildlife/hunting/lead-free/). Additionally, copies of the Draft ED along with all referenced documents are available for public review at the following location:

California Department of Fish and Wildlife
Resources Building
1416 9th Street, 12th Floor
Sacramento, CA 95814

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: County Administrator's Office

TIME REQUIRED 30 Minutes (15 minute presentation;15 minute discussion)

SUBJECT Caltrans Request for Truck Restrictions on SR 108

PERSONS APPEARING BEFORE THE BOARD Terry Erlwein, Caltrans

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Presentation by Terry Erlwein regarding truck traffic on State Route 108(Sonora Pass).

RECOMMENDED ACTION:

Receive presentation from Caltrans staff on request to restrict large trucks from SR 108 from Mile Post (PM) 0.0 in Mono County to PM 4.6. Provide any desired direction to staff.

FISCAL IMPACT:

There is no fiscal impact from receiving the presentation. Should the Board direct staff to initiate the ordinance process, staff time from various departments will be incurred.

CONTACT NAME: Jim Leddy

PHONE/EMAIL: (760) 932-5414 / jleddy@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

Click to download

- ☐ SR 108 Caltrans truck size limitation request Cover Memo
- ☐ SR 108 Caltrans request for truck size limitations

History

Time	Who	Approval
1/10/2015 10:17 AM	County Administrative Office	Yes
1/14/2015 12:00 PM	County Counsel	Yes
1/7/2015 2:27 PM	Finance	Yes

COUNTY OF MONO – County Administrative Office

P.O. BOX 696, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5412 ☐ FAX (760) 932-5411

Jim Leddy
County Administrative Officer
Acting Director of Human Resources
760.932.5414 / 760.924.1703

To: Honorable Board of Supervisors
From: Jim Leddy, County Administrator
Jeff Walters, Public Works Director
Marshall Rudolph, County Counsel

Date: December 29, 2014

Subject: Caltrans Request for Truck restriction process for select portions of State Route 108 in Mono County

Recommendation:

1) Receive Presentation by Caltrans staff on request to restrict certain types of truck traffic from State Route 108 (Sonora Pass) in Mono County.
2) Review process County would need to undertake to achieve request
3) Provide direction to County staff to initiate process.

Background: On October 21st, 2014, Terry Erlwein, District 9 Traffic Operations Engineer, and Lt. Ron Cohan of the California Highway Patrol addressed the Board of Supervisors as part of Public Comment portion of the Board meeting. The subject of the comments was a request by Caltrans and CHP to have Mono County initiate a process to restrict certain types of truck traffic along segments of Highway 108 in Mono County. At that time, a majority of Board members did request the item for discussion be placed on a future agenda.

On December 29th, the County Administrator's Office received the official written request from Bryan Winzenread, District 9 Deputy District Director – Maintenance and Operations, to agendize the matter and initiating the actions needed to pass a local ordinance declaring SR 108 be closed to trucks greater than 30 feet king pin to rear axle from postmile (PM) 0.0 (Mono County/Tuolumne County line) to PM 9.8 (closure gate west of the Marine Corps Mountain Warfare Training center). Caltrans December 22nd, 2014 letter is attached to this Board item for review. This letter was also included as Board Correspondence on the January 6th, 2015 Board of Supervisors Agenda.

Discussion: Caltrans staff will present the process for a potential truck restriction which is also detailed in the background material provided by District 9 and attached to this item. In summary, per Caltrans staff, the following is the process to complete a truck restriction process:

"TRUCK RESTRICTION PROCESS - The following suggested procedures are in accordance with CVC Sections 21101, 35701, 35702 and their related sections.

1. **Local Agency** prepares a Draft Truck Restriction Ordinance or Resolution. The local agency prepares a draft ordinance or resolution of the proposed truck restriction and informs the appropriate Caltrans District Truck Coordinator. The ordinance or resolution must cite the CVC Section providing the justification for the truck restriction. Caltrans districts should notify the Headquarters Office of Truck Services (see Caltrans Contacts at end of these guidelines) in writing as soon as possible after learning of a truck restriction proposal. Districts should request and forward copies of local agencies' draft ordinances or resolutions to Headquarters Office of Truck Services, Legal and Environmental Programs for review.

2. **Local Agency Prepares Initial Study**. The initial study provides the information necessary to justify the proposed restriction, and may also indicate if the proposed restriction is subject to California Environmental Quality Act (CEQA) review. The initial study allows the preliminary submittal of information by Caltrans, local agencies, and California Highway Patrol staff, as well as initial comments from the trucking industry, affected industries, and citizen groups. It should include the proposed restriction type, location, existing conditions, alternatives, and maintenance and safety considerations on the alternative route, any initial public comment, and conditions that may involve further CEQA compliance.

3. **Local Agency Provides Public Review and Comment Period**. During the public review period, the local agency gives public notice of the proposed truck restriction, and public hearings can be advertised and held. All documentation acquired to date regarding the proposed truck restriction should be available for public review prior to the public hearing.

4. **Local Agency Receives Comments and Prepares Final Truck Restriction Report**. The local agency considers all comments received. If the local agency still wants to proceed with the proposed restriction, a final truck restriction report is prepared and forwarded to the Caltrans district office. This final report includes any comment revisions, and the draft restriction ordinance or resolution. The Caltrans District Director forwards the report with the District's recommendations to the Caltrans Traffic Operations Division Chief at Headquarters. (See the checklist for the contents of the truck restriction report, following these guidelines.)

5. **Caltrans Traffic Operations Submits Recommendation to the Director's Office**. The Traffic Operations, Office of Truck Services, in cooperation with Caltrans Headquarters Environmental and Legal Divisions, prepares a recommendation regarding the truck restriction and submits it to the Caltrans Director's Office.

6. **Caltrans Director Issues Written Approval**. If approved, the Caltrans Director issues a written approval of the draft ordinance of resolution for the truck restriction.

7. **Local Agency** Passes Final Truck Restriction Ordinance or Resolution.

8. **Local Agency** Erects Restriction Signs, and Restriction is Enforced."

However, in initial discussion with Ryan Dermody, Deputy District 9 Director Planning, Modal Programs, and Local Assistance, Caltrans staff is committed to assisting in document preparation including the California Environmental documents. In section above areas, where Local Agency is referenced, Caltrans has in prior instances such as Lake County provided the staff to produce the needed reports.

After reviewing the documents and potential workload addition for County staff, County Administrator is recommending that should the Board endorse initiating this process, that Caltrans be requested to develop both the CEQA documents and the "Truck Study Report" with Mono County staff being a resource in gathering data. Further that the public outreach portion would also be a Caltrans led effort with County staff playing a logistical support role.

As part of the December 22nd letter, Caltrans has forwarded:

(1) A location map;
(2) A copy of a similar ordinance and action taken in Mendocino County
(3) The Draft ordinance used by the city of Fremont;
(4) A copy of the Initial study used by Lake and Mendocino Counties when they took action to restrict truck size on highway 175 in 1997;
(5) The Truck Restriction Report Checklist from Caltrans
(6) Excerpts of California Vehicle Code applicable to this process.

Fiscal Impact: The fiscal impact will be reflected in County staff time which is estimated at 10 hours of Community Development staff time, 10 hours of County Counsel staff time and 10-15 hours of Public Works staff time.

If you have any questions about this contract renewal, please feel free to contact Jim Leddy at (760) 932-5414 or at jleddy@mono.ca.gov.

DEPARTMENT OF TRANSPORTATION
DISTRICT 9
500 SOUTH MAIN STREET
BISHOP, CA 93514
PHONE (760) 872-3143
FAX (760) 872-5225
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

December 22, 2014

Mr. Larry Johnston, Chairman
Mono County Board of Supervisors
P.O. Box 715
Bridgeport, California 93517

Agenda Item Request - Recommendation for State Route 108 Truck Size Restriction

Dear Chairman Johnston:

As you are aware, Mono County and Caltrans have interacted regarding the placement of truck restrictions on a section of State Route 108 (SR 108) in Mono County from postmile (PM) 0.0 (Mono County/ Tuolumne County line) to PM 9.8 (closure gate west of the Marine Corps Mountain Warfare Training Center). This was discussed (with public comment) at the October 21, 2014 Board of Supervisors (BOS) meeting. To enable further discussion, we request this topic be placed on the agenda for your January 20, 2015 meeting.

We expect that a truck size restriction would significantly benefit both travelers and trucking companies unfamiliar with the topography of this Sierra Nevada mountain pass. The steep grade and tight curves that the road follows to reach the 9,624 foot high pass, contribute to trucks getting stuck in this section; thus, blocking the entire road and causing road closures of up to five hours. The lengthy delays are due to a number of factors such as the remote location, tow vehicle response times from Coleville or Gardnerville, Nevada, and the work to free the truck (which may include unhitching the tractor from the trailer and backing the vehicle five or more miles down the grade).

The most recurrent location is at PM 4.6, which is in a series of reversing curves. A Caltrans study from January 2005 through February 2010 documents eighty incidents of stuck trucks: forty-one incidents at PM 4.6 and thirty-nine at other curves in this section. Additionally, we have studied possible improvements to this section. However, due to the environmental constraints (i.e. steep and rocky mountainous terrain) improvements are too costly to be competitive for limited highway funds.

In order to reduce delays to travelers, and cost and impact to trucking companies, Caltrans recommends the BOS formally declare this section of SR 108 be closed to trucks greater than 30 feet king pin to rear axle (KPRA). For the truck restriction to be legally enforceable, a resolution or ordinance from Mono County is required.

We look forward to further interaction with the BOS and the public at the upcoming January meeting. If you have any questions, or need further information please contact Terry Erlwein, our Traffic Operations Engineer, at (760) 872-0650 or myself at (760) 872-3143.

Sincerely,

BRYAN WINZENREAD
Deputy District Director
Maintenance and Operations

Attachments

(1) Location Map
(2) Resolution No. 97-117 – Mendocino County Board of Supervisors
(3) Draft Ordinance – City of Fremont
(4) Initial Study for truck restriction of vehicles with 4+ axles
(5) Truck Restriction Report Checklist
(6) Excerpts from California Vehicle Code

c: Ryan Dermody, Deputy District Director, Planning, Caltrans
Terry Erlwein, Traffic Operations Engineer, Caltrans

INDEX OF SHEETS

Attachment 1

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

IN MONO COUNTY
ABOUT 10.6 MILES WEST OF SONORA JUNCTION
AT POST MILE 4.6

To be supplemented by Standard Plans dated May, 2006

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
09	Mno	108	4.8	1	

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Level 11 color 6 Circle Diameter represents truck problems by location

LOCATION OF CONSTRUCTION
PM 4.6

To Sonora
MONO CO
ALPINE CO
TUOLUMNE CO
MONO CO
SONORA PASS
Sardine Creek
SARDINE MEADOW
McKay Creek
Leavitt Creek
ROUTE 108
Leavitt Falls
LEAVITT MEADOW
WEST WALKER RIVER
Little Wolf Creek
Brownie Creek
Millie Lake
CAMPGROUND
Poore Creek
Mud Lake
Kirman Lake
Junction Reservoir
Silver Creek
Cloudburst Creek
Silver Falls
PICKEL MEADOW
USMC MOUNTAIN WARFARE SCHOOL
West Walker River
SONORA BRIDGE CAMPGROUND
Tule Lake
Creek
Junction
ROUTE 395
To Walker
HIGHWAY MAINTENANCE STATION
Sonora Junction
To Bridgeport
Little Walker River

NO SCALE

The Contractor shall possess the Class (or classes) of license as specified in the "Notice to Contractors".

Project Engineer Date
Registered Civil Engineer

Plans Approval Date

REGISTERED PROFESSIONAL ENGINEER
NO.
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER	DATE	PROJECT MANAGER	DATE
B WINZENREAD		CRAIG HOLSTE	

Contract No. 09-279704

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => RUSER
DGN FILE => MREQUEST

CU 09230 EA 279701

927970a01.dgn 3/29/2010 1:26:53 PM

Attachment 2

Jim Did this Language Meet w/ Approval in Ha Draft of Legal N

RESOLUTION NO. 97-171

RESOLUTION OF THE MENDOCINO COUNTY BOARD OF SUPERVISORS RECOMMENDING THE PROHIBITION OF VEHICLES AND COMBINATION VEHICLES WITH AN OVERALL LENGTH GREATER THAN 39 FEET FROM ACCESSING THE WESTERLY SEGMENT OF HIGHWAY 175

WHEREAS, the California Department of Transportation (Caltrans) has determined that certain large vehicles and combination vehicles described herein, cannot travel on the westerly segment of State Highway 175, specified herein, without crossing over the center stripe; and

WHEREAS, Caltrans has determined that this problem can only be resolved by imposing the herein identified restrictions; and

WHEREAS, the County of Mendocino has been requested to support Caltrans' findings and recommendations regarding State Highway 175, a highway within the exclusive jurisdiction of the State of California;

NOW, THEREFORE, BE IT RESOLVED by the Mendocino County Board of Supervisors, recommend and concur with Caltrans, that vehicles and combination vehicles with an overall length greater than 39 feet be prohibited access to State Highway 175 in Mendocino County, MEN PM 5.40, 5.4 miles east of Route 101 to the Mendocino/Lake County line at MEN PM 9.85. Access by vehicles over the 39 foot limit to local ranches, farms, agriculture, and other local business activities served by Highway 175 will be allowed.

BE IT FURTHER RESOLVED that this action, taken at the request of the California Highway Patrol and Caltrans, shall have no effect on the continuing legal responsibilities of the STATE OF CALIFORNIA, by and through Caltrans, for the continued and future maintenance of the subject highway and for its duty to the users of said State highway.

BE IT FURTHER RESOLVED that this resolution shall become effective upon appropriate State action and notification of all involved enforcement agencies and the installation of regulatory roadside signs.

The foregoing resolution was introduced by Supervisor Pinches, seconded by Supervisor Campbell, and carried this 22nd day of

September, 1997, by the following roll call vote:

AYES: Supervisors DelBar, Shoemaker, Pinches, Campbell, Peterson
NOES: None
ABSENT: None

Whereupon, the chair declared said resolution passed and adopted and SO ORDERED.

Chair, Board of Supervisors

ATTEST:

JOYCE A. BEARD
Clerk of the Board of Supervisors

I hereby certify that according to the provisions of Government Code Section 25103, delivery of this document has been made.

JOYCE A. BEARD
Clerk of the Board

By: DEPUTY

Attachment 3

ORDINANCE NO. _____

Comment [KO1]: Ordinance number will be assigned by City Council after the passage of the final ordinance

AN ORDINANCE OF THE CITY OF FREMONT AMENDING ARTICLE 7 (MISCELLANEOUS DRIVING RULES) OF CHAPTER 2 (TRAFFIC REGULATIONS) OF TITLE III (PUBLIC SAFETY, WELFARE AND MORALS) OF THE FREMONT MUNICIPAL CODE TO DELETE THE TRUCK ROUTE DESIGNATION FOR NILES CANYON ROAD (STATE ROUTE 84)

The City Council of the City of Fremont does ordain as follows:

Section 1:

Section 3-2706 (Truck Routes) of Article 7 (Miscellaneous Driving Rules) of Chapter 2 (Traffic Regulations) of Title III (public Safety, Welfare and Morals) of the City of Fremont Municipal Code is hereby amended to delete the truck route designation for Niles Canyon Road as a truck route.

Section 2:

(a) The City of Fremont, Alameda County may by ordinance in conjunction with CVC **35715.** prohibit the use of Niles Canyon Road by a vehicle or combination of vehicles that exceeds a weight limit of 10,000 pounds or more. The weight limit shall be determined by the City of Fremont City Council and specified in the ordinance.

Comment [KO2]: The subsection of the CVC will be assigned by the Department of Transportation after final approval

\ (b) An ordinance adopted pursuant to this section is not effective with respect to the following:

(1) A vehicle or combination of vehicles coming from an unrestricted highway having ingress and egress by direct route to and from the restricted highway when necessary for the purpose of making pickups or deliveries of goods, wares, and merchandise from or to any building or structure located on the restricted highway or for the purpose of delivering materials to be used

in the actual and bona fide repair, alteration, remodeling, or construction of a building or structure upon the restricted highway for which a building permit has previously been obtained.

(2) The operation of ambulances, hearses, or vehicles providing emergency roadside services or roadside assistance.

(3) Any vehicle or combination of vehicles owned, operated, controlled, or used by a public utility or licensed contractor in connection with the construction, installation, operation, maintenance, or repair of a public utility facilities or public works projects.

(4) Any vehicle which is subject to the provisions of Article 2 (commencing with Section 1031) of Chapter 5 of Part 1 of Division 1 of the Public Utilities Code or any farm labor vehicles.

(5) Any vehicle operated as an incident to any industrial, commercial or agricultural enterprise conducted upon the highway.

Legal basis for the restriction process: CVC Section 21101 allows the restriction of certain vehicles, by stating that, "Local authorities for those highways under their jurisdiction, may adopt rules and regulations by ordinance or resolution on the following matters": (c) Prohibiting the use of particular highways by certain vehicles, except as otherwise provided by the Public Utilities Commission pursuant to Article 2 (commencing with Section 1031 of Chapter 5 of Part 1 of Division 1 of the Public Utilities Code. CVC Section 21104 further states "No ordinance or resolution proposed to be enacted under Section 21101 or subdivision (d) of Section 21100 is effective as to any highway not under the exclusive jurisdiction of the local authority enacting the same, except that an ordinance or resolution which is submitted to the Department of Transportation by a local legislative body in complete draft form for approval prior to the

enactment thereof is effective as to any state highway or part thereof specified in the written approval of the department. This section does not preclude the application of an ordinance or resolution adopted under Section 21101 or subdivision (d) of Section 21100 to streets maintained by a community services district organized pursuant to Division 3 (commencing with Section 61000) of Title 6 of the Government Code. An ordinance or resolution enacted by a local authority pursuant to subdivision (c) of Section 21101 may impose a fine or penalty for a violation of this code.

The ordinance shall not be effective until appropriate signs are erected indicating either the streets affected by the ordinance or the streets not affected, as the local authority determines will best serve to give notice of the ordinance.

- CVC Section 35702 requires Caltrans approval, and the designation of an alternate route, by stating that, "No ordinance proposed under Section 35701 is effective with respect to any highway which is not under the exclusive jurisdiction of the local authority enacting the ordinance, or, in the case of any state highway, until the ordinance has been submitted by the governing body of the local authority to, and approved in writing by, the Department of Transportation. In submitting a proposed ordinance to the department for approval, the governing body of the local authority shall designate therein, an alternate route for the use of vehicles, which route shall remain unrestricted by any local regulation as to weight limits or types of vehicles so long as the ordinance proposed shall remain in effect. The approval of the proposed ordinance by the Department of Transportation shall constitute an approval by it of the alternate route so designated.

§ The alternate route designated by the City is Mission Boulevard (Route 238) between Niles Canyon Road (Route 84) and Interstate 680, and Interstate 680 between Mission Boulevard (Route 238) and Niles Canyon Road (Route 84). The alternate route is an existing truck route.

Section 3:

This ordinance shall be published once in a local newspaper of general circulation, printed and published in Alameda County and circulated in the City of Fremont, within fifteen (15) days from and after its adoption and shall take effect and be enforced thirty (30) days after its adoption.

The foregoing ordinance was duly introduced before the City Council of the City of Fremont, County of Alameda, at a meeting of the City Council of such City, held on the __th day of _____, 2011, and finally adopted at a regular meeting of said Council held on the __th day of _____, 2011, by the following vote, to wit:

AYES:

NOES:

ABSTAIN:

_____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM;

_____
City Attorney

Attachment 4

ENV. STUDY

INITIAL STUDY

FOR

TRUCK RESTRICTION OF VEHICLES WITH 4+ AXLES

LAK-175 PM 0.00 to R8.19
MEN-175 PM 5.4 to 9.85

Deborah L. Harmon

May 1, 1996
Date

INITIAL STUDY AND NEGATIVE DECLARATION

FOR

TRUCK RESTRICTIONS ON LAK/MEN 175

SCH No.
01-LAK-175-0.00/R8.19
01-MEN-175-5.40/9.85

NEGATIVE DECLARATION

Pursuant to: Division 13, Public Resources Code

Description: The proposed project involves implementing a truck restriction on the westerly portion of State Route 175 between the junction of State Routes 175 and 29 in Lake County and five miles east of the junction of Routes 101 and 175 near Hopland in Mendocino County. The restriction would prohibit vehicles with four or more axles from traversing this 12.5 mile segment of the route. Exceptions to this restriction would apply to any commercial vehicles making a delivery or pickup to a location within the restricted area.

Determination

An Initial Study has been prepared by the California Department of Transposrtation (Caltrans). On the basis of this study it is determined that the proposed action will not have a significant effect upon the environment for the following reasons:

The proposed project will have minimal or no effect on growth or rate of development, employment, economy of the area (including businesses and industries), population characteristics, housing, schools, air and water quality, or noise levels on sensitive receptors. No recreational lands, park lands, or heritage resources are involved.

The proposed project will not have a significant impact on traffic composition or volume nor will it have a significant effect on social, cultural or recreational facilities.

BOARD OF SUPERVISORS
LAKE COUNTY, CAL

Date

PURPOSE AND NEED FOR THE PROJECT

State Route 175 (SR-175) is a mountainous, east-west highway connecting Route 101 in Hopland with Route 29 near Lakeport. Few improvements have been made to this roadway over the years. The roadway alignment follows rugged terrain, with limited pavement width, steep grades, and tight curves. The roadway width, including shoulders, varies from 18 feet to a maximum of 32 feet. Grades in this segment of Route 175 average 6.5% to 7%, with some sustained grades of 9% and short stretches are as steep as 13%.

In the 12.5 mile section of Route 175 proposed for the truck restriction, there are just under 100 curves with a radius of 280 feet or less. The majority of the tight radius curves cannot be negotiated by trucks with a 30 foot kingpin to rear axle length without crossing over the centerline stripe or leaving the pavement, or both (see Exhibit B). Some curves require the complete use of both traffic lanes to be negotiated, and as such create a potentially hazardous situation for oncoming traffic. In some cases, large trucks have become stuck in the middle of a tight curve blocking the full width of the roadway and have had to be physically removed with the use of outside equipment.

The accident rate for this section of SR-175 over a three year period was 2.77 accidents per million vehicle miles which is 14% higher than the expected rate for a highway with similiar characteristics. From August 1990 to August 1993 there were 39 accidents with 20 injuries. Nearly 20% of these accidents involved large trucks or vehicles that had four or more axles in combination. This is a substantial number when taken in the context that vehicles with four or more axles only comprise 0.4% of the total volume of traffic. 12% of the accidents caused by the large trucks or combination vehicles were a result of crossing over the double yellow centerline and hitting an oncoming vehicle, or forcing the oncoming vehicle to leave the roadway.

39 x .2 = 8
8 x .12 = 1
Only 1 accid. because of offtracking
D.V. 10-8-98

Due to the steep grades and tight curves, vehicles pulling loads are forced to travel slowly, averaging approximately 15 mph. There are no paved turnouts or passing lanes in this 12.5 mile segment of Route 175, and this entire segment is barrier striped. Thus, passing opportunities for vehicles caught behind slow moving trucks are rare on this portion of Route 175 and are limited to those occasions when the slower traffic utilizes any available wide, unpaved shoulders.

In 1980 special warning signs were placed at each end of this segment of SR-175 to advise large trucks and autos with trailers against traveling this route. There are also signs warning motorists of narrow, winding road and steep grades ahead at each end of this segment. In 1991 additional warning signs were installed to advise trucks with lengths over 30 feet from kingpin

to rear axle to take another route. In total, there are five warning signs on the westerly end of Route 175 and four signs on the easterly end this segment advising motorists of the road conditions and to take alternate routes.

The California Highway Patrol (CHP) is strongly opposed to allowing large trucks and vehicles with trailers to continue using this portion of Route 175. There has been correspondence dating back to 1979 expressing concern over large trucks on the Hopland Grade. In addition to the several letters from the California Highway Patrol to Caltrans and the complaint letters that the Highway Patrol receives from citizens, Caltrans has received numerous letters and phone calls from private citizens, Supervisors from Lake County, as well as letters from Assemblywoman Bev Hansen and State Senator Jim Nielson. With few exceptions, this correspondence supports removing large trucks from this portion of Route 175.

The Highway Patrol also states that the truck advisory signs at each end of Hopland Grade have had little if any effect in preventing large trucks and vehicles with trailers from using this portion of Route 175. According to the CHP, several truck drivers have been cited for crossing over the double yellow centerline. The CHP report that when the drivers were asked whether they had seen the advisory signs, most drivers admitted that they had. When the drivers were questioned as to why they continued on, the most frequent response was that they didn't think it would be as bad as it was. Others stated that they had been dispatched over this route, or that the route looked like a shortcut on the map. Because there is no place to safely turn around, once the driver gets on this segment of Route 175, he has to continue.

The 1994 Route Segment Report shows that this portion of SR-175 currently operates at a D Level of Service (LOS) with operating speeds of 15 to 36 mph. This portion of Route 175 falls under the basic speed law, and has a 55 mph maximum speed limit. Due to the nature of the alignment, the practical speed for much of the route is 30 mph or less.

It is physically impossible for a tractor/semitrailer truck or an automobile with a tandem axle trailer (i.e., vehicles with four or more axles) to negotiate this portion of Route 175 without crossing over the center line into part or all of the opposing lane. This situation has created a disproportionately high ratio of truck-related accidents. As traffic volumes increase both seasonally in the summer and fall and during peak hours, so does the potential for truck and automobile accidents.

Closing this portion of Route 175 to vehicles which, alone or in combination with towed vehicles have four or more axles, should greatly reduce the potential for lane cutting (traffic crossing

over into opposite lanes) on these curves. This proposed traffic restriction should improve Route circulation and create a safer highway environment.

DESCRIPTION OF PROPOSED PROJECT

A vehicle restriction is being proposed on a twelve and a half mile segment Route 175 between Hopland and Lakeport, known locally as the "Hopland Grade." The restriction would close a portion of Route 175 (highway postmiles MEN-175-5.4 to 9.85 and LAK-175-0.00 to R8.19) to all vehicles with four or more axles in combination. This would include autos or pickup trucks that are towing two axle trailers and trucks with a 30 foot kingpin to rear axle length (see Exhibit B). Access to this newly closed portion of Route 175 for some deliveries and construction would be allowed.

This restriction would not "prohibit any commercial vehicles coming from an unrestricted street having ingress and egress by direct route to and from a restricted street when necessary for the purpose of making pickups or deliveries of goods, wares, and merchandise from or to any building or structure located on the restricted street or for the purpose of delivering materials to be used in the actual and bona fide repair, alteration, remodeling, or construction of any building or structure upon the restricted road or street/road for which a building permit has previously been obtained." This restriction is intended to redirect all "through traffic" vehicles (with four or more axles) to alternate State and US Routes in Mendocino and Lake County (i.e., U.S. Route 101; State Routes 20 and 29).

This section of Route 175 will be signed for traffic approaching both from the east and west in Lake County and Mendocino County respectively. These signs will inform motorists that this portion of Route 175 is closed to all through traffic vehicles with four or more axles. Enforcement of this new restriction will be by the California Highway Patrol.

Alternatives Considered and Rejected

1. Curve corrections, shoulder widening or total realignment: One alternative would be to bring this portion of SR-175 up to current highway standards, either by one or more major projects or a series of minor highway projects. This approach would not be consistent with the current route concept for this portion of SR-175 which is designated as "maintenance as necessary". Although these types of project alternatives were the subject of extensive studies by both the Lake County/City Planning Council and Caltrans in the late 1980's, they were determined infeasible due to cost, environmental

impacts, existing low traffic volumes and the fact that to improve the alignment would divert substantial funds from higher priority capital improvements on other roultes. Projections of low traffic volumes in the future for this route also played an important part in eliminating this route for consideration for major highway improvements in the future.

2. Do Nothing: This alternative would not address the identified safety concerns or remedy the existing operational deficiencies. Currently there are numerous warning signs at either end of this segment of Route 175 advising motorists of the road conditions and recommending alternate routes. Per observations from the California Highway Patrol, these signs have not been effective.

Current Status of Proposed Project and the Process for Approval

Caltrans has performed studies to document how this segment of the route is currently utilized by vehicles with four and more axles. This information is summarized in this Initial Study which will be circulated to the public for comment. After completing the public review and comment period, a Negative Declaration will be finalized which will provide responses to any questions or concerns raised during the public review of this Initial Study. Caltrans will then request that Lake and Mendocino County prepare an ordinance restricting vehicles with four or more axles per California Vehicle Code Section 21101(c). The draft ordinance will be reviewed by the Division of Traffic Operations in Caltrans in Sacramento and, if approved, the Director of Caltrans will issue a written approval of the draft ordinance which the local agencies then execute.

At this time, Lake County has indicated a willingness to propose such an ordinance. Mendocino County has not yet officially accepted this responsibility.

AFFECTED ENVIRONMENT

Annual Average Daily Traffic (ADT) in 1993 for this portion of Route 175 was approximately 1000 to 1500 vehicles and peak month average daily traffic was just a few hundred vehicles more. Actual counts taken in October of 1993 recorded 1367 vehicles. During this count, vehicles that the proposed restriction would affect were identified and recorded. Total truck ADT was numbered at 83 or 6% of the total ADT. Of the 83 trucks, 6.9% were trucks with four axles or more. This amounts to about 6 vehicles a day or 0.4% of the total vehicle ADT.

Actual counts were taken again during July 1 - 5, 1994. Counts were taken from 6:00 am to 9:00 pm each day. Of the total 5958 vehicles recorded over the five day holiday period, 52, or 0.87% would have been impacted had the restriction on vehicles with four or more axles been in place. (See Table 1)

DISCUSSION OF ENVIRONMENTAL EVALUATION

Refer to the Environmental Significance Checklist (Exhibit D).

Since the restriction of certain vehicles will not involve any physical manipulation of the existing roadway or its environs, fish and wildlife habitat, water quality, and scenic resources would not be affected.

Restricting certain vehicles (i.e., 4+ axle vehicles) will result in some minimal amount of decreased exhaust emissions and noise levels for this stretch of SR-175 while increasing, by a negligible amount, emissions and noise on the alternate routes chosen. Because the traffic volume to be affected is so small, both the beneficial aspects of removing traffic to sensitive receptors along SR 175 and any adverse effects resulting from minimally increasing the volumes along US 101 and Routes 20 and 29 are considered nonsignificant.

It is expected that there would be some minor increase in fuel consumption resulting from those vehicles restricted from using SR-175 having to detour on a longer route, however, this would be somewhat offset because alternate routes are not as steep as Route 175.

Restricting vehicles with 4+ axles would affect a small number of recreationists (e.g., some kinds of recreational vehicles or those who are towing a two axle boat trailer or a second vehicle) who use SR-175 as a route for accessing Clear Lake. However, because of the availability of alternate routes this is not considered to be significant impact.

Route 175 is used for commercial shipping and receiving of goods, in particular, for transporting agricultural produce from the various orchards in Lake County. The CHP has reported peaks in large truck volumes in the months of August and September due to the pear and walnut harvest in the Lakeport and Kelseyville areas. This is also the time of year when the bulk of citizen complaints is received concerning automobile and large truck conflicts. Some of these transport vehicles would be affected with the proposed restriction. While utilizing alternate routes could affect shipping times and cost for those vehicles affected by the restriction, the number of vehicles potentially affected is not substantial, thus, this impact is not considered to be significant.

The Ukiah Unified School District in Mendocino County no longer provides direct school bus service for students living on the Hopland Grade. Bus service was discontinued in 1991 after the school van was involved in a sideswipe accident caused by a tractor/trailer rig crossing over the center line. Currently there is a pickup point at postmile 5.40 for students that live between postmile 5.40 and the County line at postmile 9.85.

In Lake County, school bus service on Route 175 is only provided from the junction of Routes 175 and 29 west for one and a half miles to Matthews Road. Matthews Road (at postmile 6.83) is the pickup and delivery point for students that live west of postmile 6.83 to the county line at postmile 0.00.

Currently, no transit operators service this portion of SR-175.

CONSULTATION AND COORDINATION

The following agencies and/or individuals were consulted regarding the proposed 4+ axle vehicle restriction on SR-175.

Mr. Kim Seidler, Lake Co. Community Development Director
Richard Knoll, City of Lakeport Community Development Director
Mendocino County Board of Supervisors
Lake County Board of Supervisors
California Highway Patrol
Ukiah Unified School District
Lakeport Transportation Office (authority providing school bus service)
Caltrans District 1
Mendocino Council of Governments (MCOG)
Lake County/Cities Area Planning Council (LC/CAPC)

DETERMINATION

On the basis of this evaluation, it has been determined that the appropriate environmental document for the proposed project is a Negative Declaration.

BOARD OF SUPERVISORS
LAKE COUNTY, CAL

EXHIBITS

A. Map of proposed limits of restriction

B. Tractor/ Semi-Trailer Terminology

C. Alternate Routes to Route 175

D. Environmental Significance Checklist

TABLES

1. Summary Vehicle Count for SR-175 during July 1-5, 1994.

REFERENCES

"Truck Study Report" December 22, 1993 Prepared by Caltrans District 1 Traffic Operations Branch.

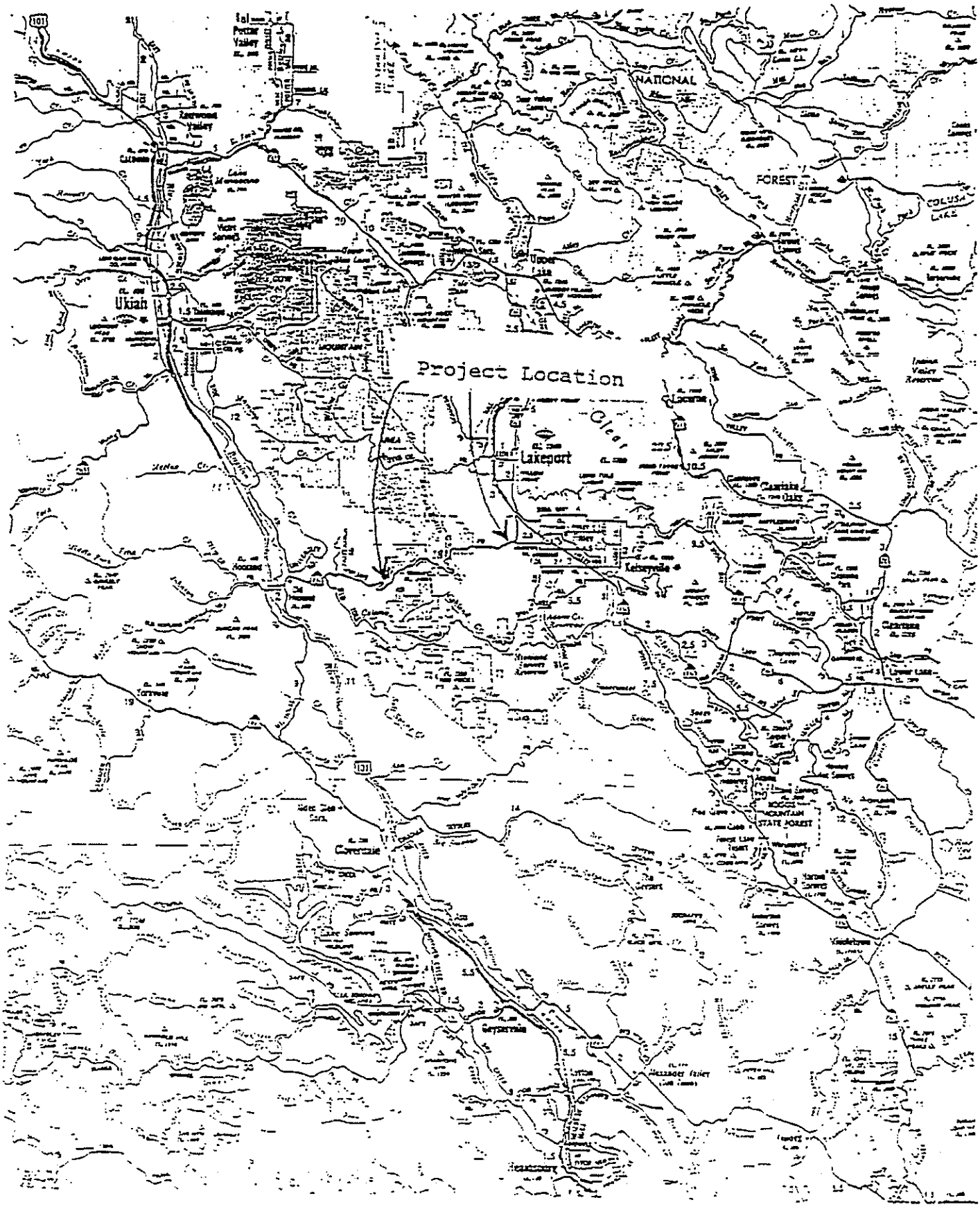
"Truck Restrictions - Overview of Existing Authority and Procedures Pertaining to Truck Restrictions" Draft February 1994 Prepared by Caltrans Office of Permits and Truck Studies.

LIST OF PREPARERS

The Initial Study for this proposal was written based on input provided by the staff of various branches within the Caltrans District 1 Office in Eureka. The following is a list of those individuals:

Craig Olofson, Associate Environmental Planner
Jim Graham, Chief, Traffic Operations & Electrical Branch
Russ Lee, Traffic Operations/Truck Studies
Deborah Harmon, Chief, Environmental Management Office
Cheryl Willis, Chief, Planning Division

EXHIBIT A



PROPOSED LIMITS OF TRUCK RESTRICTION

N

Not to Scale

EXHIBIT B

TERMINOLOGY

TRACTOR / SEMITRAILER TERMINOLOGY

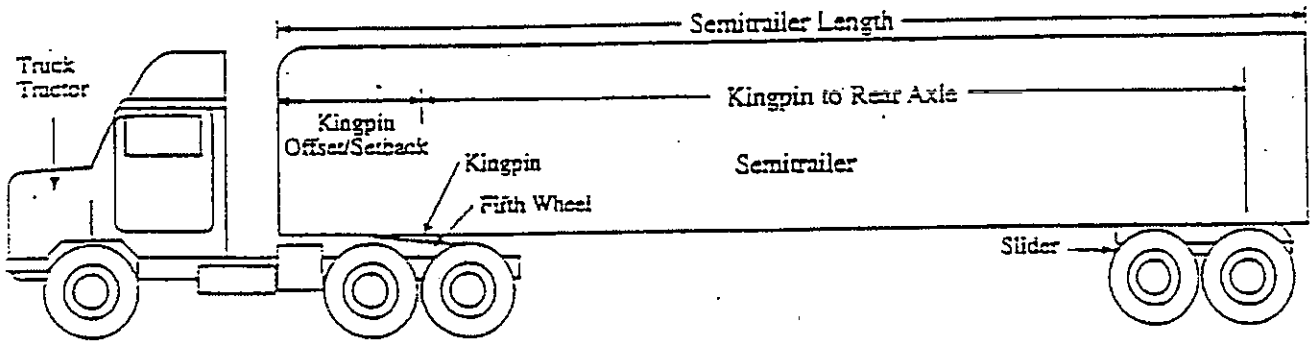
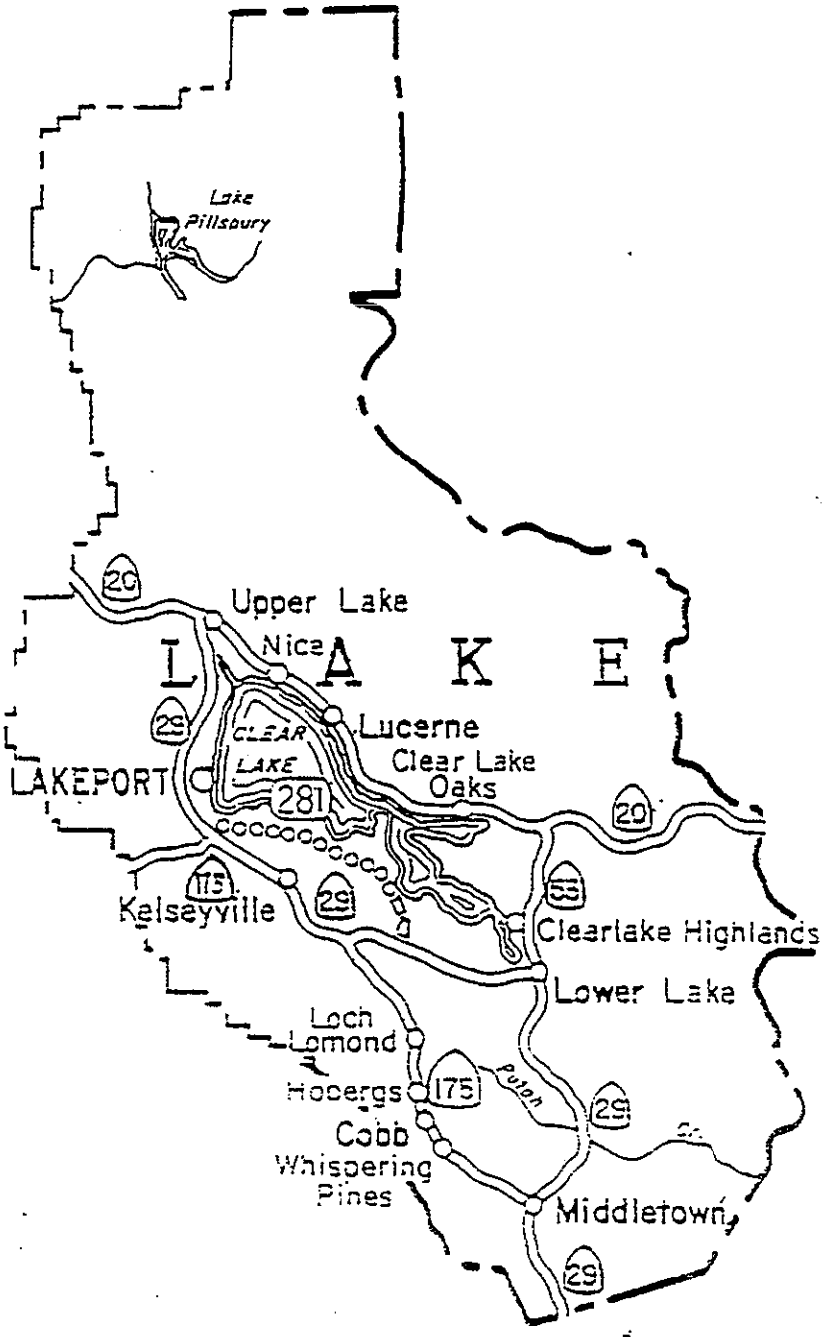


EXHIBIT C

ALTERNATE ROUTES TO SR 175



SCALE IN MILES

0 5 10 20

ENVIRONMENTAL SIGNIFICANCE CHECKLIST

This checklist was used to identify physical, biological, social and economic factors which might be impacted by the proposed project. In many cases, the background studies performed in connection with this project clearly indicate the project will not affect a particular item. A "NO" answer in the first column documents this determination. Where there is a need for clarifying discussion, an asterisk is shown next to the answer. The discussion is in the section following the checklist.

PHYSICAL—Will the proposal either directly or indirectly:	YES OR NO	IF YES, IS IT SIGNIFICANT? YES OR NO
1. Appreciably change the topography or ground surface relief features?	NO	
2. Destroy, cover, or modify any unique geologic, paleontologic, or physical features?	NO	
3. Result in unstable earth surfaces or increase the exposure of people or property to geologic or seismic hazards?	NO	
4. Result in or be affected by soil erosion or siltation (whether by water or wind)?	NO	
5. Result in the increased use of fuel or energy in large amounts or in a wasteful manner?	NO	
6. Result in an increase in the rate of use of any natural resource?	NO	
7. Result in the substantial depletion of any nonrenewable resource?	NO	
8. Violate any published Federal, State, or local standards pertaining to hazardous waste, solid waste or litter control?	NO	
9. Modify the channel of a river or stream or the bed of the ocean or any inlet or lake?	NO	
10. Encroach upon a floodplain or result in or be affected by floodwaters or tidal waves?	NO	
11. Adversely affect the quantity or quality of surface water, groundwater, or public water supply?	NO	
12. Result in the use of water in large amounts or in a wasteful manner?	NO	
13. Affect wetlands or riparian vegetation?	NO	
14. Violate or be inconsistent with Federal, State, or local water quality standards?	NO	
15. Result in changes in air movement, moisture, or temperature, or any climatic conditions?	NO	
16. Result in an increase in air pollutant emissions, adverse effects on or deterioration of ambient air quality?	NO	
17. Result in the creation of objectionable odors?	NO	
18. Violate or be inconsistent with Federal, State, or local air standards or control plans?	NO	
19. Result in an increase in noise levels or vibration for adjoining areas?	NO	
20. Result in any Federal, State, or local noise criteria being equal or exceeded?	NO	
21. Produce new light, glare, or shadows?	NO	

ENVIRONMENTAL SIGNIFICANCE CHECKLIST (Cont.)

BIOLOGICAL—Will the proposal result in (either directly or indirectly):	YES OR NO	IF YES, IS IT SIGNIFICANT? YES OR NO
22. Change in the diversity of species or number of any species of plants (including trees, shrubs, grass, microflora, and aquatic plants)?	NO	—
23. Reduction of the numbers of or encroachment upon the critical habitat of any unique, threatened or endangered species of plants?	NO	
24. Introduction of new species of plants into an area, or result in a barrier to the normal replenishment of existing species?	NO	
25. Reduction in acreage of any agricultural crop or commercial timber stand, or affect prime, unique, or other farmland of State or local importance?	NO	
26. Removal or deterioration of existing fish or wildlife habitat?	NO	
27. Change in the diversity of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?	NO	
28. Reduction of the numbers of or encroachment upon the critical habitat of any unique, threatened or endangered species of animals?	NO	
29. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	NO	
SOCIAL AND ECONOMIC—Will the proposal directly or indirectly:		
30. Cause disruption of orderly planned development?	NO	
31. Be inconsistent with any elements of adopted community plans, policies or goals?	NO	
32. Be inconsistent with a Coastal Zone Mangement Plan?	NO	
33. Affect the location, distribution, density, or growth rate of the human population of an area?	NO	
34. Affect life-styles, or neighborhood character or stability?	NO	
35. Affect minority, elderly, handicapped, transit-dependent, or other specific interest groups?	YES X	NO
36. Divide or disrupt an established community?	NO	
37. Affect existing housing, require the acquisition of residential improvements or the displacement of people or create a demand for additional housing?	NO	
38. Affect employment, industry or commerce, or require the displacement of businesses or farms?	YES X	NO
39. Affect property values or the local tax base?	NO	
40. Affect any community facilities (including medical, educational, scientific, recreational, or religious institutions, ceremonial sites or sacred shrines)?	NO	
41. Affect public utilities, or police, fire, emergency or other public services?	NO	
42. Have substantial impact on existing transportation systems or alter present patterns of circulation or movement of people and/or goods?	YES X	NO

ENVIRONMENTAL SIGNIFICANCE CHECKLIST (Cont.)

	YES OR NO	IF YES, IS IT SIGNIFICANT? YES OR NO
43. Generate additional traffic?	NO	
44. Affect or be affected by existing parking facilities or result in demand for new parking?	NO	
45. Involve a substantial risk of an explosion or the release of hazardous substances in the event of an accident or otherwise adversely affect overall public safety?	NO	
46. Result in alterations to waterborne, rail or air traffic?	NO	
47. Support large commercial or residential development?	NO	
48. Affect a significant archaeological or historic site, structure, object, or building?	NO	
49. Affect wild or scenic rivers or natural landmarks?	NO	
50. Affect any scenic resources or result in the obstruction of any scenic vista or view open to the public, or creation of an aesthetically offensive site open to public view?	NO	
51. Result in substantial impacts associated with construction activities (e.g., noise, dust, temporary drainage, traffic detours and temporary access, etc.)?	NO	
52. Result in the use of any publicly-owned land from a park, recreation area, or wildlife and waterfowl refuge?	NO	
MANDATORY FINDINGS OF SIGNIFICANCE		
53. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	NO	
54. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short- term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	NO	
55. Does the project have environmental effects which are individually limited, but cumulatively considerable? Cumulatively considerable means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. It includes the effects of other projects which interact with this project and, together, are considerable.	NO	
56. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	NO	

TABLE 1

SUMMARY

TRUCK AND RV SURVEY-01 MEN, LAK-175-MEN 5.40/LAK R8.19

HOURS: FROM 0600 TO 2100 STARTING JULY 1, 1994 AND ENDING JULY 5, 1994

TYPE OF VEHICLE	VEHICLE NUMBERS		TOTAL	PERCENT
	WB	EB		
CARS, PICKUPS, VANS, ETC..	2660	2927	5587	93.77%
CARS, PICKUPS, VANS, ETC. W/TRAILER				
BOAT TRAILER				
1-AXLE	42	49	91	1.53%
2-AXLE	15	20	35	0.59%
RV TRAILER				
1-AXLE	4	8	12	0.20%
2-AXLE	1		1	0.02%
UTILITY TRAILER				
1-AXLE	15	15	30	0.50%
2-AXLE	3	5	8	0.13%
HORSE TRAILER				
2-AXLE	5	2	7	0.12%
TRUCKS, LARGE 2-AXLE, VANS, FLATBEDS	31	31	62	1.04%
TRACTOR/TRAILER				
3-AXLE	1		1	0.02%
4-AXLE+		1	1	0.02%
MOTORHOME, SMALL (24' OR LESS)	3	10	13	0.22%
MOTORHOME, SMALL W/TRAILER				
1-AXLE		3	3	0.05%
MOTORHOME, LARGE (OVER 24')	5	3	8	0.13%
MOTORCYCLE	52	49	101	1.70%
BICYCLE	5	7	12	0.20%
TOTALS	2842	3130	5958	100.00%

Note: Of the 5,958 vehicles counted, 52 or 0.87% would have been impacted had there been a 4 axle + restriction in effect during the times of the survey.

ATTACHMENT #3

Caltrans 175 Initial Study

List of Agencies/Persons Contacted/Notified

1. Lake County Agricultural Commissioner
2. Mendocino County Agricultural Commissioner
3. Caltrans
4. Lake County Department of Public Works
5. Mendocino County Department of Public Works
6. California Highway Patrol - Ukiah and Kelseyville Offices
7. Mendocino Council of Governments
8. Lake County/City Area Planning Council
9. Lake County Traffic Advisory Committee
10. City of Lakeport
11. All property owners (145) within 700 feet of both sides of highway, both counties.
12. California Trucking Association

Attachment 5

TRUCK RESTRICTION REPORT CHECKLIST

Approval of restriction requests is contingent upon a complete identification and documentation of impacts on highway safety, structural integrity, environment and operational efficiency. Some items may not apply. This checklist is a guide only.

I. COVER

_____ The document cover clearly states the Caltrans District, County, Route and postmile limits of the proposal. Any proposed local ordinance or resolution number should also be placed on the cover.

II. PROPOSAL STATEMENT

_____ The proposed restriction and references to specific codes, regulations and any local ordinances or resolutions are clearly presented in the proposal statement. If exemptions to general rules apply; cite appropriate statutory law or regulations.

III. JUSTIFICATION FOR THE PROPOSAL

Justification depends on rationale: safety, hazardous materials, bridge weight limit, construction zones, seasonal operation, etc.

_____ Analyses of present and future safety, operational (capacity, geometrics) and/or structural adequacy supporting the restriction. A description of existing versus proposed conditions. Include supporting data tables, maps and/or photographs.

_____ List of alternatives considered, e.g. truck advisory, restriction of 39-foot vehicles, or restriction of all trucks over a certain gross weight. Statement of the proposed restriction selected.

_____ Analysis of environmental considerations for the restriction proposal with an explanation of impacts and mitigation measures.

_____ Existing and future land use plans.

_____ Analysis of the impact on interstate and intrastate commerce. Analysis of the economic impact on communities, shippers and trucking companies due to increased travel distances.

_____ Analysis and recommendations of any alternative routes that can safely accommodate any California legal commercial motor vehicles and serve the proposed restriction area.

_____ Evidence of consultation with the local or adjoining state governments affected by the proposed restriction.

_____ Results of any public hearings.

IV. APPENDICES

_____ Copies of any draft local restriction ordinances or resolutions.

_____ Copies of any supportive correspondence or documents for the restriction.

_____ Minutes of public hearings (audio or videocassette tape).

VEHICLE CODE - VEH

DIVISION 11. RULES OF THE ROAD [21000 - 23336]

(Division 11 enacted by Stats. 1959, Ch. 3.)

CHAPTER 1. Obedience to and Effect of Traffic Laws [21000 - 21282]

(Chapter 1 enacted by Stats. 1959, Ch. 3.)

ARTICLE 3. Local Regulation [21100 - 21117]

(Article 3 enacted by Stats. 1959, Ch. 3.)

21101.

Local authorities, for those highways under their jurisdiction, may adopt rules and regulations by ordinance or resolution on the following matters:

(a) Closing any highway to vehicular traffic when, in the opinion of the legislative body having jurisdiction, the highway is either of the following:

(1) No longer needed for vehicular traffic.

(2) The closure is in the interests of public safety and all of the following conditions and requirements are met:

(A) The street proposed for closure is located in a county with a population of 6,000,000 or more.

(B) The street has an unsafe volume of traffic and a significant incidence of crime.

(C) The affected local authority conducts a public hearing on the proposed street closure.

(D) Notice of the hearing is provided to residents and owners of property adjacent to the street proposed for closure.

(E) The local authority makes a finding that closure of the street likely would result in a reduced rate of crime.

(b) Designating any highway as a through highway and requiring that all vehicles observe official traffic control devices before entering or crossing the highway or designating any intersection as a stop intersection and requiring all vehicles to stop at one or more entrances to the intersection.

(c) Prohibiting the use of particular highways by certain vehicles, except as otherwise provided by the Public Utilities Commission pursuant to Article 2 (commencing with Section 1031) of Chapter 5 of Part 1 of Division 1 of the Public Utilities Code.

(d) Closing particular streets during regular school hours for the purpose of conducting automobile driver training programs in the secondary schools and colleges of this state.

(e) Temporarily closing a portion of any street for celebrations, parades, local special events, and other purposes when, in the opinion of local authorities having jurisdiction or a public officer or employee that the local authority designates by

resolution, the closing is necessary for the safety and protection of persons who are to use that portion of the street during the temporary closing.

(f) Prohibiting entry to, or exit from, or both, from any street by means of islands, curbs, traffic barriers, or other roadway design features to implement the circulation element of a general plan adopted pursuant to Article 6 (commencing with Section 65350) of Chapter 3 of Division 1 of Title 7 of the Government Code. The rules and regulations authorized by this subdivision shall be consistent with the responsibility of local government to provide for the health and safety of its citizens.

VEHICLE CODE - VEH

DIVISION 15. SIZE, WEIGHT, AND LOAD [35000 - 35796]

(Division 15 enacted by Stats. 1959, Ch. 3.)

CHAPTER 5. Weight [35550 - 35796]

(Chapter 5 enacted by Stats. 1959, Ch. 3.)

ARTICLE 4. Local Authorities [35700 - 35722]

(Article 4 enacted by Stats. 1959, Ch. 3.)

35701.

(a) Any city, or county for a residence district, may, by ordinance, prohibit the use of a street by any commercial vehicle or by any vehicle exceeding a maximum gross weight limit, except with respect to any vehicle which is subject to Sections 1031 to 1036, inclusive, of the Public Utilities Code, and except with respect to vehicles used for the collection and transportation of garbage, rubbish, or refuse using traditionally used routes in San Diego County when the solid waste management plan prepared under Section 66780.1 of the Government Code is amended to designate each traditionally used route used for the purpose of transporting garbage, rubbish, or refuse which intersects with a local or regional arterial circulation route contained within a city or county's traffic circulation element and which provides access to a solid waste disposal site.

(b) The ordinance shall not be effective until appropriate signs are erected indicating either the streets affected by the ordinance or the streets not affected, as the local authority determines will best serve to give notice of the ordinance.

(c) No ordinance adopted pursuant to this section after November 10, 1969, shall apply to any state highway which is included in the National System of Interstate and Defense Highways, except an ordinance which has been approved by a two-thirds vote of the California Transportation Commission.

(d) The solid waste management plan prepared under Section 66780.1 of the Government Code by San Diego County may designate the traditionally used routes.

(e) "Traditionally used route," for purposes of this section, means any street used for a period of one year or more as access to or from a solid waste disposal site.

VEHICLE CODE - VEH

DIVISION 15. SIZE, WEIGHT, AND LOAD [35000 - 35796]
(Division 15 enacted by Stats. 1959, Ch. 3.)

CHAPTER 5. Weight [35550 - 35796]
(Chapter 5 enacted by Stats. 1959, Ch. 3.)

ARTICLE 4. Local Authorities [35700 - 35722]
(Article 4 enacted by Stats. 1959, Ch. 3.)

35702.

No ordinance proposed under Section 35701 is effective with respect to any highway which is not under the exclusive jurisdiction of the local authority enacting the ordinance, or, in the case of any state highway, until the ordinance has been submitted by the governing body of the local authority to, and approved in writing by, the Department of Transportation. In submitting a proposed ordinance to the department for approval, the governing body of the local authority shall designate therein, an alternate route for the use of vehicles, which route shall remain unrestricted by any local regulation as to weight limits or types of vehicles so long as the ordinance proposed shall remain in effect. The approval of the proposed ordinance by the Department of Transportation shall constitute an approval by it of the alternate route so designated.

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE	January 20, 2015		
Departments: Board of Supervisors			
TIME REQUIRED	30 minutes (5 minute presentation; 25 minute discussion)	**PERSONS APPEARING BEFORE THE BOARD**	Supervisor Fred Stump
SUBJECT	Highway 6 Safety Improvements		

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Discussion of speed and safety issues along Highway 6 in the Tri Valley portion of Mono County.

RECOMMENDED ACTION:

1. The Board could direct staff to work with Caltrans to seek a legislative solution namely seek a bill to lower the speed limit on the section of Highway 6 which is of concern; 2. The Board could direct staff to monitor the issue and seek enhanced enforcement by California Highway Patrol at current speed limit levels. 3. Provide staff with any additional direction.

FISCAL IMPACT:

There is no fiscal impact from this item.

CONTACT NAME: Jim Leddy

PHONE/EMAIL: (760) 932-5414 / jleddy@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

Click to download

☐ Highway 6 Traffic and speed saftey discussion Cover memo

History

Time	Who	Approval

1/13/2015 2:43 PM	County Administrative Office	Yes
1/14/2015 1:17 PM	County Counsel	Yes
1/13/2015 5:34 PM	Finance	Yes

COUNTY OF MONO – County Administrative Office

P.O. BOX 696, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5412 □ FAX (760) 932-5411

Jim Leddy
County Administrative Officer
760.932.5414

To: Honorable Board of Supervisors
From: Jim Leddy, County Administrator
Date: January 10, 2015

Subject: Highway 6 safety issues

Recommendation:

1) Review safety information provided by Caltrans regarding issues of speed and traffic safety on Highway 6 in the tri-Valley;
2) Direct staff to further review need for legislative action to address concerns raised.

Background: Supervisor Fred Stump received a request from the residents of Chalfant and other portions of the Tri-Valley on the rate of traffic speed. In October 2014, Supervisor Stump was informed that due to the traffic survey and accident rate, Caltrans District 9 office was limited in their authority to lower the speed limit below the current 60 miles per hour rate without legislative action.

Supervisor Stump has continued to work with Caltrans, the California Highway Patrol and members of the community to ensure the safety issue be addressed. Today's item is a discussion with possible Board direction to seek the legislative authority to reduce the speed limit along that section of Highway 6.

Discussion: According to correspondence with Supervisor Stump, Caltrans staffer Terry Erlwein provided the following information after reviewing the accident and safety records of the area from the Chalfant Loop Road to one half (1/2) mile north of Brown Subdivision for the last ten years.

"There were 6 collisions within these parameters. The rates are expressed as accidents per million vehicle miles traveled. Accident analysis utilizes actual numbers of accidents compared with the statewide average for similar facilities.

The rates for this section of US 6 demonstrate that there are fewer accidents than would be expected on a road with similar geometry and traffic volume. The severity is slightly higher than would be expected due to 1 fatality in 2003. The rates are as follows.

Statewide Average		
Fatal	Fatal+Injury	Total
0.024	**0.40**	**0.94**

Actual Fatal	Fatal+Injury	Total
0.123	**0.37**	**0.74**

According to state records, there was one non-injury collision at Chafant Loop Rd in 2005, one non-injury collision 0.45 miles north of Chafant Loop Rd in 2002, one injury collision at Chafant Rd in 2008, one non-injury collision at Brown Subdivision Rd in 2003, one fatal+injury collision at Brown Subdivision Rd in 2003, and one injury collision 0.2 miles north of Brown Subdivision Rd in 2005 between 2 bicycles.

This is the entire history of recorded collisions for 10 years. As we discussed, this does not include non-reported collisions and close calls."

Caltrans further researched speed limit legislation for the last 5 years and could not find any bills or laws that have to do with lowering a speed limit on a State highway under the jurisdiction of Caltrans. There were several regarding speed limits on local City or County Roads and regarding equestrian activities and school zones. Also on local City or County Roads.

Options:

1) The Board could direct staff to work with Caltrans to seek a legislative solution namely seek a bill to lower the speed limit on the section of Highway 6 which is of concern;

2) The Board could direct staff to monitor the issue and seek enhanced enforcement by California Highway Patrol at current speed limit levels

Fiscal Impact: There is no fiscal impact from holding the discussion. Should the Board adopt Option 1), existing staff resources could handle the request. Option 2) would also be covered by existing staff resources.

For questions, please contact me at (760) 932-5414 or jleddy@mono.ca.gov

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE	January 20, 2015		
Departments: CAO, Community Development, Finance, Public Works			
TIME REQUIRED	10 minutes	**PERSONS APPEARING BEFORE THE BOARD**	Megan Mahaffey and Vianey White
SUBJECT	Authorization to Apply for the Energy Partnership Program Grant		

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

The California Energy Commission (CEC) Energy Partnership Program (EPP) offers services to help identify the most cost-effective energy saving opportunities for facilities. There is no cost to participate in the program which offers technical assistance services of up to $20,000 of the CEC consultant's costs. The EPP is an annual program and there is no cap on the number of submissions for Technical Assistance. $20,000 in EPP funding covers approximately 150,000 square feet in facility energy audits, depending on the depth with which the County choses to conduct the audits.

RECOMMENDED ACTION:

Approve the Energy Partnership Program Resolution and submission of the Energy Partnership Program Grant Application to the California Energy Commission to receive an award of $20,000 in contract services towards Energy Audits for Mono County Facilities. Provide any desired direction to staff.

FISCAL IMPACT:

Minimal staff time to manage the California Energy Commission's consultant performing the energy audits on 150,000 - 200,000 square feet of Mono County Facilities that will result in cost estimates and cost benefit analysis to implement energy efficiency improvements.

CONTACT NAME: Vianey White

PHONE/EMAIL: 760-814-7614 / vwhite@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☑ YES ☐ NO

ATTACHMENTS:

Click to download

- [ ] B0S Staff Report - EPP Application
- [ ] Attchmt 1 - EPP Application
- [ ] Attchmt 2 - EPP Application Attachment A
- [ ] Attchmt 3 - Resolution
- [ ] Attchmt 4 - EPP Energy Audits Example Section 1 of 3
- [ ] Attach 5
- [ ] Attach 6

History

Time	Who	Approval
1/13/2015 2:33 PM	County Administrative Office	Yes
1/14/2015 5:21 PM	County Counsel	Yes
1/13/2015 4:56 PM	Finance	Yes

MONO COUNTY

P.O. BOX 696, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5412 FAX (760) 932-5411

January 20, 2015

To: Mono County Board of Supervisors

From:

County Administrator's Office:	Jim Leddy
Community Development:	Scott Burns, Tom Perry, Wendy Sugimura
Finance:	Leslie Chapman, Gerald Frank, Megan Mahaffey
Public Works:	Joe Blanchard, Tony Dublino, Jeff Walters, Vianey White

Re: Authorization to Apply for the Energy Partnership Program Application

Actions Requested:

Authorize the Energy Partnership Program Resolution and submission of the Energy Partnership Program Application to the California Energy Commission to receive an award of $20,000 in contract services towards Energy Audits for Mono County Facilities. Provide any desired direction to staff.

Fiscal Impact of Requested Actions:

Minimal staff time to manage the California Energy Commission's consultant performing the energy audits on 150,000 -200,000 square feet of Mono County Facilities that will result in cost estimates and cost benefit analysis to implement energy efficiency improvements.

Background

The Mono County Energy Task Force formed as a collaborative cross departmental team to provide feedback on the Resource Efficiency Plan and implementation of Energy Policies. The Resource Efficiency Plan is a work effort funded by the Sustainable Communities Grant from the Strategic Growth Council. The Mono County Board of Supervisors supported the general goal of Zero Net Energy (ZNE) for County Facilities on February 4, 2014. Since the Board of Supervisors gave Mono County direction by means of Energy Policy Workshops, the Energy Task Force has looked for ways to implement energy efficient projects to reduce the county carbon footprint as well as operating costs. The California Energy Commission (CEC) is the state's primary energy policy and planning agency with responsibility to develop renewable energy resources. The CEC has programs in place including the Energy Partnership Program (EPP) that will help Mono County implement the Mono County Resource Efficiency Plan and move towards the goal of Zero Net Energy.

Discussion

The California Energy Commission (CEC) Energy Partnership Program (EPP) offers services to help identify the most cost-effective energy saving opportunities for facilities. There is no cost to participate in the program which offers technical assistance services of up to $20,000 of the CEC consultant's costs. The EPP is an annual program and there is no cap on the number of submissions for Technical Assistance. $20,000 in EPP funding covers approximately 150,000 square feet in facility energy audits, depending on the depth with which the County choses to conduct the audits. The Energy audits undertaken through Southern California Edison's (SCE) On-bill Financing program could potentially stretch the $20,000 in Technical assistance to cover energy audits for up to 200,000 square feet of Mono County facilities. The energy audits will include cost estimates for the improvements as well

as a return on investment analysis. If Mono County submits the EPP application in January, the energy audits may begin as early as March. The typical turnaround time for a completed report is 2-5 months. Submission of the EPP Technical Assistance Application in January will put Mono County in the position to take action on Energy Audit findings before next winter. Funding for the implementation of the recommended energy savings projects will be determined on a project by project basis, but may include participating in the SCE On-bill Financing Program and CEC zero to low interest loans.

Respectfully submitted,

Megan Mahaffey

Attachments:

1. Energy Partnership Program Application
2. Attachment A – List of facilities for potential Energy Audit
3. Resolution for EPP Application
4. Example of Energy Audits from EPP program for East Bay Regional Headquarters – Section 1 of 3
5. Example of Energy Audits from EPP program for East Bay Regional Headquarters – Section 2 of 3
6. Example of Energy Audits from EPP program for East Bay Regional Headquarters – Section 3 of 3

Technical Assistance Application
Energy Partnership Program
C a l i f o r n i a E n e r g y C o m m i s s i o n

Eligible Applicants:
Cities, Counties, Special districts, public or non-profit hospitals, public or non-profit public care facilities

1. Applicant Information

Name of local government, public care facility, hospital or special district) **The County of Mono**	County: **Mono County**	
Mailing Address: PO Box 347	City: Mammoth Lakes	Zip: 93546
Street Address (if different): 437 Old Mammoth Rd	City: Mammoth Lakes	Zip: 93546
Contact Person: Megan Mahaffey	Title: Accountant	Department: Finance
Phone Number: 760-924-1836	Email: mmahaffey@mono.ca.gov	

2. Attach the following information

- ¤ Governing Board Resolution (a sample template available at: http://www.energy.ca.gov/efficiency/partnership/)
- ¤ Copies of latest 12 months electric and gas or propane bills showing energy cost / detailed usage information for each facility listed in Table 5. **OR**
- ¤ Or Utility data release form - allowing the Energy Commission to access both 12 months of historical utility billing data and time-of-use interval data
- ¤ Hours of operation
- ¤ Any past energy studies (if applicable) within last 3 years
- ¤ Site map of facilities (e.g. 1As or a fire evacuation map)
- ¤ Only for facilities with on-site solar systems:

  Provide the Solar/photovoltaic (PV) on-site electric production (kWh) for the same 12 month period reported above. Applicants may obtain this information as follows:

  1) For facilities with power purchase agreement (PPA), provide the PPA bills which report the annually purchased kWh. OR
  2) For applicants who own their solar system, provide the above information via a report from the solar production tracking system.

3. Project Description

Type of assistance needed. (Please choose **one**):

X Energy audit – evaluate energy efficiency opportunities at existing facilities ***with lighting utility survey***

- ¤ Review existing proposals and designs
- ¤ Develop equipment performance specifications
- ¤ Review equipment bid specifications
- ¤ New construction – evaluation of new facility

Other (please describe):

Are there any specific equipment or proposed project(s) for which you are requesting technical assistance: (please describe)

Requesting technical assistance to line up projects for funding to reduce greenhouse gas emissions and monthly energy costs at Mono County facilities.

Describe how you plan to implement the energy recommendations that may be identified:

Mono County anticipates applying for the 1% loan program or any other recommended grant funding in order to implement the energy efficient improvements.

Do you have any current (or upcoming) working relationships with consultants, energy services companies, utilities, architects, or others that pertain to this request for Technical Assistance?
If yes, please describe:

Mono County is in the process of determining if it qualifies for lighting retrofits with the Southern California Edison On-bill Financing Program.

What is the expected project start date: 2/15/15

What is the expected project completion date: 6/1/15

4. Project Team

Title	Name	Phone No	E-Mail
Project Manager	Vianey White	760-932-5446	vwhite@mono.ca.gov
Business Manager or Finance Officer	Megan Mahaffey	760-924-1836	mmahaffey@mono.ca.gov
Electric and Gas Utility Representative	SCE Electricity Liberty Electricity Amerigas	951-212-7460 800-782-2506 530-495-2324	gerald.wilson@sce.com N/A Lisa.fitzpatrick2@amerigas.com
Consultant/Contractor (if known)			

5. Provide the following information

If you are requesting assistance for more than one facility, please prioritize from highest to lowest. Attach additional pages if needed.

See Attachment A	Year Built (excluding portables)	Estimated Building Size (sq. ft.)

I certify to the best of my knowledge that the data in this application are correct and complete.

Authorized Representative *

Name: _____ Title _____

Signature: _____ Date _____

*** Authorized Representative is the one designated by the governing body, in your Resolution, to execute documents in the name of the applicant.**

Attachment 2: EPP Application Attachment A

Facility Name	Address	City	2010 Emissions ($MTCO_2e$)	Estimated Building Size (SF)	Year Built	Fuel Types	Notes
District 2 Road Shop	25574 Highway 6	Benton	22.88	2,470	1957	Propane and SCE Electricity	
District 2 Road Shop #2	25574 Highway 6	Benton		1,250	1960	Propane and SCE Electricity	
District 2 Road Shop #3	25574 Highway 6	Benton		825	1957	Propane and SCE Electricity	
District 2 Road Shop Storage Shed #1	25574 Highway 6	Benton		176	1960	Propane and SCE Electricity	
District 2 Road Shop Storage Shed #2	25574 Highway 6	Benton		156	1960	Propane and SCE Electricity	
Benton and Ida Lynn Community Centers	58869 Highway 120	Benton	7.86	4,132	1957	Propane and SCE Electricity	
District 4 Road Shop / Warehouse	207 Jack Sawyer Road	Bridgeport	190.11	0	1965	Propane and SCE Electricity	SF included with other District 4 Road Shop spaces
District 4 Road Shop / Warehouse - Road Crew Office	207 Jack Sawyer Road	Bridgeport		672	1965	Propane and SCE Electricity	
District 4 Road Shop / Warehouse - Parks & Rec Bldg	207/201 Jack Sawyer Road	Bridgeport		3,880	1980	Propane and Diesel	
District 4 Road Shop / Warehouse - Parks & Rec Bldg Warehouse	207 Jack Sawyer Road	Bridgeport		1,750	1957	Propane and SCE Electricity	
District 4 Road Shop / Warehouse - Shop Building	207 Jack Sawyer Road	Bridgeport		9,200	1957	Propane and SCE Electricity	
District 4 Road Shop / Warehouse - Tire Storage Warehouse	207 Jack Sawyer Road	Bridgeport		2,485	1990	Propane and SCE Electricity	
Hospital / Health Dept.	221 Twin Lakes Road	Bridgeport	164.19	16,796	1962	Propane, SCE Electricity and Diesel	
Hospital / Health Dept. - Garage	221 Twin Lakes Road	Bridgeport		960	2005	Propane, SCE Electricity and Diesel	
Hospital / Health Dept. - Workshop Bldg	221 Twin Lakes Road	Bridgeport		775	1965	Propane, SCE Electricity and Diesel	
Courthouse Annex #2	25 Bryant Street	Bridgeport	107.79	10,200	1974	Propane and SCE Electricity	
Courthouse	278 Main Street	Bridgeport	81.43	12,514	1862	Propane and SCE Electricity	
MCSO Jail	25 Emigrant Street	Bridgeport	75.35	15,787	1988	Propane and SCE Electricity	paid by MCSO
Courthouse Annex #1	74 North School Street	Bridgeport	66.84	10,752	1965	Propane and SCE Electricity	
MCSO Administration	49 Bryant Street	Bridgeport	23.76	0	1988	Propane and SCE Electricity	paid by MCSO, SF included with MCSO Jail
Old County Jail	Bryant Street	Bridgeport	16.83	1,221	1883	SCE Electricity	not shown in County billing
Medic 7	193 Twin Lakes Road	Bridgeport	11.95	1,050	1972	Propane and SCE Electricity	
Animal Shelter	197 Jack Sawyer Road	Bridgeport	11.81	1,600	1957	Propane and SCE Electricity	
Social Services	137 Emigrant Street	Bridgeport	10.86	3,268	1937	Propane and SCE Electricity	
Memorial Hall	73 North School Street	Bridgeport	7.13	10,602	1956	Propane and SCE Electricity	
Probation Department	57 Bryant Street	Bridgeport	7.1	2,112	1990	Propane and SCE Electricity	
Senior Center	123 Emigrant Street	Bridgeport	4.26	816	1956	Propane and SCE Electricity	
Park	121 Emigrant Street	Bridgeport	4.07	160	1960	SCE Electricity	
Museum	129 Emigrant Street	Bridgeport	0.6	3,185	1880	Propane and SCE Electricity	
Old Morgue	38 Bryant Street	Bridgeport	0.23	0	1960	SCE Electricity	672 SF
Library	74 North School Street	Bridgeport	0.13	0	1965	SCE Electricity	SF included with Annex 1
Chalfant Community Center / Ball Field / Park	123 Valley Road	Chalfant	15.34	1,838	1974	Propane and SCE Electricity	
District 1 Road Shop	332 South Landing Road	Crowley Lake	38.84	6,050	1984	Propane and SCE Electricity	
Library	3627 Crowley Lake Drive	Crowley Lake	14.02	1,440	1995	Propane and SCE Electricity	
Sheriff Sub-Station	3609 Crowley Lake Drive	Crowley Lake	5.46	1,500	1990	Propane and SCE Electricity	
Community Center	58 Pearson Road	Crowley Lake	3.17	3,220	2003	Propane and SCE Electricity	
Community Center / Library	90 West Granite Avenue	June Lake	27.4	6,356	1957	Propane and SCE Electricity	
Sheriff Substation	120 W. Granite Avenue	June Lake	2.01	987	1990	SCE Electricity	

Attachment 2: EPP Application Attachment A

Facility Name	Address	City	2010 Emissions ($MTCO_2e$)	Estimated Building Size (SF)	Year Built	Fuel Types	Notes
District 3 Road Shop	51596 Highway 395	Lee Vining	60.84	2,528	1957	Propane and SCE Electricity	
Community Center	296 Mattly Avenue	Lee Vining	34.61	5,155	2002	Propane and SCE Electricity	
Gus Hess Museum	129 Mattly Avenue	Lee Vining	0.4	1,200	1900	SCE Electricity	
Sierra Center Mall Offices - Lease #1	452 Old Mammoth Road	Mammoth Lakes	121.02	20,719	1980	SCE Electricity	20,719 SF, Lease, utilities paid through CAMS
Sierra Center Mall Offices - Lease #2	452 Old Mammoth Road	Mammoth Lakes		826	1980	SCE Electricity	826 SF, Lease, utilities paid through CAMS
Minaret Mall / Mammoth Lakes Clinic - Lease #1 - Community Development/Public Health	437 Old Mammoth Road	Mammoth Lakes	61.76	6,977	1980	Propane and SCE Electricity	6,977 SF, Lease, utilities paid through CAMS
Minaret Mall / Mammoth Lakes Clinic - Lease #2 - HHSA/WIC	437 Old Mammoth Road	Mammoth Lakes		2,080	1980	Propane and SCE Electricity	2,080 SF, Lease, utilities paid through CAMS
Minaret Mall / Mammoth Lakes Clinic - Lease #3 - IT Dept.	437 Old Mammoth Road	Mammoth Lakes		1,618	1980	Propane and SCE Electricity	1,618 SF, Lease, utilities paid through CAMS
Minaret Mall	437 Old Mammoth Road	Mammoth Lakes		0	1980	Propane and SCE Electricity	Lease, utilities paid through CAMS
Whitmore Animal Shelter	575 Benton Crossing Road	Mammoth Lakes	3.19	2,870	1983	Propane and SCE Electricity	
Davison House	71 Davison Street	Mammoth Lakes	0	7,522	1978	None	Currently closed, but in the process of evaluating the scope of work to reopen the building
District 5 Road Shop / Walker Shop	62 Shop Road	Walker	17.88	1,716	1957	Propane and Liberty Electricity	
Senior Center	399 Mule Deer Road	Walker	17.11	5,168	1988	Propane and Liberty Electricity	
Community Center / Ball Field	442 Mule Deer Road	Walker	15.95	5,324	1957	Propane and Liberty Electricity	
Mental Health	107655 Highway 395	Walker	13.6	2,162	1939	Propane and Liberty Electricity	
Medic 1	466 Mule Deer Road	Walker	5.75	0	1980	Propane and Liberty Electricity	1,300 SF, not paid by Mono County
Medic 1 Garage	466 Mule Deer Road	Walker		0	1980	Propane and Liberty Electricity	528 SF, not paid by Mono County
Park Restroom	Hackney Road	Walker	3.47	300	1988	Liberty Electricity	
				206,350		**Approximate Total Square Footage**	

Chalfant Community Center	123 Valley Road
Bridgeport Social Services	137 Emigrant Street
Bridgeport Animal Shelter	197 Jack Sawyer Road
Parks Building	201 Jack Sawyer Road
District 4 Road Shop (old)	207 Jack Sawyer Road
Maintenance Shop	207 Jack Sawyer Road
Tire Warehouse	207 Jack Sawyer Road
Courthouse Annex #2	25 Bryant Street
Courthouse	278 Main Street
District 1 Road Shop	332 South Landing Road
District 3 Road Shop	51596 Highway 395
District 5 Road Shop	62 Shop Road
Courthouse Annex #1	74 North School Street
June Lake Community Center	90 West Granite Avenue
Old County Jail	Bryant Street

R15-__

A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS AUTHORIZING PARTICIPATION IN THE CALIFORNIA ENERGY COMMISSION ENERGY PARTNERSHIP PROGRAM

WHEREAS, the California Energy Commission's Energy Partnership Program provides technical assistance in identifying energy efficiency improvements; and

WHEREAS, the Mono County Board of Supervisors authorizes the County of Mono to apply for technical assistance from the California Energy Commission; and

WHEREAS, the Mono County Board of Supervisors recognizes that the California Energy Commission has limited funds for technical assistance and that primary consideration will be given to those that are committed to implementing the recommended projects identified through the Energy Partnership Program;

NOW, THEREFORE, THE BOARD OF SUPERVISORS OF THE COUNTY OF MONO RESOLVES that:

SECTION ONE: The Mono County Board of Supervisors will seek funding, if necessary, to implement the recommended feasible energy efficiency projects identified through the Energy Partnership program.

SECTION TWO: The Mono County Administrative Officer, is hereby authorized and empowered to execute in the name of the County of Mono all necessary documents to implement and carry out the purposes of this Resolution.

PASSED, APPROVED and **ADOPTED** this 20th day of January, 2015, by the following vote, to wit:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Timothy E. Fesko, Chair
Mono County Board of Supervisors

ATTEST:

_____
Clerk of the Board

APPROVED AS TO FORM:

_____
County Counsel

CONSULTANT REPORT

ENERGY EFFICIENCY STUDY FOR EAST BAY REGIONAL PARK DISTRICT

District Headquarters

Prepared for: California Energy Commission Energy Partnership Program

Prepared by: kW Engineering

kW ENGINEERING

NOVEMBER 11, 2014

CONTRACT NUMBER: 400-13-001
WORK AUTHORIZATION #62

Prepared by:

Primary Author(s):
James Donson, P.E., LC

kW Engineering
287 17th Street, Suite 300
Oakland, CA 94611
510-834-6420
www.kw-engineering.com

Contract Number: 400-13-001
Work Authorization #62

Prepared for:

California Energy Commission

Anne Fisher
Contract Manager

Amir Ehyai
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Marcia Smith
Office Manager
Local Assistance and Financing Office

Dave Ashuckian
Deputy Director
Energy Efficiency Division

Robert Oglesby
Executive Director

Table of Contents

Preface

This study was prepared as a result of a request from East Bay Regional Park District (District) for assistance under the Energy Partnership Program. This California Energy Commission (Energy Commission) program assists cities, counties, special districts, hospitals, public care facilities, and colleges or universities in identifying projects that can cut energy use and cost in existing and planned facilities. Once the projects are identified, the program can provide additional assistance to help implement or finance the recommendations. Financial assistance for the implementation of recommendations may also be available through the Energy Commission's Energy Efficiency Financing Program, which requires a separate application. The Energy Commission's low interest loans provide competitive financing and are structured so that the estimated project savings are the basis for the loan repayments.

The intent of this energy analysis report is to estimate energy savings associated with recommended upgrades to the heating, ventilation, and air conditioning (HVAC) and lighting systems at the District headquarters located at 2950 Peralta Oaks Court in Oakland, California. The District has a history of participating in Pacific Gas and Electric (PG&E) incentive programs in the past. Appropriate details are included in sections 2-5 of this report to make decisions about implementing energy efficiency measures at the facility. However, this report is not intended to serve as a detailed engineering design document. The descriptions of the improvements are only diagrammatic in nature in order to document the basis of cost estimates and savings, and to demonstrate the feasibility to construct the improvements. It should be noted that detailed design efforts may be required in order to implement several of the improvements evaluated as part of this energy analysis. As appropriate, costs for those design efforts are included as part of the cost estimate for each measure.

This study was conducted for the Energy Commission by kW Engineering, Inc., under the direction of Bruce Chamberlain, C.E.M. The contract assignment was directed and managed by Amir Ehyai from the Energy Commission. kW Engineering and Energy Commission staff appreciate the assistance provided by all District staff during the study.

1 Executive Summary

A. Focus and Scope of the Audit

On behalf of the California Energy Commission's Energy Partnership Program, kW Engineering performed an energy audit of the 43,273 sq. ft. East Bay Regional Park District (District) headquarters located at 2950 Peralta Oaks Court in Oakland, California. The site visit took place on July 3, 2014. The audit focused on identifying energy savings opportunities for exterior and interior lighting systems and the heating, ventilation, and air conditioning (HVAC) systems. A separate audit, conducted by Sage Renewables, evaluated the status of the existing photovoltaic (PV) panels and the further potential for on-site renewable energy.

B. Annual Energy Use and Cost

The District spends approximately $117,400 annually for energy at their headquarters. The energy use breakdown is $104,100 for electricity (89%) and $13,300 for natural gas (11%). The facility site energy use intensity is 93.4 kBtu/ft², which corresponds to a source energy use intensity[1] of 219.4 kBtu/ft². The on-site solar generation accounts for 6.4 kBtu/ft² (6.9% of the site energy use intensity).

C. Energy Project Recommendations

This report identifies 13 potential energy efficiency measures and 1 alternative measure. Of the 13 potential energy efficiency measures, 10 measures are recommended. Four energy efficiency measures are not recommended. The 10 recommended measures account for 263,000 kWh of annual electricity savings and 4,200 therms of annual gas savings, amounting to $44,800 of savings per year or about 35% of the current annual electricity bills and 28% of the annual gas bills. These measures would require an investment of about $262,500 and could qualify for utility incentives of $15,000, resulting in a net payback after incentives of 5.5 years. These measures would reduce annual greenhouse gas (GHG) emissions by approximately 71.0 metric tons. In addition, these measures will contribute to upgrading the existing mechanical and lighting systems, improving occupant comfort and reducing maintenance costs.

D. Project Summary Tables

The following Table 1.1 summarizes the measures that are recommended for this facility. There are six Low Cost Measures (LCM) and four Capital Improvement Measures (CIM). Table 1.2 summarizes measures that were analyzed but not recommended.

[1] Source energy conversion factors are 10,716 Btu/kWh, 100,000 Btu/therm, 92,500 Btu/gal propane and 138,500 Btu/gal fuel oil. Conversions are based on California Energy Commission Proposition 39 Calculators. Electricity conversion rate is the same as the national average for Energy Star.

Table 1.1: Energy Efficiency Measures Summary

Measure Number	Measure Description	Annual Energy & Cost Savings					Financial Metrics			
		Peak Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Total Cost Savings	CO_2 Savings (tons/yr)	Measure Cost	Potential Utility Incentive	Net Measure Cost	Simple Payback
LCM-1	Install Dampers, Ducting and Controls to Minimize Outside Air Intake during Morning Warm-up and Hot Weather, and to Increase Outside Air Intake during Free Cooling Conditions	-	9,262	(886)	$ 654	(3.0)	$ 8,700	$ 741	$ 7,959	12.2
LCM-2	Reset Hot Deck and Cold Deck Temperatures Based on Zone Temperature Feedback	8.1	8,399	2,031	$ 3,124	12.3	$ 3,600	$ 1,800	$ 1,800	0.6
LCM-3	Reset the Condenser Water Temperature Based on the Outside Air Wetbulb Temperature	3.7	2,225	-	$ 347	0.4	$ 10,200	$ 548	$ 9,652	27.8
LCM-4	Reset the Chilled Water Temperature Based on the Air Handler Chilled Water Valve Positions	2.4	20,687	-	$ 3,227	3.9	$ 5,000	$ 1,895	$ 3,105	1.0
CIM-6a	Add Variable Frequency Drives to Air Handler Supply Fans & Reduce the Fan Speed When the Zone Temperatures Meet Setpoint	(0.1)	37,530	3,051	$ 8,579	23.2	$ 57,000	$ 4,800	$ 52,200	6.1
CIM-7a	Lighting Controls Upgrade: Recircuit Lighting for Zone Control, Install Occupancy Sensors, Install Override Controls, and Reduce Schedule	-	51,501	-	$ 8,034	9.6	$ 95,000	$ -	$ 95,000	11.8
CIM-8	Redesign Exterior Façade Lighting with Bi-Level LED Fixtures	-	9,004	-	$ 1,405	1.7	$ 18,000	$ 720	$ 17,280	12.3

Table 1.1: Energy Efficiency Measures Summary (continued)

Measure Number	Measure Description	Annual Energy & Cost Savings					Financial Metrics			
		Peak Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Total Cost Savings	CO_2 Savings (tons/yr)	Measure Cost	Potential Utility Incentive	Net Measure Cost	Simple Payback
LCM-10	Install Centralized Personal Computer (PC) Power Management Software	-	31,000	-	$ 4,836	5.8	$ 3,300	$ 2,250	$ 1,050	0.2
LCM-11	Install Smart Power Strips to Turn-Off Non-Essential Plug Load Devices in Open & Private Offices	-	18,780	-	$ 2,930	3.5	$ 6,700	$ 2,250	$ 4,450	1.5
CIM-12	Replace Existing On-Site Servers, Install New, Virtualized Servers, and Replace Split System	12.7	75,052	-	$ 11,708	14.0	$ 55,000	$ -	$ 55,000	4.7
TOTALS (All Recommended Measures)		**26.8**	**263,440**	**4,196**	**$ 44,844**	**71.4**	**$ 262,500**	**$ 15,004**	**$ 247,496**	**5.5**

Table 1.1: Energy Efficiency Measures Summary (continued)

Basic Assumptions

Assumed Annual Electricity Rate	$ 0.1562	/kWh	Average for recent 12 months, this facility	
Assumed Annual Gas Rate	$ 0.0894	/therm	Average for recent 12 months, this facility	
Equivalent CO_2 Reduction, Electricity	0.412	lbs CO_2/kWh	PG&E	April 2013 prediction for 2014
Equivalent CO_2 Reduction, Natural Gas	11.691	lbs CO_2/therm	EPA 2013	

2014 PG&E Incentives - July 1, 2014

Customized Retrofit Incentives (CRI)		
Cost Cap (each project)	50%	
Peak Electricity Demand Reduction	$150.00	per peak kW
Targeted Lighting	$0.08	per kWh
Basic Lighting	$0.03	per kWh
Targeted Non-Lighting	$0.15	per kWh
Basic Non-Lighting	$0.08	per kWh
Natural Gas	$1.00	per therm
Retrocommissioning Program (RCx)		
Cost Cap (each project)	50%	
Peak Electricity Demand Reduction	$100.00	per peak kW
Electricity Savings	$0.08	per kWh
Natural Gas	$1.00	per therm

Deemed Rebates		
VFD HVAC Fan (H148)	$80.00	per hp
LED Exterior (LT012)	$70.00	per fixture
LED Exterior (LT013)	$60.00	per fixture
LED Exterior (LT015)	$40.00	per fixture
Smart Power Strip Incentive (L65)	$15.00	per strip
PC Power Management Software (M03)	$15.00	per license

Table 1.2: Measures Analyzed but Not Recommended

Measure Number	Measure Description	Annual Energy & Cost Savings				Financial Metrics			
		Peak Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Total Cost Savings	Measure Cost	Potential Utility Incentive	Net Measure Cost	Simple Payback
CIM-5	Install a Waterside Economizer to Minimize Chilled Water Energy Consumption during Mild Weather	0.2	14,235	-	$ 2,221	$ 71,000	$ 1,169	$ 69,831	31.4
CIM-6b	Option 2: Retrofit the Air Handlers with Variable Air Volume Dual Duct Zone Boxes and Controls	-	61,445	2,508	$ 11,825	$ 192,000	$ 7,424	$ 184,576	15.6
CIM-7b	Redesign Interior Lighting including New Pendant Fixtures with Daylighting Control & Task Tuning, Remove Vertical Blinds on Clerestory Windows, Add Task Lighting	17.0	55,758	-	$ 8,698	$ 323,000	$ 7,013	$ 315,987	36.3
CIM-9	Replace Parking Lot Fixtures with Bi-Level LED Fixtures	-	10,854	-	$ 1,693	$ 29,000	$ 868	$ 28,132	16.6
TOTALS (Non-Recommended Measures)		**17.2**	**142,291**	**2,508**	**$ 24,437**	**$ 615,000**	**$ 16,473**	**$ 598,527**	**24.5**

2 Facility Background and Site Information

2.1 Facility Description

The East Bay Regional Parks District headquarters (headquarters building) is a single four-story, split-level building with a total area of 43,273 sq. ft. The headquarters building includes perimeter private offices, large open office areas, conference rooms, and a board room. The building was constructed in 1966 and has been occupied by the District for approximately 23 years.

Figure 2.1: Overhead View of the District Headquarters

2.2 Building Occupancy

The headquarters building is generally occupied from 6:30 a.m. to 6:00 p.m. Monday through Friday. Daily cleaning by dedicated janitorial staff begins at 4:30 p.m. and ends by 9:30 p.m. Most District staff observe 13.5 holidays per year, as follows:

- New Year's Day
- Martin Luther King, Jr. Day
- Lincoln's Birthday
- Washington's Birthday
- Cesar Chavez's Birthday
- Memorial Day
- Independence Day
- Labor Day
- Admission Day
- Veteran's Day
- Thanksgiving Day
- Day After Thanksgiving
- Christmas Eve (half day)
- Christmas Day

2.3 Weather

Hourly weather data for Oakland, California was obtained from the Typical Meteorological Year set 3 (TMY3) for Oakland International Airport (Bin 724945, Bin index 4, CEC climate zone 4). The American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) design conditions (Fundamentals 2013 Chapter 14) for this location are for 39.0 °F for heating (99% heating conditions) and 82.3 °F dry-bulb and 64.3 °F wet-bulb for cooling (1% cooling conditions).

3 Energy-Using Systems

3.1 Heating, Ventilation and Air Conditioning

The District has two large, multi-zone, single-fan, dual duct air handlers serving the building. Both air handlers are constant-volume and original to the building. Both air handlers have fixed outside air fractions and share the same mixed air plenum. Table 3.1 summarizes the air handler mechanical specifications.

Table 3.1: Air Handler Specifications

Air Handler	Supply Fan Flow (CFM)	Fixed Outside Air Flow (CFM/%)	Total Static Pressure (in w.c.)	Motor Size (hp)	Motor Efficiency	Cold Deck Max. Flow (CFM)	Cooling Capacity (tons)	Hot Deck Max. Flow (CFM)	Heating Capacity (kBtu/hr)
AHU-1	25,150	5,750 (22%)	2.25	20	93.0%	20,800	45.8	18,000	545
AHU-2	42,250	5,270 (12%)	2.50	40	94.5%	33,330	76.8	30,800	902

Air handler unit 1 (AHU-1) is located on the first floor of the building inside the south concrete tower. AHU-1 serves the entire first floor, the entrance lobby on the second floor, and the private offices on the east side of the third floor. The first floor zones (zone 3 through zone 11) have constant volume mixing boxes in the ceiling above the zones. The second floor zone (zone 2) and third floor zone (zone 1) have constant volume mixing dampers installed on the duct leaving the air handler.

AHU-2 is located in a mechanical room off the facility manager's office on the third floor inside the south concrete tower. AHU-2 serves 19 zones on the second, third, and fourth floors. The constant volume mixing dampers are installed on the discharge of the air handler.

Figure 3.1: AHU-1 Hot and Cold Decks (left) and Zone Mixing Dampers (right)

Figure 3.2: AHU-2 Zone Mixing Dampers on the Air Handler Discharge

The chilled water coils in AHU-1 and AHU-2 are served by a Trane screw chiller with a single compressor. The chiller is about 16 years old and in very good shape. The chiller uses R-22 refrigerant and has a high nominal efficiency of 0.78 kW/ton or an energy efficiency ratio (EER) of 15.4. The chiller's condenser water is provided by a forced-draft Baltimore Aircoil Company (BAC) cooling tower on the roof. The cooling tower has two fan motors, one 10-horsepower (hp) high speed motor, and one 6-hp low-speed motor.

Figure 3.3: Trane Screw Chiller (left) and BAC Cooling Tower (right)

The heating hot water coils are supplied by a non-condensing, AJAX boiler (model number WEG2500). The boiler is approximately 15 years old and rated for 1,806 kBtu/hr with a nominal efficiency of 85%. The boiler has a PowerFlame burner assembly with mechanical linkages and a 1/3 hp combustion fan. The PowerFlame burner assembly can control excess oxygen supplied to the boiler within 3% to 5%.

The chilled water, condenser water, and heating hot water loops have a single pump each, described in Table 3.2.

Table 3.2: Pump Performance Summary

Pump	Flow (gpm)	Total Dynamic Head (feet)	Motor Size (hp)	Motor Efficiency
Chilled Water	295	60	7.5	88.5%
Condenser Water	318	55	7.5	82.5%
Heating Hot Water	145	27	2	86.5%

HVAC Controls

The District recently replaced all of the pneumatic controls and actuators in the facility with a new direct-digital control (DDC) system. The controls were set up to mimic the existing controls and do not leverage all of the capabilities the new DDC system provides. The chiller, boiler, pumps, and air handlers are all directly addressable from the control system. The cooling tower remains isolated from the DDC system, in that it cannot be centrally controlled; however, the status of the cooling tower (status, fan stage, etc.) is visible from the central system.

3.2 Lighting

The District headquarters uses 4-foot T8 fluorescent fixtures in most areas. The fixtures were converted from T12 lamps and magnetic ballasts to T8 lamps and electronic ballasts in 1999 as part of an energy service company (ESCO) project. The current ballasts are Sylvania Quicktronic, instant-start ballasts with normal ballast factors (0.88). Most T8 lamps are 32 watt, long-life, 800-series with a color rendering index (CRI) of 85 and a color temperature of 4100 kelvin (K). There are both Sylvania and Philips lamps on site.

Most of the District headquarters has recessed fixtures with dropped translucent white lenses and multiple lamps. The first floor has a combination of 2-foot by 4-foot fixtures in the office areas and board room, while the hallway has 2-foot by 2-foot fixtures. The second, third, and fourth floors have similar recessed fixtures. The second floor, half of the third floor, and the fourth floor have 4-foot by 4-foot fixtures and 4-foot by 8-foot fixtures mixed with slightly narrower, 3.5-foot by 12-foot or 3.5-foot by 16-foot fixtures. The storage and mechanical areas have a mixture of prismatic wrap fixtures and linear strip fixtures with two, 4-foot lamps each. The stairwells have 2-lamp corridor wrap fixtures.

The interior lighting zones are wired in large groups with very few local controls. The lights are manually controlled by occupants and are supposed to be shut off by janitorial staff as they pass through various areas. The fourth-floor private offices have low-voltage light switches in each office. The conference rooms on the fourth floor have auto-on, ceiling occupancy sensors. The conference room on the second floor has a manual-on, auto-off switch-replacement occupancy sensor. The restrooms on the second, third, and fourth floors have auto-on, auto-off occupancy sensors. The break room has a ceiling occupancy sensor and no manual switch.

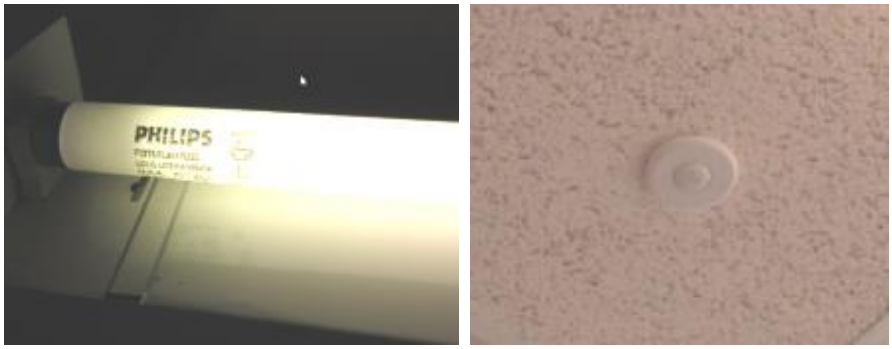


Figure 3.4: Lamp (left) and Occupancy Sensor (right)

The building has a few outdoor high intensity discharge (HID) fixtures around the perimeter of the building, primarily wall pack fixtures and flood lights mounted on the roofline. The delivery driveway (adjacent to the second floor and below the third floor) has recessed downlight fixtures with a cowling that extends two to three inches below the ceiling with compact fluorescent reflector lamps (CFL-R), and large, circular recessed fixtures with transparent acrylic lenses and four T8 lamps. The downlights are not in use and the circular fixtures operate continuously. The parking lot has six, 250-watt metal halide light fixtures evenly spaced throughout the parking lot.

Figure 3.5: Metal Halides Fixtures (left) and High Pressure Sodium (middle and right)

The wall pack, flood, and parking lot fixtures are photocell controlled. The circular fixtures in the covered driveway operate continuously. The downlights in the same area are not in use.

3.3 Other Systems

Server Room

There is a small server room on the first floor of the District headquarters. The server room contains three small server racks and an uninterruptable power supply (UPS) serving the server equipment only. During the site visit, the UPS was drawing 7.7 kW of power.

The server room is cooled by a small split system fan coil and a Liebert computer room air conditioner (CRAC). The fan on the fan coil operates continuously to circulate air in the server room while the fan coil compressor only runs when the Liebert CRAC is offline. The CRAC

operates continuously to maintain its return air temperature at 70 °F and does not have any active humidity controls.

Printing Room

The first floor also houses a small printing room for preparing flyers, calendars, and other printed goods. There are two large digital printers with a dedicated, full-time staff member assigned to preparing and managing printed products. The printers run four hours per day, on average.

The heat generated by the printers is too much for the zone mixing box on AHU-1; therefore, the room has a supplementary split system fan coil on a seven-day programmable thermostat. The split system is approximately 20 years old.

Electric Vehicle Charging Station

There are two electric vehicle charging stations on site for charging district-owned, electric vehicles.

Domestic Hot Water

There is a 40-gallon natural gas-fired domestic hot water heater in the first floor mechanical room. The domestic hot water heater serves break room kitchen sinks and restroom faucets. The heater has an offset, forced-draft stack, which minimizes heat loss. The domestic hot water loop has a small, in-line circulation pump to recirculate water to maintain water temperature in the distribution loop and decrease the time for hot water to reach the faucets in the restrooms.

3.4 On Site Generation

The District has three solar PV panel arrays on the roof of the second and third floors. The two arrays on the second floor roof have 180 panels each. The array on the third floor roof has 156 panels. The electric inverter, which converts direct current (DC) electricity produced by the solar panels to alternating current (AC) electricity used by the electricity grid and devices on site, is located in the south-east concrete tower well. The inverter is a Xantrex (model number PV-100208) and is maintained and sub-metered by SunPower.

The energy generated by the solar panels has decreased by 32% over the last few years. The solar generation submeter data is incomplete for 2013; however, in 2012, the solar array generated about 80,000 kWh/yr, or 11% of the total site energy consumption.

A separate audit, conducted by Sage Renewables, evaluated the status of the existing PV panels and the further potential for on-site renewable energy.

4 Site Energy Use and Costs

This section provides a review of historical electricity consumption (kWh) and natural gas consumption (therms) at the District headquarters. Electricity and natural gas are provided by PG&E.

4.1 Electricity Consumption

The following table and figure show the electricity consumption history for the District headquarters, which is provided by a single meter. The District has a 516 panel solar PV system, which is independently metered from the utility electricity meter. The utility electricity meter is on an A-10S NEMEXPM tariff, which is a Net-Metered Medium General Demand-Metered Service. This tariff has a time-of-use charge based on when energy is consumed, as described in Table 4.1. The tariff also includes a monthly charge for the highest, 15-minute average electricity demand.

Table 4.1: Time of Use Periods

Winter (November 1 through April 30)		
Period	**Time of Day**	**Days of the Week**
Partial-Peak	8:30 a.m. to 9:30 p.m.	Monday through Friday
Off-Peak	9:30 p.m. to 8:30 a.m.	Monday through Friday
	All Day	Saturday, Sunday, Holidays
Summer (May 1 through October 31)		
Period	**Time of Day**	**Days of the Week**
Peak	12:00 p.m. to 6:00 p.m.	Monday through Friday
Partial-Peak	8:30 a.m. to 12:00 p.m. & 6:00 p.m. to 9:30 p.m.	Monday through Friday
Off-Peak	9:30 p.m. to 8:30 a.m.	Monday through Friday
	All Day	Saturday, Sunday, Holidays

Table 4.2: Monthly Electricity Consumption, Peak Demand and Cost

Month	Peak Demand (kW)	PG&E Electricity Consumption (kWh)	Solar Electricity Consumption (kWh)	Total Electricity Consumption (kWh)	Average Daily Consumption (kWh/day)	Total Electricity Cost ($)
Jan-13	174	56,320	4,503	60,823	1,905	$ 1,126
Feb-13	177	56,240	5,892	62,132	2,085	$ 1,129
Mar-13	168	56,400	6,550	62,950	2,091	$ 1,079
Apr-13	178	55,040	9,634	64,674	2,097	$ 1,139
May-13	169	54,880	10,884	65,764	2,180	$ 1,433
Jun-13	170	52,720	10,719	63,439	2,115	$ 2,406
Jul-13	190	56,400	10,746	67,146	2,109	$ 2,682
Aug-13	167	52,080	3,610	55,690	1,912	$ 2,361
Sep-13	170	55,840	7,023	62,863	2,095	$ 2,406
Oct-13	170	51,840	5,838	57,678	2,040	$ 84,709
Nov-13	177	60,240	311	60,551	1,893	$ 2,339
Dec-13	177	58,320	4,471	62,791	2,026	$ 1,277
Annual Totals	190	666,320	80,182	746,502	2,046	**$ 104,086**
Average Cost of PG&E Electricity ($/kWh)						**$0.156**

Note that Table 4.2 shows low electricity costs throughout the year with a large annual Net-Metering adjustment in October.

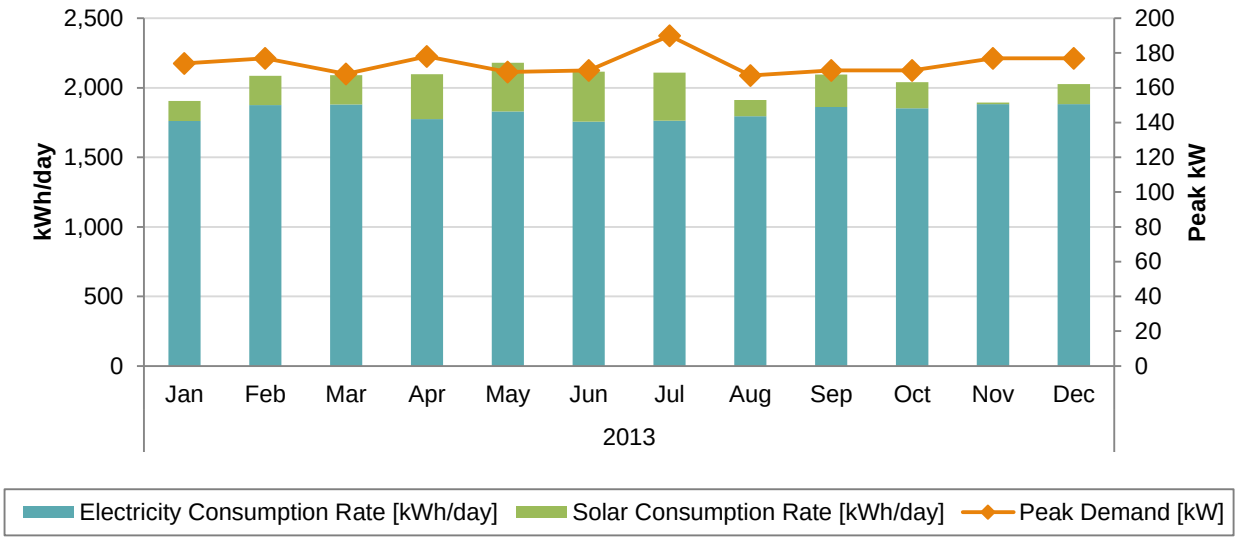


Figure 4.1: Monthly Average Daily Total Electricity Consumption

Figure 4.1 shows very steady electricity use through the year. The steady electricity use is consistent primarily due to the moderate climate, constant-speed air handling equipment and long chiller run hours. Steady chiller use is necessary because the air handlers lack a functional economizer.

4.2 Natural Gas Consumption

The following table and figure show the gas consumption history for the District headquarters, which is provided by a single meter (Meter number 1955827). Gas usage is billed at the GNR-1 rate schedule.

Table 4.3: Monthly Natural Gas Consumption and Estimated Cost

Month	Natural Gas Consumption (therms)	Total Gas Cost ($)
Jan-13	1,895	$ 1,720
Feb-13	1,872	$ 1,651
Mar-13	1,728	$ 1,594
Apr-13	1,400	$ 1,229
May-13	1,076	$ 956
Jun-13	1,280	$ 1,166
Jul-13	832	$ 737
Aug-13	827	$ 708
Sep-13	678	$ 580
Oct-13	632	$ 531
Nov-13	1,085	$ 908
Dec-13	1,603	$ 1,548
Annual Totals	14,908	**$ 13,327**
Average Cost of Gas ($/therm)		**$0.894**

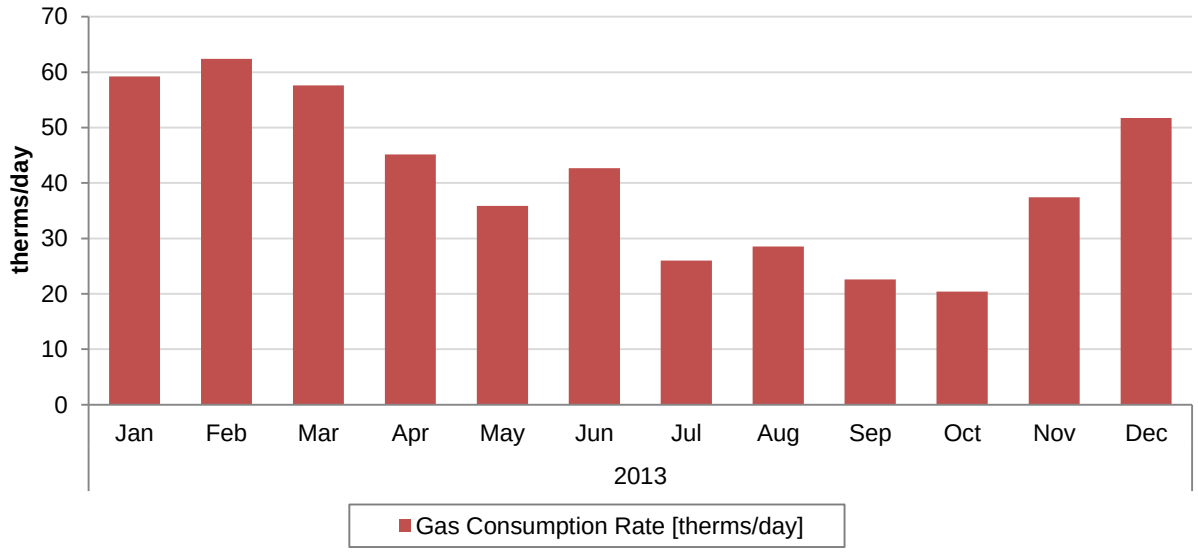


Figure 4.2: Monthly Average Daily Natural Gas Consumption Rates

Figure 4.2 shows a clear seasonal pattern associated with space heating.

4.3 Total Cost of Energy

The total annual cost of energy at the District headquarters is approximately $117,400. The following figure shows the monthly breakdown of electric and gas costs. The on-site PV generation reduces the annual electricity bills by approximately $12,500 each year.

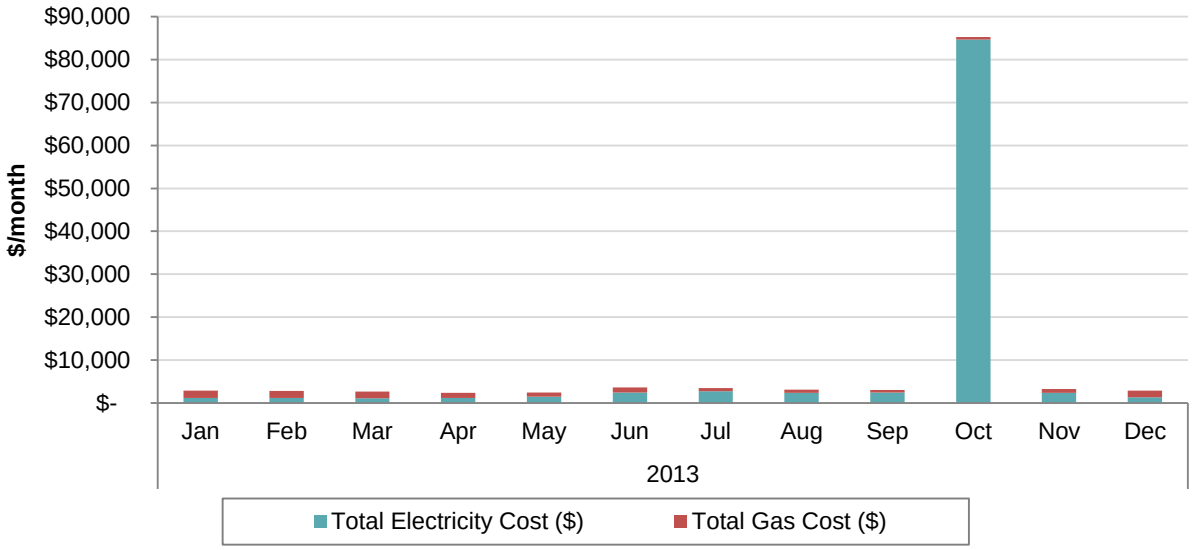


Figure 4.3: Estimated Total Monthly Energy Costs

Note that Figure 4.3 shows a large rate adjustment in October associated with the net-energy meter (NEM) electricity tariff.

4.4 Energy Use Benchmarks

The facility site energy use intensity is 93.4 kBtu/ft², which corresponds to a source energy use intensity[2] of 219.4 kBtu/ft². These figures include the use of on-site generation.

Benchmarking compares the energy use of a facility to those of similar size and purpose. The energy use is compared on a "per square foot" basis to enable comparisons of different sized buildings.

EnergyIQ, from Lawrence Berkeley National Laboratory, is a benchmarking service using the 2006 Commercial End Use Survey (CEUS) data. EnergyIQ contains a database of sites with a high degree of granularity to compare specific commercial site types, vintages, and locations. Figure 4.4 and Figure 4.5 compare the electricity and fuel consumption of the District headquarters (gold bar) against the EnergyIQ dataset for similar office buildings

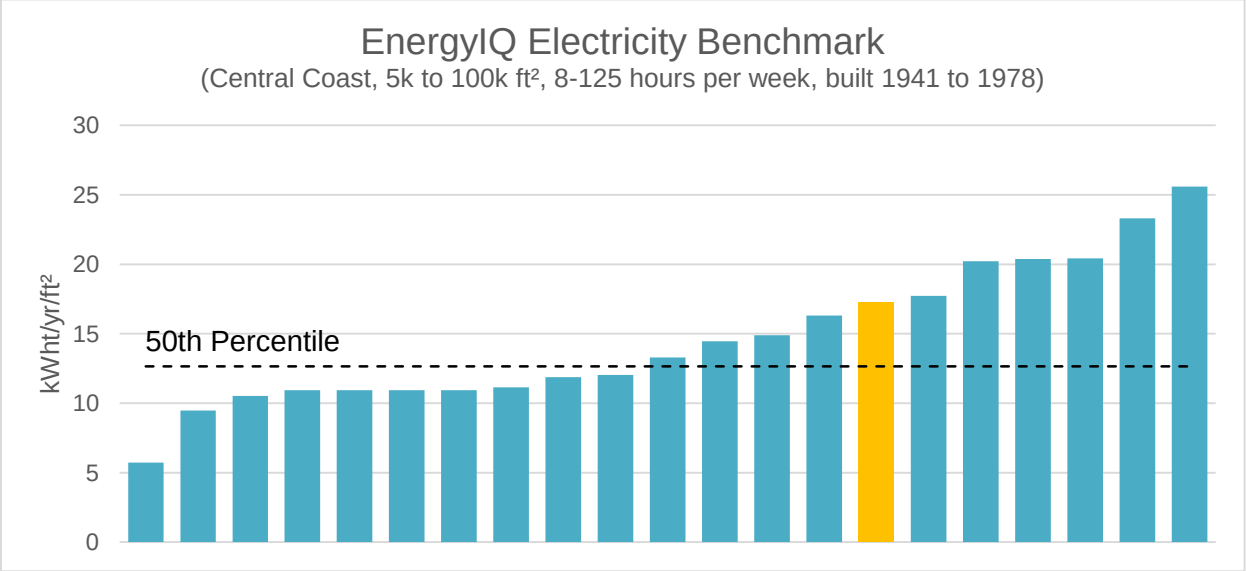


Figure 4.4: EnergyIQ Electricity Benchmark

The electricity use at the District headquarters (17.3 kWh/yr/sq. ft.) is above the 50th percentile (13.3 kWh/yr/sq. ft.). The high electricity benchmark is likely due to the manual lighting controls, the lack of airside air handler economizers for free cooling, and simultaneous heating and cooling on the air handlers.

[2] Source energy conversion factors are 10,716 Btu/kWh, 100,000 Btu/therm, 92,500 Btu/gal propane and 138,500 Btu/gal fuel oil. Conversions are based on California Energy Commission Proposition 39 Calculators. Electricity conversion rate is the same as the national average for Energy Star.

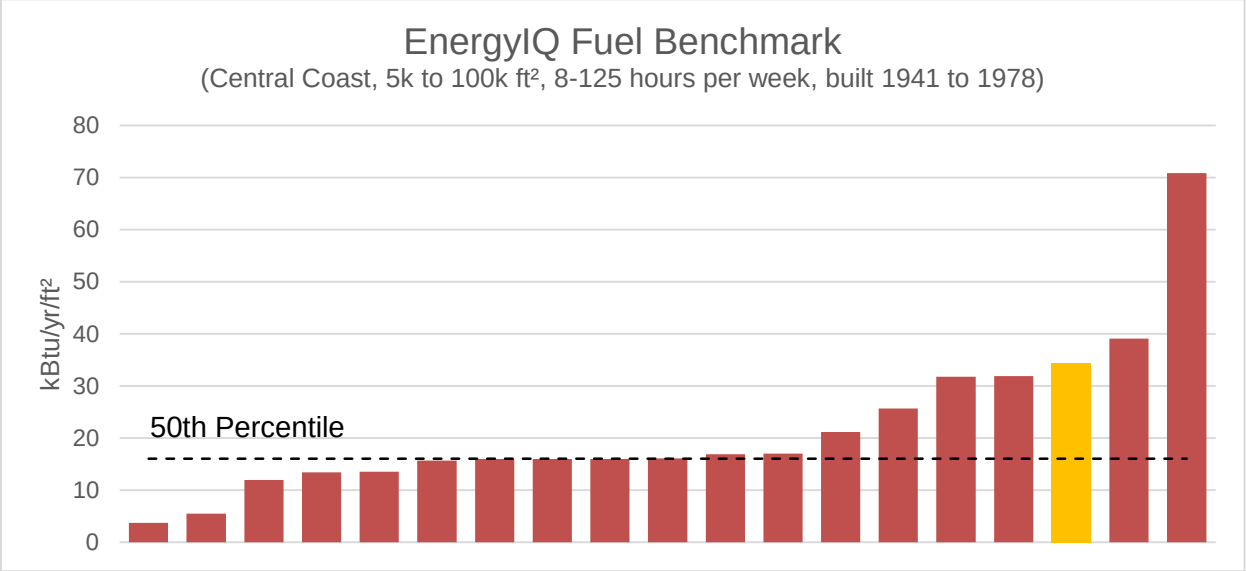


Figure 4.5: EnergyIQ Fuel Benchmark

The natural gas use at the District headquarters (34.5 kBtu/yr/sq. ft.) is roughly double the 50th percentile (18.3 kBtu/yr/sq. ft.). The very high natural gas use is likely due largely to simultaneous heating and cooling on the dual-duct air handlers.

4.5 Energy Balance

In order to estimate potential energy savings, an energy use baseline is necessary. The baseline conditions represent how the facility operates without proposed energy efficiency measures in place.

An estimated electricity end-use breakdown based on that analysis is shown in the following chart.

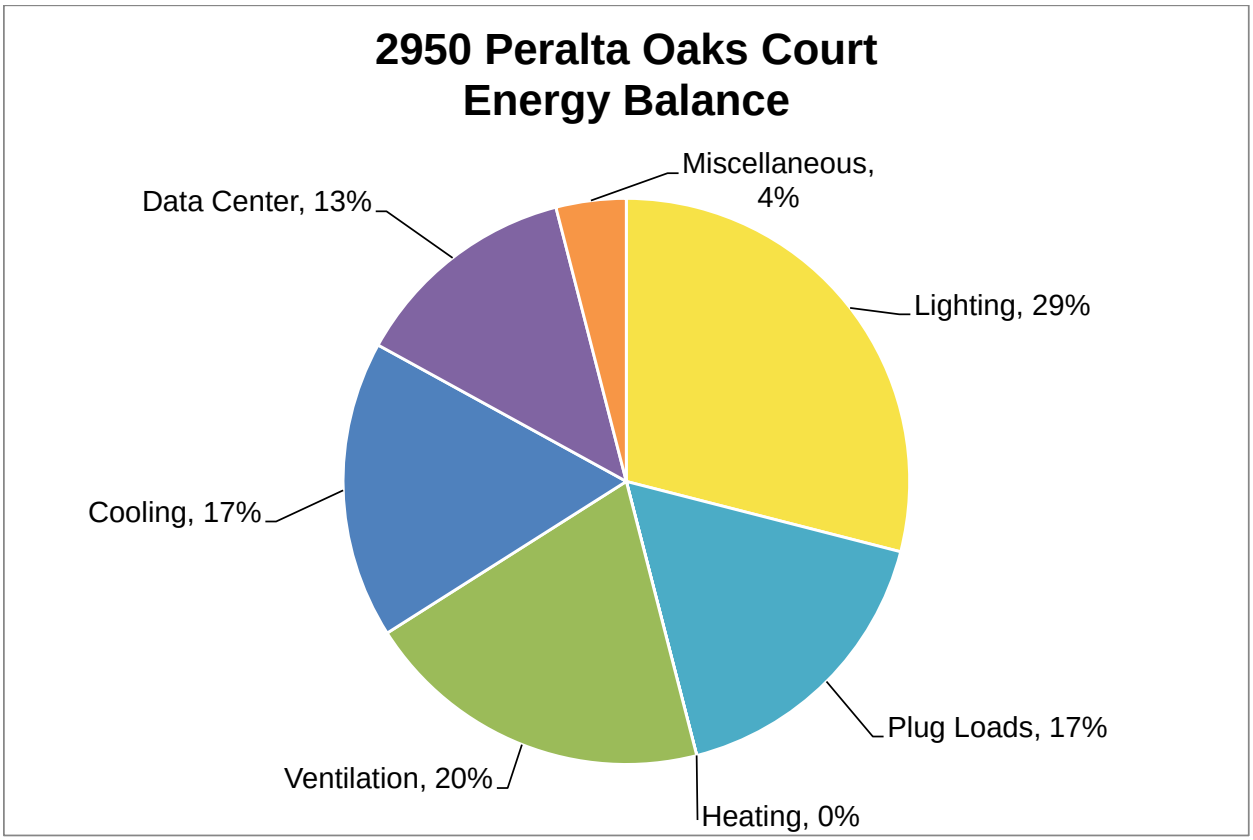


Figure 4.6: Electric Energy Balance

The lighting energy use is based on a detailed inventory of fixtures by space using reflected ceiling plans and information gathered on site. The plug load consumption is based on observations collected on site and typical plug loads in office buildings. The ventilation energy includes detailed energy consumption calculations for the air handlers and calculations based on the nameplates for other ventilation systems. The chilled water plant energy consumption is based on a detailed model. The data center energy use is based on UPS electrical readings and nameplate performance of the systems serving the data center. The miscellaneous loads include the transformer losses at 50% load for the original, inefficient transformers and the domestic hot water pump energy use. Operating hours for the equipment was provided by site staff.

Note the electric heating end-use only includes the heating hot water pump, which consumes far less than one percent of the energy used on site.

An estimated natural gas end-use breakdown is shown in the following figure.

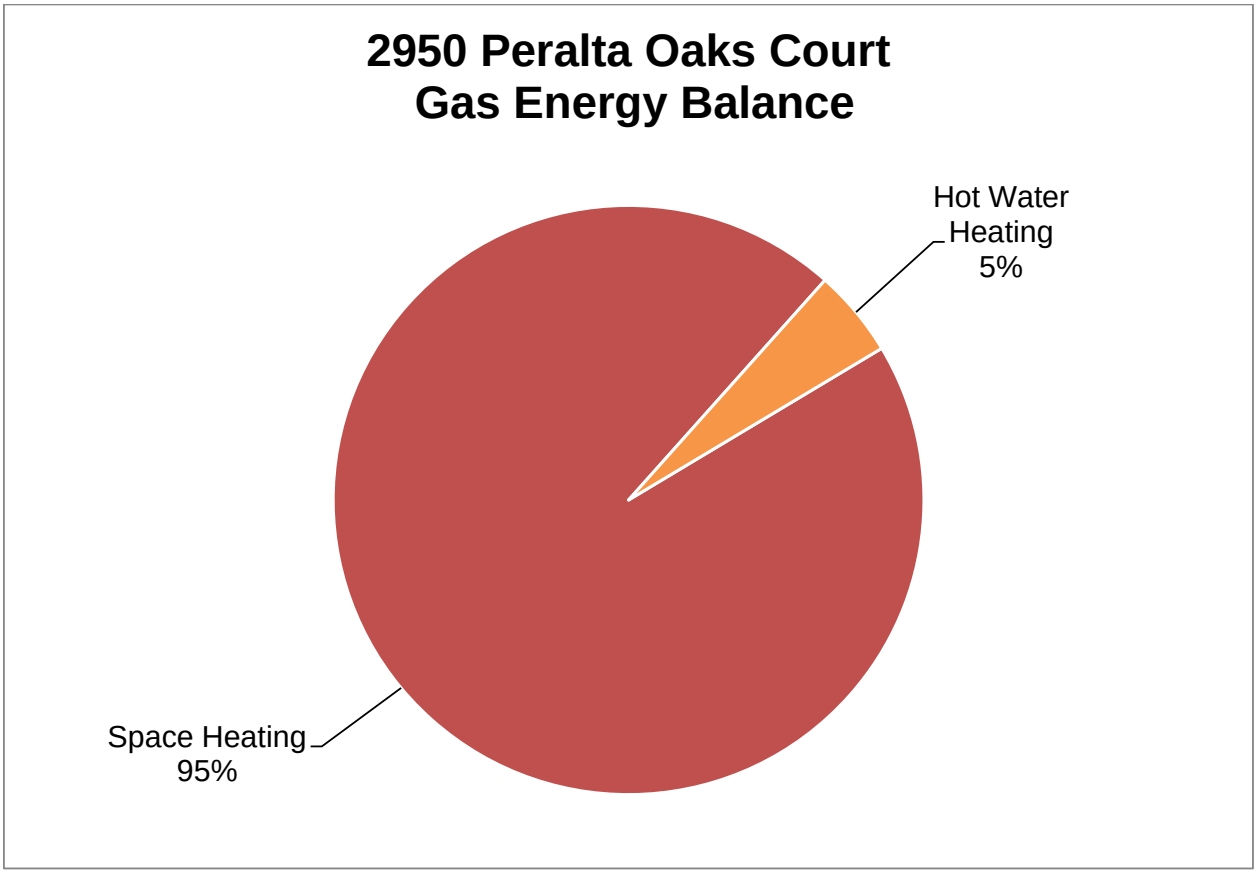


Figure 4.7 Natural Gas Energy Balance

The space heating energy use is based on detailed air handler and boiler models. The hot water heating (hot faucet tap water) is based on the California Commercial End-Use Survey for Offices in the same climate zone.[3]

[3] California Commercial End-Use Survey, Itron, Inc., March 2006, CEC-400-2006-005, http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF

5 Energy Project Opportunities

5.1 Energy Analysis Methodology

A site visit was performed to collect nameplate and operational data for mechanical equipment and lighting systems, and to identify potential energy efficiency measures. During the site visit, the following data were collected:

- A sampling of lighting fixtures and controls
- Mechanical system nameplate specifications and control means
- Operation documents and mechanical drawings, and
- Observations and photographs of conditions and controls.

Spreadsheet calculations (see Appendix) were used to estimate energy savings from potential measures for mechanical, lighting, and plug load systems. The baseline load (kW or kBtu/h) and hours of operation were used to calculate the annual baseline energy usage. The proposed energy usage is dependent on changes to either the load or hour of operation or both. The difference between baseline and proposed energy usage is the energy savings. Energy cost savings are calculated by multiplying the energy savings by the energy rate. For some measures, the load was estimated at various outside air temperature bins to account for weather dependent equipment demand and performance. Light fixture wattage was obtained from the standard lighting wattage table from California investor owned utilities (IOU) incentive programs. More information about specific methodology is provided in the Methodology section for each measure and in the Appendix.

5.2 No-Cost Measures (NCM)

No-cost measures are energy conservation, energy efficiency, or time-of-use management projects that have no associated cost, but may involve internal labor. These measures reduce energy usage and costs with no capital investment, except for the time and effort of the on-site maintenance personnel.

There were no no-cost measures identified.

5.3 Low-Cost Measures (LCM)

Low-cost measures are energy conservation, energy efficiency, or time-of-use management projects with a capital cost of less than $10,000. These measures may significantly reduce energy consumption and costs while requiring relatively little capital investment.

LCM-1: Install Dampers, Ducting and Controls to Minimize Outside Air Intake during Morning Warm-up and Hot Weather, and to Increase Outside Air Intake during Free Cooling Conditions

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	9,262	(886)	$654	$8,700	$741	$7,959	12.2

Observations

The air handlers in the headquarters building have fixed outside air and return air fractions. The two air handlers were installed in the south concrete tower and use the entire tower as a mixed air plenum. The south tower also contains two dedicated ducts for the boiler room in an adjacent mechanical room on the first floor. One of these ducts supplies fresh air to the boiler room and the other serves as the boiler exhaust.

As a result of the original installation, there is no means of installing an economizer to control the outside and return air fractions to enable free cooling, or to cease ventilation during the morning warm-up cycle. During morning warm-up the unoccupied building is in heating only mode with no need for ventilation.

Finally, the maximum available outside air fraction is currently limited by the duct sizing to the air handlers.

Figure 5.1: Outside Air Inlets for AHU-1 (left) and AHU-2 (right)

Recommendations

It is recommended to install mechanical isolation dampers on the outside air inlets on the air handlers. Control sequences should be developed to close these outside air inlet dampers

during morning warm-up. The air handlers can then bring up the zone temperatures to a comfortable temperature prior to the arrival of the first occupants, without taking in cold outside air.

In addition, sequences should be added to optimize when morning warm-up mode should be initiated. An optimized morning warm-up sequence polls the zone temperature sensors and determines how early the air handlers need to start to bring the building up to temperature. This sequence saves energy by starting the fans later if the building remains fairly warm, such as after a mild night, as opposed to after a cold winter night.

Last, it is recommended to repurpose the existing boiler outside air duct to provide additional outside air to the air handlers. Providing the air handlers with additional outside air will allow the air handlers to utilize more free cooling during mild weather and reduce the chiller energy consumption. This requires combining the boiler room outside air and exhaust ducts by dropping a stainless steel duct into the existing exhaust duct and using the existing exhaust duct to bring outside air to the boiler room. Dampers should be added and controlled to maintain the cold deck temperature. During warm weather, the dampers will be closed and during moderate weather they will be fully open, and during cold weather they will modulate to maintain the cold deck temperature.

Note that this proposed configuration will consume more natural gas during the occupied period, but reduce gas consumption during the morning warm-up cycle. This approach will result in net cost saving by increasing the amount of outside air available during cool weather and reducing the chiller operating hours.

Implementation Notes

This measure will require multiple outside air dampers, one for each of the existing outside air ducts. The location of the ducts was hard to verify while on site. It is recommended that the engineer of record or mechanical contractor review the mechanical drawings to ensure all of the outside air inlets are properly identified and the appropriately sized dampers are installed.

Bringing additional outside air into the building may cause building pressurization issues, which may manifest as slamming doors (negative pressure) or doors that do not close all the way (positive pressure). In the event that this is an issue, the mechanical contractor may have to install a building pressure sensor and limit the outside air fraction when building pressure gets too high. A variable air volume distribution system or increasing building exhaust may also mitigate any building pressure issues.

Methodology

Energy savings are calculated using a two-degree temperature bin simulation with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin-simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption.

The engineering calculations for the proposed system assume the air handlers use no outside air during the morning warm-up sequence. During the occupied period, it is assumed that the air handlers are capable of controlling the outside air fraction up to 35% of total air flow on both air handlers.

The annual hours of operation are assumed to be 4,171, which corresponds to 5:30 a.m. to 9:30 p.m. operation Monday through Friday for 52 weeks per year.

Costs and Incentives

The cost for this measure includes three new motorized dampers (two for the existing ducts and one for the proposed new duct), stainless steel exhaust duct for the boiler exhaust, and 16 hours of programming labor. The costs also include adders for additional installation, wiring, and controls costs, controls commissioning, and a contingency.

This measure may be eligible for PG&E's Retrocommissioning (RCx) Incentive program, which provides energy efficiency incentives at $0.08 per kWh/year saved, $1.00 per therm saved, and $100.00 per peak kW reduced capped at 50% of the installation cost. The potential incentive for this measure is based on this incentive program.

Note that while this measure may be eligible for PG&E's RCx Incentive program, the District will need to work with their PG&E account representative to submit an application and confirm eligibility in the program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/retrocommissioning/index.page

LCM-2: Reset Hot Deck and Cold Deck Temperatures Based on Zone Temperature Feedback

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
8.1	8,399	2,031	$3,124	$3,600	$1,800	$1,800	0.6

Observations

The air handlers in the headquarters building currently reset the hot and cold deck temperatures based on the outside air temperature. The reset sequence uses the outside air temperature as a rough proxy for building demand for heating or cooling. The headquarters building recently had all of the pneumatic zone controls replaced with DDC, which now provide zone temperatures and damper positions to the control system.

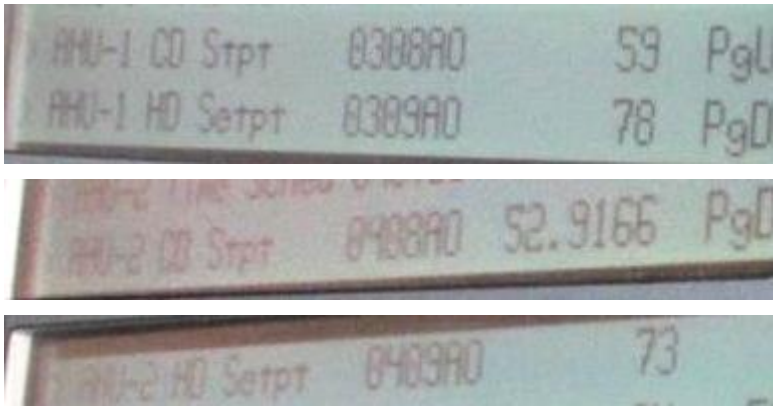


Figure 5.2: Hot Deck and Cold Deck Temperature Setpoints

Recommendations

It is recommended to reprogram the control sequences to reset the hot and cold deck temperatures based on zone temperatures and damper positions. Since the zones now have DDC thermostats and damper controls, using the outside air temperature as a rough proxy for zone load is unnecessary. The zone-based resets will save more energy compared to outside air temperature resets because of the direct response to actual zone demand. The reset will also be more responsive to changes in zone load.

Implementation Notes

It is recommended to use the zone temperature from the DDC controls to reset the duct temperatures. The reset should use the deviation between each zone temperature and temperature setpoint for that zone and use trim-and-respond control logic to set the duct temperatures based on the worst-case zone temperature.

As the zone heats up, the zone temperature will deviate from setpoint. On a regular basis (e.g. five minutes), the control system will check for zone deviation from setpoint. If there is one or more warm zone, the control system will lower the cold deck temperature (CDT) setpoint by set increment (e.g. 1 °F) and will repeat the process every five minutes, until all the zones are at

setpoint or the cold deck setpoint reaches a predetermined minimum temperature (e.g. 53 °F). If all the zones are cool (indicating no need for additional cooling) or if the zones are the desired temperature (minimal deviation from setpoint), the reset will raise the cold deck temperature by a small faction (e.g. 1 °F) every few minutes (e.g. five minutes) up to a predetermined maximum temperature (e.g. 63 °F).

The hot deck temperature (HDT) reset will work similar to the cold deck temperature reset, but in reverse (lowering the HDT setpoint when the zones are satisfied or warm; raising the HDT setpoint when the zones are cool).

Methodology

Energy savings are calculated using two-degree temperature bin simulations with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption.

The peak kW calculations in the baseline and proposed bin simulations use TMY-3 data selected to coincide with the peak period.[4] Since the weather in Oakland is slightly cooler than the average weather for the climate zone, the cooling system is not operating at design conditions for the defined summer peak period.

The engineering calculations for the proposed system assume the previous measure has been implemented (i.e. the air handlers use no outside air during the morning warm-up sequence). During the occupied period, it is assumed that the air handlers are capable of controlling the outside air fraction up to 35% of total air flow on both air handlers.

The annual hours of operation are assumed to be 4,171, which corresponds to 5:30 a.m. to 9:30 p.m. operation Monday through Friday for 52 weeks per year.

Costs and Incentives

The cost for this measure includes control technician labor. The control system has all of the capabilities necessary to achieve this measure and should only require programming and commissioning.

This measure may be eligible for PG&E's Retrocommissioning (RCx) Incentive program, which provides energy efficiency incentives at $0.08 per kWh/year saved, $1.00 per therm saved, and $100.00 per peak kW reduced capped at 50% of the installation cost. The potential incentive for this measure is based on this incentive program.

Note that while this measure may be eligible for PG&E's RCx Incentive program, the District will need to work with their PG&E account representative to submit an application and confirm

[4] "2013-14 Statewide Customized Retrofit Offering Procedures Manual for Business", Table 1.4, July 2014, http://www.aesc-inc.com/download/spc/2013SPCDocs/PGE/Customized%201.0%20Policy.pdf

eligibility in the program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/retrocommissioning/index.page

LCM-3: Reset the Condenser Water Temperature Based on the Outside Air Wet-bulb Temperature

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
3.7	2,225	0	$347	$10,200	$548	$9,652	27.8

Observations

The condenser water system at the headquarters has limited control from the central control system. The controls are not set from the main control panel; however, the control setpoints are visible. The cooling tower fan motors and spray pump are controlled to maintain a condenser water loop return temperature setpoint. Table 5.1 lists the cooling tower response according to the condenser water return temperature.

Table 5.1: Existing Cooling Tower Temperature Control

Condenser Water Return Temperature	Fan Status	Spray Pump
Below 72°F	Off	Off
72°F	Off	On
74°F	Low Speed	On
80°F and Above	High Speed	On

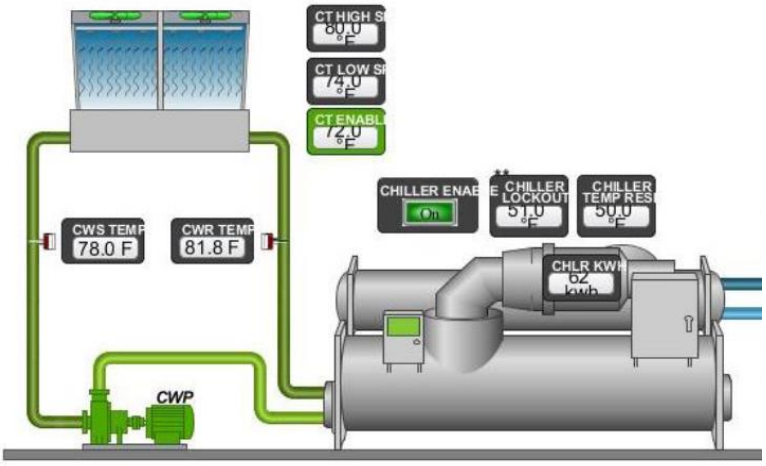


Figure 5.3: Cooling Tower Controls from the Building Automation System

The current cooling tower control does not directly control the condenser water supply temperature setpoint. The controls don't consider advantageous outdoor air conditions that would provide lower condenser water temperatures and improve the chiller efficiency.

Recommendations

It is recommended to install a new cooling tower controller on the central control system and implement control sequences for the cooling tower to reset the condenser water supply temperature according to the outdoor air wet-bulb temperature. This control sequence will operate the cooling tower fan more frequently, but in turn the chiller will be more efficient and save more energy than the added cooling tower fan energy.

Note that while this measure has a simple payback greater than the 13 years specified by the District, there was sufficient District interest in this measure to include it in the recommended measures.

Implementation Notes

Based on the size of the cooling tower, the control sequence should maintain a 13 °F approach to the outdoor air wet-bulb temperature. The chiller can handle condenser water temperatures as low as 55 °F according to manufacturer literature. During most operating hours of the chilled water plant, the outdoor wet-bulb does not frequently reach low enough temperatures to maintain a 55 °F temperature with the 13 °F approach; therefore, it is recommended to use the reset schedule in Table 5.2.

Table 5.2: Condenser Water Temperature Control Setpoints

Outdoor Air Wet-bulb Temperature	Condenser Water Supply Temperature
47 °F	60 °F
67 °F	80 °F

The implementation costs for this measure are substantially higher than the other control reprogramming measures based on the feedback provided by the control technician for the headquarters building. The costs include integrating all of the cooling tower controls into the central control system with a new logic controller and a wiring allowance. The costs may be lower if the existing controls can be integrated without adding a new logic controller.

Methodology

Energy savings are calculated using two-degree temperature bin simulations with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption.

The peak kW calculations in the baseline and proposed bin simulations use TMY-3 data selected to coincide with the peak period.[5] Since the weather in Oakland is slightly cooler than

[5] "2013-14 Statewide Customized Retrofit Offering Procedures Manual for Business", Table 1.4, July 2014, http://www.aesc-inc.com/download/spc/2013SPCDocs/PGE/Customized%201.0%20Policy.pdf

the average weather for the climate zone, the cooling system is not operating at design conditions for the defined summer peak period.

The engineering calculations for the proposed system assume the condenser water supply temperature uses the reset sequence in Table 5.2.

The annual hours of operation are assumed to be 3,490, which corresponds to all outdoor air conditions above 50 °F between 5:30 a.m. to 9:30 p.m. Monday through Friday for 52 weeks per year

Costs and Incentives

The cost for this measure includes a combined temperature/humidity sensor to calculate outdoor wet-bulb, a new 16 point DDC controller, and 16 hours of control technician labor.

This measure may be eligible for PG&E's Retrocommissioning (RCx) Incentive program, which provides energy efficiency incentives at $0.08 per kWh/year saved, $1.00 per therm saved, and $100.00 per peak kW reduced capped at 50% of the installation cost. The potential incentive for this measure is based on this incentive program.

Note that while this measure may be eligible for PG&E's RCx Incentive program, the District will need to work with their PG&E account representative to submit an application and confirm eligibility in the program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/retrocommissioning/index.page

LCM-4: Reset the Chilled Water Temperature Based on the Air Handler Chilled Water Valve Positions

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
2.4	20,687	0	$3,227	$5,000	$1,895	$3,105	1.0

Observations

The District staff indicates that the chilled water system only recently received a chilled water supply temperature reset sequence. Currently, the chilled water temperature is reset according to the outdoor air temperature. The outdoor air temperature is a rough proxy for actual zone loads; however, it does not directly respond to the zone loads. As a result, the chiller energy use is not directly responsive to the zone load, which means the chiller can provide more cooling than required by the zone. Higher chilled water temperature setpoints reduce the energy usage of chillers.

Recommendations

It is recommended to reprogram the control sequences on the chilled water system to control the chilled water supply temperature according to the chilled water valve position using trim-and-response controls. This control sequence will continuously try to raise the chilled water temperature until one of the chilled water valves approaches the fully open position. As a result, the chilled water loop will minimize chiller energy consumption.

Methodology

Energy savings are calculated using two-degree temperature bin simulations with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption.

The peak kW calculations in the baseline and proposed bin simulations use TMY-3 data selected to coincide with the peak period.[6] Since the weather in Oakland is slightly cooler than the average weather for the climate zone, the cooling system is not operating at design conditions for the defined summer peak period.

The engineering calculations for the proposed system assume the air handlers and condenser water systems use the resets previously discussed. In the proposed case, the chilled water system resets slightly more efficiently, given the use of the chilled water valve position.

[6] "2013-14 Statewide Customized Retrofit Offering Procedures Manual for Business", Table 1.4, July 2014, http://www.aesc-inc.com/download/spc/2013SPCDocs/PGE/Customized%201.0%20Policy.pdf

The annual hours of operation are assumed to be 4,171, which corresponds to 5:30 a.m. to 9:30 p.m. operation Monday through Friday for 52 weeks per year.

Costs and Incentives

The cost for this measure includes 12 hours of controls technician labor using the existing control system and control inputs.

This measure may be eligible for PG&E's Retrocommissioning (RCx) Incentive program, which provides energy efficiency incentives at $0.08 per kWh/year saved, $1.00 per therm saved, and $100.00 per peak kW reduced capped at 50% of the installation cost. The potential incentive for this measure is based on this incentive program.

Note that while this measure may be eligible for PG&E's RCx Incentive program, the District will need to work with their PG&E account representative to submit an application and confirm eligibility in the program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/retrocommissioning/index.page

LCM-10: Personal Computer (PC) Power Management Software

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	31,000	0	$4,836	$3,300	$2,250	$1,050	0.2

Observations

The desktop computers at the District have independent power settings. Several computers were left on when not in use and it is likely that many computers remain on overnight. This represents a significant opportunity to reduce annual electricity use and cost.

Recommendations

It is recommended to install network-based power management software for all appropriate desktop computers in the building. This would allow the Information Technology (IT) department to control the power settings of all computers. The software should be configured to turn off monitors and hard disks and to hibernate the computers after an hour of non-use. This will essentially eliminate the energy consumption of the PCs overnight, and possibly reduce consumption during parts of the day.

Depending on the needs of the IT staff, the power management software can be a simple stand-alone program or a fully integrated IT management solution. Most network-based solutions offer a “wake-on-LAN” feature where computers can be remotely controlled for software updates. They also typically come with a reporting tool which allows the IT department to measure the energy savings yielded by the software.

Implementation Notes

Several companies offer this type of software with the main difference being the level of integration with the other needs of the IT department.

A list of some vendors, provided by PG&E, can be obtained from the following weblink:

http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/rebatesincentives/vendorlist_computerpowermanagementsoftware.pdf

Computer Power Management:

An idle desktop computer, when not in use, typically consumes one quarter of full load power. In most offices, this load ranges between 60 and 80 watts. Energy use falls dramatically when the system enters stand-by or hibernation mode, using as little as 6 watts and 3 watts in stand-by and hibernation mode, respectively. In both modes, however, the computer software stays resident in memory, allowing the computer user to “wake-up” the computer and begin working in a matter of seconds.

Network-based power-management software allows IT managers to control the power settings of all computers, including the ability to turn off the monitor and force the computer into stand-by or hibernation mode after a predetermined idling period. These software solutions often include built-in energy saving calculations, providing management and IT personnel the information they require to quantify their energy saving efforts.

Many of these software packages include additional network management benefits, including the ability to perform system software updates, installations, and maintenance remotely, during non-business hours.

Methodology

Based on information gathered during the energy audit, there are approximately 150 employees at the District headquarters. The calculations assume one desktop computer per employee. Energy calculations assume that all existing computers consume on average 74 watts[7]. The computer shutdown rates were based upon a 2004 Lawrence Berkeley National Lab Report[8] on after-hours office equipment use which suggests that typically about 36% of computers are turned off when they are not being used. However the energy savings calculation for this study used a more conservative 60% shutdown rate based on site observations.

Engineering calculations (see Appendix) are used to determine the energy savings for this measure.

Costs and Incentives

Implementation costs are estimated based on a quote from a vendor[9]. The quoted cost is $13.00 per desktop computer, which includes an implementation fee. A 30% contingency is added to cover the District's internal implementation costs; the total estimated cost is $16.90 per desktop computer.

The potential incentive is based on the deemed Business Computing Rebate Catalog by PG&E, which offers $15.00 per computer with power management installed (M-03). Note that the rebate should cover the entire direct cost of the software, installation, and some but not all of implementation. The rebate catalog can be accessed using the following weblink:

http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/businesscomputing_final.pdf

[7] Based on Lawrence Berkeley National Laboratory Standby Power Table, http://standby.lbl.gov/summary-table.html

[8] Roberson, Judy, et al., LBNL, "After-hours Power Status of Office Equipment and Energy Use of Miscellaneous Plug-Load Equipment", January 2004. http://enduse.lbl.gov/Info/LBNL-53729.pdf

[9] Bill Hedges, Verdiem, BillH@verdiem.com, (206) 838-2822

LCM-11: Install Smart Power Strips to Turn-Off Non-Essential Plug Load Devices in Open & Private Offices

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	18,780	0	$2,930	$6,700	$2,250	$4,450	1.5

Observations

The typical office setup includes several electronic devices plugged into a power strip, including computers, monitors, task lights, device chargers, speakers, printers, fans, and space heaters. Power strips are usually hard to reach and are rarely turned off, so that many of these devices use idling energy around the clock even when they are not in use.

Figure 5.4: Multiple Task Lights on When Employee Has Left for the Weekend

Recommendations

It is recommended to install smart power strips. Smart power strips come with one master outlet, typically for the computer; when that outlet senses that the computer is off, it shuts off power on the controlled outlets where the peripherals are plugged in. The smart plugs typically also include unswitched outlets that remain always on to serve essential equipment. Note that occupancy sensor-based power strips are also available; however they are much more expensive than smart power strips ($90 vs. $20-30) and provide very similar functionality when used in conjunction with LCM-10: Personal Computer (PC) Power Management Software.

In copy rooms and break rooms it is recommended to use plug timers and to program the timers to be on only during business hours. Rollout of this measure must include occupant education and support to ensure correct use of the new strips.

Figure 5.5: Sample Smart Power Strip – Blue Outlet Is "Master", White Outlets Are Controlled, Red Outlets Are "Always On"

Implementation Notes

The implementation of smart power strips should include employee training. This is advisable so that the appropriate device is plugged into the appropriate outlet in order to save energy. For example, if a device that never turns off is plugged into the master outlet, then peripherals will not automatically turn off as intended.

Methodology

An estimated standby power of peripherals was assumed to be 20 watts on average for each of the 150 work spaces, based on a PG&E workpaper (PGECOALL101).[10] Continuous operating hours are assumed for the base case. For the proposed case, peripherals are only enabled when the offices are occupied.

Calculations (see Appendix) are used to determine the energy savings for this measure.

Costs and Incentives

Costs for this measure are based on online material costs for a main brand smart power strip, and include labor costs for the installation of the strips. The total implementation cost per workstation is estimated to be $42.90.

The potential incentive was based on the deemed Business Computing Rebate Catalog by PG&E, which offers $15.00 per power strip (L-65). The rebate catalog can be accessed using the following weblink:

http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/businesscomputing_final.pdf

[10] http://www.deeresources.com/files/2013_14_exante/downloads/PGE_Sept2012.zip

5.4 Capital-Intensive Measures (CIM)

Capital-intensive measures are energy conservation, energy efficiency, or time-of-use management projects with a capital cost of greater than $10,000. These measures may significantly reduce energy consumption and costs, but also require significant capital investment.

CIM-6a: Add Variable Frequency Drives to Air Handler Supply Fans & Reduce the Fan Speed When the Zone Temperatures Meet Setpoint

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
-0.1	37,530	3,051	$8,579	$57,000	$4,800	$52,200	6.1

Observations

The air handlers in the District headquarters have constant speed fans and constant volume mixing boxes. The constant volume fans result in extra fan energy by having to recirculate return air through the hot decks during hot and moderate weather, when most or all of the building wants cooling.

Recommendations

It is recommended to install variable frequency drives (VFDs) on each of the supply fans and program a sequence to lower the fan speeds when the zone temperatures meet their setpoint. The intention is that individual zone temperature control will continue to be achieved by the existing dual duct terminal boxes regulated by local thermostats. However, total air flow for each air handler will be reduced when the zones temperatures meet the zone temperature setpoints. This will occur in moderate load conditions, which account for a large number of hours in Oakland.

Implementation Notes

The specific details of the control strategies need to be determined by the implementer. A trim-and-respond control sequence using the zone temperature sensors is the most likely to work with the fewest additional control components.

As the zones drift from the programmed setpoint (either hot or cold), the control sequence will raise the fan speed up incrementally (e.g. 1%) every 10 minutes (adjustable). When all of the zones reach setpoint again, the control sequence will operate in reverse, lowering the fan speed incrementally every 10 minutes.

Since the duct temperature reset in LCM-2 uses the zone temperature setpoints as a control variable already, it is recommended to use a different time interval (ten minutes vs.five minutes) to improve the stability of the system.

Success of the measure will depend on careful commissioning which considers the needs of each zone. Generally, the level of energy savings achieved for each air handler will depend on the needs of its most demanding zone.

Before finalizing this recommendation, a dual-duct, variable-air-volume retrofit with new mixing boxes was also considered for both air handlers. While the dual-duct, variable-air-volume system saves more energy, the implementation cost is much larger and exceeds a 13-year simple payback. One of the key component costs for this retrofit is the replacement ductwork for the first floor, which is substantial, but provides little quantifiable energy savings. As a result, the simpler dual-duct variable speed fan control retrofit was selected.

Methodology

Energy savings are calculated using a two-degree temperature bin simulation with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin-simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption.

The engineering calculations for the proposed system assume the air handlers, chiller, and condenser water systems use the resets previously discussed. In the proposed case, the fan speed responds to the zone load.

The annual hours of operation are assumed to be 4,171, which corresponds to 5:30 a.m. to 9:30 p.m. operation Monday through Friday for 52 weeks per year.

Costs and Incentives

The cost for this measure includes 12 hours of controls technician labor using the existing control system and control inputs.

This measure is eligible for PG&E's Customized Retrofit Incentive (CRI) program, which provides energy efficiency incentives at $0.08 per kWh/year saved and $150.00 per peak kW reduced, capped at 50% of the installation cost. The potential incentive for this measure is based on this incentive program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/ief/index.page?WT.mc_id=Vanity_cr

CIM-7a: Lighting Controls Upgrade: Recircuit Lighting for Zone Control, Install Occupancy Sensors, Install Override Controls, and Reduce Schedule

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	51,501	0	$8,034	$95,000	$0	$95,000	11.8

Observations

As previously mentioned, the District headquarters building consists of private offices, large open cubicle office areas, restrooms, and conference/break/board rooms. The current wiring configuration for the majority of these spaces does not allow for local lighting control. Light fixtures serving multiple private offices and open office areas are wired to a single switch on the second and third floors, resulting in fixtures being on when they are not needed. Multiple office lights are controlled by a single switch. Therefore, if only one employee is occupying one cubicle space, many fixtures are on. Specific examples follow under the Recommendations section.

Figure 5.6: Lit, Unoccupied Room with No Manual Switch or Occupancy Sensor

Recommendations

It is recommended to hire a lighting designer or electrical engineer to redesign the lighting controls to enable more local lighting control throughout the building. The main objectives of this redesign are to allow for more local lighting control, installing more occupancy sensors, installing manual override switches and bi-level lighting control in certain areas, and reducing the current operating schedule.

This measure breaks out the cost associated with the lighting control upgrade. A separate measure, CIM-7b, considered new light fixtures with new daylighting and dimming capabilities. CIM-7b was not recommended due to the high cost. For further details, see page 48.

Implementation Notes

The specifics regarding the recircuiting will require an electrical engineer to design the circuit alterations and will likely trigger Title 24 and require an electrical permit. To ensure project success, the design team should ensure the new system includes the following:

1. **Break up lighting circuits to provide local control.** Each space should have its own manual control. For the open office space, the lighting circuitry should be broken up in a way such that from the location of the manual control switch, the switch operator can see the light fixtures being controlled.
2. **Install occupancy sensors in all private offices, restrooms, stairwells, conference rooms, break rooms, and board rooms.** Occupancy sensors will shut off lighting in spaces that are not occupied. The sensor should be located where occupancy can be detected in all corners of the room. The sensor should include both passive infrared (PIR) and ultrasonic technologies to detect occupancy, commonly known as a dual technology sensor. Installing occupancy sensors doesn't mean that manual controls should be removed. For example, in the main break room, even though there is an occupancy sensor to minimize lighting if the space is unoccupied, there is no manual control. Installing a local switch would allow an employee to turn off the light if there is sufficient daylight from the many large windows present.
3. **Modify schedule to match occupancy.** In spaces without occupancy sensors, the time-clock schedules should be modified to match the occupancy of the space. This modification will reduce lighting operating hours between 5:30 p.m. and 9:30 p.m.
4. **Provide central, timed override controls.** The headquarters building has cleaning staff on site between 4:30 p.m. and 9:30 p.m. When on site, the cleaning staff needs to turn on the lights to accomplish their job. Timed override controls allow the cleaning staff to temporarily override the lighting schedule. The override should be set for the duration required to complete cleaning tasks on each floor so that the operating hours are minimized. A good starting duration is one hour. If desired, dimming or bi-level controls can be used to ensure that only some of the lights are turned on for cleaning tasks, which are generally less visually demanding than office tasks. Using bi-level controls will save additional energy, but require more complex circuiting.

Methodology

Savings are calculated based on the number of existing fixtures, their power consumption, and the difference in operating hours between the existing and proposed modes of operation. Calculations to reflect reduced usage based on occupancy sensors, bi-level lighting capability, and fewer scheduled operating hours are used to calculate energy savings. The reduction in operating hours from occupancy sensors was taken from the Database for Energy Efficient Resources (DEER) Occupancy Sensor Savings Table. See Appendix for calculations.

Costs and Incentives

Total measure cost is based on costs for control modules, occupancy sensors, manual switches, and lighting designer consulting fees. These estimates come from the RSMeans Electrical costing database.

There are no incentive rebates for the proposed measure, as these recommendations are required under Title 24-2013.

CIM-8: Redesign Exterior Façade Lighting with Bi-Level LED Fixtures

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	9,004	0	$1,405	$18,000	$720	$17,280	12.3

Observations

The District uses mostly high pressure sodium (HPS) light fixtures for exterior lighting, including 70-watt and 150-watt HPS wall packs, 250-watt HPS flood fixtures, and a 250-watt HPS flag light.

Figure 5.7: High Pressure Sodium Flag Light

Recommendations

It is recommended to redesign the exterior lighting at the District headquarters to better located fixtures along paths of egress and other exterior task areas used overnight. The design should include replacing the exterior HPS fixtures with bi-level light emitting diode (LED) fixtures and occupancy sensors. Placing light fixtures closer to task areas improves the efficiency of the lighting system and requires less light and thus less energy to illuminate the area. The upgrade to LED fixtures will provide higher luminous efficacies (more lumens per watt) and provide control options to reduce the light output when occupants are not present.

Implementation Notes

There are a few key implementation criteria necessary for a successful retrofit.

- Good Lighting Design: LED fixtures provide better light distribution uniformity (higher minimum light levels and lower maximum light levels). Leveraging the light distribution efficiency is only possible when a lighting model is made of the application area. It is important to consider multiple vendors in order to get the best lighting installation. A third party lighting designer or a lighting representative of multiple outdoor fixture manufacturers will provide the best results. Many contractors and vendors will do this as part of their scope; however, they are often interested in selling specific products. Good design practices require:
    - Reasonable Illuminance (footcandle) Targets: Providing excessive light levels wastes energy. Recommended average light levels from the Illuminating

Engineering Society of North America (IESNA) list 1.0 horizontal fc at grade for institutional sidewalks and footpaths.[11]

The United States Flag Code states that the United States flag may be flown at night, but requires adequate illumination to show proper respect.[12] Neither the Flag Code nor the IESNA define the proper illumination for flags; however, fixture manufacturers suggest that a 20-foot pole with a 3-foot by 5-foot flag and 7 fc is acceptable.[13]

- Reasonable Light Loss Factors: The lighting designer should use IESNA guidelines and industry best practices for assigning light loss factors. At minimum, they should include a reasonable luminaire lumen depreciation factor (LLD) and luminaire dirt depreciation (LDD). For LEDs, the IESNA recommends a LLD of 0.7. For eight year maintenance cycles in areas with moderate to heavy traffic and no significant sources of smoke or particulate generation, the IESNA recommends using a 0.8 LDD factor.[14] Combined, this means the District should de-rate any new LED product light output by 44% to ensure the persistence of the good light levels.

  To decrease the derating factor, the District needs to plan to perform more frequent cleaning (lower LDD) or plan to replace the LED fixtures more often (lower LLD). Excluding these aggressive de-rating factors will result in lower light levels at the end of product life and under-performance of the new lighting system.

- Glare Abatement: LED fixtures can have significant glare issues depending on the viewing angle between the observer and the fixture. Care needs to be taken to prevent installing a fixture with excessive glare. A sample fixture installation is recommended to identify and address this potential issue prior to completing the retrofit.
- Fixture Placement: The current exterior light fixtures are inconsistently placed on the building façade. Some of the fixtures (notably on the north and south faces) are on the roof line, approximately 30 feet above walkways around the building. Illuminance decreases with the inverse square of the distance between the light source and the illuminated surface. Installing new fixtures that more closely follow the sidewalks and footpaths around building will reduce the light lost from distance, but will require more fixtures, more wiring, and an increase in installation costs. Working with a lighting designer will ensure that the fewest fixtures necessary are installed.
- Quality Fixture Selection: It is recommended to select LED fixtures that are listed on the Qualified Product List (QPL) of the DesignLights Consortium (DLC), which collects test data for various fixtures to ensure high-quality fixtures are selected for

[11] IESNA G-1-03 “Guideline for Security Lighting for People, Property, and Public Spaces” page 11

[12] United States Code Title 36, Chapter 10, §174 (a)

[13] “Flag Lighting Guide”, LSI Industries, January 2014.
http://www.lsi-industries.com/documents/literature/flag-lighting-guide.pdf

[14] IESNA DG-4-03 “Design Guide for Roadway Lighting Maintenance”, page 3

LED incentive programs. In addition, the fixtures would preferably be from a reliable, well-known manufacturer to ensure that warranty issues will be promptly addressed in the future.

- Integral Occupancy Sensors: The installation of integral occupancy sensors is recommended to turn the lights down to 50% power when the space surrounding the light fixtures is unoccupied. Integral or fixture-mounted occupancy sensors reduce installation labor and provide excellent coverage.

Costs and Assumptions

The energy savings for this measure assumes the following fixture replacements:

- Each 250-watt roof-line HPS fixture is replaced with two bi-level 35-watt LED wall pack
- Each 150-watt HPS wall pack is replaced with one bi-level 75-watt LED wall pack
- Each 70-watt HPS wall pack is replaced with one bi-level 35-watt LED wall pack

The DEER exterior lighting hours (4,100 hours per year) based on typical exterior lighting hours in California. It is assumed that the fixtures would operate at full light output for 15% of the hours and at reduced light output for the remaining 85% of the hours, based on the higher evening occupancy of public-institution facilities.[15]

The cost to purchase and install the bi-level LED fixtures is estimated based on a municipal 2013 job order contract that includes demolition, installation, and material costs.

The potential incentive is based on the deemed rebate incentives available from PG&E for exterior LED fixtures between 70 watts and 110 watts (LT013) at $60 per fixture and fixtures 50 watts or less (LT015) at $40 per fixture.

http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/lighting_catalog_final.pdf

[15] "Western Exterior Occupancy Survey for Exterior Adaptive Lighting Applications, Phase 2", California Lighting Technologies Center, August 2014, Page 62: http://www.etcc-ca.com/sites/default/files/reports/westernexterioroccupancysurveyphase2_finalreport_20140806.pdf

CIM-12: Replace Existing On-Site Servers, Install New, Virtualized Servers, and Replace Split System

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
12.7	75,052	0	$11,708	$55,000	$0	$55,000	4.7

Observations

There is one server room on the first floor of the District headquarters with servers that hold many parks department resources, including human resource data, geographic information services, and other data sources vital to day to day operations. Within the server room, there is one UPS, which was consuming 7.5 kW at the time of the audit. There is also a CRAC system that draws a total of 9.1 kW and a split system ventilation fan that draws 0.4 kW; both operate continuously. Since the server room is located in the core of the building, there is only a small amount of outside air fed into the space for minimum ventilation.

Figure 5.8: Server Room

Recommendations

It is recommended to virtualize and consolidate applications running on the servers to save both server and cooling energy. Currently, each server typically operates one operating system or application. Virtualization is now a common measure which consolidates individual physical servers into one physical host server operating a number of virtual machines. Typically, eight to ten physical servers can be consolidated into one host server. This significantly reduces the number of servers needed to run a set of applications, and has the potential to reduce the existing IT loads from 7.5 kW down to about 1.3 kW.

Virtualizing the server will reduce the cooling load in the space. Rather than run the now oversized Liebert, it is recommend to replace the existing split system with a high efficiency unit (SEER 14 or greater) and operate the split system as the primary mode of cooling.

Methodology

The energy savings from this measure are based on the on-site survey of UPS power in the server room and on estimated cooling efficiencies of the cooling. It is assumed that all servers and their associated cooling equipment are running continuously.

The proposed simulation assumes that 18 individual servers will be replaced with 3 virtual servers on site, reducing the power by a similar ratio. Rather than running the larger CRAC, the new split system is assumed to operate as the primary cooling mode with the CRAC for back-up.

Costs and Incentives

The cost estimate assumes that 18 servers are virtualized are replaced with 3 servers. The count of servers is based on photo documentation from the on-site visit. The UPS power consumption is based on what was observed from the UPS LCD screen. The power consumption of the CRAC cooling system and split system ventilation fan is based on nameplate information and calculations that can be found in the Appendix.

Server virtualization projects are no longer eligible for PG&E incentives.

5.5 Other Measures Analyzed But Not Recommended

This section discusses measures that were analyzed for energy savings but did not have an attractive payback.

CIM-5: Install a New Waterside Economizer to Reduce Chiller Run Hours during Low Load Operating Hours (Not Recommended)

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.2	14,235	0	$2,221	$ 71,000	$ 1,169	$ 69,831	31.4

Observations

The headquarters building uses chilled water for all comfort cooling. Even during moderate weather conditions, the chiller must run in order to meet the cold deck supply air temperature setpoints on AHU-1 and AHU-2. The air handlers do not have an airside economizer, meaning that the air handlers cannot bring in additional cool air during moderate weather to reduce the chiller operations. The current ducting of the return air and outside air combined with the available space and the orientation of the air handlers in mechanical rooms makes adding an airside economizer infeasible.

Figure 5.9: Potential Location for a Heat Exchanger for Waterside Economizing

Analysis

The analysis for this measure considered installing a waterside economizer to reduce chiller energy consumption during periods of low loads and cool outside conditions. A waterside economizer reduces energy consumption by rejecting heat with the cooling tower fan only, rather than using the vapor compression cycle of the chiller.

Based on the high implementation cost estimate, the project does not pay back within the useful life of the waterside economizer. The cost is heavily influenced by the plate-frame heat exchanger. If the cost of the plate frame heat exchanger is substantially less, the installation could be more economically feasible.

Implementation Notes

The installation of the waterside economizer will require coordination with a mechanical engineering design firm to confirm capacity and adequacy of existing pumping and heat rejection equipment. This project will require a permit from the local permitting body.

There is sufficient space in the basement mechanical room to install a plate and frame heat exchanger, with adequate room from plumbing connections for the chilled water and condenser water circulation loops.

Methodology

Energy savings are calculated using two-degree temperature bin simulations with weather data for Oakland International Airport. The bin simulations are calibrated using spot temperature readings, equipment operations, and the mechanical schedules for the air handlers, chilled water system, and condenser water system. As a final check on the calibration of the bin simulations, the models are compared with the energy balance to ensure that the energy use matches the billed energy consumption. The baseline for this measure assumes the other, more cost-effective control system modifications are made first (LCM-1 through CIM-6a).

The engineering calculations for the proposed system assume the waterside economizer is active whenever the outside air temperature is below 65 °F and that the condenser water loop has a 2 °F approach with the outside air wet-bulb. The measure also includes upgrading the condenser water pump motor with a motor exceeding the NEMA premium efficiency motor standard. The new pump motor will reduce the pumping energy penalty associated with more condenser run hours.

The annual hours of operation are assumed to be 4,171, which corresponds to 5:30 a.m. to 9:30 p.m. operation Monday through Friday for 52 weeks per year.

Costs and Incentives

The cost for this measure includes a new plate and frame heat exchanger, and a high efficiency condenser water pump motor. The cost also includes adders for additional installation, wiring, and controls costs, programming labor, professional design and engineering services, controls commissioning, and a contingency.

This measure is eligible for PG&E's Customized Retrofit Incentive program, which provides energy efficiency incentives at $0.08 per kWh/year saved and $150.00 per peak kW reduced. The potential incentive for this measure is based on this incentive program. Please see the following web link for information on applying for this incentive:

http://www.pge.com/en/mybusiness/save/rebates/ief/index.page?WT.mc_id=Vanity_cr

CIM-7b: Redesign Interior Lighting including New Pendant Fixtures with Daylighting Control & Task Tuning, Remove Vertical Blinds on Clerestory Windows, Add Task Lighting (Not Recommended)

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
17.0	55,758	0	$8,698	$ 323,000	$ 7,013	$ 315,987	36.3

Observations

The interior lighting at the headquarters building is dated. While many fixtures have newer lamps and ballasts installed as part of an energy efficiency project, the fixtures themselves are very removed from the occupied space (with mounting heights in excess of 30 feet in some areas). They also use translucent white acrylic diffusers, which absorb and waste light, instead of modern clear prismatic lenses. The office areas have extensive north and south facing view windows and gabled clerestory windows. Both the view windows and the clerestory windows have vertical blinds, which were extensively used during the site visit and prevented daylight penetration.

Light levels in the spaces are between 50 and 80 footcandles, which is higher than the general office area light level target listed by the IESNA of 30 footcandles for primarily computer-based office tasks. The overall lighting power density for the building interior is approximately 1.04 W/sq. ft., while Title 24-2013 requires 0.75 W/sq. ft. for office buildings and efficient design practices can drive lighting power densities well below 0.5 W/sq. ft.

The installation of new pendant fixtures and controls, the removal of the existing vertical blinds, and the addition of task lighting would improve the overall lighting quality and reduce energy use.

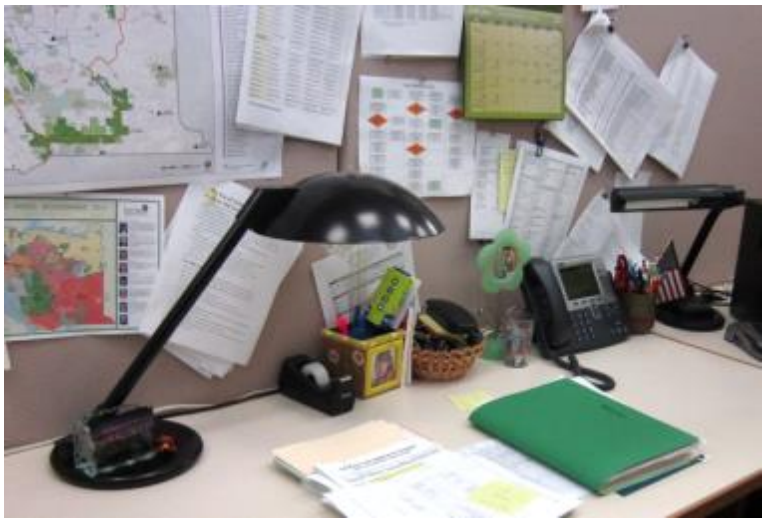


Figure 5.10: Cubicle with Two Task Lights

Figure 5.11: Closed and Open Vertical Blinds

Analysis

The analysis for this measure considered hiring a lighting designer to redesign the interior lighting at the headquarters building to employ a task-ambient lighting system making use of the extensive daylight views. A lighting designer is necessary to adequately address all of the lighting design requirements needed to provide the best interior lighting system with the least energy use possible. Performing individual fixture retrofits and making use of the existing lighting system hardware is lower cost, but will not achieve deep energy savings.

The costs associated with this measure are preliminary, but appear too high to justify the project on energy savings only. Additional light design analysis and strategies could reduce costs. This measure is not recommended without further, detailed study.

Implementation Notes

The following points should be considered with the lighting designer selected for this project.

1. Establish light level requirements early in the design process. The Illuminating Engineering Society has a number of published light level requirements for interior spaces. Selecting the appropriate light levels will ensure that light isn't wasted. Generally, 30 footcandles is acceptable for most office tasks.
2. Make use of task lighting. Don't design the general light levels to meet the lighting requirements for the most demanding users. For users who require more lighting for specific tasks (i.e. the parks design staff, located on the third floor, or individuals that process paper-based records), provide energy-efficient task lights. Encourage employees to remove task lights brought from home and replace them with energy efficient fixtures.
3. Put light and light fixtures where needed. The current lighting design at the headquarters is very uniform, but the tasks are not. The same fixtures that illuminate the stairs between the second floor and third floor also illuminate the lobby area on the first floor. Consider the following design elements to improve the perceived brightness of the space:
    a. Use wall-washing perimeter fixtures. In spaces with white walls, particularly the east and west walls of the second and third floor, consider washing the walls with low-intensity light to provide vertical illuminance.

Moderate vertical lighting improves the perception of brightness in the space and makes the space seem open and bright. As a result, the horizontal light levels can be lowered accordingly.

b. Use wall-grazing fixtures on the north and south tower. The vertical towers on the north and south walls have a natural concrete/stone finish with abundant texture. These walls absorb the general lighting from the surrounding office fixtures. By grazing these walls with direct lighting, the darkness is somewhat abated and can improve the perception of brightness.

c. Uniformly lower fixtures closer to the task plane. The light fixtures on the second, third, and fourth floors are much higher than the typical ten foot office area ceiling. While this makes the space seem very open, but is inefficient, given that the intensity of light decreases by the inverse square of the distance. As a result, much of the light is lost. Fixtures closer to the task plane need less light output to accomplish the same light levels. Consider suspended pendant fixtures with two-lamp T8 cross-sections or LED pendants. Omni-directional or direct/indirect pendants will illuminate the ceiling cavity and maintain the open perception while lowering energy consumption.

4. Combine dimming fixtures with closed-loop daylighting controls and passive glare control. The headquarters building is fortunate to have the daylight views on the second and third floor. To make optimal use of the daylight, these spaces will require a lighting model to develop functional glare control. For example, replacing the vertical blinds with perforated solar shades to reduce glare, but still allow light to pass through, will improve the look of the space as well as maintain visual comfort.

Consider removing the shading devices from the clerestory windows on the second and third floors. The daylight model will indicate if the south-facing clerestory windows will result in a high probability of glare for the occupants further into the spaces. Corrective action could be taken using an interior or exterior light shelf.

The dimming controls on the fixtures in the daylight zone (likely most of the fixtures on the second and fourth floors) will efficiently transition from the electric lighting to daylight. Closed loop controls will ensure that the target light levels are maintained.

Methodology

Energy savings are calculated based on the difference between the lighting power density after implementation of the above CIM-7a and the target lighting power density of 0.65 W/sq.ft.[16] and mean operating hours of 3,250 hours per year, using the proposed operating hours after installing the controls specified.

[16] 0.75 from The Advanced Energy Design Guide for Small/Medium Office and -0.10 for improved daylighting controls

Costs and Incentives

Total measure cost is based on costs for new pendant lighting fixtures, miscellaneous costs per square foot, and lighting designer consulting fees. These estimates come from previously installed projects using direct/indirect light fixtures and an assumed installation cost adder per square foot.

The potential incentive on the estimated savings is based on PG&E's Customized Retrofit Incentive program rates of $0.08 per kWh and $100 per peak kW for Targeted Lighting. Please see the following link for information on applying for customized (calculated) incentives:

www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/

CIM-9: Replace Parking Lot Fixtures with Bi-Level LED Fixtures

Annual Savings				Financial Metrics			
Peak Period Savings (kW)	Electricity Savings (kWh/yr)	Gas Savings (therms/yr)	Annual Cost Savings	Measure Cost	Potential Incentive	Net Measure Cost	Simple Payback (years)
0.0	10,854	0	$1,693	$ 29,000	$ 868	$ 28,132	16.6

Observations

The District uses six 250-watt metal halide light fixtures with photocells spaced evenly throughout the parking lot. They currently have plans to build a new parking lot that will be served by six 150-watt metal halide light fixtures with photocells.

Analysis

The analysis considered replacing the six metal halide parking lot fixtures with dual-head (35-watt/90-watt bi-level LED fixtures with integral occupancy sensors. The dual-head is recommended due to the different levels of the parking lot. The area northeast of the light fixture is higher and therefore closer to the light fixture than the area southwest of the fixture, as can be seen in the following figure:

Figure 5.12: Varying levels of the parking lot

A dual-head solution includes a 35-watt LED lamp for the northeast side of the fixture and a 90-watt LED lamp for the southwest side of the fixture.

For the proposed parking lot, a simple one-for-one 75-watt LED substitution was analyzed instead of the six proposed 150-watt metal halides.

LED fixtures provide more efficient distribution of light than HPS fixtures and are more resilient when turned on and off frequently. While LED and HPS fixtures provide similar lumens per watt, LED fixtures have a photometric efficiency of 100%, whereas only a fraction of the input power

for an HPS fixture is converted to light. Therefore, LEDs provide significantly higher lumens per watt compared to the total luminaire efficacy of an equivalent HPS fixture. In addition, combining LED fixtures with integral occupancy sensors will reduce the fixture light output when parts of the parking lot are unoccupied, providing additional energy savings.

The current tiered parking lot layout makes a one-for-one fixture replacement difficult, since one side of the light fixture has a task plane roughly twice as close to the light fixture as the other. The analysis specifically included replacing each fixture with two fixtures, a lower wattage fixture for the closer task plane and a higher wattage fixture for the far task plane. Using two fixtures save the most energy, but increases the project cost and results in an unattractive payback.

Given that the District is considering a parking lot solar photovoltaic canopy, investing in new LED fixtures is not recommended until the solar canopy decision is finalized. If a solar photovoltaic canopy is selected for installation, the District should include canopy-mounted, bi-level LED fixtures.

Implementation Notes

There are a few key implementation criteria necessary for a successful retrofit.

- Good Lighting Design: LED fixtures provide better light distribution uniformity (higher minimum and lower maximum light levels). Leveraging the light distribution efficiency is only possible when a lighting model is made of the application area. It is important to consider multiple vendors in order to get the best lighting installation. A third party lighting designer or a lighting representative of multiple outdoor fixture manufacturers will provide the best results. Many contractors and vendors will do this as part of their scope; however, they are often interested in selling specific products. Good design practices require:
    - Reasonable Illuminance (footcandle) Targets: Providing excessive light levels in parking lots can result in wasted energy use. Recommended minimum light levels from the Illuminating Engineering Society of North America (IESNA) list 0.2 horizontal fc at grade for most parking lot applications. For high-security parking or areas where security is a concern, the IESNA recommends a minimum of 0.5 horizontal fc at grade.[17]
    - Reasonable Light Loss Factors: The lighting designer should use IESNA guidelines and industry best practices for assigning light loss factors. At minimum, they should include a reasonable luminaire lumen depreciation factor (LLD) and luminaire dirt depreciation (LDD). For LEDs, the IESNA recommends a LLD of 0.7. For eight-year maintenance cycles in areas with moderate to heavy traffic and no significant sources of smoke or particulate generation, the IESNA recommends using a 0.8 LDD factor.[18] Combined, this means the District should de-rate any new LED product light output by 44% to ensure the persistence of the good light levels.

[17] IESNA RP-20-98 “Recommended Practices for Lighting for Parking Facilities” page 3

[18] IESNA DG-4-03 “Design Guide for Roadway Lighting Maintenance”, page 3

To decrease the derating factor, the District needs to plan on more frequent cleaning maintenance or plan on replacing the LED fixtures earlier. Excluding these aggressive de-rating factors will result in lower light levels at the end of product life and under-performance of the new lighting system.

- Glare Abatement: LED fixtures can have significant glare issues depending on the viewing angle between the observer and the fixture. Care needs to be taken to prevent installing a fixture with excessive glare. A sample fixture installation is recommended to identify and address this potential issue prior to completing the retrofit.
- Quality Fixture Selection: It is recommended to select LED fixtures that are listed on the Qualified Product List (QPL) of the DesignLights Consortium (DLC), which collects test data for various fixtures to ensure high-quality fixtures are selected for LED incentive programs. In addition, the fixtures would preferably be from a reliable, well-known manufacturer to ensure that warranty issues will be promptly addressed in the future.
- Integral Occupancy Sensors: The installation of integral occupancy sensors is recommended to turn the lights down to 50% power when the space surrounding the light fixtures is unoccupied. Integral or fixture-mounted occupancy sensors reduce installation labor and provide excellent coverage.

Methodology

The energy savings for this measure assumes each 250-watt metal halide fixture will be replaced with a dual head light fixture, with one head drawing 95-watts at full light output and the other drawing 35-watts. When operating at reduce light levels, the LED fixtures operate at 47.5 watts and 17.5 watts, respectively. The proposed parking lot energy-use includes replacing each 150-watt metal halide fixture with a 75-watt LED (at full power) with bi-level controls that operate the fixture at 37.5 watts when unoccupied.

The DEER exterior lighting hours (4,100 hours per year) based on typical exterior lighting hours in California. It is assumed that the fixtures would operate at full light output for 15% of the hours and at reduced light output for the remaining 85% of the hours, based on the higher evening occupancy of public-institution facilities.[19]

Costs and Incentives

The cost to purchase and install the bi-level LED fixtures is estimated based on a municipal 2013 job order contract that includes demolition, installation, and material costs.

The potential incentive is based on the calculated savings and the PG&E customized rebate rates of $0.08 per kWh and $100 per peak kW for Targeted Lighting. Please see the following link for information on applying for customized (calculated) incentives: www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/

[19] "Western Exterior Occupancy Survey for Exterior Adaptive Lighting Applications, Phase 2", California Lighting Technologies Center, August 2014, Page 62: http://www.etcc-ca.com/sites/default/files/reports/westernexterioroccupancysurveyphase2_finalreport_20140806.pdf

6 Implementation Assistance

Besides the California Energy Commission's Energy Partnership Program, there are several resources to assist the District in implementing energy efficiency projects. These resources include energy efficiency incentives, low-/no-interest financing programs, and technical expertise. The following programs may be applicable for the measures recommended in this report.

Energy Commission's Energy Efficiency Financing Program

The Energy Commission's Energy Efficiency Financing Program provides low interest loans to public entities for financing projects with proven energy savings. Under the program, low interest rate loans of up to $3,000,000 per application may be provided which are payable within 20 years. Loan program funding is revolving with new loans being offered as old loans are paid back. For more information, please refer to the following website or contact the Energy Commission:

Website	http://www.energy.ca.gov/efficiency/financing
Contact	Local Assistance and Financing Office
	pubprog@energy.ca.gov
	(916) 654-4104

Site/Space:	Most of Second and third floors, all of fo	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.50	17.5	787.4	0.0	0.78	50.9		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.50	17.5	782.9	0.0	0.77	50.1		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.75	48.5		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.50	17.5	814.3	0.0	0.77	52.3		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.50	17.5	800.8	0.0	0.76	50.7		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.50	17.5	791.9	0.0	0.75	49.7		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.77	49.9		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.77	49.8		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.77	49.8		0%	
															Average:	**17.50**					50.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant Cooling Loads Measure Name: Reset Condenser Water Temp Chiller Template - v1.6.4

Notes:

OAT	Base Hrs	Cooling Loads: Plant Duty Cycle	Plant Running Hours	Total Output (tons)	Cooling Mode	AHU-1 CCoil Load (tons)	AHU-2 CCoil Load (tons)
94	1	100%	1	118	Chiller	48	70
92	2	100%	2	113	Chiller	44	69
90	4	100%	4	112	Chiller	44	68
88	8	100%	8	110	Chiller	43	67
86	5	100%	5	109	Chiller	42	67
84	11	100%	11	107	Chiller	41	66
82	14	100%	14	105	Chiller	40	65
80	22	100%	22	104	Chiller	39	64
78	34	100%	34	101	Chiller	38	64
76	26	100%	26	96	Chiller	34	62
74	58	100%	58	87	Chiller	31	56
72	70	100%	70	77	Chiller	27	50
70	138	100%	138	67	Chiller	23	44
68	98	100%	98	58	Chiller	20	38
66	205	100%	205	49	Chiller	17	33
64	303	100%	303	42	Chiller	14	28
62	383	100%	383	34	Chiller	11	23
60	696	100%	696	28	Chiller	8	19
58	462	100%	462	22	Chiller	6	16
56	394	100%	394	17	Chiller	5	12
54	304	100%	304	13	Chiller	4	9
52	253	100%	253	11	Chiller	3	8
50	147	100%	0	0	Chiller	-	-
48	120	100%	0	0	Chiller	-	-
46	93	100%	0	0	Chiller	-	-
44	25	100%	0	0	Chiller	-	-
42	26	100%	0	0	Chiller	-	-
40	4	100%	0	0	Chiller	-	-
38	2	100%	0	0	Chiller	-	-
36	2	100%	0	0	Chiller	-	-
34	0	100%	0	0	Chiller	-	-
32	1	100%	0	0	Chiller	-	-
TOTAL	3,911		3,490				

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Reset Condenser Water Temp Based on Sheet: (CIM-2) CHP Summary Chiller Template - v1.6.4

Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

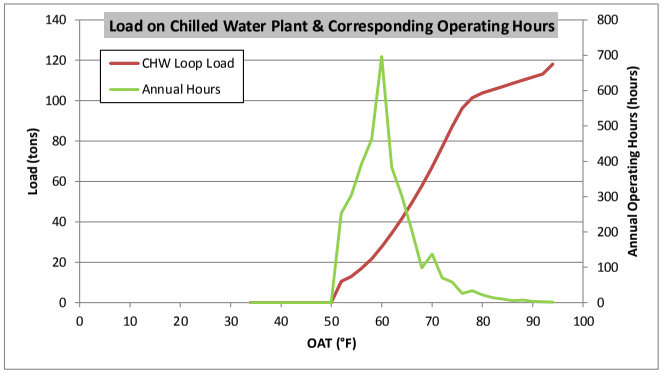
Chillers - Inputs		
CH-1 Size	100	tons

CHWST SP Reset	
OAT	CHWT
55	50
70	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29

System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	72.7	52,732	12,234
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	23,557	4,537
Condensing Water Pumps [CWP]	5.0	17,440	3,352
Total	**89.3**	**110,183**	**23,285**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	5.0	7	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	5.0	11	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	5.0	18	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	5.0	39	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	5.0	25	6.8	34	0.77	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	5.0	54	6.8	73	0.77	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	5.0	71	6.8	97	0.76	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	5.0	111	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.60	60.7	2,039	4.7	158	5.0	168	6.8	229	0.76	0.2703	1
76	62.0	26	96	1	26	96	0.59	56.5	1,493	4.7	125	5.0	132	6.8	180	0.76	0.2736	1
74	61.1	58	87	1	58	87	0.57	50.1	2,898	4.7	273	5.0	289	6.8	394	0.76	0.2536	1
72	60.8	70	77	1	70	77	0.57	43.7	3,044	4.7	328	5.0	348	6.8	474	0.78	0.2549	1
70	59.5	138	67	1	138	67	0.55	36.7	5,052	4.7	648	5.0	687	6.8	937	0.79	0.2714	1
68	58.9	98	58	1	98	58	0.52	30.0	2,948	4.7	463	5.0	491	6.8	669	0.81	0.2555	1
66	58.3	205	49	1	205	49	0.49	24.2	4,969	4.7	968	5.0	1,026	6.8	1,399	0.82	0.2569	1
64	57.2	303	42	1	303	42	0.45	18.8	5,682	4.7	1,428	5.0	1,513	6.8	2,063	0.85	0.2463	1
62	56.4	383	34	1	383	34	0.41	14.1	5,383	4.7	1,803	5.0	1,911	6.8	2,605	0.89	0.2160	1
60	55.7	696	28	1	696	28	0.37	11.5	7,183	4.7	3,283	5.0	3,480	6.8	4,743	0.97	0.1747	1
58	54.2	462	22	1	462	22	0.34	10.8	3,437	4.7	2,179	5.0	2,309	6.8	3,148	1.10	0.1512	1
56	52.5	394	17	1	394	17	0.32	10.2	2,116	4.7	1,855	5.0	1,967	6.8	2,681	1.29	0.1447	1
54	50.8	304	13	1	304	13	0.30	9.7	1,178	4.7	1,431	5.0	1,517	6.8	2,068	1.58	0.1399	1
52	49.0	253	11	1	253	11	0.36	9.4	949	4.7	1,194	5.0	1,265	6.0	1,512	1.85	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				52,732		16,453		17,440		23,557	1.09		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		5.0		6.8		0.78	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		5.0		6.8		0.77	1
76	66.0	7/17 4 PM	115	1	1	115	0.60	69.7		4.7		5.0		6.8		0.75	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		5.0		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		5.0		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		5.0		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.63	72.1		4.7		5.0		6.8		0.77	1
76	68.0	7/19 3 PM	114	1	1	114	0.63	71.4		4.7		5.0		6.8		0.77	1
76	68.0	7/19 4 PM	114	1	1	114	0.63	71.4		4.7		5.0		6.8		0.77	1
								72.7		**4.7**		**5.0**		**6.8**			

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Reset Condenser Water Temp

Based on Sheet: (CIM-2) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	55	50
	70	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	0	°F
Prim. Pump Operates with WSE	NO	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	45.0	75.6	1.08	108.2	94%	100%	94%	0.84	0.93	60.7	0.60	2,039	5.6	4.7	158
76	62.0	26	96	45.0	74.3	1.09	109.0	88%	100%	88%	0.82	0.88	56.5	0.59	1,493	5.6	4.7	125
74	61.1	58	87	45.0	72.7	1.10	110.0	79%	100%	79%	0.80	0.80	50.1	0.57	2,898	5.6	4.7	273
72	60.8	70	77	45.0	71.5	1.11	110.7	70%	100%	70%	0.79	0.71	43.7	0.57	3,044	5.6	4.7	328
70	59.5	138	67	45.0	69.5	1.12	111.9	60%	100%	60%	0.76	0.62	36.7	0.55	5,052	5.6	4.7	648
68	58.9	98	58	45.7	68.0	1.14	114.2	51%	100%	51%	0.74	0.52	30.0	0.52	2,948	5.6	4.7	463
66	58.3	205	49	46.3	66.6	1.17	116.4	42%	100%	42%	0.72	0.43	24.2	0.49	4,969	5.6	4.7	968
64	57.2	303	42	47.0	64.7	1.19	118.9	35%	100%	35%	0.70	0.34	18.8	0.45	5,682	5.6	4.7	1,428
62	56.4	383	34	47.7	63.1	1.21	121.3	28%	100%	28%	0.68	0.26	14.1	0.41	5,383	5.6	4.7	1,803
60	55.7	696	28	48.3	61.5	1.24	123.6	22%	90%	25%	0.67	0.22	11.5	0.37	7,183	5.6	4.7	3,283
58	54.2	462	22	49.0	59.5	1.26	126.3	17%	69%	25%	0.65	0.21	10.8	0.34	3,437	5.6	4.7	2,179
56	52.5	394	17	49.7	57.2	1.29	129.0	13%	53%	25%	0.64	0.20	10.2	0.32	2,116	5.6	4.7	1,855
54	50.8	304	13	50.0	55.1	1.31	130.9	10%	40%	25%	0.63	0.20	9.7	0.30	1,178	5.6	4.7	1,431
52	49.0	253	11	50.0	53.3	1.32	131.9	10%	40%	25%	0.62	0.19	9.4	0.36	949	5.6	4.7	1,194
50	47.4	0	0	50.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	50.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	50.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	50.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	50.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	50.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	50.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	50.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	50.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**52,732**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	45.0	77.2	1.07	107.1	108%	100%	108%	0.86	1.04	69.7	0.60		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.1	0.63		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	45.0	78.7	1.06	106.1	107%	100%	107%	0.88	1.04	71.4	0.63		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	45.0	78.7	1.06	106.1	107%	100%	107%	0.88	1.04	71.4	0.63		5.6	4.7	
													72.7				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District

2950 Peralta Oaks Court

Cooling Tower Bin Simulation Measure Name: Reset Condenser Water Temp Based on Sheet: (CIM-2) CT

Notes:

Total Number of Cells	1

Cooling Tower Design Specs - One Cell		
Make	Baltimore Air Coil	
Model	VXT-95C	
Design EWT (i.e. CWRT)	90.0	°F
Design LWT (i.e. CWST)	80.0	°F
Design WBT	67.0	°F
Cell Design CW Flow	313	gpm
Design Approach	13.0	°F
Design Range	10.0	°F
Capacity (tons)	131	tons
Flow Capacity @ CTI	245	gpm
Tower Performance Curve	Open Tower (DOE 2.2)	

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WBT	CWST SetP
	45	58
	70	29

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	NO	
OAT for WSE Staging		°F
HX Approach		°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size		Inches	
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	82.5%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	5.0	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	32.0	81.1	91.6	80.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	5.0	7
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	32.7	80.2	90.3	79.3	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	5.0	11
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	35.2	78.5	88.4	77.6	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	5.0	18
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	35.3	78.3	88.0	77.4	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	5.0	39
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	35.4	78.0	87.7	77.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	5.0	25
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	35.6	77.8	87.2	77.0	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	5.0	54
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	36.8	76.9	86.2	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	5.0	71
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	36.6	76.9	86.0	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	5.0	111
78	63.1	34	102	1	0.60	119	285	1	318	1	102%	9.0	37.0	76.4	85.3	75.6	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	5.0	168
76	62.0	26	96	1	0.59	112	269	1	318	1	102%	8.5	38.3	75.0	83.5	74.3	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	5.0	132
74	61.1	58	87	1	0.57	102	244	1	318	1	102%	7.7	39.4	73.4	81.0	72.7	100%	317	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	5.0	289
72	60.8	70	77	1	0.57	90	215	1	318	1	102%	6.8	39.7	72.1	78.9	71.5	100%	319	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	5.0	348
70	59.5	138	67	1	0.55	78	186	1	318	1	102%	5.9	41.2	70.0	75.9	69.5	100%	321	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	937	100%	5.5	5.0	687
68	58.9	98	58	1	0.52	66	159	1	318	1	102%	5.0	41.9	68.4	73.4	68.0	100%	324	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	669	100%	5.5	5.0	491
66	58.3	205	49	1	0.49	56	146	1	318	1	102%	4.2	42.5	66.9	71.2	66.6	100%	326	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	1,399	100%	5.5	5.0	1,026
64	57.2	303	42	1	0.45	47	146	1	318	1	102%	3.5	43.8	65.0	68.5	64.7	100%	328	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	2,063	100%	5.5	5.0	1,513
62	56.4	383	34	1	0.41	38	146	1	318	1	102%	2.9	44.8	63.3	66.2	63.1	100%	331	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	2,605	100%	5.5	5.0	1,911
60	55.7	696	28	1	0.37	31	146	1	318	1	102%	2.3	45.6	61.8	64.1	61.5	100%	334	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	4,743	100%	5.5	5.0	3,480
58	54.2	462	22	1	0.34	24	146	1	318	1	102%	1.8	47.3	59.6	61.4	59.5	100%	338	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	3,148	100%	5.5	5.0	2,309
56	52.5	394	17	1	0.32	19	146	1	318	1	102%	1.4	49.3	57.4	58.8	57.2	100%	341	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	2,681	100%	5.5	5.0	1,967
54	50.8	304	13	1	0.30	14	146	1	318	1	102%	1.1	51.2	55.2	56.3	55.1	100%	344	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	2,068	100%	5.5	5.0	1,517
52	49.0	253	11	1	0.36	12	146	1	318	1	102%	0.9	53.4	53.4	54.3	53.3	93%	344	100%	0%	0%	80%	0%	0%	6.0	0.0	0.0	6.0	1,512	100%	5.5	5.0	1,265
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	55.2	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	57.3	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**23,557**				**17,440**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	31.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	32.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	66.0	7/17/00 4:00 PM	115	1	0.60	112	269	1	318	1	102%	8.5	33.6	78.0	86.4	77.2	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	31.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	32.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	33.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 2:00 PM	115	1	0.63	112	269	1	318	1	102%	8.5	31.3	79.4	87.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 3:00 PM	114	1	0.63	112	269	1	318	1	102%	8.5	31.3	79.4	87.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 4:00 PM	114	1	0.63	112	269	1	318	1	102%	8.5	31.3	79.4	87.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
																												6.8				**5.0**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations. More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)

Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)

Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Reset Condenser Water Temp **Based on Sheet:** (CIM-2) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

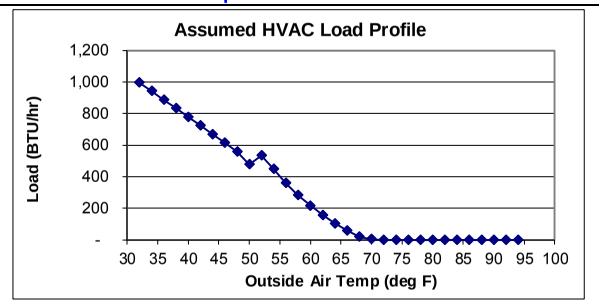
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 °F

Optimization[2] (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase[1]		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

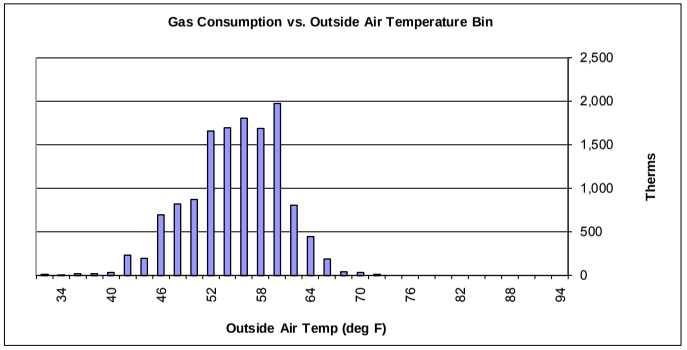
Hot Water Delivery Design				Min Flow	Flow at Design	
Coil Design EWT	200 °F					
Coil Design EAT	63 °F	Required/Primary System		30%	100%	
2-way valves	TRUE	Secondary System		30%	100%	
Primary Pumps	**1**	**Total Design Flow**		**145**	***gpm***	
Pump Name	PHWP-1					
Pump Motor HP	2.0					*hp*
Design Flow	145					*gpm*
Design Head Pressure	27					*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0		*hp*
Pump eff	45%					
Brake Pump Power	2.2	0.0	0.0	0.0		*hp*
Pump Motor Eff	84%					
Pump Motor kW	2.0	0.0	0.0	0.0		*kW*
Pump Enabled (% Flow)	0%					*Design Flow*
Pump Curve	Const Flow					
Secondary Pumps	**0**	**Total Design Flow**		**0**	***gpm***	
Pump Name						
Pump Motor HP						*hp*
Design Flow						*gpm*
Design Head Pressure						*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0		*hp*
Pump eff						
Brake Pump Power	0.0	0.0	0.0	0.0		*hp*
Pump Motor Eff						
Pump Motor kW	0.0	0.0	0.0	0.0		*kW*
Pump Enabled (% Flow)						*Design Flow*
Pump Curve	Typical VFD					

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	4	-	-	4	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	269	-	4,080
68	98	98	19	-	-	19	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	192	-	2,904
66	205	205	58	-	-	58	1	100	99	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,018
64	303	303	103	-	-	103	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,688
62	383	383	156	-	-	156	1	109	107	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,391
60	696	696	216	-	-	216	1	115	112	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,095
58	462	462	282	-	-	282	1	121	117	236%	33%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,531
56	394	394	361	-	-	361	1	127	122	214%	39%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,335
54	304	304	448	-	-	448	1	133	127	196%	44%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,096
52	253	253	534	-	-	534	1	139	132	180%	48%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,463
50	147	147	479	-	-	479	1	145	138	167%	40%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,480
48	120	120	559	-	-	559	1	151	143	156%	44%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,221
46	93	93	614	-	-	614	1	157	149	146%	45%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,687
44	25	25	669	-	-	669	1	160	151	141%	47%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,097
42	26	26	723	-	-	723	1	160	150	141%	51%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,239
40	4	4	778	-	-	778	1	160	149	141%	55%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	331
38	2	2	833	-	-	833	1	160	149	141%	59%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	180
36	2	2	888	-	-	888	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
34	0	0	942	-	-	942	1	160	147	141%	67%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	30
32	1	1	997	-	-	997	1	160	146	141%	70%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	89
Morning Warmup[5]		**260**	997	100	-	1,097	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21355
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**180,202**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 **Base Case Simulation** **Measure Name:** Reset Condenser Water Temp **Based on Sheet:** (CIM-2) Bo

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficiency	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	1	4	4	22	100	20%	0.21	0.97	82%	361	6%	37
68	98	1	19	19	37	100	20%	0.21	0.97	82%	361	10%	44
66	205	1	58	58	76	99	20%	0.21	0.97	82%	361	21%	189
64	303	1	103	103	121	102	20%	0.21	0.97	82%	361	34%	447
62	383	1	156	156	174	107	20%	0.21	0.97	82%	361	48%	809
60	696	1	216	216	234	112	20%	0.21	0.97	82%	361	65%	1,977
58	462	1	282	282	300	117	20%	0.21	0.97	82%	361	83%	1,686
56	394	1	361	361	379	122	21%	0.22	0.97	83%	379	100%	1,808
54	304	1	448	448	466	127	26%	0.26	0.98	84%	466	100%	1,693
52	253	1	534	534	552	132	31%	0.31	0.99	84%	552	100%	1,660
50	147	1	479	479	497	138	28%	0.28	0.99	84%	497	100%	870
48	120	1	559	559	577	143	32%	0.32	0.99	84%	577	100%	821
46	93	1	614	614	632	149	35%	0.35	1.00	85%	632	100%	696
44	25	1	669	669	687	151	38%	0.38	1.00	85%	687	100%	199
42	26	1	723	723	741	150	41%	0.41	1.00	85%	741	100%	231
40	4	1	778	778	796	149	44%	0.44	1.00	85%	796	100%	37
38	2	1	833	833	851	149	47%	0.47	1.00	85%	851	100%	21
36	2	1	888	888	906	148	50%	0.50	1.00	85%	906	100%	23
34	0	1	942	942	960	147	53%	0.53	1.00	85%	960	100%	4
32	1	1	997	997	1,015	146	56%	0.56	1.00	85%	1,015	100%	13
Warmup	260	1	997	997	1,015	145	56%	0.56	1.00	85%	1,015	100%	3,091
	hrs/yr												therms
TOTAL	**3,726**												**16,370**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Chilled Water Reset

Based on Sheet: (LCM-3) AHU-1

Site/Space:	First Floor, Second & Third Floor Zones	**Model Specific**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume	**Notes**	

Load Shape Characteristics

Design Space Temp	72.3 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	536.7 kBtu/hr	Htg. Design Zone Load	-356.5 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	15%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	80.5 kBtu/hr
		Clg. Load at Zero Htg.	220.3 kBtu/hr
Max Cold Deck Airflow	20,800 CFM	Max Hot Deck Airflow	18,000 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
25,750	100%	None	13.45	1.00	22.3%	30.0%	3,863
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				1.000000	0.000000	0.000000	0.000000

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
58	62	32	85.5
smooth	60	smooth	0
76	53	70	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
25,150	2.5	59%	93%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	781	781	0	53.0	22%	78.5	53.0	20,800	78.5	4,950	25,750	100%	13.45	19	572.1	0.0	0.78	37.3	53	0%	0.0
	92	66.8	2	741	741	0	53.0	22%	76.7	53.0	20,800	76.7	4,950	25,750	100%	13.45	29	532.4	0.0	0.78	34.8	74	0%	0.0
	90	64.7	4	701	701	0	53.0	22%	76.3	53.0	20,800	76.3	4,950	25,750	100%	13.45	48	522.3	0.0	0.76	33.2	119	0%	0.0
	88	64.6	8	661	661	0	53.0	22%	75.8	53.0	20,800	75.8	4,950	25,750	100%	13.45	106	512.3	0.0	0.76	32.6	256	0%	0.0
	86	64.5	5	621	621	0	53.0	22%	75.4	53.0	20,800	75.4	4,950	25,750	100%	13.45	67	502.3	0.0	0.77	32.0	160	0%	0.0
	84	64.3	11	581	581	0	53.0	22%	74.9	53.0	20,800	74.9	4,950	25,750	100%	13.45	144	492.2	0.0	0.77	31.4	336	0%	0.0
Design Cooling	82	63.3	14	541	541	0	53.0	22%	74.5	53.0	20,800	74.5	4,950	25,750	100%	13.45	192	482.2	0.0	0.76	30.4	435	0%	0.0
	80	63.5	22	501	501	0	53.0	22%	74.0	53.0	20,800	74.0	4,950	25,750	100%	13.45	298	472.2	0.0	0.76	30.0	664	0%	0.0
	78	63.1	34	461	461	0	53.0	22%	73.6	53.0	20,413	73.6	5,337	25,750	100%	13.45	452	453.5	0.0	0.73	27.8	932	0%	0.0
	76	62.0	26	421	421	0	53.0	22%	73.1	53.0	18,987	73.1	6,763	25,750	100%	13.45	356	412.7	0.0	0.71	24.3	643	0%	0.0
	74	61.1	58	381	381	0	54.0	30%	72.8	54.0	18,234	72.8	7,516	25,750	100%	13.45	778	370.4	0.0	0.69	21.3	1,232	0%	0.0
	72	60.8	70	340	340	0	55.0	30%	72.2	55.0	17,355	72.2	8,395	25,750	100%	13.45	937	322.6	0.0	0.69	18.4	1,282	82%	0.0
	70	59.5	138	300	300	0	56.0	30%	71.6	56.0	16,425	72.0	9,325	25,750	100%	13.45	1,849	276.9	3.9	0.67	15.6	2,139	82%	6.6
	68	58.9	98	260	260	0	57.0	30%	71.0	57.0	15,617	72.7	10,133	25,750	100%	13.45	1,321	236.3	18.6	0.67	13.1	1,288	82%	22.2
Observed	**66**	58.3	205	**220**	**220**	**0**	**58.0**	30%	**70.4**	**58.0**	**14,786**	**73.4**	**10,964**	**25,750**	**100%**	**13.45**	**2,762**	**198.2**	**35.7**	0.66	10.9	2,229	82%	89.0
	64	57.2	303	180	195	-15	59.0	30%	69.8	59.0	13,933	74.1	11,817	25,750	100%	13.45	4,073	162.7	55.2	0.67	9.0	2,736	82%	202.9
	62	56.4	383	140	169	-29	60.0	30%	69.2	60.0	13,056	74.8	12,694	25,750	100%	13.45	5,145	129.9	77.2	0.69	7.5	2,875	82%	358.8
	60	55.7	696	100	144	-44	61.0	30%	68.6	61.0	12,155	75.6	13,595	25,750	100%	13.45	9,367	99.9	101.9	0.76	6.3	4,422	82%	862.6
	58	54.2	462	60	119	-59	62.0	30%	68.0	62.0	11,228	76.3	14,522	25,750	100%	13.45	6,216	72.9	129.4	0.86	5.2	2,411	82%	726.8
	56	52.5	394	20	93	-73	62.0	30%	67.4	62.0	9,784	77.0	15,966	25,750	100%	13.45	5,294	57.2	164.9	0.98	4.7	1,840	83%	786.0
	54	50.8	304	-20	81	-101	62.0	30%	66.8	62.0	8,434	77.7	17,316	25,750	100%	13.45	4,083	43.8	203.4	1.19	4.3	1,318	84%	738.7
	52	49.0	253	-60	81	-141	62.0	30%	66.2	62.0	7,750	78.4	18,000	25,750	100%	13.45	3,406	35.2	236.9	1.44	4.2	1,068	84%	712.1
	50	47.4	147	-100	81	-181	66.9	22%	67.3	67.3	7,775	79.1	17,975	25,750	100%	13.45	1,974	0.0	228.8	0.00	0.0	0	84%	400.6
	48	45.6	120	-140	81	-221	66.4	22%	66.9	66.9	7,750	79.8	18,000	25,750	100%	13.45	1,614	0.0	251.6	0.00	0.0	0	84%	357.9
	46	43.6	93	-180	81	-261	66.0	22%	66.4	66.4	7,750	80.5	18,000	25,750	100%	13.45	1,254	0.0	274.1	0.00	0.0	0	85%	301.9
	44	42.1	25	-220	81	-301	65.5	22%	66.0	66.0	7,750	81.2	18,000	25,750	100%	13.45	331	0.0	296.6	0.00	0.0	0	85%	86.1
	42	39.5	26	-260	81	-341	65.1	22%	65.5	65.5	7,750	81.9	18,000	25,750	100%	13.45	356	0.0	319.1	0.00	0.0	0	85%	99.2
	40	38.1	4	-300	81	-381	64.6	22%	65.1	65.1	7,750	82.7	18,000	25,750	100%	13.45	53	0.0	341.6	0.00	0.0	0	85%	15.8
Design Heating	38	36.6	2	-340	81	-421	64.2	22%	64.6	64.6	7,750	83.4	18,000	25,750	100%	13.45	29	0.0	364.1	0.00	0.0	0	85%	9.2
	36	34.4	2	-381	81	-461	63.7	22%	64.2	64.2	7,750	84.1	18,000	25,750	100%	13.45	29	0.0	386.6	0.00	0.0	0	85%	9.7
	34	32.7	0	-421	81	-501	63.3	22%	63.7	63.7	7,750	84.8	18,000	25,750	100%	13.45	5	0.0	409.1	0.00	0.0	0	85%	1.7
	32	30.5	1	-461	81	-541	64.2	22%	63.3	63.3	7,750	85.5	18,000	25,750	100%	13.45	14	0.0	431.5	0.00	0.0	0	85%	5.4
		Total:	**3,914**													Total:	**52,599**					**28,512**		**5,793**

Site/Space:	First Floor, Second & Third Floor Zones	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

Indx		Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
		OAT Bin	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date		°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	7/17, 2PM	81	68.0	1	521	521	0	53.0	22%	76	53.0	20,800	75.6	4,950	25,750	100%	13.45	13.5	506.9	0.0	0.78	32.8		0%	
	7/17, 3PM	80	67.0	1	501	501	0	53.0	22%	75	53.0	20,800	75.3	4,950	25,750	100%	13.45	13.5	501.8	0.0	0.77	32.1		0%	
	7/17, 4PM	79	66.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.45	13.5	496.8	0.0	0.70	28.9		0%	
	7/18, 2PM	87	68.0	1	641	641	0	53.0	22%	77	53.0	20,800	76.9	4,950	25,750	100%	13.45	13.5	537.0	0.0	0.77	34.5		0%	
	7/18, 3PM	84	67.0	1	581	581	0	53.0	22%	76	53.0	20,800	76.2	4,950	25,750	100%	13.45	13.5	521.9	0.0	0.76	33.0		85%	
	7/18, 4PM	82	66.0	1	541	541	0	53.0	22%	76	53.0	20,800	75.8	4,950	25,750	100%	13.45	13.5	511.9	0.0	0.75	32.1		0%	
	7/19, 2PM	79	68.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.45	13.5	496.8	0.0	0.72	29.7		0%	
	7/19, 3PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.45	13.5	483.1	0.0	0.72	29.0		0%	
	7/19, 4PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.45	13.5	483.1	0.0	0.72	29.0		0%	
																Average:	**13.45**					31.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .
1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Chilled Water Reset

Based on Sheet: (LCM-3) AHU-2

Site/Space:	Most of Second and third floors, all of f	**Model Specific**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume	**Notes**	

Load Shape Characteristics

Design Space Temp	73.7 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	944.5 kBtu/hr	Htg. Design Zone Load	-627.3 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	20%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	188.9 kBtu/hr
		Clg. Load at Zero Htg.	387.7 kBtu/hr
Max Cold Deck Airflow	33,330 CFM	Max Hot Deck Airflow	30,800 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
42,250	100%	None	17.50	1.00	12.5%	20.0%	6,338
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				1.000000	0.000000	0.000000	0.000000

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
54	62	32	85.5
smooth	60	smooth	0
75	53	69.5	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
42,250	2.5	75%	95%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	1,375	1,375	0	53.0	12%	76.5	53.0	33,330	76.5	8,920	42,250	100%	17.50	25.0	845.7	0.0	0.78	55.2	79	0%	0.0
	92	66.8	2	1,304	1,304	0	53.0	12%	76.0	53.0	33,330	76.0	8,920	42,250	100%	17.50	37.5	827.3	0.0	0.78	54.0	116	0%	0.0
	90	64.7	4	1,234	1,234	0	53.0	12%	75.7	53.0	33,330	75.7	8,920	42,250	100%	17.50	62.5	818.3	0.0	0.76	52.0	186	0%	0.0
	88	64.6	8	1,163	1,163	0	53.0	12%	75.5	53.0	33,330	75.5	8,920	42,250	100%	17.50	137.5	809.3	0.0	0.76	51.5	405	0%	0.0
	86	64.5	5	1,093	1,093	0	53.0	12%	75.2	53.0	33,330	75.2	8,920	42,250	100%	17.50	87.5	800.4	0.0	0.77	51.0	255	0%	0.0
	84	64.3	11	1,022	1,022	0	53.0	12%	75.0	53.0	33,330	75.0	8,920	42,250	100%	17.50	187.5	791.4	0.0	0.77	50.5	541	0%	0.0
Design Cooling	82	63.3	14	952	952	0	53.0	12%	74.7	53.0	33,330	74.7	8,920	42,250	100%	17.50	250.0	782.4	0.0	0.76	49.4	706	0%	0.0
	80	63.5	22	881	881	0	53.0	12%	74.5	53.0	33,330	74.5	8,920	42,250	100%	17.50	387.5	773.4	0.0	0.76	49.1	1,087	0%	0.0
	78	63.1	34	811	811	0	53.0	12%	74.2	53.0	33,330	74.2	8,920	42,250	100%	17.50	587.5	764.4	0.0	0.73	46.8	1,571	0%	0.0
	76	62.0	26	740	740	0	53.0	12%	74.0	53.0	32,788	74.0	9,462	42,250	100%	17.50	462.5	743.2	0.0	0.71	43.8	1,158	0%	0.0
	74	61.1	58	670	670	0	53.4	20%	73.8	53.4	30,838	73.8	11,412	42,250	100%	17.50	1,012.5	677.1	0.0	0.69	38.9	2,252	0%	0.0
	72	60.8	70	599	599	0	54.3	20%	73.4	54.3	29,250	73.4	13,000	42,250	100%	17.50	1,218.8	602.6	0.0	0.69	34.4	2,396	82%	0.0
	70	59.5	138	529	529	0	55.1	20%	73.0	55.1	27,494	73.0	14,756	42,250	100%	17.50	2,406.3	529.0	0.0	0.67	29.7	4,087	82%	0.0
	68	58.9	98	458	458	0	56.0	20%	72.6	56.0	25,542	72.6	16,708	42,250	100%	17.50	1,718.8	456.8	0.0	0.67	25.4	2,490	82%	0.0
Observed	**66**	58.3	205	**388**	**388**	**0**	**56.9**	20%	**72.2**	**56.9**	**23,849**	**73.3**	**18,401**	**42,250**	**100%**	**17.50**	**3,593.8**	**394.2**	**21.9**	0.66	21.6	4,433	82%	54.5
	64	57.2	303	317	352	-34	57.7	20%	71.8	57.7	22,142	74.0	20,108	42,250	100%	17.50	5,300.0	335.9	48.2	0.67	18.7	5,648	82%	177.4
	62	56.4	383	247	315	-69	58.6	20%	71.4	58.6	20,415	74.7	21,835	42,250	100%	17.50	6,693.8	282.0	78.8	0.69	16.3	6,242	82%	366.1
	60	55.7	696	176	279	-103	59.4	20%	71.0	59.4	18,665	75.4	23,585	42,250	100%	17.50	12,187.5	232.5	113.6	0.76	14.8	10,289	82%	961.3
	58	54.2	462	106	243	-137	60.3	20%	70.6	60.3	16,894	76.1	25,356	42,250	100%	17.50	8,087.5	187.5	152.8	0.86	13.4	6,201	82%	858.0
	56	52.5	394	35	207	-172	61.1	20%	70.2	61.1	15,100	76.9	27,150	42,250	100%	17.50	6,887.5	147.1	196.5	0.98	12.0	4,733	83%	936.3
	54	50.8	304	-35	189	-224	62.0	20%	69.8	62.0	13,284	77.6	28,966	42,250	100%	17.50	5,312.5	111.3	244.6	1.19	11.0	3,348	84%	888.6
	52	49.0	253	-106	189	-295	62.0	20%	69.4	62.0	11,450	78.3	30,800	42,250	100%	17.50	4,431.3	91.0	297.4	1.44	10.9	2,759	84%	894.1
	50	47.4	147	-176	189	-365	70.5	12%	70.7	70.7	14,298	79.0	27,952	42,250	100%	17.50	2,568.8	0.0	249.9	0.00	0.0	0	84%	437.5
	48	45.6	120	-247	189	-436	70.2	12%	70.5	70.5	11,450	79.7	30,800	42,250	100%	17.50	2,100.0	0.0	307.6	0.00	0.0	0	84%	437.5
	46	43.6	93	-317	189	-506	70.0	12%	70.2	70.2	11,450	80.5	30,800	42,250	100%	17.50	1,631.3	0.0	339.8	0.00	0.0	0	85%	374.3
	44	42.1	25	-388	189	-577	69.7	12%	70.0	70.0	11,450	81.2	30,800	42,250	100%	17.50	431.3	0.0	372.1	0.00	0.0	0	85%	108.1
	42	39.5	26	-458	189	-647	69.5	12%	69.7	69.7	11,450	81.9	30,800	42,250	100%	17.50	462.5	0.0	404.3	0.00	0.0	0	85%	125.7
	40	38.1	4	-529	189	-718	69.2	12%	69.5	69.5	11,450	82.6	30,800	42,250	100%	17.50	68.8	0.0	436.6	0.00	0.0	0	85%	20.1
Design Heating	38	36.6	2	-599	189	-788	69.0	12%	69.2	69.2	11,450	83.3	30,800	42,250	100%	17.50	37.5	0.0	468.8	0.00	0.0	0	85%	11.8
	36	34.4	2	-670	189	-859	68.7	12%	69.0	69.0	11,450	84.1	30,800	42,250	100%	17.50	37.5	0.0	501.1	0.00	0.0	0	85%	12.6
	34	32.7	0	-740	189	-929	68.5	12%	68.7	68.7	11,450	84.8	30,800	42,250	100%	17.50	6.3	0.0	533.3	0.00	0.0	0	85%	2.2
	32	30.5	1	-811	189	-1,000	66.6	12%	68.5	68.5	11,450	85.5	30,800	42,250	100%	17.50	18.8	0.0	565.6	0.00	0.0	0	85%	7.1
		Total:	**3,914**													Total:	**68,438.1**					**60,981**		**6,673**

Site/Space:	Most of Second and third floors, all of fo	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.50	17.5	787.4	0.0	0.78	50.9		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.50	17.5	782.9	0.0	0.77	50.1		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.70	45.3		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.50	17.5	814.3	0.0	0.77	52.3		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.50	17.5	800.8	0.0	0.76	50.7		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.50	17.5	791.9	0.0	0.75	49.7		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.72	46.5		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.72	46.5		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.72	46.5		0%	
															Average:	**17.50**					48.7			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant Cooling Loads Measure Name: Chilled Water Reset Chiller Template - v1.6.4

Notes:

OAT	Base Hrs	Cooling Loads: Plant Duty Cycle	Plant Running Hours	Total Output (tons)	Cooling Mode	AHU-1 CCoil Load (tons)	AHU-2 CCoil Load (tons)
94	1	100%	1	118	Chiller	48	70
92	2	100%	2	113	Chiller	44	69
90	4	100%	4	112	Chiller	44	68
88	8	100%	8	110	Chiller	43	67
86	5	100%	5	109	Chiller	42	67
84	11	100%	11	107	Chiller	41	66
82	14	100%	14	105	Chiller	40	65
80	22	100%	22	104	Chiller	39	64
78	34	100%	34	101	Chiller	38	64
76	26	100%	26	96	Chiller	34	62
74	58	100%	58	87	Chiller	31	56
72	70	100%	70	77	Chiller	27	50
70	138	100%	138	67	Chiller	23	44
68	98	100%	98	58	Chiller	20	38
66	205	100%	205	49	Chiller	17	33
64	303	100%	303	42	Chiller	14	28
62	383	100%	383	34	Chiller	11	23
60	696	100%	696	28	Chiller	8	19
58	462	100%	462	22	Chiller	6	16
56	394	100%	394	17	Chiller	5	12
54	304	100%	304	13	Chiller	4	9
52	253	100%	253	11	Chiller	3	8
50	147	100%	0	0	Chiller	-	-
48	120	100%	0	0	Chiller	-	-
46	93	100%	0	0	Chiller	-	-
44	25	100%	0	0	Chiller	-	-
42	26	100%	0	0	Chiller	-	-
40	4	100%	0	0	Chiller	-	-
38	2	100%	0	0	Chiller	-	-
36	2	100%	0	0	Chiller	-	-
34	0	100%	0	0	Chiller	-	-
32	1	100%	0	0	Chiller	-	-
TOTAL	3,911		3,490				

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Chilled Water Reset Based on Sheet: (LCM-3) CHP Summary Chiller Template - v1.6.4

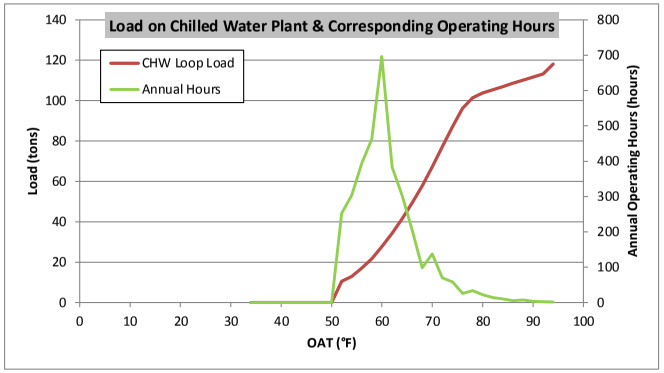
Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

Chillers - Inputs	
CH-1 Size	100 tons

CHWST SP Reset	
OAT	CHWT
66	55
80	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29



System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	70.1	45,968	10,601
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	9,633	2,088
Condensing Water Pumps [CWP]	5.0	17,440	3,352
Total	**86.6**	**89,495**	**19,202**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	5.0	7	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	5.0	11	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	5.0	18	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	5.0	39	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	5.0	25	6.8	34	0.77	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	5.0	54	6.8	73	0.77	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	5.0	71	6.8	97	0.76	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	5.0	111	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.57	58.1	1,949	4.7	158	5.0	168	6.8	229	0.73	0.2703	1
76	62.0	26	96	1	26	96	0.54	51.6	1,364	4.7	125	5.0	132	6.8	180	0.71	0.2736	1
74	61.1	58	87	1	58	87	0.50	43.7	2,527	4.7	273	5.0	289	6.8	394	0.69	0.2536	1
72	60.8	70	77	1	70	77	0.47	36.3	2,527	4.7	328	5.0	348	6.8	474	0.69	0.2549	1
70	59.5	138	67	1	138	67	0.44	29.2	4,018	4.7	648	5.0	687	6.3	873	0.67	0.2714	1
68	58.9	98	58	1	98	58	0.41	23.6	2,322	4.7	463	5.0	491	5.1	503	0.67	0.2555	1
66	58.3	205	49	1	205	49	0.38	18.8	3,854	4.7	968	5.0	1,026	4.0	814	0.66	0.2569	1
64	57.2	303	42	1	303	42	0.36	15.0	4,555	4.7	1,428	5.0	1,513	2.9	888	0.67	0.2463	1
62	56.4	383	34	1	383	34	0.34	11.7	4,461	4.7	1,803	5.0	1,911	2.5	942	0.69	0.2160	1
60	55.7	696	28	1	696	28	0.33	11.4	6,429	4.7	3,283	5.0	3,480	2.2	1,520	0.76	0.1747	1
58	54.2	462	22	1	462	22	0.32	11.1	3,235	4.7	2,179	5.0	2,309	1.9	887	0.86	0.1512	1
56	52.5	394	17	1	394	17	0.31	10.7	2,082	4.7	1,855	5.0	1,967	1.7	670	0.98	0.1447	1
54	50.8	304	13	1	304	13	0.32	10.4	1,263	4.7	1,431	5.0	1,517	1.5	455	1.19	0.1399	1
52	49.0	253	11	1	253	11	0.38	10.1	1,020	4.7	1,194	5.0	1,265	1.4	348	1.44	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				45,968		16,453		17,440		9,633	0.85		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		5.0		6.8		0.78	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		5.0		6.8		0.77	1
76	66.0	7/17 4 PM	115	1	1	115	0.55	63.9		4.7		5.0		6.8		0.70	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		5.0		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		5.0		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		5.0		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.57	66.1		4.7		5.0		6.8		0.72	1
76	68.0	7/19 3 PM	114	1	1	114	0.58	65.4		4.7		5.0		6.8		0.72	1
76	68.0	7/19 4 PM	114	1	1	114	0.58	65.4		4.7		5.0		6.8		0.72	1
								70.1		**4.7**		**5.0**		**6.8**			

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Chilled Water Reset

Based on Sheet: (LCM-3) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	66	55
	80	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	0	°F
Prim. Pump Operates with WSE	NO	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	46.4	75.5	1.11	111.1	91%	100%	91%	0.82	0.90	58.1	0.57	1,949	5.6	4.7	158
76	62.0	26	96	47.9	74.2	1.15	115.0	84%	100%	84%	0.79	0.84	51.6	0.54	1,364	5.6	4.7	125
74	61.1	58	87	49.3	72.5	1.19	119.2	73%	100%	73%	0.76	0.74	43.7	0.50	2,527	5.6	4.7	273
72	60.8	70	77	50.7	71.3	1.23	123.2	63%	100%	63%	0.74	0.63	36.3	0.47	2,527	5.6	4.7	328
70	59.5	138	67	52.1	69.7	1.28	127.6	53%	100%	53%	0.71	0.53	29.2	0.44	4,018	5.6	4.7	648
68	58.9	98	58	53.6	69.2	1.31	131.3	44%	100%	44%	0.70	0.43	23.6	0.41	2,322	5.6	4.7	463
66	58.3	205	49	55.0	68.8	1.35	135.1	37%	100%	37%	0.69	0.35	18.8	0.38	3,854	5.6	4.7	968
64	57.2	303	42	55.0	68.0	1.36	135.6	31%	100%	31%	0.68	0.28	15.0	0.36	4,555	5.6	4.7	1,428
62	56.4	383	34	55.0	67.3	1.36	136.0	25%	100%	25%	0.68	0.22	11.7	0.34	4,461	5.6	4.7	1,803
60	55.7	696	28	55.0	66.7	1.36	136.3	20%	81%	25%	0.67	0.22	11.4	0.33	6,429	5.6	4.7	3,283
58	54.2	462	22	55.0	65.6	1.37	137.0	16%	63%	25%	0.66	0.21	11.1	0.32	3,235	5.6	4.7	2,179
56	52.5	394	17	55.0	64.2	1.38	137.9	12%	49%	25%	0.66	0.21	10.7	0.31	2,082	5.6	4.7	1,855
54	50.8	304	13	55.0	62.8	1.39	138.7	10%	40%	25%	0.65	0.21	10.4	0.32	1,263	5.6	4.7	1,431
52	49.0	253	11	55.0	61.2	1.40	139.6	10%	40%	25%	0.64	0.20	10.1	0.38	1,020	5.6	4.7	1,194
50	47.4	0	0	55.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	55.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	55.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	55.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	55.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	55.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	55.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	55.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	55.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**45,968**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	47.9	77.1	1.13	113.1	102%	100%	102%	0.83	0.99	63.9	0.55		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	47.9	78.6	1.12	112.1	103%	100%	103%	0.85	1.00	66.1	0.57		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	47.9	78.6	1.12	112.1	101%	100%	101%	0.85	0.99	65.4	0.58		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	47.9	78.6	1.12	112.1	101%	100%	101%	0.85	0.99	65.4	0.58		5.6	4.7	
													70.1				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Cooling Tower Bin Simulation Measure Name: Chilled Water Reset Based on Sheet: (LCM-3) CT

Notes:

Total Number of Cells	1
Cooling Tower Design Specs - One Cell	
Make	Baltimore Air Coil
Model	VXT-95C
Design EWT (i.e. CWRT)	90.0 °F
Design LWT (i.e. CWST)	80.0 °F
Design WBT	67.0 °F
Cell Design CW Flow	313 gpm
Design Approach	13.0 °F
Design Range	10.0 °F
Capacity (tons)	131 tons
Flow Capacity @ CTI	245 gpm
Tower Performance Curve	Open Tower (DOE 2.2)

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WB	CWST SetP
	45	58
	70	79

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	NO	
OAT for WSE Staging		°F
HX Approach		°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size		Inches	
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	82.5%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	5.0	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	76.8	81.1	91.6	80.2	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	5.0	7
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	76.3	80.2	90.3	79.3	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	5.0	11
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	74.5	78.5	88.4	77.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	5.0	18
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	74.4	78.3	88.0	77.4	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	5.0	39
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	74.4	78.0	87.7	77.2	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	5.0	25
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	74.2	77.8	87.2	77.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	5.0	54
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	73.4	76.9	86.2	76.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	5.0	71
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	73.5	76.9	86.0	76.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	5.0	111
78	63.1	34	102	1	0.57	118	283	1	318	1	102%	8.9	73.2	76.3	85.2	75.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	5.0	168
76	62.0	26	96	1	0.54	111	266	1	318	1	102%	8.4	72.3	74.9	83.3	74.2	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	5.0	132
74	61.1	58	87	1	0.50	100	239	1	318	1	102%	7.5	71.5	73.2	80.7	72.5	100%	317	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	5.0	289
72	60.8	70	77	1	0.47	87	210	1	318	1	102%	6.6	71.3	71.9	78.5	71.3	100%	319	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	5.0	348
70	59.5	138	67	1	0.44	75	181	1	318	1	102%	5.7	70.2	70.2	75.9	69.7	96%	321	100%	0%	0%	89%	0%	0%	6.3	0.0	0.0	6.3	873	100%	5.5	5.0	687
68	58.9	98	58	1	0.41	64	155	1	318	1	102%	4.9	69.7	69.7	74.5	69.2	87%	324	100%	0%	0%	59%	0%	0%	5.1	0.0	0.0	5.1	503	100%	5.5	5.0	491
66	58.3	205	49	1	0.38	55	146	1	318	1	102%	4.1	69.2	69.2	73.3	68.8	78%	326	100%	0%	0%	31%	0%	0%	4.0	0.0	0.0	4.0	814	100%	5.5	5.0	1,026
64	57.2	303	42	1	0.36	46	146	1	318	1	102%	3.5	68.3	68.3	71.7	68.0	70%	328	100%	0%	0%	6%	0%	0%	2.9	0.0	0.0	2.9	888	100%	5.5	5.0	1,513
62	56.4	383	34	1	0.34	38	146	1	318	1	102%	2.8	67.6	67.6	70.4	67.3	62%	331	68%	0%	0%	91%	0%	0%	2.5	0.0	0.0	2.5	942	100%	5.5	5.0	1,911
60	55.7	696	28	1	0.33	30	146	1	318	1	102%	2.3	67.0	67.0	69.2	66.7	55%	334	68%	0%	0%	81%	0%	0%	2.2	0.0	0.0	2.2	1,520	100%	5.5	5.0	3,480
58	54.2	462	22	1	0.32	24	146	1	318	1	102%	1.8	65.7	65.7	67.5	65.6	48%	338	68%	0%	0%	71%	0%	0%	1.9	0.0	0.0	1.9	887	100%	5.5	5.0	2,309
56	52.5	394	17	1	0.31	19	146	1	318	1	102%	1.4	64.3	64.3	65.7	64.2	43%	341	68%	0%	0%	63%	0%	0%	1.7	0.0	0.0	1.7	670	100%	5.5	5.0	1,967
54	50.8	304	13	1	0.32	14	146	1	318	1	102%	1.1	62.9	62.9	64.0	62.8	38%	342	68%	0%	0%	56%	0%	0%	1.5	0.0	0.0	1.5	455	100%	5.5	5.0	1,517
52	49.0	253	11	1	0.38	12	146	1	318	1	102%	0.9	61.3	61.3	62.2	61.2	35%	343	68%	0%	0%	51%	0%	0%	1.4	0.0	0.0	1.4	348	100%	5.5	5.0	1,265
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	60.0	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.5	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**9,633**				**17,440**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	77.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	66.0	7/17/00 4:00 PM	115	1	0.55	111	266	1	318	1	102%	8.4	75.6	77.8	86.2	77.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	77.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	75.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 2:00 PM	115	1	0.57	111	266	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 3:00 PM	114	1	0.58	111	266	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
76	68.0	7/19/00 4:00 PM	114	1	0.58	111	266	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	5.0	
																												6.8				**5.0**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations.
More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)
Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Chilled Water Reset **Based on Sheet:** (LCM-3) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

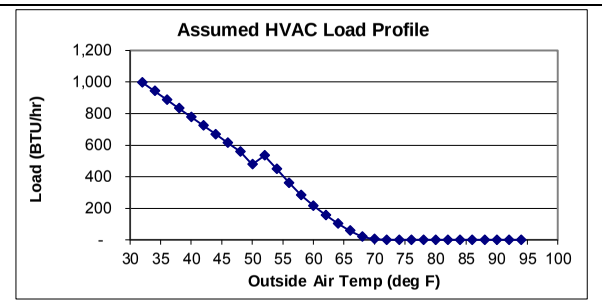
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 °F

Optimization² (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase¹		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

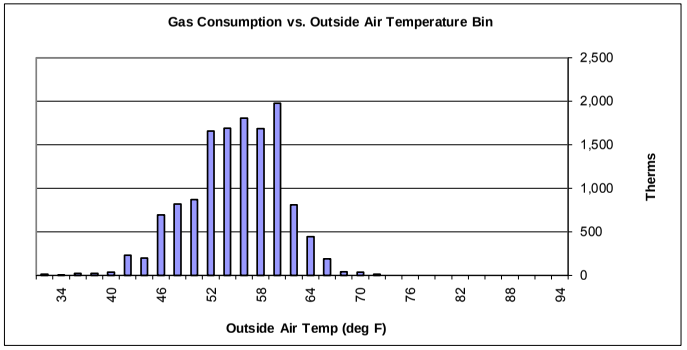
Hot Water Delivery Design					
Coil Design EWT	200 °F			Min Flow	Flow at Design
Coil Design EAT	63 °F		Required/Primary System	30%	100%
2-way valves	TRUE		Secondary System	30%	100%
Primary Pumps	**1**		**Total Design Flow**	**145**	***gpm***
Pump Name	PHWP-1				
Pump Motor HP	2.0				*hp*
Design Flow	145				*gpm*
Design Head Pressure	27				*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0	*hp*
Pump eff	45%				
Brake Pump Power	2.2	0.0	0.0	0.0	*hp*
Pump Motor Eff	84%				
Pump Motor kW	2.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)	0%				*Design Flow*
Pump Curve	Const Flow				
Secondary Pumps	**0**		**Total Design Flow**	**0**	***gpm***
Pump Name					
Pump Motor HP					*hp*
Design Flow					*gpm*
Design Head Pressure					*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0	*hp*
Pump eff					
Brake Pump Power	0.0	0.0	0.0	0.0	*hp*
Pump Motor Eff					
Pump Motor kW	0.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)					*Design Flow*
Pump Curve	Typical VFD				

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	4	-	-	4	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	269	-	4,080
68	98	98	19	-	-	19	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	192	-	2,904
66	205	205	58	-	-	58	1	100	99	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,018
64	303	303	103	-	-	103	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,688
62	383	383	156	-	-	156	1	109	107	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,391
60	696	696	216	-	-	216	1	115	112	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,095
58	462	462	282	-	-	282	1	121	117	236%	33%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,531
56	394	394	361	-	-	361	1	127	122	214%	39%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,335
54	304	304	448	-	-	448	1	133	127	196%	44%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,096
52	253	253	534	-	-	534	1	139	132	180%	48%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,463
50	147	147	479	-	-	479	1	145	138	167%	40%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,480
48	120	120	559	-	-	559	1	151	143	156%	44%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,221
46	93	93	614	-	-	614	1	157	149	146%	45%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,687
44	25	25	669	-	-	669	1	160	151	141%	47%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,097
42	26	26	723	-	-	723	1	160	150	141%	51%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,239
40	4	4	778	-	-	778	1	160	149	141%	55%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	331
38	2	2	833	-	-	833	1	160	149	141%	59%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	180
36	2	2	888	-	-	888	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
34	0	0	942	-	-	942	1	160	147	141%	67%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	30
32	1	1	997	-	-	997	1	160	146	141%	70%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	89
Morning Warmup[5]		**260**	997	100	-	1,097	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21355
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**180,202**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 **Base Case Simulation** **Measure Name:** Chilled Water Reset **Based on Sheet:** (LCM-3) B

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficiency	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	1	4	4	22	100	20%	0.21	0.97	82%	361	6%	37
68	98	1	19	19	37	100	20%	0.21	0.97	82%	361	10%	44
66	205	1	58	58	76	99	20%	0.21	0.97	82%	361	21%	189
64	303	1	103	103	121	102	20%	0.21	0.97	82%	361	34%	447
62	383	1	156	156	174	107	20%	0.21	0.97	82%	361	48%	809
60	696	1	216	216	234	112	20%	0.21	0.97	82%	361	65%	1,977
58	462	1	282	282	300	117	20%	0.21	0.97	82%	361	83%	1,686
56	394	1	361	361	379	122	21%	0.22	0.97	83%	379	100%	1,808
54	304	1	448	448	466	127	26%	0.26	0.98	84%	466	100%	1,693
52	253	1	534	534	552	132	31%	0.31	0.99	84%	552	100%	1,660
50	147	1	479	479	497	138	28%	0.28	0.99	84%	497	100%	870
48	120	1	559	559	577	143	32%	0.32	0.99	84%	577	100%	821
46	93	1	614	614	632	149	35%	0.35	1.00	85%	632	100%	696
44	25	1	669	669	687	151	38%	0.38	1.00	85%	687	100%	199
42	26	1	723	723	741	150	41%	0.41	1.00	85%	741	100%	231
40	4	1	778	778	796	149	44%	0.44	1.00	85%	796	100%	37
38	2	1	833	833	851	149	47%	0.47	1.00	85%	851	100%	21
36	2	1	888	888	906	148	50%	0.50	1.00	85%	906	100%	23
34	0	1	942	942	960	147	53%	0.53	1.00	85%	960	100%	4
32	1	1	997	997	1,015	146	56%	0.56	1.00	85%	1,015	100%	13
Warmup	260	1	997	997	1,015	145	56%	0.56	1.00	85%	1,015	100%	3,091
	hrs/yr												therms
TOTAL	**3,726**												**16,370**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation **Measure Name:** Waterside Economizer Based on Sheet: (LCM-4) AHU-1

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

Load Shape Characteristics

Design Space Temp	72.3 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	536.7 kBtu/hr	Htg. Design Zone Load	-356.5 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Fracti	15%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	80.5 kBtu/hr
		Clg. Load at Zero Htg.	220.3 kBtu/hr
Max Cold Deck Airflow	20,800 CFM	Max Hot Deck Airflow	18,000 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
25,750	100%	None	13.45	1.00	22.3%	30.0%	3,863
Fan Input Power Curve ($a+b{\cdot}x+c{\cdot}x^2+d{\cdot}x^3$):			1.000000	0.000000	0.000000	0.000000	

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
58	62	32	85.5
smooth	60	smooth	0
76	53	70	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
25,150	2.5	59%	93%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	781	781	0	53.0	22%	78.5	53.0	20,800	78.5	4,950	25,750	100%	13.45	19	572.1	0.0	0.78	37.1	53	0%	0.0
	92	66.8	2	741	741	0	53.0	22%	76.7	53.0	20,800	76.7	4,950	25,750	100%	13.45	29	532.4	0.0	0.78	34.6	74	0%	0.0
	90	64.7	4	701	701	0	53.0	22%	76.3	53.0	20,800	76.3	4,950	25,750	100%	13.45	48	522.3	0.0	0.76	33.0	118	0%	0.0
	88	64.6	8	661	661	0	53.0	22%	75.8	53.0	20,800	75.8	4,950	25,750	100%	13.45	106	512.3	0.0	0.76	32.4	255	0%	0.0
	86	64.5	5	621	621	0	53.0	22%	75.4	53.0	20,800	75.4	4,950	25,750	100%	13.45	67	502.3	0.0	0.76	31.8	159	0%	0.0
	84	64.3	11	581	581	0	53.0	22%	74.9	53.0	20,800	74.9	4,950	25,750	100%	13.45	144	492.2	0.0	0.76	31.2	334	0%	0.0
Design Cooling	82	63.3	14	541	541	0	53.0	22%	74.5	53.0	20,800	74.5	4,950	25,750	100%	13.45	192	482.2	0.0	0.75	30.3	432	0%	0.0
	80	63.5	22	501	501	0	53.0	22%	74.0	53.0	20,800	74.0	4,950	25,750	100%	13.45	298	472.2	0.0	0.76	29.8	659	0%	0.0
	78	63.1	34	461	461	0	53.0	22%	73.6	53.0	20,413	73.6	5,337	25,750	100%	13.45	452	453.5	0.0	0.73	27.7	930	0%	0.0
	76	62.0	26	421	421	0	53.0	22%	73.1	53.0	18,987	73.1	6,763	25,750	100%	13.45	356	412.7	0.0	0.71	24.4	644	0%	0.0
	74	61.1	58	381	381	0	54.0	30%	72.8	54.0	18,234	72.8	7,516	25,750	100%	13.45	778	370.4	0.0	0.69	21.4	1,237	0%	0.0
	72	60.8	70	340	340	0	55.0	30%	72.2	55.0	17,355	72.2	8,395	25,750	100%	13.45	937	322.6	0.0	0.69	18.5	1,291	82%	0.0
	70	59.5	138	300	300	0	56.0	30%	71.6	56.0	16,425	72.0	9,325	25,750	100%	13.45	1,849	276.9	3.9	0.68	15.7	2,157	82%	6.6
	68	58.9	98	260	260	0	57.0	30%	71.0	57.0	15,617	72.7	10,133	25,750	100%	13.45	1,321	236.3	18.6	0.67	13.3	1,301	82%	22.2
Observed	**66**	58.3	205	**220**	**220**	**0**	**58.0**	30%	**70.4**	**58.0**	**14,786**	**73.4**	**10,964**	**25,750**	**100%**	**13.45**	**2,762**	**198.2**	**35.7**	0.67	11.0	2,256	82%	89.0
	64	57.2	303	180	195	-15	59.0	30%	69.8	59.0	13,933	74.1	11,817	25,750	100%	13.45	4,073	162.7	55.2	0.39	5.2	1,583	82%	202.9
	62	56.4	383	140	169	-29	60.0	30%	69.2	60.0	13,056	74.8	12,694	25,750	100%	13.45	5,145	129.9	77.2	0.47	5.1	1,932	82%	358.8
	60	55.7	696	100	144	-44	61.0	30%	68.6	61.0	12,155	75.6	13,595	25,750	100%	13.45	9,367	99.9	101.9	0.58	4.8	3,353	82%	862.6
	58	54.2	462	60	119	-59	62.0	30%	68.0	62.0	11,228	76.3	14,522	25,750	100%	13.45	6,216	72.9	129.4	0.74	4.5	2,073	82%	726.8
	56	52.5	394	20	93	-73	62.0	30%	67.4	62.0	9,784	77.0	15,966	25,750	100%	13.45	5,294	57.2	164.9	0.84	4.0	1,567	83%	786.0
	54	50.8	304	-20	81	-101	62.0	30%	66.8	62.0	8,434	77.7	17,316	25,750	100%	13.45	4,083	43.8	203.4	0.90	3.3	1,000	84%	738.7
	52	49.0	253	-60	81	-141	62.0	30%	66.2	62.0	7,750	78.4	18,000	25,750	100%	13.45	3,406	35.2	236.9	1.05	3.1	782	84%	712.1
	50	47.4	147	-100	81	-181	66.9	22%	67.3	67.3	7,775	79.1	17,975	25,750	100%	13.45	1,974	0.0	228.8	0.00	0.0	0	84%	400.6
	48	45.6	120	-140	81	-221	66.4	22%	66.9	66.9	7,750	79.8	18,000	25,750	100%	13.45	1,614	0.0	251.6	0.00	0.0	0	84%	357.9
	46	43.6	93	-180	81	-261	66.0	22%	66.4	66.4	7,750	80.5	18,000	25,750	100%	13.45	1,254	0.0	274.1	0.00	0.0	0	85%	301.9
	44	42.1	25	-220	81	-301	65.5	22%	66.0	66.0	7,750	81.2	18,000	25,750	100%	13.45	331	0.0	296.6	0.00	0.0	0	85%	86.1
	42	39.5	26	-260	81	-341	65.1	22%	65.5	65.5	7,750	81.9	18,000	25,750	100%	13.45	356	0.0	319.1	0.00	0.0	0	85%	99.2
	40	38.1	4	-300	81	-381	64.6	22%	65.1	65.1	7,750	82.7	18,000	25,750	100%	13.45	53	0.0	341.6	0.00	0.0	0	85%	15.8
Design Heating	38	36.6	2	-340	81	-421	64.2	22%	64.6	64.6	7,750	83.4	18,000	25,750	100%	13.45	29	0.0	364.1	0.00	0.0	0	85%	9.2
	36	34.4	2	-381	81	-461	63.7	22%	64.2	64.2	7,750	84.1	18,000	25,750	100%	13.45	29	0.0	386.6	0.00	0.0	0	85%	9.7
	34	32.7	0	-421	81	-501	63.3	22%	63.7	63.7	7,750	84.8	18,000	25,750	100%	13.45	5	0.0	409.1	0.00	0.0	0	85%	1.7
	32	30.5	1	-461	81	-541	64.2	22%	63.3	63.3	7,750	85.5	18,000	25,750	100%	13.45	14	0.0	431.5	0.00	0.0	0	85%	5.4
		Total:	**3,914**													Total:	**52,599**					**24,192**		**5,793**

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

Indx	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	OAT Bin	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	521	521	0	53.0	22%	76	53.0	20,800	75.6	4,950	25,750	100%	13.45	13.5	506.9	0.0	0.77	32.6		0%	
7/17, 3PM	80	67.0	1	501	501	0	53.0	22%	75	53.0	20,800	75.3	4,950	25,750	100%	13.45	13.5	501.8	0.0	0.76	31.9		0%	
7/17, 4PM	79	66.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.45	13.5	496.8	0.0	0.70	29.0		0%	
7/18, 2PM	87	68.0	1	641	641	0	53.0	22%	77	53.0	20,800	76.9	4,950	25,750	100%	13.45	13.5	537.0	0.0	0.77	34.3		0%	
7/18, 3PM	84	67.0	1	581	581	0	53.0	22%	76	53.0	20,800	76.2	4,950	25,750	100%	13.45	13.5	521.9	0.0	0.76	32.9		85%	
7/18, 4PM	82	66.0	1	541	541	0	53.0	22%	76	53.0	20,800	75.8	4,950	25,750	100%	13.45	13.5	511.9	0.0	0.75	31.9		0%	
7/19, 2PM	79	68.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.45	13.5	496.8	0.0	0.72	29.7		0%	
7/19, 3PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.45	13.5	483.1	0.0	0.72	29.1		0%	
7/19, 4PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.45	13.5	483.1	0.0	0.72	29.1		0%	
															Average:	**13.45**					31.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Waterside Economizer

Based on Sheet: (LCM-4) AHU-2

Site/Space:	Most of Second and third floors, all of f	**Model Specific**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume	**Notes**	

Load Shape Characteristics

Design Space Temp	73.7 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	944.5 kBtu/hr	Htg. Design Zone Load	-627.3 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	20%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	188.9 kBtu/hr
		Clg. Load at Zero Htg.	387.7 kBtu/hr
Max Cold Deck Airflow	33,330 CFM	Max Hot Deck Airflow	30,800 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
42,250	100%	None	17.50	1.00	12.5%	20.0%	6,338
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				1.000000	0.000000	0.000000	0.000000

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
54	62	32	85.5
smooth	60	smooth	0
75	53	69.5	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
42,250	2.5	75%	95%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	1,375	1,375	0	53.0	12%	76.5	53.0	33,330	76.5	8,920	42,250	100%	17.50	25.0	845.7	0.0	0.78	54.9	78	0%	0.0
	92	66.8	2	1,304	1,304	0	53.0	12%	76.0	53.0	33,330	76.0	8,920	42,250	100%	17.50	37.5	827.3	0.0	0.78	53.7	115	0%	0.0
	90	64.7	4	1,234	1,234	0	53.0	12%	75.7	53.0	33,330	75.7	8,920	42,250	100%	17.50	62.5	818.3	0.0	0.76	51.7	185	0%	0.0
	88	64.6	8	1,163	1,163	0	53.0	12%	75.5	53.0	33,330	75.5	8,920	42,250	100%	17.50	137.5	809.3	0.0	0.76	51.2	403	0%	0.0
	86	64.5	5	1,093	1,093	0	53.0	12%	75.2	53.0	33,330	75.2	8,920	42,250	100%	17.50	87.5	800.4	0.0	0.76	50.7	254	0%	0.0
	84	64.3	11	1,022	1,022	0	53.0	12%	75.0	53.0	33,330	75.0	8,920	42,250	100%	17.50	187.5	791.4	0.0	0.76	50.2	538	0%	0.0
Design Cooling	82	63.3	14	952	952	0	53.0	12%	74.7	53.0	33,330	74.7	8,920	42,250	100%	17.50	250.0	782.4	0.0	0.75	49.1	701	0%	0.0
	80	63.5	22	881	881	0	53.0	12%	74.5	53.0	33,330	74.5	8,920	42,250	100%	17.50	387.5	773.4	0.0	0.76	48.8	1,080	0%	0.0
	78	63.1	34	811	811	0	53.0	12%	74.2	53.0	33,330	74.2	8,920	42,250	100%	17.50	587.5	764.4	0.0	0.73	46.7	1,567	0%	0.0
	76	62.0	26	740	740	0	53.0	12%	74.0	53.0	32,788	74.0	9,462	42,250	100%	17.50	462.5	743.2	0.0	0.71	43.9	1,160	0%	0.0
	74	61.1	58	670	670	0	53.4	20%	73.8	53.4	30,838	73.8	11,412	42,250	100%	17.50	1,012.5	677.1	0.0	0.69	39.1	2,261	0%	0.0
	72	60.8	70	599	599	0	54.3	20%	73.4	54.3	29,250	73.4	13,000	42,250	100%	17.50	1,218.8	602.6	0.0	0.69	34.6	2,411	82%	0.0
	70	59.5	138	529	529	0	55.1	20%	73.0	55.1	27,494	73.0	14,756	42,250	100%	17.50	2,406.3	529.0	0.0	0.68	30.0	4,122	82%	0.0
	68	58.9	98	458	458	0	56.0	20%	72.6	56.0	25,542	72.6	16,708	42,250	100%	17.50	1,718.8	456.8	0.0	0.67	25.6	2,516	82%	0.0
Observed	**66**	58.3	205	**388**	**388**	**0**	**56.9**	20%	**72.2**	**56.9**	**23,849**	**73.3**	**18,401**	**42,250**	**100%**	**17.50**	**3,593.8**	**394.2**	**21.9**	0.67	21.8	4,487	82%	54.5
	64	57.2	303	317	352	-34	57.7	20%	71.8	57.7	22,142	74.0	20,108	42,250	100%	17.50	5,300.0	335.9	48.2	0.39	10.8	3,269	82%	177.4
	62	56.4	383	247	315	-69	58.6	20%	71.4	58.6	20,415	74.7	21,835	42,250	100%	17.50	6,693.8	282.0	78.8	0.47	11.0	4,195	82%	366.1
	60	55.7	696	176	279	-103	59.4	20%	71.0	59.4	18,665	75.4	23,585	42,250	100%	17.50	12,187.5	232.5	113.6	0.58	11.2	7,803	82%	961.3
	58	54.2	462	106	243	-137	60.3	20%	70.6	60.3	16,894	76.1	25,356	42,250	100%	17.50	8,087.5	187.5	152.8	0.74	11.5	5,333	82%	858.0
	56	52.5	394	35	207	-172	61.1	20%	70.2	61.1	15,100	76.9	27,150	42,250	100%	17.50	6,887.5	147.1	196.5	0.84	10.2	4,032	83%	936.3
	54	50.8	304	-35	189	-224	62.0	20%	69.8	62.0	13,284	77.6	28,966	42,250	100%	17.50	5,312.5	111.3	244.6	0.90	8.4	2,541	84%	888.6
	52	49.0	253	-106	189	-295	62.0	20%	69.4	62.0	11,450	78.3	30,800	42,250	100%	17.50	4,431.3	91.0	297.4	1.05	8.0	2,019	84%	894.1
	50	47.4	147	-176	189	-365	70.5	12%	70.7	70.7	14,298	79.0	27,952	42,250	100%	17.50	2,568.8	0.0	249.9	0.00	0.0	0	84%	437.5
	48	45.6	120	-247	189	-436	70.2	12%	70.5	70.5	11,450	79.7	30,800	42,250	100%	17.50	2,100.0	0.0	307.6	0.00	0.0	0	84%	437.5
	46	43.6	93	-317	189	-506	70.0	12%	70.2	70.2	11,450	80.5	30,800	42,250	100%	17.50	1,631.3	0.0	339.8	0.00	0.0	0	85%	374.3
	44	42.1	25	-388	189	-577	69.7	12%	70.0	70.0	11,450	81.2	30,800	42,250	100%	17.50	431.3	0.0	372.1	0.00	0.0	0	85%	108.1
	42	39.5	26	-458	189	-647	69.5	12%	69.7	69.7	11,450	81.9	30,800	42,250	100%	17.50	462.5	0.0	404.3	0.00	0.0	0	85%	125.7
	40	38.1	4	-529	189	-718	69.2	12%	69.5	69.5	11,450	82.6	30,800	42,250	100%	17.50	68.8	0.0	436.6	0.00	0.0	0	85%	20.1
Design Heating	38	36.6	2	-599	189	-788	69.0	12%	69.2	69.2	11,450	83.3	30,800	42,250	100%	17.50	37.5	0.0	468.8	0.00	0.0	0	85%	11.8
	36	34.4	2	-670	189	-859	68.7	12%	69.0	69.0	11,450	84.1	30,800	42,250	100%	17.50	37.5	0.0	501.1	0.00	0.0	0	85%	12.6
	34	32.7	0	-740	189	-929	68.5	12%	68.7	68.7	11,450	84.8	30,800	42,250	100%	17.50	6.3	0.0	533.3	0.00	0.0	0	85%	2.2
	32	30.5	1	-811	189	-1,000	66.6	12%	68.5	68.5	11,450	85.5	30,800	42,250	100%	17.50	18.8	0.0	565.6	0.00	0.0	0	85%	7.1
		Total:	**3,914**													Total:	**68,438.1**					**51,067**		**6,673**

Site/Space:	Most of Second and third floors, all of fo	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.50	17.5	787.4	0.0	0.77	50.7		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.50	17.5	782.9	0.0	0.76	49.8		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.70	45.4		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.50	17.5	814.3	0.0	0.77	52.0		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.50	17.5	800.8	0.0	0.76	50.4		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.50	17.5	791.9	0.0	0.75	49.4		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.50	17.5	778.4	0.0	0.72	46.6		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.72	46.6		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.50	17.5	773.9	0.0	0.72	46.6		0%	
															Average:	**17.50**					48.6			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant Cooling Loads Measure Name: Waterside Economizer Chiller Template - v1.6.4

Notes:

OAT	Base Hrs	Cooling Loads: Plant Duty Cycle	Plant Running Hours	Total Output (tons)	Cooling Mode	AHU-1 CCoil Load (tons)	AHU-2 CCoil Load (tons)
94	1	100%	1	118	Chiller	48	70
92	2	100%	2	113	Chiller	44	69
90	4	100%	4	112	Chiller	44	68
88	8	100%	8	110	Chiller	43	67
86	5	100%	5	109	Chiller	42	67
84	11	100%	11	107	Chiller	41	66
82	14	100%	14	105	Chiller	40	65
80	22	100%	22	104	Chiller	39	64
78	34	100%	34	101	Chiller	38	64
76	26	100%	26	96	Chiller	34	62
74	58	100%	58	87	Chiller	31	56
72	70	100%	70	77	Chiller	27	50
70	138	100%	138	67	Chiller	23	44
68	98	100%	98	58	Chiller	20	38
66	205	100%	205	49	Chiller	17	33
64	303	100%	303	42	WSE	14	28
62	383	100%	383	34	WSE	11	23
60	696	100%	696	28	WSE	8	19
58	462	100%	462	22	WSE	6	16
56	394	100%	394	17	WSE	5	12
54	304	100%	304	13	WSE	4	9
52	253	100%	253	11	WSE	3	8
50	147	100%	0	0	WSE	-	-
48	120	100%	0	0	WSE	-	-
46	93	100%	0	0	WSE	-	-
44	25	100%	0	0	WSE	-	-
42	26	100%	0	0	WSE	-	-
40	4	100%	0	0	WSE	-	-
38	2	100%	0	0	WSE	-	-
36	2	100%	0	0	WSE	-	-
34	0	100%	0	0	WSE	-	-
32	1	100%	0	0	WSE	-	-
TOTAL	3,911		3,490				

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Waterside Economizer Based on Sheet: (LCM-4) CHP Summary Chiller Template - v1.6.4

Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

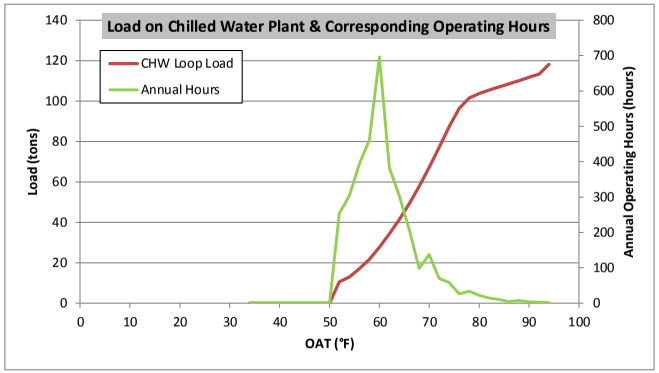
Chillers - Inputs		
CH-1 Size	100	tons

CHWST SP Reset	
OAT	CHWT
66	55
80	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29

System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	70.4	23,435	6,410
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	19,681	3,891
Condensing Water Pumps [CWP]	4.5	15,691	3,015
Total	**86.4**	**75,260**	**16,478**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	4.5	6	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	4.5	10	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	4.5	16	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	4.5	35	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	4.5	22	6.8	34	0.76	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	4.5	48	6.8	73	0.76	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	4.5	64	6.8	97	0.75	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	4.5	100	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.58	58.4	1,960	4.7	158	4.5	151	6.8	229	0.73	0.2703	1
76	62.0	26	96	1	26	96	0.54	52.2	1,380	4.7	125	4.5	119	6.8	180	0.71	0.2736	1
74	61.1	58	87	1	58	87	0.51	44.4	2,571	4.7	273	4.5	260	6.8	394	0.69	0.2536	1
72	60.8	70	77	1	70	77	0.48	37.1	2,586	4.7	328	4.5	313	6.8	474	0.69	0.2549	1
70	59.5	138	67	1	138	67	0.45	30.1	4,136	4.7	648	4.5	618	6.4	876	0.68	0.2714	1
68	58.9	98	58	1	98	58	0.42	24.5	2,408	4.7	463	4.5	442	5.1	505	0.67	0.2555	1
66	58.3	205	49	1	205	49	0.40	19.6	4,032	4.7	968	4.5	923	4.0	819	0.67	0.2569	1
64	57.2	303	42	1	303	42	0.00	0.0	0	4.7	1,428	4.5	1,362	6.8	2,063	0.39	0.2463	1
62	56.4	383	34	1	383	34	0.00	0.0	0	4.7	1,803	4.5	1,720	6.8	2,605	0.47	0.2160	1
60	55.7	696	28	1	696	28	0.00	0.0	0	4.7	3,283	4.5	3,131	6.8	4,743	0.58	0.1747	1
58	54.2	462	22	1	462	22	0.00	0.0	0	4.7	2,179	4.5	2,078	6.8	3,148	0.74	0.1512	1
56	52.5	394	17	1	394	17	0.00	0.0	0	4.7	1,855	4.5	1,769	5.0	1,974	0.84	0.1447	1
54	50.8	304	13	1	304	13	0.00	0.0	0	4.7	1,431	4.5	1,365	2.5	745	0.90	0.1399	1
52	49.0	253	11	1	253	11	0.00	0.0	0	4.7	1,194	4.5	1,138	1.8	468	1.05	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				23,435		16,453		15,691		19,681	0.68		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		4.5		6.8		0.77	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		4.5		6.8		0.76	1
76	66.0	7/17 4 PM	115	1	1	115	0.56	64.6		4.7		4.5		6.8		0.70	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		4.5		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		4.5		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		4.5		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.58	66.8		4.7		4.5		6.8		0.72	1
76	68.0	7/19 3 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
76	68.0	7/19 4 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
								70.4		**4.7**		**4.5**		**6.8**			

Secondary Pump Curve Regression, %bhp = f(%Flow)

Curve Type #N/A **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	#REF!	#REF!	#REF!	#REF!		

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Waterside Economizer

Based on Sheet: (LCM-4) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	56	60
	80	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
Prim. Pump Operates with WSE	YES	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	46.3	75.5	1.11	110.8	92%	100%	92%	0.82	0.91	58.4	0.58	1,960	5.6	4.7	158
76	62.0	26	96	47.5	74.2	1.14	114.2	84%	100%	84%	0.80	0.84	52.2	0.54	1,380	5.6	4.7	125
74	61.1	58	87	48.8	72.6	1.18	118.0	74%	100%	74%	0.77	0.74	44.4	0.51	2,571	5.6	4.7	273
72	60.8	70	77	50.0	71.4	1.22	121.5	63%	100%	63%	0.74	0.64	37.1	0.48	2,586	5.6	4.7	328
70	59.5	138	67	51.3	69.7	1.26	125.5	54%	100%	54%	0.72	0.54	30.1	0.45	4,136	5.6	4.7	648
68	58.9	98	58	52.5	69.2	1.29	128.7	45%	100%	45%	0.70	0.45	24.5	0.42	2,408	5.6	4.7	463
66	58.3	205	49	53.8	68.8	1.32	132.0	37%	100%	37%	0.69	0.36	19.6	0.40	4,032	5.6	4.7	968
64	57.2	303	42	55.0	64.1	1.38	137.9	30%	100%	30%	0.66	0.27	0.0	0.00	0	5.6	4.7	1,428
62	56.4	383	34	56.3	62.6	1.42	142.0	24%	97%	25%	0.64	0.20	0.0	0.00	0	5.6	4.7	1,803
60	55.7	696	28	57.5	61.2	1.46	146.1	19%	76%	25%	0.64	0.19	0.0	0.00	0	5.6	4.7	3,283
58	54.2	462	22	58.8	59.2	1.51	150.6	14%	58%	25%	0.63	0.19	0.0	0.00	0	5.6	4.7	2,179
56	52.5	394	17	60.0	57.9	1.55	154.7	11%	44%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,855
54	50.8	304	13	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,431
52	49.0	253	11	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,194
50	47.4	0	0	60.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	60.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	60.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	60.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**23,435**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	47.5	77.1	1.12	112.3	103%	100%	103%	0.83	0.99	64.6	0.56		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	47.5	78.6	1.11	111.4	103%	100%	103%	0.85	1.00	66.8	0.58		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
													70.4				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District

2950 Peralta Oaks Court

Cooling Tower Bin Simulation Measure Name: Waterside Economizer Based on Sheet: (LCM-4) CT

Notes:

Total Number of Cells	1
Cooling Tower Design Specs - One Cell	
Make	Baltimore Air Coil
Model	VXT-95C
Design EWT (i.e. CWRT)	90.0 °F
Design LWT (i.e. CWST)	80.0 °F
Design WBT	67.0 °F
Cell Design CW Flow	313 gpm
Design Approach	13.0 °F
Design Range	10.0 °F
Capacity (tons)	131 tons
Flow Capacity @ CTI	245 gpm
Tower Performance Curve	Open Tower (DOE 2.2)

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WB	CWST SetP
	45	58
	70	79

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
HX Approach	2.0	°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size		Inches	
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	91.7%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	4.5	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	76.8	81.1	91.6	80.2	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	4.5	6
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	76.3	80.2	90.3	79.3	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	4.5	10
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	74.5	78.5	88.4	77.6	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	4.5	16
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	74.4	78.3	88.0	77.4	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	4.5	35
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	74.4	78.0	87.7	77.2	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	4.5	22
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	74.2	77.8	87.2	77.0	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	4.5	48
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	73.4	76.9	86.2	76.1	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	4.5	64
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	73.5	76.9	86.0	76.1	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	4.5	100
78	63.1	34	102	1	0.58	118	283	1	318	1	102%	8.9	73.2	76.3	85.2	75.5	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	4.5	151
76	62.0	26	96	1	0.54	111	267	1	318	1	102%	8.4	72.3	74.9	83.3	74.2	100%	318	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	4.5	119
74	61.1	58	87	1	0.51	100	240	1	318	1	102%	7.5	71.5	73.2	80.7	72.6	100%	317	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	4.5	260
72	60.8	70	77	1	0.48	88	210	1	318	1	102%	6.6	71.3	71.9	78.5	71.4	100%	319	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	4.5	313
70	59.5	138	67	1	0.45	76	182	1	318	1	102%	5.7	70.2	70.2	75.9	69.7	97%	321	100%	0%	0%	0%	89%	0%	0%	6.4	0.0	0.0	6.4	876	100%	5.5	4.5	618
68	58.9	98	58	1	0.42	65	155	1	318	1	102%	4.9	69.7	69.7	74.5	69.2	87%	324	100%	0%	0%	0%	59%	0%	0%	5.1	0.0	0.0	5.1	505	100%	5.5	4.5	442
66	58.3	205	49	1	0.40	55	146	1	318	1	102%	4.1	69.2	69.2	73.3	68.8	78%	326	100%	0%	0%	0%	31%	0%	0%	4.0	0.0	0.0	4.0	819	100%	5.5	4.5	923
64	57.2	303	42	1	0.00	42	146	1	318	1	102%	3.1	53.0	64.3	67.5	64.1	100%	328	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,063	100%	5.5	4.5	1,362
62	56.4	383	34	1	0.00	34	146	1	318	1	102%	2.6	54.3	62.8	65.4	62.6	100%	330	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,605	100%	5.5	4.5	1,720
60	55.7	696	28	1	0.00	28	146	1	318	1	102%	2.1	55.5	61.4	63.5	61.2	100%	334	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	4,743	100%	5.5	4.5	3,131
58	54.2	462	22	1	0.00	22	146	1	318	1	102%	1.6	56.8	59.3	60.9	59.2	100%	337	100%	0%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	3,148	100%	5.5	4.5	2,078
56	52.5	394	17	1	0.00	17	146	1	318	1	102%	1.3	58.0	58.0	59.3	57.9	86%	340	100%	0%	0%	0%	56%	0%	0%	5.0	0.0	0.0	5.0	1,974	100%	5.5	4.5	1,769
54	50.8	304	13	1	0.00	13	146	1	318	1	102%	1.0	58.0	58.0	59.0	57.9	62%	343	68%	0%	0%	0%	91%	0%	0%	2.5	0.0	0.0	2.5	745	100%	5.5	4.5	1,365
52	49.0	253	11	1	0.00	11	146	1	318	1	102%	0.8	58.0	58.0	58.8	57.9	47%	345	68%	0%	0%	0%	69%	0%	0%	1.8	0.0	0.0	1.8	468	100%	5.5	4.5	1,138
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**19,681**				**15,691**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	77.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	66.0	7/17/00 4:00 PM	115	1	0.56	111	267	1	318	1	102%	8.4	75.6	77.9	86.3	77.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	77.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	75.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 2:00 PM	115	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 3:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 4:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
																												6.8				**4.5**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations.
More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)
Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Waterside Economizer **Based on Sheet:** (LCM-4) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

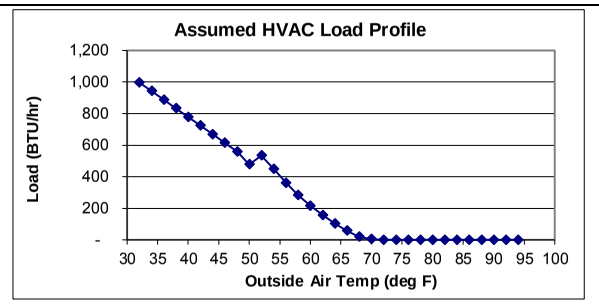
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 °F

Optimization² (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase¹		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

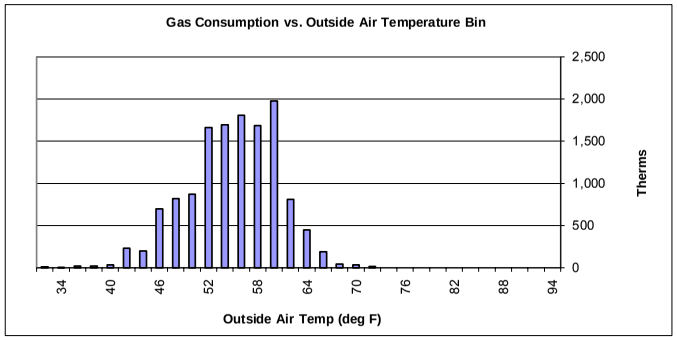
Hot Water Delivery Design					
Coil Design EWT	200 °F			Min Flow	Flow at Design
Coil Design EAT	63 °F		Required/Primary System	30%	100%
2-way valves	TRUE		Secondary System	30%	100%
Primary Pumps	**1**		**Total Design Flow**	**145**	***gpm***
Pump Name	PHWP-1				
Pump Motor HP	2.0				*hp*
Design Flow	145				*gpm*
Design Head Pressure	27				*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0	*hp*
Pump eff	45%				
Brake Pump Power	2.2	0.0	0.0	0.0	*hp*
Pump Motor Eff	84%				
Pump Motor kW	2.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)	0%				*Design Flow*
Pump Curve	Const Flow				
Secondary Pumps	**0**		**Total Design Flow**	**0**	***gpm***
Pump Name					
Pump Motor HP					*hp*
Design Flow					*gpm*
Design Head Pressure					*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0	*hp*
Pump eff					
Brake Pump Power	0.0	0.0	0.0	0.0	*hp*
Pump Motor Eff					
Pump Motor kW	0.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)					*Design Flow*
Pump Curve	Typical VFD				

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	4	-	-	4	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	269	-	4,080
68	98	98	19	-	-	19	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	192	-	2,904
66	205	205	58	-	-	58	1	100	99	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,018
64	303	303	103	-	-	103	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,688
62	383	383	156	-	-	156	1	109	107	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,391
60	696	696	216	-	-	216	1	115	112	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,095
58	462	462	282	-	-	282	1	121	117	236%	33%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,531
56	394	394	361	-	-	361	1	127	122	214%	39%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,335
54	304	304	448	-	-	448	1	133	127	196%	44%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,096
52	253	253	534	-	-	534	1	139	132	180%	48%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,463
50	147	147	479	-	-	479	1	145	138	167%	40%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,480
48	120	120	559	-	-	559	1	151	143	156%	44%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,221
46	93	93	614	-	-	614	1	157	149	146%	45%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,687
44	25	25	669	-	-	669	1	160	151	141%	47%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,097
42	26	26	723	-	-	723	1	160	150	141%	51%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,239
40	4	4	778	-	-	778	1	160	149	141%	55%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	331
38	2	2	833	-	-	833	1	160	149	141%	59%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	180
36	2	2	888	-	-	888	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
34	0	0	942	-	-	942	1	160	147	141%	67%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	30
32	1	1	997	-	-	997	1	160	146	141%	70%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	89
Morning Warmup[5]		**260**	997	100	-	1,097	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21355
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**180,202**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 Base Case Simulation **Measure Name: Waterside Economizer** **Based on Sheet: (LCM-4) B**

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficienc	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	1	4	4	22	100	20%	0.21	0.97	82%	361	6%	37
68	98	1	19	19	37	100	20%	0.21	0.97	82%	361	10%	44
66	205	1	58	58	76	99	20%	0.21	0.97	82%	361	21%	189
64	303	1	103	103	121	102	20%	0.21	0.97	82%	361	34%	447
62	383	1	156	156	174	107	20%	0.21	0.97	82%	361	48%	809
60	696	1	216	216	234	112	20%	0.21	0.97	82%	361	65%	1,977
58	462	1	282	282	300	117	20%	0.21	0.97	82%	361	83%	1,686
56	394	1	361	361	379	122	21%	0.22	0.97	83%	379	100%	1,808
54	304	1	448	448	466	127	26%	0.26	0.98	84%	466	100%	1,693
52	253	1	534	534	552	132	31%	0.31	0.99	84%	552	100%	1,660
50	147	1	479	479	497	138	28%	0.28	0.99	84%	497	100%	870
48	120	1	559	559	577	143	32%	0.32	0.99	84%	577	100%	821
46	93	1	614	614	632	149	35%	0.35	1.00	85%	632	100%	696
44	25	1	669	669	687	151	38%	0.38	1.00	85%	687	100%	199
42	26	1	723	723	741	150	41%	0.41	1.00	85%	741	100%	231
40	4	1	778	778	796	149	44%	0.44	1.00	85%	796	100%	37
38	2	1	833	833	851	149	47%	0.47	1.00	85%	851	100%	21
36	2	1	888	888	906	148	50%	0.50	1.00	85%	906	100%	23
34	0	1	942	942	960	147	53%	0.53	1.00	85%	960	100%	4
32	1	1	997	997	1,015	146	56%	0.56	1.00	85%	1,015	100%	13
Warmup	260	1	997	997	1,015	145	56%	0.56	1.00	85%	1,015	100%	3,091
	hrs/yr												therms
TOTAL	**3,726**												**16,370**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV Retrofit

Based on Sheet: (CIM-5) AHU-1

Site/Space:	First Floor, Second & Third Floor Zones	**Model Specific**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume	**Notes**	

Load Shape Characteristics

Design Space Temp	72.3 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	536.7 kBtu/hr	Htg. Design Zone Load	-356.5 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	15%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	80.5 kBtu/hr
		Clg. Load at Zero Htg.	220.3 kBtu/hr
Max Cold Deck Airflow	20,800 CFM	Max Hot Deck Airflow	18,000 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
25,750	100%	Plenum 1.5"	13.45	1.00	22.3%	30.0%	3,863
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):			0.070429	0.385330	#########	1.009203	

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
58	62	32	85.5
smooth	60	smooth	0
76	53	70	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
25,150	2.5	59%	93%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	781	781	0	53.0	22%	78.5	53.0	20,800	78.5	3,875	24,675	96%	12.17	17	572.1	0.0	0.78	37.1	53	0%	0.0
	92	66.8	2	741	741	0	53.0	22%	76.7	53.0	20,800	76.7	3,875	24,675	96%	12.17	26	532.4	0.0	0.78	34.6	74	0%	0.0
	90	64.7	4	701	701	0	53.0	22%	76.3	53.0	20,800	76.3	3,875	24,675	96%	12.17	44	522.3	0.0	0.76	33.0	118	0%	0.0
	88	64.6	8	661	661	0	53.0	22%	75.8	53.0	20,800	75.8	3,875	24,675	96%	12.17	96	512.3	0.0	0.76	32.4	255	0%	0.0
	86	64.5	5	621	621	0	53.0	22%	75.4	53.0	20,800	75.4	3,875	24,675	96%	12.17	61	502.3	0.0	0.76	31.8	159	0%	0.0
	84	64.3	11	581	581	0	53.0	22%	74.9	53.0	20,800	74.9	3,875	24,675	96%	12.17	130	492.2	0.0	0.76	31.2	334	0%	0.0
Design Cooling	82	63.3	14	541	541	0	53.0	22%	74.5	53.0	20,800	74.5	3,875	24,675	96%	12.17	174	482.2	0.0	0.75	30.3	432	0%	0.0
	80	63.5	22	501	501	0	53.0	22%	74.0	53.0	20,800	74.0	3,875	24,675	96%	12.17	270	472.2	0.0	0.76	29.8	659	0%	0.0
	78	63.1	34	461	461	0	53.0	22%	73.6	53.0	20,413	73.6	3,875	24,288	94%	11.71	393	453.5	0.0	0.73	27.7	930	0%	0.0
	76	62.0	26	421	421	0	53.0	22%	73.1	53.0	18,987	73.1	3,875	22,862	89%	10.16	269	412.7	0.0	0.71	24.4	644	0%	0.0
	74	61.1	58	381	381	0	54.0	30%	72.8	54.0	18,234	72.8	3,875	22,109	86%	9.42	545	370.4	0.0	0.69	21.4	1,237	0%	0.0
	72	60.8	70	340	340	0	55.0	30%	72.2	55.0	17,355	72.2	3,875	21,230	82%	8.62	600	322.6	0.0	0.69	18.5	1,291	82%	0.0
	70	59.5	138	300	300	0	56.0	30%	71.6	56.0	16,425	72.0	3,875	20,300	79%	7.83	1,077	276.9	1.6	0.68	15.7	2,157	82%	2.7
	68	58.9	98	260	260	0	57.0	30%	71.0	57.0	15,617	72.7	3,875	19,492	76%	7.21	708	236.3	7.1	0.67	13.3	1,301	82%	8.5
Observed	**66**	58.3	205	**220**	**220**	**0**	**58.0**	30%	**70.4**	**58.0**	**14,786**	**73.4**	3,875	**18,661**	**72%**	**6.62**	**1,360**	**198.2**	**12.6**	0.67	11.0	2,256	82%	31.4
	64	57.2	303	180	195	-15	59.0	30%	69.8	59.0	13,933	74.1	3,136	17,070	66%	5.61	1,699	162.7	14.6	0.39	5.2	1,583	82%	53.9
	62	56.4	383	140	169	-29	60.0	30%	69.2	60.0	13,056	74.8	4,813	17,869	69%	6.10	2,333	129.9	29.3	0.47	5.1	1,932	82%	136.1
	60	55.7	696	100	144	-44	61.0	30%	68.6	61.0	12,155	75.6	5,857	18,012	70%	6.19	4,311	99.9	43.9	0.58	4.8	3,353	82%	371.6
	58	54.2	462	60	119	-59	62.0	30%	68.0	62.0	11,228	76.3	6,569	17,797	69%	6.05	2,796	72.9	58.6	0.74	4.5	2,073	82%	328.8
	56	52.5	394	20	93	-73	62.0	30%	67.4	62.0	9,784	77.0	7,086	16,870	66%	5.50	2,165	57.2	73.2	0.84	4.0	1,567	82%	350.0
	54	50.8	304	-20	81	-101	62.0	30%	66.8	62.0	8,434	77.7	8,561	16,995	66%	5.57	1,691	43.8	100.5	0.90	3.3	1,000	82%	370.8
	52	49.0	253	-60	81	-141	62.0	30%	66.2	62.0	7,750	78.4	10,684	18,434	72%	6.46	1,636	35.2	140.6	1.05	3.1	782	83%	426.6
	50	47.4	147	-100	81	-181	66.9	22%	67.3	67.3	7,775	79.1	14,193	21,968	85%	9.29	1,364	0.0	180.6	0.00	0.0	0	83%	317.9
	48	45.6	120	-140	81	-221	66.4	22%	66.9	66.9	7,750	79.8	15,790	23,540	91%	10.88	1,306	0.0	220.7	0.00	0.0	0	84%	314.6
	46	43.6	93	-180	81	-261	66.0	22%	66.4	66.4	7,750	80.5	17,125	24,875	97%	12.41	1,157	0.0	260.8	0.00	0.0	0	85%	287.4
	44	42.1	25	-220	81	-301	65.5	22%	66.0	66.0	7,750	81.2	18,000	25,750	100%	13.51	333	0.0	296.6	0.00	0.0	0	85%	86.1
	42	39.5	26	-260	81	-341	65.1	22%	65.5	65.5	7,750	81.9	18,000	25,750	100%	13.51	357	0.0	319.1	0.00	0.0	0	85%	99.2
	40	38.1	4	-300	81	-381	64.6	22%	65.1	65.1	7,750	82.7	18,000	25,750	100%	13.51	53	0.0	341.6	0.00	0.0	0	85%	15.8
Design Heating	38	36.6	2	-340	81	-421	64.2	22%	64.6	64.6	7,750	83.4	18,000	25,750	100%	13.51	29	0.0	364.1	0.00	0.0	0	85%	9.2
	36	34.4	2	-381	81	-461	63.7	22%	64.2	64.2	7,750	84.1	18,000	25,750	100%	13.51	29	0.0	386.6	0.00	0.0	0	85%	9.7
	34	32.7	0	-421	81	-501	63.3	22%	63.7	63.7	7,750	84.8	18,000	25,750	100%	13.51	5	0.0	409.1	0.00	0.0	0	85%	1.7
	32	30.5	1	-461	81	-541	64.2	22%	63.3	63.3	7,750	85.5	18,000	25,750	100%	13.51	15	0.0	431.5	0.00	0.0	0	85%	5.4
		Total:	**3,914**													Total:	**27,045**					**24,192**		**3,227**

Site/Space:	First Floor, Second & Third Floor Zones	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

Indx		Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
		OAT Bin	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date		°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	7/17, 2PM	81	68.0	1	521	521	0	53.0	22%	76	53.0	20,800	75.6	4,950	25,750	100%	13.51	13.5	506.9	0.0	0.77	32.6		0%	
	7/17, 3PM	80	67.0	1	501	501	0	53.0	22%	75	53.0	20,800	75.3	4,950	25,750	100%	13.51	13.5	501.8	0.0	0.76	31.9		0%	
	7/17, 4PM	79	66.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.51	13.5	496.8	0.0	0.70	29.0		0%	
	7/18, 2PM	87	68.0	1	641	641	0	53.0	22%	77	53.0	20,800	76.9	4,950	25,750	100%	13.51	13.5	537.0	0.0	0.77	34.3		0%	
	7/18, 3PM	84	67.0	1	581	581	0	53.0	22%	76	53.0	20,800	76.2	4,950	25,750	100%	13.51	13.5	521.9	0.0	0.76	32.9		85%	
	7/18, 4PM	82	66.0	1	541	541	0	53.0	22%	76	53.0	20,800	75.8	4,950	25,750	100%	13.51	13.5	511.9	0.0	0.75	31.9		0%	
	7/19, 2PM	79	68.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.51	13.5	496.8	0.0	0.72	29.7		0%	
	7/19, 3PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.51	13.5	483.1	0.0	0.72	29.1		0%	
	7/19, 4PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.51	13.5	483.1	0.0	0.72	29.1		0%	
																Average:	**13.51**					31.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV Retrofit

Based on Sheet: (CIM-5) AHU-2

Site/Space:	Most of Second and third floors, all of	**Model**	Baseline
Unit(s) Modeled:	AC-2	**Specific**	
Model Type:	Dual-Duct, Constant-Air-Volume	**Notes**	

Load Shape Characteristics

Design Space Temp	73.7 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	944.5 kBtu/hr	Htg. Design Zone Load	-627.3 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	20%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	188.9 kBtu/hr
		Clg. Load at Zero Htg.	387.7 kBtu/hr
Max Cold Deck Airflow	33,330 CFM	Max Hot Deck Airflow	30,800 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
42,250	100%	Plenum 1.5"	17.50	1.00	12.5%	20.0%	6,338
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				0.070429	0.385330	########	1.009203

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
54	62	32	85.5
smooth	60	smooth	0
75	53	69.5	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
42,250	2.5	75%	95%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	1,375	1,375	0	53.0	12%	76.5	53.0	33,330	76.5	5,725	39,055	92%	14.52	20.7	845.7	0.0	0.78	54.9	78	0%	0.0
	92	66.8	2	1,304	1,304	0	53.0	12%	76.0	53.0	33,330	76.0	5,725	39,055	92%	14.52	31.1	827.3	0.0	0.78	53.7	115	0%	0.0
	90	64.7	4	1,234	1,234	0	53.0	12%	75.7	53.0	33,330	75.7	5,725	39,055	92%	14.52	51.9	818.3	0.0	0.76	51.7	185	0%	0.0
	88	64.6	8	1,163	1,163	0	53.0	12%	75.5	53.0	33,330	75.5	5,725	39,055	92%	14.52	114.1	809.3	0.0	0.76	51.2	403	0%	0.0
	86	64.5	5	1,093	1,093	0	53.0	12%	75.2	53.0	33,330	75.2	5,725	39,055	92%	14.52	72.6	800.4	0.0	0.76	50.7	254	0%	0.0
	84	64.3	11	1,022	1,022	0	53.0	12%	75.0	53.0	33,330	75.0	5,725	39,055	92%	14.52	155.6	791.4	0.0	0.76	50.2	538	0%	0.0
Design Cooling	82	63.3	14	952	952	0	53.0	12%	74.7	53.0	33,330	74.7	5,725	39,055	92%	14.52	207.4	782.4	0.0	0.75	49.1	701	0%	0.0
	80	63.5	22	881	881	0	53.0	12%	74.5	53.0	33,330	74.5	5,725	39,055	92%	14.52	321.5	773.4	0.0	0.76	48.8	1,080	0%	0.0
	78	63.1	34	811	811	0	53.0	12%	74.2	53.0	33,330	74.2	5,725	39,055	92%	14.52	487.5	764.4	0.0	0.73	46.7	1,567	0%	0.0
	76	62.0	26	740	740	0	53.0	12%	74.0	53.0	32,788	74.0	5,725	38,513	91%	14.05	371.3	743.2	0.0	0.71	43.9	1,160	0%	0.0
	74	61.1	58	670	670	0	53.4	20%	73.8	53.4	30,838	73.8	5,725	36,563	87%	12.47	721.5	677.1	0.0	0.69	39.1	2,261	0%	0.0
	72	60.8	70	599	599	0	54.3	20%	73.4	54.3	29,250	73.4	5,725	34,975	83%	11.30	787.0	602.6	0.0	0.69	34.6	2,411	82%	0.0
	70	59.5	138	529	529	0	55.1	20%	73.0	55.1	27,494	73.0	5,725	33,219	79%	10.13	1,392.9	529.0	0.0	0.68	30.0	4,122	82%	0.0
	68	58.9	98	458	458	0	56.0	20%	72.6	56.0	25,542	72.6	5,725	31,267	74%	8.96	880.0	456.8	0.0	0.67	25.6	2,516	82%	0.0
Observed	**66**	58.3	205	**388**	**388**	**0**	**56.9**	20%	**72.2**	**56.9**	**23,849**	**73.3**	5,725	**29,574**	**70%**	**8.06**	**1,655.2**	**394.2**	**6.8**	0.67	21.8	4,487	82%	17.0
	64	57.2	303	317	352	-34	57.7	20%	71.8	57.7	22,142	74.0	14,326	36,468	86%	12.40	3,755.4	335.9	34.3	0.39	10.8	3,269	82%	126.4
	62	56.4	383	247	315	-69	58.6	20%	71.4	58.6	20,415	74.7	19,044	39,458	93%	14.88	5,691.6	282.0	68.7	0.47	11.0	4,195	82%	319.3
	60	55.7	696	176	279	-103	59.4	20%	71.0	59.4	18,665	75.4	21,392	40,057	95%	15.43	10,745.9	232.5	103.0	0.58	11.2	7,803	82%	871.9
	58	54.2	462	106	243	-137	60.3	20%	70.6	60.3	16,894	76.1	22,798	39,692	94%	15.09	6,973.7	187.5	137.4	0.74	11.5	5,333	82%	771.4
	56	52.5	394	35	207	-172	61.1	20%	70.2	61.1	15,100	76.9	23,733	38,834	92%	14.33	5,639.9	147.1	171.7	0.84	10.2	4,032	82%	821.2
	54	50.8	304	-35	189	-224	62.0	20%	69.8	62.0	13,284	77.6	26,541	39,825	94%	15.21	4,617.3	111.3	224.2	0.90	8.4	2,541	82%	826.8
	52	49.0	253	-106	189	-295	62.0	20%	69.4	62.0	11,450	78.3	30,516	41,966	99%	17.28	4,375.5	91.0	294.6	1.05	8.0	2,019	83%	894.0
	50	47.4	147	-176	189	-365	70.5	12%	70.7	70.7	14,298	79.0	27,952	42,250	100%	17.57	2,579.0	0.0	249.9	0.00	0.0	0	83%	439.7
	48	45.6	120	-247	189	-436	70.2	12%	70.5	70.5	11,450	79.7	30,800	42,250	100%	17.57	2,108.4	0.0	307.6	0.00	0.0	0	84%	438.4
	46	43.6	93	-317	189	-506	70.0	12%	70.2	70.2	11,450	80.5	30,800	42,250	100%	17.57	1,637.8	0.0	339.8	0.00	0.0	0	85%	374.5
	44	42.1	25	-388	189	-577	69.7	12%	70.0	70.0	11,450	81.2	30,800	42,250	100%	17.57	433.0	0.0	372.1	0.00	0.0	0	85%	108.1
	42	39.5	26	-458	189	-647	69.5	12%	69.7	69.7	11,450	81.9	30,800	42,250	100%	17.57	464.4	0.0	404.3	0.00	0.0	0	85%	125.7
	40	38.1	4	-529	189	-718	69.2	12%	69.5	69.5	11,450	82.6	30,800	42,250	100%	17.57	69.0	0.0	436.6	0.00	0.0	0	85%	20.1
Design Heating	38	36.6	2	-599	189	-788	69.0	12%	69.2	69.2	11,450	83.3	30,800	42,250	100%	17.57	37.7	0.0	468.8	0.00	0.0	0	85%	11.8
	36	34.4	2	-670	189	-859	68.7	12%	69.0	69.0	11,450	84.1	30,800	42,250	100%	17.57	37.7	0.0	501.1	0.00	0.0	0	85%	12.6
	34	32.7	0	-740	189	-929	68.5	12%	68.7	68.7	11,450	84.8	30,800	42,250	100%	17.57	6.3	0.0	533.3	0.00	0.0	0	85%	2.2
	32	30.5	1	-811	189	-1,000	66.6	12%	68.5	68.5	11,450	85.5	30,800	42,250	100%	17.57	18.8	0.0	565.6	0.00	0.0	0	85%	7.1
		Total:	**3,914**													Total:	**56,461.7**					**51,067**		**6,188**

Site/Space:	Most of Second and third floors, all of	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.57	17.6	787.4	0.0	0.77	50.7		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.57	17.6	782.9	0.0	0.76	49.8		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.57	17.6	778.4	0.0	0.70	45.4		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.57	17.6	814.3	0.0	0.77	52.0		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.57	17.6	800.8	0.0	0.76	50.4		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.57	17.6	791.9	0.0	0.75	49.4		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.57	17.6	778.4	0.0	0.72	46.6		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.57	17.6	773.9	0.0	0.72	46.6		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.57	17.6	773.9	0.0	0.72	46.6		0%	
															Average:	**17.57**					48.6			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.

* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant Cooling Loads Measure Name: Dual Duct VAV Retrofit Chiller Template - v1.6.4

Notes:

OAT	Base Hrs	Cooling Loads: Plant Duty Cycle	Plant Running Hours	Total Output (tons)	Cooling Mode	AHU-1 CCoil Load (tons)	AHU-2 CCoil Load (tons)
94	1	100%	1	118	Chiller	48	70
92	2	100%	2	113	Chiller	44	69
90	4	100%	4	112	Chiller	44	68
88	8	100%	8	110	Chiller	43	67
86	5	100%	5	109	Chiller	42	67
84	11	100%	11	107	Chiller	41	66
82	14	100%	14	105	Chiller	40	65
80	22	100%	22	104	Chiller	39	64
78	34	100%	34	101	Chiller	38	64
76	26	100%	26	96	Chiller	34	62
74	58	100%	58	87	Chiller	31	56
72	70	100%	70	77	Chiller	27	50
70	138	100%	138	67	Chiller	23	44
68	98	100%	98	58	Chiller	20	38
66	205	100%	205	49	Chiller	17	33
64	303	100%	303	42	WSE	14	28
62	383	100%	383	34	WSE	11	23
60	696	100%	696	28	WSE	8	19
58	462	100%	462	22	WSE	6	16
56	394	100%	394	17	WSE	5	12
54	304	100%	304	13	WSE	4	9
52	253	100%	253	11	WSE	3	8
50	147	100%	0	0	WSE	-	-
48	120	100%	0	0	WSE	-	-
46	93	100%	0	0	WSE	-	-
44	25	100%	0	0	WSE	-	-
42	26	100%	0	0	WSE	-	-
40	4	100%	0	0	WSE	-	-
38	2	100%	0	0	WSE	-	-
36	2	100%	0	0	WSE	-	-
34	0	100%	0	0	WSE	-	-
32	1	100%	0	0	WSE	-	-
TOTAL	3,911		3,490				

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Dual Duct VAV Retrofit Based on Sheet: (CIM-5) CHP Summary Chiller Template - v1.6.4

Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

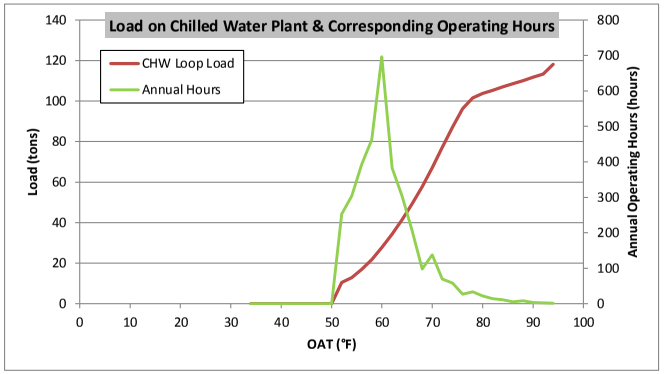
Chillers - Inputs		
CH-1 Size	100	tons

CHWST SP Reset	
OAT	CHWT
66	55
80	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29

System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	70.4	23,435	6,410
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	19,681	3,891
Condensing Water Pumps [CWP]	4.5	15,691	3,015
Total	**86.4**	**75,260**	**16,478**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	4.5	6	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	4.5	10	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	4.5	16	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	4.5	35	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	4.5	22	6.8	34	0.76	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	4.5	48	6.8	73	0.76	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	4.5	64	6.8	97	0.75	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	4.5	100	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.58	58.4	1,960	4.7	158	4.5	151	6.8	229	0.73	0.2703	1
76	62.0	26	96	1	26	96	0.54	52.2	1,380	4.7	125	4.5	119	6.8	180	0.71	0.2736	1
74	61.1	58	87	1	58	87	0.51	44.4	2,571	4.7	273	4.5	260	6.8	394	0.69	0.2536	1
72	60.8	70	77	1	70	77	0.48	37.1	2,586	4.7	328	4.5	313	6.8	474	0.69	0.2549	1
70	59.5	138	67	1	138	67	0.45	30.1	4,136	4.7	648	4.5	618	6.4	876	0.68	0.2714	1
68	58.9	98	58	1	98	58	0.42	24.5	2,408	4.7	463	4.5	442	5.1	505	0.67	0.2555	1
66	58.3	205	49	1	205	49	0.40	19.6	4,032	4.7	968	4.5	923	4.0	819	0.67	0.2569	1
64	57.2	303	42	1	303	42	0.00	0.0	0	4.7	1,428	4.5	1,362	6.8	2,063	0.39	0.2463	1
62	56.4	383	34	1	383	34	0.00	0.0	0	4.7	1,803	4.5	1,720	6.8	2,605	0.47	0.2160	1
60	55.7	696	28	1	696	28	0.00	0.0	0	4.7	3,283	4.5	3,131	6.8	4,743	0.58	0.1747	1
58	54.2	462	22	1	462	22	0.00	0.0	0	4.7	2,179	4.5	2,078	6.8	3,148	0.74	0.1512	1
56	52.5	394	17	1	394	17	0.00	0.0	0	4.7	1,855	4.5	1,769	5.0	1,974	0.84	0.1447	1
54	50.8	304	13	1	304	13	0.00	0.0	0	4.7	1,431	4.5	1,365	2.5	745	0.90	0.1399	1
52	49.0	253	11	1	253	11	0.00	0.0	0	4.7	1,194	4.5	1,138	1.8	468	1.05	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				23,435		16,453		15,691		19,681	0.68		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		4.5		6.8		0.77	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		4.5		6.8		0.76	1
76	66.0	7/17 4 PM	115	1	1	115	0.56	64.6		4.7		4.5		6.8		0.70	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		4.5		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		4.5		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		4.5		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.58	66.8		4.7		4.5		6.8		0.72	1
76	68.0	7/19 3 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
76	68.0	7/19 4 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
								70.4		**4.7**		**4.5**		**6.8**			

Secondary Pump Curve Regression, %bhp = f(%Flow)

Curve Type #N/A **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	#REF!	#REF!	#REF!	#REF!		

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Dual Duct VAV Retrofit

Based on Sheet: (CIM-5) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	56	60
	80	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
Prim. Pump Operates with WSE	YES	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	46.3	75.5	1.11	110.8	92%	100%	92%	0.82	0.91	58.4	0.58	1,960	5.6	4.7	158
76	62.0	26	96	47.5	74.2	1.14	114.2	84%	100%	84%	0.80	0.84	52.2	0.54	1,380	5.6	4.7	125
74	61.1	58	87	48.8	72.6	1.18	118.0	74%	100%	74%	0.77	0.74	44.4	0.51	2,571	5.6	4.7	273
72	60.8	70	77	50.0	71.4	1.22	121.5	63%	100%	63%	0.74	0.64	37.1	0.48	2,586	5.6	4.7	328
70	59.5	138	67	51.3	69.7	1.26	125.5	54%	100%	54%	0.72	0.54	30.1	0.45	4,136	5.6	4.7	648
68	58.9	98	58	52.5	69.2	1.29	128.7	45%	100%	45%	0.70	0.45	24.5	0.42	2,408	5.6	4.7	463
66	58.3	205	49	53.8	68.8	1.32	132.0	37%	100%	37%	0.69	0.36	19.6	0.40	4,032	5.6	4.7	968
64	57.2	303	42	55.0	64.1	1.38	137.9	30%	100%	30%	0.66	0.27	0.0	0.00	0	5.6	4.7	1,428
62	56.4	383	34	56.3	62.6	1.42	142.0	24%	97%	25%	0.64	0.20	0.0	0.00	0	5.6	4.7	1,803
60	55.7	696	28	57.5	61.2	1.46	146.1	19%	76%	25%	0.64	0.19	0.0	0.00	0	5.6	4.7	3,283
58	54.2	462	22	58.8	59.2	1.51	150.6	14%	58%	25%	0.63	0.19	0.0	0.00	0	5.6	4.7	2,179
56	52.5	394	17	60.0	57.9	1.55	154.7	11%	44%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,855
54	50.8	304	13	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,431
52	49.0	253	11	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,194
50	47.4	0	0	60.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	60.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	60.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	60.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**23,435**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	47.5	77.1	1.12	112.3	103%	100%	103%	0.83	0.99	64.6	0.56		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	47.5	78.6	1.11	111.4	103%	100%	103%	0.85	1.00	66.8	0.58		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
													70.4				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District

2950 Peralta Oaks Court

Cooling Tower Bin Simulation Measure Name: Dual Duct VAV Retrofit Based on Sheet: (CIM-5) CT

Chiller Template - v1.6.4

Notes:

Total Number of Cells	1

Cooling Tower Design Specs - One Cell		
Make	Baltimore Air Coil	
Model	VXT-95C	
Design EWT (i.e. CWRT)	90.0	°F
Design LWT (i.e. CWST)	80.0	°F
Design WBT	67.0	°F
Cell Design CW Flow	313	gpm
Design Approach	13.0	°F
Design Range	10.0	°F
Capacity (tons)	131	tons
Flow Capacity @ CTI	245	gpm
Tower Performance Curve	Open Tower (DOE 2.2)	

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WB	CWST SetP
	45	58
	70	79

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
HX Approach	2.0	°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size			Inches
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	91.7%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	4.5	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	76.8	81.1	91.6	80.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	4.5	6
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	76.3	80.2	90.3	79.3	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	4.5	10
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	74.5	78.5	88.4	77.6	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	4.5	16
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	74.4	78.3	88.0	77.4	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	4.5	35
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	74.4	78.0	87.7	77.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	4.5	22
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	74.2	77.8	87.2	77.0	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	4.5	48
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	73.4	76.9	86.2	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	4.5	64
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	73.5	76.9	86.0	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	4.5	100
78	63.1	34	102	1	0.58	118	283	1	318	1	102%	8.9	73.2	76.3	85.2	75.5	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	4.5	151
76	62.0	26	96	1	0.54	111	267	1	318	1	102%	8.4	72.3	74.9	83.3	74.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	4.5	119
74	61.1	58	87	1	0.51	100	240	1	318	1	102%	7.5	71.5	73.2	80.7	72.6	100%	317	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	4.5	260
72	60.8	70	77	1	0.48	88	210	1	318	1	102%	6.6	71.3	71.9	78.5	71.4	100%	319	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	4.5	313
70	59.5	138	67	1	0.45	76	182	1	318	1	102%	5.7	70.2	70.2	75.9	69.7	97%	321	100%	0%	0%	89%	0%	0%	6.4	0.0	0.0	6.4	876	100%	5.5	4.5	618
68	58.9	98	58	1	0.42	65	155	1	318	1	102%	4.9	69.7	69.7	74.5	69.2	87%	324	100%	0%	0%	59%	0%	0%	5.1	0.0	0.0	5.1	505	100%	5.5	4.5	442
66	58.3	205	49	1	0.40	55	146	1	318	1	102%	4.1	69.2	69.2	73.3	68.8	78%	326	100%	0%	0%	31%	0%	0%	4.0	0.0	0.0	4.0	819	100%	5.5	4.5	923
64	57.2	303	42	1	0.00	42	146	1	318	1	102%	3.1	53.0	64.3	67.5	64.1	100%	328	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,063	100%	5.5	4.5	1,362
62	56.4	383	34	1	0.00	34	146	1	318	1	102%	2.6	54.3	62.8	65.4	62.6	100%	330	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,605	100%	5.5	4.5	1,720
60	55.7	696	28	1	0.00	28	146	1	318	1	102%	2.1	55.5	61.4	63.5	61.2	100%	334	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	4,743	100%	5.5	4.5	3,131
58	54.2	462	22	1	0.00	22	146	1	318	1	102%	1.6	56.8	59.3	60.9	59.2	100%	337	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	3,148	100%	5.5	4.5	2,078
56	52.5	394	17	1	0.00	17	146	1	318	1	102%	1.3	58.0	58.0	59.3	57.9	86%	340	100%	0%	0%	56%	0%	0%	5.0	0.0	0.0	5.0	1,974	100%	5.5	4.5	1,769
54	50.8	304	13	1	0.00	13	146	1	318	1	102%	1.0	58.0	58.0	59.0	57.9	62%	343	68%	0%	0%	91%	0%	0%	2.5	0.0	0.0	2.5	745	100%	5.5	4.5	1,365
52	49.0	253	11	1	0.00	11	146	1	318	1	102%	0.8	58.0	58.0	58.8	57.9	47%	345	68%	0%	0%	69%	0%	0%	1.8	0.0	0.0	1.8	468	100%	5.5	4.5	1,138
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**19,681**				**15,691**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	77.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	66.0	7/17/00 4:00 PM	115	1	0.56	111	267	1	318	1	102%	8.4	75.6	77.9	86.3	77.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	77.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	75.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 2:00 PM	115	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 3:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 4:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
																												6.8				**4.5**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations.
More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)
Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Dual Duct VAV Retrofit **Based on Sheet:** (CIM-5) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

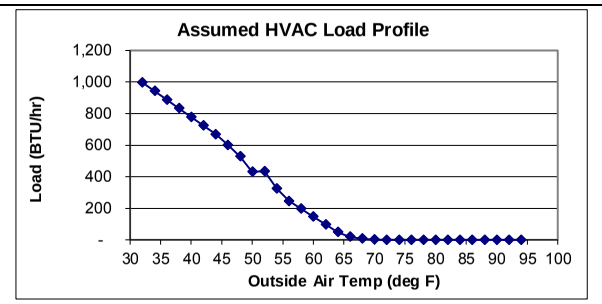
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 °F

Optimization² (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase¹		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

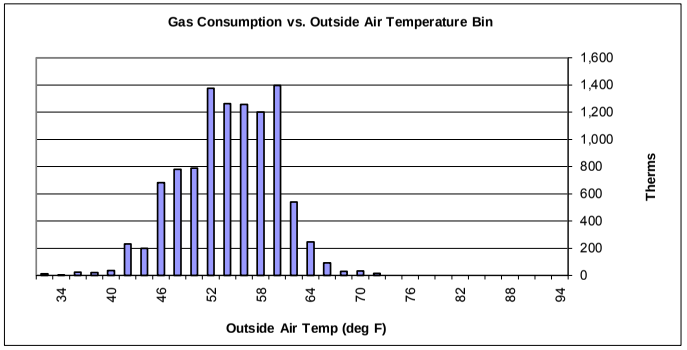
Hot Water Delivery Design					
Coil Design EWT	200 °F			Min Flow	Flow at Design
Coil Design EAT	63 °F		Required/Primary System	30%	100%
2-way valves	TRUE		Secondary System	30%	100%
Primary Pumps	**1**		**Total Design Flow**	**145**	***gpm***
Pump Name	PHWP-1				
Pump Motor HP	2.0				*hp*
Design Flow	145				*gpm*
Design Head Pressure	27				*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0	*hp*
Pump eff	45%				
Brake Pump Power	2.2	0.0	0.0	0.0	*hp*
Pump Motor Eff	84%				
Pump Motor kW	2.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)	0%				*Design Flow*
Pump Curve	Const Flow				
Secondary Pumps	**0**		**Total Design Flow**	**0**	***gpm***
Pump Name					
Pump Motor HP					*hp*
Design Flow					*gpm*
Design Head Pressure					*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0	*hp*
Pump eff					
Brake Pump Power	0.0	0.0	0.0	0.0	*hp*
Pump Motor Eff					
Pump Motor kW	0.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)					*Design Flow*
Pump Curve	Typical VFD				

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	2	-	-	2	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	269	-	4,082
68	98	98	7	-	-	7	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	192	-	2,912
66	205	205	19	-	-	19	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,072
64	303	303	49	-	-	49	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,801
62	383	383	98	-	-	98	1	109	108	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,544
60	696	696	147	-	-	147	1	115	113	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,425
58	462	462	196	-	-	196	1	121	118	236%	30%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,806
56	394	394	245	-	-	245	1	127	124	214%	30%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,651
54	304	304	325	-	-	325	1	133	129	196%	32%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,354
52	253	253	435	-	-	435	1	139	133	180%	39%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,636
50	147	147	431	-	-	431	1	145	139	167%	36%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,529
48	120	120	528	-	-	528	1	151	144	156%	41%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,247
46	93	93	601	-	-	601	1	157	149	146%	44%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,696
44	25	25	669	-	-	669	1	160	151	141%	47%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,097
42	26	26	723	-	-	723	1	160	150	141%	51%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,239
40	4	4	778	-	-	778	1	160	149	141%	55%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	331
38	2	2	833	-	-	833	1	160	149	141%	59%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	180
36	2	2	888	-	-	888	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
34	0	0	942	-	-	942	1	160	147	141%	67%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	30
32	1	1	997	-	-	997	1	160	146	141%	70%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	89
Morning Warmup[5]		**260**	997	100	-	1,097	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21355
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**181,967**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 **Base Case Simulation** **Measure Name:** Dual Duct VAV Retrofit **Based on Sheet:** (CIM-5) Bo

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficiency	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	1	2	2	20	100	20%	0.21	0.97	82%	361	5%	33
68	98	1	7	7	25	100	20%	0.21	0.97	82%	361	7%	30
66	205	1	19	19	37	100	20%	0.21	0.97	82%	361	10%	93
64	303	1	49	49	67	102	20%	0.21	0.97	82%	361	19%	247
62	383	1	98	98	116	108	20%	0.21	0.97	82%	361	32%	539
60	696	1	147	147	165	113	20%	0.21	0.97	82%	361	46%	1,396
58	462	1	196	196	214	118	20%	0.21	0.97	82%	361	59%	1,202
56	394	1	245	245	263	124	20%	0.21	0.97	82%	361	73%	1,258
54	304	1	325	325	343	129	20%	0.21	0.97	82%	361	95%	1,264
52	253	1	435	435	453	133	25%	0.26	0.98	83%	453	100%	1,375
50	147	1	431	431	449	139	25%	0.25	0.98	83%	449	100%	789
48	120	1	528	528	546	144	30%	0.31	0.99	84%	546	100%	779
46	93	1	601	601	619	149	34%	0.34	0.99	85%	619	100%	682
44	25	1	669	669	687	151	38%	0.38	1.00	85%	687	100%	199
42	26	1	723	723	741	150	41%	0.41	1.00	85%	741	100%	231
40	4	1	778	778	796	149	44%	0.44	1.00	85%	796	100%	37
38	2	1	833	833	851	149	47%	0.47	1.00	85%	851	100%	21
36	2	1	888	888	906	148	50%	0.50	1.00	85%	906	100%	23
34	0	1	942	942	960	147	53%	0.53	1.00	85%	960	100%	4
32	1	1	997	997	1,015	146	56%	0.56	1.00	85%	1,015	100%	13
Warmup	260	1	997	997	1,015	145	56%	0.56	1.00	85%	1,015	100%	3,091
	hrs/yr												therms
TOTAL	**3,726**												**13,321**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV

Based on Sheet: (CIM-5) AHU-1

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

Load Shape Characteristics

Design Space Temp	72.3 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	536.7 kBtu/hr	Htg. Design Zone Load	-356.5 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Fracti	15%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	80.5 kBtu/hr
		Clg. Load at Zero Htg.	220.3 kBtu/hr
Max Cold Deck Airflow	20,800 CFM	Max Hot Deck Airflow	18,000 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
25,750	40%	Plenum 0.8	13.45	1.00	22.3%	30.0%	3,863
Fan Input Power Curve ($a+b{\cdot}x+c{\cdot}x^2+d{\cdot}x^3$):				0.050254	0.156228	########	0.943697

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
58	62	40	90
smooth	60	smooth	0
76	53	70	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
25,150	2.5	59%	93%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	781	781	0	53.0	22%	78.5	53.0	20,800	78.5	0	20,800	81%	7.76	11	572.1	0.0	0.78	37.1	53	0%	0.0
	92	66.8	2	741	741	0	53.0	22%	76.7	53.0	20,800	76.7	0	20,800	81%	7.76	17	532.4	0.0	0.78	34.6	74	0%	0.0
	90	64.7	4	701	701	0	53.0	22%	76.3	53.0	20,800	76.3	0	20,800	81%	7.76	28	522.3	0.0	0.76	33.0	118	0%	0.0
	88	64.6	8	661	661	0	53.0	22%	75.8	53.0	20,800	75.8	0	20,800	81%	7.76	61	512.3	0.0	0.76	32.4	255	0%	0.0
	86	64.5	5	621	621	0	53.0	22%	75.4	53.0	20,800	75.4	0	20,800	81%	7.76	39	502.3	0.0	0.76	31.8	159	0%	0.0
	84	64.3	11	581	581	0	53.0	22%	74.9	53.0	20,800	74.9	0	20,800	81%	7.76	83	492.2	0.0	0.76	31.2	334	0%	0.0
Design Cooling	82	63.3	14	541	541	0	53.0	22%	74.5	53.0	20,800	74.5	0	20,800	81%	7.76	111	482.2	0.0	0.75	30.3	432	0%	0.0
	80	63.5	22	501	501	0	53.0	22%	74.0	53.0	20,800	74.0	0	20,800	81%	7.76	172	472.2	0.0	0.76	29.8	659	0%	0.0
	78	63.1	34	461	461	0	53.0	22%	73.6	53.0	20,413	73.6	0	20,413	79%	7.41	249	453.5	0.0	0.73	27.7	930	0%	0.0
	76	62.0	26	421	421	0	53.0	22%	73.1	53.0	18,987	73.1	0	18,987	74%	6.23	165	412.7	0.0	0.71	24.4	644	0%	0.0
	74	61.1	58	381	381	0	54.0	30%	72.8	54.0	18,234	72.8	0	18,234	71%	5.67	328	370.4	0.0	0.69	21.4	1,237	0%	0.0
	72	60.8	70	340	340	0	55.0	30%	72.2	55.0	17,355	72.2	0	17,355	67%	5.07	353	322.6	0.0	0.69	18.5	1,291	82%	0.0
	70	59.5	138	300	300	0	56.0	30%	71.6	56.0	16,425	72.0	0	16,425	64%	4.50	619	276.9	0.0	0.68	15.7	2,157	82%	0.0
	68	58.9	98	260	260	0	57.0	30%	71.0	57.0	15,731	73.2	0	15,731	61%	4.11	404	238.0	0.0	0.67	13.3	1,308	82%	0.0
Observed	**66**	58.3	205	**220**	**220**	**0**	**58.0**	30%	**70.4**	**58.0**	**15,049**	**74.4**	0	**15,049**	**58%**	**3.75**	**770**	**201.7**	**0.0**	0.66	11.1	2,284	82%	0.0
	64	57.2	303	180	195	-15	59.0	30%	69.8	59.0	14,379	75.6	2,341	16,720	65%	4.67	1,414	167.9	14.6	0.37	5.2	1,586	82%	53.9
	62	56.4	383	140	169	-29	60.0	30%	69.2	60.0	13,721	76.8	3,572	17,293	67%	5.03	1,924	136.5	29.3	0.44	5.1	1,934	82%	136.1
	60	55.7	696	100	144	-44	61.0	30%	68.6	61.0	13,075	78.0	4,330	17,405	68%	5.10	3,552	107.5	43.9	0.54	4.8	3,352	82%	371.6
	58	54.2	462	60	119	-59	62.0	30%	68.0	62.0	12,439	79.2	4,845	17,284	67%	5.02	2,320	80.7	58.6	0.66	4.5	2,065	82%	328.8
	56	52.5	394	20	93	-73	62.0	30%	67.4	62.0	11,330	80.4	5,217	16,548	64%	4.57	1,799	66.2	73.2	0.72	4.0	1,563	82%	350.0
	54	50.8	304	-20	81	-101	62.0	30%	66.8	62.0	10,326	81.6	6,294	16,620	65%	4.61	1,400	53.6	100.5	0.73	3.3	997	82%	370.7
	52	49.0	253	-60	81	-141	62.0	30%	66.2	62.0	9,411	82.8	7,847	17,258	67%	5.01	1,269	42.8	140.6	0.83	3.0	752	83%	426.4
	50	47.4	147	-100	81	-181	66.9	22%	67.3	67.3	10,586	84.0	10,028	20,614	80%	7.59	1,114	0.0	180.6	0.00	0.0	0	83%	317.9
	48	45.6	120	-140	81	-221	66.4	22%	66.9	66.9	9,371	85.2	11,151	20,522	80%	7.51	901	0.0	220.7	0.00	0.0	0	84%	314.6
	46	43.6	93	-180	81	-261	66.0	22%	66.4	66.4	8,310	86.4	12,088	20,398	79%	7.40	690	0.0	260.8	0.00	0.0	0	85%	287.4
	44	42.1	25	-220	81	-301	65.5	22%	66.0	66.0	7,750	87.6	12,883	20,633	80%	7.61	188	0.0	300.8	0.00	0.0	0	85%	87.4
	42	39.5	26	-260	81	-341	65.1	22%	65.5	65.5	7,750	88.8	13,566	21,316	83%	8.25	218	0.0	340.9	0.00	0.0	0	85%	105.9
	40	38.1	4	-300	81	-381	64.6	22%	65.1	65.1	7,750	90.0	14,158	21,908	85%	8.83	35	0.0	380.9	0.00	0.0	0	85%	17.6
Design Heating	38	36.6	2	-340	81	-421	64.2	22%	64.6	64.6	7,750	90.0	15,371	23,121	90%	10.14	22	0.0	421.0	0.00	0.0	0	85%	10.6
	36	34.4	2	-381	81	-461	63.7	22%	64.2	64.2	7,750	90.0	16,542	24,292	94%	11.54	25	0.0	461.0	0.00	0.0	0	85%	11.6
	34	32.7	0	-421	81	-501	63.3	22%	63.7	63.7	7,750	90.0	17,673	25,423	99%	13.02	5	0.0	501.1	0.00	0.0	0	85%	2.1
	32	30.5	1	-461	81	-541	64.2	22%	63.3	63.3	7,750	90.0	18,000	25,750	100%	13.47	14	0.0	519.0	0.00	0.0	0	85%	6.5
		Total:	**3,914**													Total:	**20,296**					**24,185**		**3,199**

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

Indx	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	OAT Bin	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	521	521	0	53.0	22%	76	53.0	20,800	75.6	4,950	25,750	100%	13.47	13.5	506.9	0.0	0.77	32.6		0%	
7/17, 3PM	80	67.0	1	501	501	0	53.0	22%	75	53.0	20,800	75.3	4,950	25,750	100%	13.47	13.5	501.8	0.0	0.76	31.9		0%	
7/17, 4PM	79	66.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.47	13.5	496.8	0.0	0.70	29.0		0%	
7/18, 2PM	87	68.0	1	641	641	0	53.0	22%	77	53.0	20,800	76.9	4,950	25,750	100%	13.47	13.5	537.0	0.0	0.77	34.3		0%	
7/18, 3PM	84	67.0	1	581	581	0	53.0	22%	76	53.0	20,800	76.2	4,950	25,750	100%	13.47	13.5	521.9	0.0	0.76	32.9		85%	
7/18, 4PM	82	66.0	1	541	541	0	53.0	22%	76	53.0	20,800	75.8	4,950	25,750	100%	13.47	13.5	511.9	0.0	0.75	31.9		0%	
7/19, 2PM	79	68.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.47	13.5	496.8	0.0	0.72	29.7		0%	
7/19, 3PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.47	13.5	483.1	0.0	0.72	29.1		0%	
7/19, 4PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.47	13.5	483.1	0.0	0.72	29.1		0%	
															Average:	**13.47**					31.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .
1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV

Based on Sheet: (CIM-5) AHU-2

Site/Space:	Most of Second and third floors, all of f	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

Load Shape Characteristics

Design Space Temp	73.7 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	944.5 kBtu/hr	Htg. Design Zone Load	-627.3 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	20%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	188.9 kBtu/hr
		Clg. Load at Zero Htg.	387.7 kBtu/hr
Max Cold Deck Airflow	33,330 CFM	Max Hot Deck Airflow	30,800 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
42,250	100%	Plenum 0.8"	17.50	1.00	12.5%	20.0%	6,338
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				0.050254	0.156228	#########	0.943697

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
54	62	40	90
smooth	60	smooth	0
75	53	69.5	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
42,250	2.5	75%	95%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	1,375	1,375	0	53.0	12%	76.5	53.0	33,330	76.5	0	33,330	79%	9.5	13.6	845.7	0.0	0.78	54.9	78	0%	0.0
	92	66.8	2	1,304	1,304	0	53.0	12%	76.0	53.0	33,330	76.0	0	33,330	79%	9.52	20.4	827.3	0.0	0.78	53.7	115	0%	0.0
	90	64.7	4	1,234	1,234	0	53.0	12%	75.7	53.0	33,330	75.7	0	33,330	79%	9.52	34.0	818.3	0.0	0.76	51.7	185	0%	0.0
	88	64.6	8	1,163	1,163	0	53.0	12%	75.5	53.0	33,330	75.5	0	33,330	79%	9.52	74.8	809.3	0.0	0.76	51.2	403	0%	0.0
	86	64.5	5	1,093	1,093	0	53.0	12%	75.2	53.0	33,330	75.2	0	33,330	79%	9.52	47.6	800.4	0.0	0.76	50.7	254	0%	0.0
	84	64.3	11	1,022	1,022	0	53.0	12%	75.0	53.0	33,330	75.0	0	33,330	79%	9.52	102.0	791.4	0.0	0.76	50.2	538	0%	0.0
Design Cooling	82	63.3	14	952	952	0	53.0	12%	74.7	53.0	33,330	74.7	0	33,330	79%	9.52	136.0	782.4	0.0	0.75	49.1	701	0%	0.0
	80	63.5	22	881	881	0	53.0	12%	74.5	53.0	33,330	74.5	0	33,330	79%	9.52	210.8	773.4	0.0	0.76	48.8	1,080	0%	0.0
	78	63.1	34	811	811	0	53.0	12%	74.2	53.0	33,330	74.2	0	33,330	79%	9.52	319.6	764.4	0.0	0.73	46.7	1,567	0%	0.0
	76	62.0	26	740	740	0	53.0	12%	74.0	53.0	32,788	74.0	0	32,788	78%	9.15	241.8	743.2	0.0	0.71	43.9	1,160	0%	0.0
	74	61.1	58	670	670	0	53.4	20%	73.8	53.4	30,838	73.8	0	30,838	73%	7.91	457.7	677.1	0.0	0.69	39.1	2,261	0%	0.0
	72	60.8	70	599	599	0	54.3	20%	73.4	54.3	29,250	73.4	0	29,250	69%	7.00	487.5	602.6	0.0	0.69	34.6	2,411	82%	0.0
	70	59.5	138	529	529	0	55.1	20%	73.0	55.1	27,494	73.0	0	27,494	65%	6.11	840.1	529.0	0.0	0.68	30.0	4,122	82%	0.0
	68	58.9	98	458	458	0	56.0	20%	72.6	56.0	25,662	72.9	0	25,662	61%	5.28	518.6	459.0	0.0	0.67	25.7	2,523	82%	0.0
Observed	**66**	58.3	205	**388**	**388**	**0**	**56.9**	20%	**72.2**	**56.9**	**24,206**	**74.1**	0	**24,206**	**57%**	**4.70**	**965.2**	**400.0**	**0.0**	0.66	22.1	4,529	82%	0.0
	64	57.2	303	317	352	-34	57.7	20%	71.8	57.7	22,793	75.4	8,844	31,637	75%	8.40	2,544.0	345.8	34.3	0.37	10.8	3,267	82%	126.4
	62	56.4	383	247	315	-69	58.6	20%	71.4	58.6	21,424	76.6	12,194	33,618	80%	9.72	3,717.9	295.9	68.7	0.44	11.0	4,194	82%	319.3
	60	55.7	696	176	279	-103	59.4	20%	71.0	59.4	20,096	77.8	13,955	34,051	81%	10.03	6,985.2	250.3	103.0	0.54	11.2	7,806	82%	871.9
	58	54.2	462	106	243	-137	60.3	20%	70.6	60.3	18,806	79.0	15,042	33,848	80%	9.89	4,570.6	208.7	137.4	0.66	11.6	5,338	82%	771.4
	56	52.5	394	35	207	-172	61.1	20%	70.2	61.1	17,554	80.2	15,779	33,333	79%	9.52	3,746.8	170.9	171.7	0.72	10.3	4,037	82%	821.2
	54	50.8	304	-35	189	-224	62.0	20%	69.8	62.0	16,337	81.5	17,743	34,080	81%	10.06	3,053.9	136.9	224.2	0.73	8.4	2,544	82%	826.4
	52	49.0	253	-106	189	-295	62.0	20%	69.4	62.0	14,668	82.7	20,485	35,153	83%	10.86	2,749.9	116.6	294.6	0.83	8.1	2,049	83%	893.7
	50	47.4	147	-176	189	-365	70.5	12%	70.7	70.7	19,145	83.9	23,105	42,250	100%	17.52	2,571.7	0.0	328.3	0.00	0.0	0	83%	577.7
	48	45.6	120	-247	189	-436	70.2	12%	70.5	70.5	16,588	85.1	25,662	42,250	100%	17.52	2,102.4	0.0	405.3	0.00	0.0	0	84%	577.8
	46	43.6	93	-317	189	-506	70.0	12%	70.2	70.2	14,372	86.3	27,878	42,250	100%	17.52	1,633.1	0.0	484.6	0.00	0.0	0	85%	534.1
	44	42.1	25	-388	189	-577	69.7	12%	70.0	70.0	12,432	87.6	29,818	42,250	100%	17.52	431.7	0.0	565.7	0.00	0.0	0	85%	164.3
	42	39.5	26	-458	189	-647	69.5	12%	69.7	69.7	11,450	88.8	30,800	42,250	100%	17.52	463.0	0.0	633.2	0.00	0.0	0	85%	196.7
	40	38.1	4	-529	189	-718	69.2	12%	69.5	69.5	11,450	90.0	30,800	42,250	100%	17.52	68.8	0.0	682.1	0.00	0.0	0	85%	31.4
Design Heating	38	36.6	2	-599	189	-788	69.0	12%	69.2	69.2	11,450	90.0	30,800	42,250	100%	17.52	37.5	0.0	690.4	0.00	0.0	0	85%	17.3
	36	34.4	2	-670	189	-859	68.7	12%	69.0	69.0	11,450	90.0	30,800	42,250	100%	17.52	37.5	0.0	698.7	0.00	0.0	0	85%	17.5
	34	32.7	0	-740	189	-929	68.5	12%	68.7	68.7	11,450	90.0	30,800	42,250	100%	17.52	6.3	0.0	707.0	0.00	0.0	0	85%	3.0
	32	30.5	1	-811	189	-1,000	66.6	12%	68.5	68.5	11,450	90.0	30,800	42,250	100%	17.52	18.8	0.0	715.3	0.00	0.0	0	85%	9.0
		Total:	**3,914**													Total:	**39,208.8**					**51,161**		**6,759**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Dual Duct VAV Retrofit Based on Sheet: (CIM-5) CHP Summary Chiller Template - v1.6.4

Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

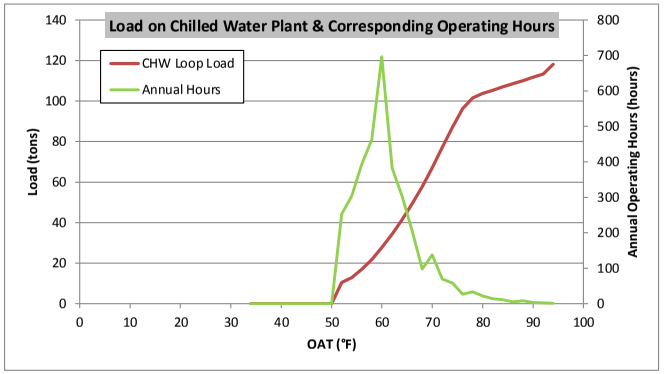
Chillers - Inputs		
CH-1 Size	100	tons

CHWST SP Reset	
OAT	CHWT
66	55
80	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29

System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	70.4	23,435	6,410
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	19,681	3,891
Condensing Water Pumps [CWP]	4.5	15,691	3,015
Total	**86.4**	**75,260**	**16,478**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	4.5	6	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	4.5	10	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	4.5	16	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	4.5	35	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	4.5	22	6.8	34	0.76	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	4.5	48	6.8	73	0.76	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	4.5	64	6.8	97	0.75	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	4.5	100	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.58	58.4	1,960	4.7	158	4.5	151	6.8	229	0.73	0.2703	1
76	62.0	26	96	1	26	96	0.54	52.2	1,380	4.7	125	4.5	119	6.8	180	0.71	0.2736	1
74	61.1	58	87	1	58	87	0.51	44.4	2,571	4.7	273	4.5	260	6.8	394	0.69	0.2536	1
72	60.8	70	77	1	70	77	0.48	37.1	2,586	4.7	328	4.5	313	6.8	474	0.69	0.2549	1
70	59.5	138	67	1	138	67	0.45	30.1	4,136	4.7	648	4.5	618	6.4	876	0.68	0.2714	1
68	58.9	98	58	1	98	58	0.42	24.5	2,408	4.7	463	4.5	442	5.1	505	0.67	0.2555	1
66	58.3	205	49	1	205	49	0.40	19.6	4,032	4.7	968	4.5	923	4.0	819	0.67	0.2569	1
64	57.2	303	42	1	303	42	0.00	0.0	0	4.7	1,428	4.5	1,362	6.8	2,063	0.39	0.2463	1
62	56.4	383	34	1	383	34	0.00	0.0	0	4.7	1,803	4.5	1,720	6.8	2,605	0.47	0.2160	1
60	55.7	696	28	1	696	28	0.00	0.0	0	4.7	3,283	4.5	3,131	6.8	4,743	0.58	0.1747	1
58	54.2	462	22	1	462	22	0.00	0.0	0	4.7	2,179	4.5	2,078	6.8	3,148	0.74	0.1512	1
56	52.5	394	17	1	394	17	0.00	0.0	0	4.7	1,855	4.5	1,769	5.0	1,974	0.84	0.1447	1
54	50.8	304	13	1	304	13	0.00	0.0	0	4.7	1,431	4.5	1,365	2.5	745	0.90	0.1399	1
52	49.0	253	11	1	253	11	0.00	0.0	0	4.7	1,194	4.5	1,138	1.8	468	1.05	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				23,435		16,453		15,691		19,681	0.68		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		4.5		6.8		0.77	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		4.5		6.8		0.76	1
76	66.0	7/17 4 PM	115	1	1	115	0.56	64.6		4.7		4.5		6.8		0.70	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		4.5		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		4.5		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		4.5		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.58	66.8		4.7		4.5		6.8		0.72	1
76	68.0	7/19 3 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
76	68.0	7/19 4 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
								70.4		**4.7**		**4.5**		**6.8**			

Secondary Pump Curve Regression, %bhp = f(%Flow)

Curve Type #N/A **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	#REF!	#REF!	#REF!	#REF!		

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Dual Duct VAV Retrofit

Based on Sheet: (CIM-5) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	56	60
	80	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
Prim. Pump Operates with WSE	YES	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	46.3	75.5	1.11	110.8	92%	100%	92%	0.82	0.91	58.4	0.58	1,960	5.6	4.7	158
76	62.0	26	96	47.5	74.2	1.14	114.2	84%	100%	84%	0.80	0.84	52.2	0.54	1,380	5.6	4.7	125
74	61.1	58	87	48.8	72.6	1.18	118.0	74%	100%	74%	0.77	0.74	44.4	0.51	2,571	5.6	4.7	273
72	60.8	70	77	50.0	71.4	1.22	121.5	63%	100%	63%	0.74	0.64	37.1	0.48	2,586	5.6	4.7	328
70	59.5	138	67	51.3	69.7	1.26	125.5	54%	100%	54%	0.72	0.54	30.1	0.45	4,136	5.6	4.7	648
68	58.9	98	58	52.5	69.2	1.29	128.7	45%	100%	45%	0.70	0.45	24.5	0.42	2,408	5.6	4.7	463
66	58.3	205	49	53.8	68.8	1.32	132.0	37%	100%	37%	0.69	0.36	19.6	0.40	4,032	5.6	4.7	968
64	57.2	303	42	55.0	64.1	1.38	137.9	30%	100%	30%	0.66	0.27	0.0	0.00	0	5.6	4.7	1,428
62	56.4	383	34	56.3	62.6	1.42	142.0	24%	97%	25%	0.64	0.20	0.0	0.00	0	5.6	4.7	1,803
60	55.7	696	28	57.5	61.2	1.46	146.1	19%	76%	25%	0.64	0.19	0.0	0.00	0	5.6	4.7	3,283
58	54.2	462	22	58.8	59.2	1.51	150.6	14%	58%	25%	0.63	0.19	0.0	0.00	0	5.6	4.7	2,179
56	52.5	394	17	60.0	57.9	1.55	154.7	11%	44%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,855
54	50.8	304	13	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,431
52	49.0	253	11	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,194
50	47.4	0	0	60.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	60.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	60.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	60.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**23,435**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	47.5	77.1	1.12	112.3	103%	100%	103%	0.83	0.99	64.6	0.56		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	47.5	78.6	1.11	111.4	103%	100%	103%	0.85	1.00	66.8	0.58		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
													70.4				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District

2950 Peralta Oaks Court

Cooling Tower Bin Simulation Measure Name: Dual Duct VAV Retrofit Based on Sheet: (CIM-5) CT

Chiller Template - v1.6.4

Notes:

Total Number of Cells	1

Cooling Tower Design Specs - One Cell		
Make	Baltimore Air Coil	
Model	VXT-95C	
Design EWT (i.e. CWRT)	90.0	°F
Design LWT (i.e. CWST)	80.0	°F
Design WBT	67.0	°F
Cell Design CW Flow	313	gpm
Design Approach	13.0	°F
Design Range	10.0	°F
Capacity (tons)	131	tons
Flow Capacity @ CTI	245	gpm
Tower Performance Curve	Open Tower (DOE 2.2)	

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WB	CWST SetP
	45	58
	70	79

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
HX Approach	2.0	°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size			Inches
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	91.7%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	4.5	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	76.8	81.1	91.6	80.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	4.5	6
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	76.3	80.2	90.3	79.3	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	4.5	10
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	74.5	78.5	88.4	77.6	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	4.5	16
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	74.4	78.3	88.0	77.4	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	4.5	35
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	74.4	78.0	87.7	77.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	4.5	22
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	74.2	77.8	87.2	77.0	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	4.5	48
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	73.4	76.9	86.2	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	4.5	64
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	73.5	76.9	86.0	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	4.5	100
78	63.1	34	102	1	0.58	118	283	1	318	1	102%	8.9	73.2	76.3	85.2	75.5	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	4.5	151
76	62.0	26	96	1	0.54	111	267	1	318	1	102%	8.4	72.3	74.9	83.3	74.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	4.5	119
74	61.1	58	87	1	0.51	100	240	1	318	1	102%	7.5	71.5	73.2	80.7	72.6	100%	317	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	4.5	260
72	60.8	70	77	1	0.48	88	210	1	318	1	102%	6.6	71.3	71.9	78.5	71.4	100%	319	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	4.5	313
70	59.5	138	67	1	0.45	76	182	1	318	1	102%	5.7	70.2	70.2	75.9	69.7	97%	321	100%	0%	0%	89%	0%	0%	6.4	0.0	0.0	6.4	876	100%	5.5	4.5	618
68	58.9	98	58	1	0.42	65	155	1	318	1	102%	4.9	69.7	69.7	74.5	69.2	87%	324	100%	0%	0%	59%	0%	0%	5.1	0.0	0.0	5.1	505	100%	5.5	4.5	442
66	58.3	205	49	1	0.40	55	146	1	318	1	102%	4.1	69.2	69.2	73.3	68.8	78%	326	100%	0%	0%	31%	0%	0%	4.0	0.0	0.0	4.0	819	100%	5.5	4.5	923
64	57.2	303	42	1	0.00	42	146	1	318	1	102%	3.1	53.0	64.3	67.5	64.1	100%	328	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,063	100%	5.5	4.5	1,362
62	56.4	383	34	1	0.00	34	146	1	318	1	102%	2.6	54.3	62.8	65.4	62.6	100%	330	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,605	100%	5.5	4.5	1,720
60	55.7	696	28	1	0.00	28	146	1	318	1	102%	2.1	55.5	61.4	63.5	61.2	100%	334	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	4,743	100%	5.5	4.5	3,131
58	54.2	462	22	1	0.00	22	146	1	318	1	102%	1.6	56.8	59.3	60.9	59.2	100%	337	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	3,148	100%	5.5	4.5	2,078
56	52.5	394	17	1	0.00	17	146	1	318	1	102%	1.3	58.0	58.0	59.3	57.9	86%	340	100%	0%	0%	56%	0%	0%	5.0	0.0	0.0	5.0	1,974	100%	5.5	4.5	1,769
54	50.8	304	13	1	0.00	13	146	1	318	1	102%	1.0	58.0	58.0	59.0	57.9	62%	343	68%	0%	0%	91%	0%	0%	2.5	0.0	0.0	2.5	745	100%	5.5	4.5	1,365
52	49.0	253	11	1	0.00	11	146	1	318	1	102%	0.8	58.0	58.0	58.8	57.9	47%	345	68%	0%	0%	69%	0%	0%	1.8	0.0	0.0	1.8	468	100%	5.5	4.5	1,138
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**19,681**				**15,691**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	77.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	66.0	7/17/00 4:00 PM	115	1	0.56	111	267	1	318	1	102%	8.4	75.6	77.9	86.3	77.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	77.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	75.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 2:00 PM	115	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 3:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 4:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
																												6.8				**4.5**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations.
More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)
Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Dual Duct VAV Retrofit **Based on Sheet:** (CIM-5) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

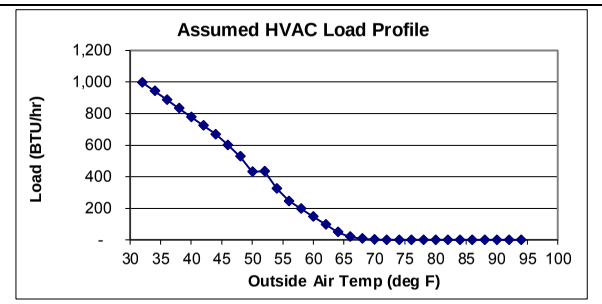
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 °F

Optimization² (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase¹		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

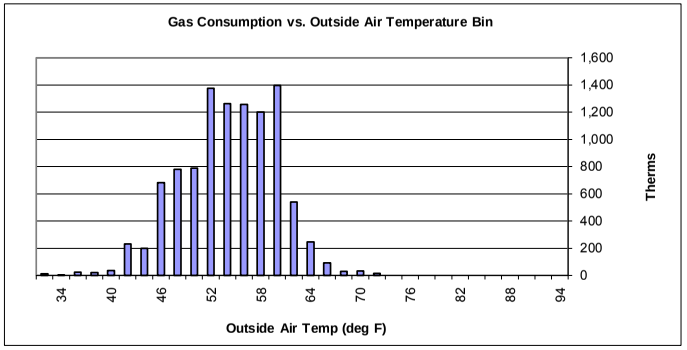
Hot Water Delivery Design					
Coil Design EWT	200 °F			Min Flow	Flow at Design
Coil Design EAT	63 °F		Required/Primary System	30%	100%
2-way valves	TRUE		Secondary System	30%	100%
Primary Pumps	**1**		**Total Design Flow**	**145**	***gpm***
Pump Name	PHWP-1				
Pump Motor HP	2.0				*hp*
Design Flow	145				*gpm*
Design Head Pressure	27				*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0	*hp*
Pump eff	45%				
Brake Pump Power	2.2	0.0	0.0	0.0	*hp*
Pump Motor Eff	84%				
Pump Motor kW	2.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)	0%				*Design Flow*
Pump Curve	Const Flow				
Secondary Pumps	**0**		**Total Design Flow**	**0**	***gpm***
Pump Name					
Pump Motor HP					*hp*
Design Flow					*gpm*
Design Head Pressure					*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0	*hp*
Pump eff					
Brake Pump Power	0.0	0.0	0.0	0.0	*hp*
Pump Motor Eff					
Pump Motor kW	0.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)					*Design Flow*
Pump Curve	Typical VFD				

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	2	-	-	2	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	269	-	4,082
68	98	98	7	-	-	7	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	192	-	2,912
66	205	205	19	-	-	19	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,072
64	303	303	49	-	-	49	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,801
62	383	383	98	-	-	98	1	109	108	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,544
60	696	696	147	-	-	147	1	115	113	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,425
58	462	462	196	-	-	196	1	121	118	236%	30%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,806
56	394	394	245	-	-	245	1	127	124	214%	30%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,651
54	304	304	325	-	-	325	1	133	129	196%	32%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,354
52	253	253	435	-	-	435	1	139	133	180%	39%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,636
50	147	147	431	-	-	431	1	145	139	167%	36%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,529
48	120	120	528	-	-	528	1	151	144	156%	41%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,247
46	93	93	601	-	-	601	1	157	149	146%	44%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,696
44	25	25	669	-	-	669	1	160	151	141%	47%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,097
42	26	26	723	-	-	723	1	160	150	141%	51%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,239
40	4	4	778	-	-	778	1	160	149	141%	55%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	331
38	2	2	833	-	-	833	1	160	149	141%	59%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	180
36	2	2	888	-	-	888	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
34	0	0	942	-	-	942	1	160	147	141%	67%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	30
32	1	1	997	-	-	997	1	160	146	141%	70%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	89
Morning Warmup[5]		**260**	997	100	-	1,097	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21355
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**181,967**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 **Base Case Simulation** **Measure Name:** Dual Duct VAV Retrofit **Based on Sheet:** (CIM-5) Bo

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficiency	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	1	2	2	20	100	20%	0.21	0.97	82%	361	5%	33
68	98	1	7	7	25	100	20%	0.21	0.97	82%	361	7%	30
66	205	1	19	19	37	100	20%	0.21	0.97	82%	361	10%	93
64	303	1	49	49	67	102	20%	0.21	0.97	82%	361	19%	247
62	383	1	98	98	116	108	20%	0.21	0.97	82%	361	32%	539
60	696	1	147	147	165	113	20%	0.21	0.97	82%	361	46%	1,396
58	462	1	196	196	214	118	20%	0.21	0.97	82%	361	59%	1,202
56	394	1	245	245	263	124	20%	0.21	0.97	82%	361	73%	1,258
54	304	1	325	325	343	129	20%	0.21	0.97	82%	361	95%	1,264
52	253	1	435	435	453	133	25%	0.26	0.98	83%	453	100%	1,375
50	147	1	431	431	449	139	25%	0.25	0.98	83%	449	100%	789
48	120	1	528	528	546	144	30%	0.31	0.99	84%	546	100%	779
46	93	1	601	601	619	149	34%	0.34	0.99	85%	619	100%	682
44	25	1	669	669	687	151	38%	0.38	1.00	85%	687	100%	199
42	26	1	723	723	741	150	41%	0.41	1.00	85%	741	100%	231
40	4	1	778	778	796	149	44%	0.44	1.00	85%	796	100%	37
38	2	1	833	833	851	149	47%	0.47	1.00	85%	851	100%	21
36	2	1	888	888	906	148	50%	0.50	1.00	85%	906	100%	23
34	0	1	942	942	960	147	53%	0.53	1.00	85%	960	100%	4
32	1	1	997	997	1,015	146	56%	0.56	1.00	85%	1,015	100%	13
Warmup	260	1	997	997	1,015	145	56%	0.56	1.00	85%	1,015	100%	3,091
	hrs/yr												therms
TOTAL	**3,726**												**13,321**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV

Based on Sheet: (CIM-5) AHU-1

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

Load Shape Characteristics

Design Space Temp	72.3 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	536.7 kBtu/hr	Htg. Design Zone Load	-356.5 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Fracti	15%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	80.5 kBtu/hr
		Clg. Load at Zero Htg.	220.3 kBtu/hr
Max Cold Deck Airflow	20,800 CFM	Max Hot Deck Airflow	18,000 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
25,750	40%	Plenum 0.8	13.45	1.00	22.3%	30.0%	3,863
Fan Input Power Curve ($a+b{\cdot}x+c{\cdot}x^2+d{\cdot}x^3$):				0.050254	0.156228	########	0.943697

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
58	62	40	90
smooth	60	smooth	0
76	53	70	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
25,150	2.5	59%	93%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	781	781	0	53.0	22%	78.5	53.0	20,800	78.5	0	20,800	81%	7.76	11	572.1	0.0	0.78	37.1	53	0%	0.0
	92	66.8	2	741	741	0	53.0	22%	76.7	53.0	20,800	76.7	0	20,800	81%	7.76	17	532.4	0.0	0.78	34.6	74	0%	0.0
	90	64.7	4	701	701	0	53.0	22%	76.3	53.0	20,800	76.3	0	20,800	81%	7.76	28	522.3	0.0	0.76	33.0	118	0%	0.0
	88	64.6	8	661	661	0	53.0	22%	75.8	53.0	20,800	75.8	0	20,800	81%	7.76	61	512.3	0.0	0.76	32.4	255	0%	0.0
	86	64.5	5	621	621	0	53.0	22%	75.4	53.0	20,800	75.4	0	20,800	81%	7.76	39	502.3	0.0	0.76	31.8	159	0%	0.0
	84	64.3	11	581	581	0	53.0	22%	74.9	53.0	20,800	74.9	0	20,800	81%	7.76	83	492.2	0.0	0.76	31.2	334	0%	0.0
Design Cooling	82	63.3	14	541	541	0	53.0	22%	74.5	53.0	20,800	74.5	0	20,800	81%	7.76	111	482.2	0.0	0.75	30.3	432	0%	0.0
	80	63.5	22	501	501	0	53.0	22%	74.0	53.0	20,800	74.0	0	20,800	81%	7.76	172	472.2	0.0	0.76	29.8	659	0%	0.0
	78	63.1	34	461	461	0	53.0	22%	73.6	53.0	20,413	73.6	0	20,413	79%	7.41	249	453.5	0.0	0.73	27.7	930	0%	0.0
	76	62.0	26	421	421	0	53.0	22%	73.1	53.0	18,987	73.1	0	18,987	74%	6.23	165	412.7	0.0	0.71	24.4	644	0%	0.0
	74	61.1	58	381	381	0	54.0	30%	72.8	54.0	18,234	72.8	0	18,234	71%	5.67	328	370.4	0.0	0.69	21.4	1,237	0%	0.0
	72	60.8	70	340	340	0	55.0	30%	72.2	55.0	17,355	72.2	0	17,355	67%	5.07	353	322.6	0.0	0.69	18.5	1,291	82%	0.0
	70	59.5	138	300	300	0	56.0	30%	71.6	56.0	16,425	72.0	0	16,425	64%	4.50	619	276.9	0.0	0.68	15.7	2,157	82%	0.0
	68	58.9	98	260	260	0	57.0	30%	71.0	57.0	15,731	73.2	0	15,731	61%	4.11	404	238.0	0.0	0.67	13.3	1,308	82%	0.0
Observed	**66**	58.3	205	**220**	**220**	**0**	**58.0**	30%	**70.4**	**58.0**	**15,049**	**74.4**	0	**15,049**	**58%**	**3.75**	**770**	**201.7**	**0.0**	0.66	11.1	2,284	82%	0.0
	64	57.2	303	180	195	-15	59.0	30%	69.8	59.0	14,379	75.6	2,341	16,720	65%	4.67	1,414	167.9	14.6	0.37	5.2	1,586	82%	53.9
	62	56.4	383	140	169	-29	60.0	30%	69.2	60.0	13,721	76.8	3,572	17,293	67%	5.03	1,924	136.5	29.3	0.44	5.1	1,934	82%	136.1
	60	55.7	696	100	144	-44	61.0	30%	68.6	61.0	13,075	78.0	4,330	17,405	68%	5.10	3,552	107.5	43.9	0.54	4.8	3,352	82%	371.6
	58	54.2	462	60	119	-59	62.0	30%	68.0	62.0	12,439	79.2	4,845	17,284	67%	5.02	2,320	80.7	58.6	0.66	4.5	2,065	82%	328.8
	56	52.5	394	20	93	-73	62.0	30%	67.4	62.0	11,330	80.4	5,217	16,548	64%	4.57	1,799	66.2	73.2	0.72	4.0	1,563	82%	350.0
	54	50.8	304	-20	81	-101	62.0	30%	66.8	62.0	10,326	81.6	6,294	16,620	65%	4.61	1,400	53.6	100.5	0.73	3.3	997	82%	370.7
	52	49.0	253	-60	81	-141	62.0	30%	66.2	62.0	9,411	82.8	7,847	17,258	67%	5.01	1,269	42.8	140.6	0.83	3.0	752	83%	426.4
	50	47.4	147	-100	81	-181	66.9	22%	67.3	67.3	10,586	84.0	10,028	20,614	80%	7.59	1,114	0.0	180.6	0.00	0.0	0	83%	317.9
	48	45.6	120	-140	81	-221	66.4	22%	66.9	66.9	9,371	85.2	11,151	20,522	80%	7.51	901	0.0	220.7	0.00	0.0	0	84%	314.6
	46	43.6	93	-180	81	-261	66.0	22%	66.4	66.4	8,310	86.4	12,088	20,398	79%	7.40	690	0.0	260.8	0.00	0.0	0	85%	287.4
	44	42.1	25	-220	81	-301	65.5	22%	66.0	66.0	7,750	87.6	12,883	20,633	80%	7.61	188	0.0	300.8	0.00	0.0	0	85%	87.4
	42	39.5	26	-260	81	-341	65.1	22%	65.5	65.5	7,750	88.8	13,566	21,316	83%	8.25	218	0.0	340.9	0.00	0.0	0	85%	105.9
	40	38.1	4	-300	81	-381	64.6	22%	65.1	65.1	7,750	90.0	14,158	21,908	85%	8.83	35	0.0	380.9	0.00	0.0	0	85%	17.6
Design Heating	38	36.6	2	-340	81	-421	64.2	22%	64.6	64.6	7,750	90.0	15,371	23,121	90%	10.14	22	0.0	421.0	0.00	0.0	0	85%	10.6
	36	34.4	2	-381	81	-461	63.7	22%	64.2	64.2	7,750	90.0	16,542	24,292	94%	11.54	25	0.0	461.0	0.00	0.0	0	85%	11.6
	34	32.7	0	-421	81	-501	63.3	22%	63.7	63.7	7,750	90.0	17,673	25,423	99%	13.02	5	0.0	501.1	0.00	0.0	0	85%	2.1
	32	30.5	1	-461	81	-541	64.2	22%	63.3	63.3	7,750	90.0	18,000	25,750	100%	13.47	14	0.0	519.0	0.00	0.0	0	85%	6.5
		Total:	**3,914**													Total:	**20,296**					**24,185**		**3,199**

Site/Space:	First Floor, Second & Third Floor Zone	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-1		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

Indx	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	OAT Bin	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	521	521	0	53.0	22%	76	53.0	20,800	75.6	4,950	25,750	100%	13.47	13.5	506.9	0.0	0.77	32.6		0%	
7/17, 3PM	80	67.0	1	501	501	0	53.0	22%	75	53.0	20,800	75.3	4,950	25,750	100%	13.47	13.5	501.8	0.0	0.76	31.9		0%	
7/17, 4PM	79	66.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.47	13.5	496.8	0.0	0.70	29.0		0%	
7/18, 2PM	87	68.0	1	641	641	0	53.0	22%	77	53.0	20,800	76.9	4,950	25,750	100%	13.47	13.5	537.0	0.0	0.77	34.3		0%	
7/18, 3PM	84	67.0	1	581	581	0	53.0	22%	76	53.0	20,800	76.2	4,950	25,750	100%	13.47	13.5	521.9	0.0	0.76	32.9		85%	
7/18, 4PM	82	66.0	1	541	541	0	53.0	22%	76	53.0	20,800	75.8	4,950	25,750	100%	13.47	13.5	511.9	0.0	0.75	31.9		0%	
7/19, 2PM	79	68.0	1	481	481	0	53.0	22%	75	53.0	20,800	75.1	4,950	25,750	100%	13.47	13.5	496.8	0.0	0.72	29.7		0%	
7/19, 3PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.47	13.5	483.1	0.0	0.72	29.1		0%	
7/19, 4PM	78	68.0	1	461	461	0	53.0	22%	75	53.0	20,431	74.9	5,319	25,750	100%	13.47	13.5	483.1	0.0	0.72	29.1		0%	
															Average:	**13.47**					31.2			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .
1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Dual Duct Bin Simulation

Measure Name: Dual Duct VAV

Based on Sheet: (CIM-5) AHU-2

Site/Space:	Most of Second and third floors, all of f	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

Load Shape Characteristics

Design Space Temp	73.7 °F		
Clg. Space Temp	74.0 °F	Htg. Space Temp	68.0 °F
Clg. Design OAT	81.8 °F	Htg. Design OAT	37.2 °F
Design Clg. Load	944.5 kBtu/hr	Htg. Design Zone Load	-627.3 kBtu/hr
Clg. Lockout OAT	51.0 °F	Htg. Lockout OAT	72 °F
Zero/Min Zone Clg. OAT	55.0 °F	Zero Zone Htg. OAT	66.0 °F
Net Load Balance OAT	55.0 °F	Base/Core-Zones Clg. Load Frac	20%
Max Clg. % of Design Clg.	100%	Base (Core) Clg. Load	188.9 kBtu/hr
		Clg. Load at Zero Htg.	387.7 kBtu/hr
Max Cold Deck Airflow	33,330 CFM	Max Hot Deck Airflow	30,800 CFM

Supply Air / Ventilation Parameters [1]

Supply Air Flow Maximum (CFM)	Supply Air Flow Minimum (%)	Supply Air Flow Control	Design Fan Input Power (kW)	VFD Efficiency	OA Damper Min OA Fraction	OA Damper Max OA Fraction	Minimum Ventilation (CFM)
42,250	100%	Plenum 0.8"	17.50	1.00	12.5%	20.0%	6,338
Fan Input Power Curve ($a+b\cdot x+c\cdot x^2+d\cdot x^3$):				0.050254	0.156228	#########	0.943697

Supply Air Temp.

OAT	C.D. (°F)	OAT	H.D. (°F)
54	62	40	90
smooth	60	smooth	0
75	53	69.5	72

Fan CFM	Fan TSP	Fan Eff	Motor Eff
42,250	2.5	75%	95%

From Mechanical Schedule

Annual Analysis

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		22	23	24
	OAT Bin	Mean Coincident Wet-Bulb	Annual Hours	Net Zone Load	Net Zone Cooling Load	Net Zone Heating Load	Supply Air Temp. Setpoint	Outside Air Fraction	MAT	Cold Deck SAT	Cold Deck Flow Rate	Hot Deck SAT	Hot Deck Flow Rate	Total Air Flow	Fan Flow Capacity Fraction	Motor Input Power	Annual Fan Energy	Cooling Coil Load	Heating Coil Load	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr	°F	CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
	94	67.4	1	1,375	1,375	0	53.0	12%	76.5	53.0	33,330	76.5	0	33,330	79%	9.5	13.6	845.7	0.0	0.78	54.9	78	0%	0.0
	92	66.8	2	1,304	1,304	0	53.0	12%	76.0	53.0	33,330	76.0	0	33,330	79%	9.52	20.4	827.3	0.0	0.78	53.7	115	0%	0.0
	90	64.7	4	1,234	1,234	0	53.0	12%	75.7	53.0	33,330	75.7	0	33,330	79%	9.52	34.0	818.3	0.0	0.76	51.7	185	0%	0.0
	88	64.6	8	1,163	1,163	0	53.0	12%	75.5	53.0	33,330	75.5	0	33,330	79%	9.52	74.8	809.3	0.0	0.76	51.2	403	0%	0.0
	86	64.5	5	1,093	1,093	0	53.0	12%	75.2	53.0	33,330	75.2	0	33,330	79%	9.52	47.6	800.4	0.0	0.76	50.7	254	0%	0.0
	84	64.3	11	1,022	1,022	0	53.0	12%	75.0	53.0	33,330	75.0	0	33,330	79%	9.52	102.0	791.4	0.0	0.76	50.2	538	0%	0.0
Design Cooling	82	63.3	14	952	952	0	53.0	12%	74.7	53.0	33,330	74.7	0	33,330	79%	9.52	136.0	782.4	0.0	0.75	49.1	701	0%	0.0
	80	63.5	22	881	881	0	53.0	12%	74.5	53.0	33,330	74.5	0	33,330	79%	9.52	210.8	773.4	0.0	0.76	48.8	1,080	0%	0.0
	78	63.1	34	811	811	0	53.0	12%	74.2	53.0	33,330	74.2	0	33,330	79%	9.52	319.6	764.4	0.0	0.73	46.7	1,567	0%	0.0
	76	62.0	26	740	740	0	53.0	12%	74.0	53.0	32,788	74.0	0	32,788	78%	9.15	241.8	743.2	0.0	0.71	43.9	1,160	0%	0.0
	74	61.1	58	670	670	0	53.4	20%	73.8	53.4	30,838	73.8	0	30,838	73%	7.91	457.7	677.1	0.0	0.69	39.1	2,261	0%	0.0
	72	60.8	70	599	599	0	54.3	20%	73.4	54.3	29,250	73.4	0	29,250	69%	7.00	487.5	602.6	0.0	0.69	34.6	2,411	82%	0.0
	70	59.5	138	529	529	0	55.1	20%	73.0	55.1	27,494	73.0	0	27,494	65%	6.11	840.1	529.0	0.0	0.68	30.0	4,122	82%	0.0
	68	58.9	98	458	458	0	56.0	20%	72.6	56.0	25,662	72.9	0	25,662	61%	5.28	518.6	459.0	0.0	0.67	25.7	2,523	82%	0.0
Observed	**66**	58.3	205	**388**	**388**	**0**	**56.9**	20%	**72.2**	**56.9**	**24,206**	**74.1**	0	**24,206**	**57%**	**4.70**	**965.2**	**400.0**	**0.0**	0.66	22.1	4,529	82%	0.0
	64	57.2	303	317	352	-34	57.7	20%	71.8	57.7	22,793	75.4	8,844	31,637	75%	8.40	2,544.0	345.8	34.3	0.37	10.8	3,267	82%	126.4
	62	56.4	383	247	315	-69	58.6	20%	71.4	58.6	21,424	76.6	12,194	33,618	80%	9.72	3,717.9	295.9	68.7	0.44	11.0	4,194	82%	319.3
	60	55.7	696	176	279	-103	59.4	20%	71.0	59.4	20,096	77.8	13,955	34,051	81%	10.03	6,985.2	250.3	103.0	0.54	11.2	7,806	82%	871.9
	58	54.2	462	106	243	-137	60.3	20%	70.6	60.3	18,806	79.0	15,042	33,848	80%	9.89	4,570.6	208.7	137.4	0.66	11.6	5,338	82%	771.4
	56	52.5	394	35	207	-172	61.1	20%	70.2	61.1	17,554	80.2	15,779	33,333	79%	9.52	3,746.8	170.9	171.7	0.72	10.3	4,037	82%	821.2
	54	50.8	304	-35	189	-224	62.0	20%	69.8	62.0	16,337	81.5	17,743	34,080	81%	10.06	3,053.9	136.9	224.2	0.73	8.4	2,544	82%	826.4
	52	49.0	253	-106	189	-295	62.0	20%	69.4	62.0	14,668	82.7	20,485	35,153	83%	10.86	2,749.9	116.6	294.6	0.83	8.1	2,049	83%	893.7
	50	47.4	147	-176	189	-365	70.5	12%	70.7	70.7	19,145	83.9	23,105	42,250	100%	17.52	2,571.7	0.0	328.3	0.00	0.0	0	83%	577.7
	48	45.6	120	-247	189	-436	70.2	12%	70.5	70.5	16,588	85.1	25,662	42,250	100%	17.52	2,102.4	0.0	405.3	0.00	0.0	0	84%	577.8
	46	43.6	93	-317	189	-506	70.0	12%	70.2	70.2	14,372	86.3	27,878	42,250	100%	17.52	1,633.1	0.0	484.6	0.00	0.0	0	85%	534.1
	44	42.1	25	-388	189	-577	69.7	12%	70.0	70.0	12,432	87.6	29,818	42,250	100%	17.52	431.7	0.0	565.7	0.00	0.0	0	85%	164.3
	42	39.5	26	-458	189	-647	69.5	12%	69.7	69.7	11,450	88.8	30,800	42,250	100%	17.52	463.0	0.0	633.2	0.00	0.0	0	85%	196.7
	40	38.1	4	-529	189	-718	69.2	12%	69.5	69.5	11,450	90.0	30,800	42,250	100%	17.52	68.8	0.0	682.1	0.00	0.0	0	85%	31.4
Design Heating	38	36.6	2	-599	189	-788	69.0	12%	69.2	69.2	11,450	90.0	30,800	42,250	100%	17.52	37.5	0.0	690.4	0.00	0.0	0	85%	17.3
	36	34.4	2	-670	189	-859	68.7	12%	69.0	69.0	11,450	90.0	30,800	42,250	100%	17.52	37.5	0.0	698.7	0.00	0.0	0	85%	17.5
	34	32.7	0	-740	189	-929	68.5	12%	68.7	68.7	11,450	90.0	30,800	42,250	100%	17.52	6.3	0.0	707.0	0.00	0.0	0	85%	3.0
	32	30.5	1	-811	189	-1,000	66.6	12%	68.5	68.5	11,450	90.0	30,800	42,250	100%	17.52	18.8	0.0	715.3	0.00	0.0	0	85%	9.0
		Total:	**3,914**													Total:	**39,208.8**					**51,161**		**6,759**

Site/Space:	Most of Second and third floors, all of fo	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.52	17.5	787.4	0.0	0.77	50.7		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.52	17.5	782.9	0.0	0.76	49.8		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.52	17.5	778.4	0.0	0.70	45.4		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.52	17.5	814.3	0.0	0.77	52.0		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.52	17.5	800.8	0.0	0.76	50.4		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.52	17.5	791.9	0.0	0.75	49.4		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.52	17.5	778.4	0.0	0.72	46.6		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.52	17.5	773.9	0.0	0.72	46.6		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.52	17.5	773.9	0.0	0.72	46.6		0%	
															Average:	**17.52**					48.6			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Site/Space:	Most of Second and third floors, all of fo	**Model Specific Notes**	Baseline
Unit(s) Modeled:	AC-2		
Model Type:	Dual-Duct, Constant-Air-Volume		

DEER Peak Demand Period Bin Simulation (Climate Zone 3)

	Weather Data			Building HVAC Loads			Air Economizer			Supply Air				Supply Fan Energy				System Loads		Cooling			Heating	
Indx	*OAT Bin*	*Mean Coincident Wet-Bulb*	*Annual Hours*	*Net Zone Load*	*Net Zone Cooling Load*	*Net Zone Heating Load*	*Outside Air Fraction*	*Outside Air Fraction*	*MAT*	*Cold Deck SAT*	*Cold Deck Flow Rate*	*Hot Deck SAT*	*Hot Deck Flow Rate*	*Total Air Flow*	*Fan Flow Capacity Fraction*	*Motor Input Power*	*Annual Fan Energy*	*Cooling Coil Load*	*Heating Coil Load*	System Eff.	Demand	Annual Energy Use	Heating Eff.	Annual Energy Use
Date	°F	°F	Hours	kBtu/hr	kBtu/hr	kBtu/hr		CFM	°F	°F	CFM	°F	CFM	CFM	-	kW	kWh	kBtu/hr	kBtu/hr	kW/ton	kW	kWh/yr		therm/yr
7/17, 2PM	81	68.0	1	916	916	0	53.0	12%	75	53.0	33,330	74.9	8,920	42,250	100%	17.52	17.5	787.4	0.0	0.77	50.7		0%	
7/17, 3PM	80	67.0	1	881	881	0	53.0	12%	75	53.0	33,330	74.7	8,920	42,250	100%	17.52	17.5	782.9	0.0	0.76	49.8		0%	
7/17, 4PM	79	66.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.52	17.5	778.4	0.0	0.70	45.4		0%	
7/18, 2PM	87	68.0	1	1,128	1,128	0	53.0	12%	76	53.0	33,330	75.6	8,920	42,250	100%	17.52	17.5	814.3	0.0	0.77	52.0		0%	
7/18, 3PM	84	67.0	1	1,022	1,022	0	53.0	12%	75	53.0	33,330	75.2	8,920	42,250	100%	17.52	17.5	800.8	0.0	0.76	50.4		85%	
7/18, 4PM	82	66.0	1	952	952	0	53.0	12%	75	53.0	33,330	75.0	8,920	42,250	100%	17.52	17.5	791.9	0.0	0.75	49.4		0%	
7/19, 2PM	79	68.0	1	846	846	0	53.0	12%	75	53.0	33,330	74.6	8,920	42,250	100%	17.52	17.5	778.4	0.0	0.72	46.6		0%	
7/19, 3PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.52	17.5	773.9	0.0	0.72	46.6		0%	
7/19, 4PM	78	68.0	1	811	811	0	53.0	12%	74	53.0	33,330	74.5	8,920	42,250	100%	17.52	17.5	773.9	0.0	0.72	46.6		0%	
															Average:	**17.52**					48.6			

Notes:

OA = Outside Air; LAT = Leaving Air Temperature; RAT = Return Air Temperature; OAT = Outside Air Temperature.
* notes with asterisk number (*#) refer to Figure 1 and are explained on following page .

1. The packaged unit supply air parameters were obtained from…
2. Space conditioning parameters were determined by…
3. Cooling load shape was determined by…
4. Heating load shape was determined by…
5. Packaged unit cooling parameters were obtained from…
6. Reheat system and boiler parameters were obtained from…

Variable Air Volume Reheat Simulation (numbers correspond to diagram below)

1 Input power to fan at the maximum flow condition.
2 Supply air flow rate. CFM is calculated so that the cooling zone load is met with the Supply Air Temp.
3 Supply fan part-load input power is based on DOE 2 curves for various flow control methods. Acceptable inputs are AF DD, AF IV, FC DD, FC IV, VAVP, VFD.
4 Fraction of outside air in supply air flow. 100% indicates that supply air is 100% outside air. This value is found in order to minimize the cooling load.
5 Supply Air Temperature (SAT) is the setpoint for air leaving the packaged unit.
6 Average temperature of the zone or conditioned spaces.
Zone load is a function of the cooling and heating load shapes and heating and cooling system capacities.
7 Average return air temperature (RAT) is the temperature of the air leaving the zone or conditioned spaces.
8 Outside air temperature (OAT).
9 Balance outside air temperature (OAT) is the OAT at which the zone or space needs no conditioning.
10 Mixed air temp. is the temperature of the air after the return air and outside air streams are mixed.
MAT = RAT x (1-%OA) + OA x %OA
11 The energy supplied to the cooling coil = CFM x (MAT-SAT) * 1.08 .
12 The energy supplied to the heating coil = [heat load] - [cool load] - CFM x (SAT - [space temp]) x 1.08 .
13 The temperature of the air leaving the reheat coil. Leaving air temperature (LAT).

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant Cooling Loads Measure Name: Dual Duct VAV Chiller Template - v1.6.4

Notes:

OAT	Base Hrs	Cooling Loads: Plant Duty Cycle	Plant Running Hours	Total Output (tons)	Cooling Mode	AHU-1 CCoil Load (tons)	AHU-2 CCoil Load (tons)
94	1	100%	1	118	Chiller	48	70
92	2	100%	2	113	Chiller	44	69
90	4	100%	4	112	Chiller	44	68
88	8	100%	8	110	Chiller	43	67
86	5	100%	5	109	Chiller	42	67
84	11	100%	11	107	Chiller	41	66
82	14	100%	14	105	Chiller	40	65
80	22	100%	22	104	Chiller	39	64
78	34	100%	34	101	Chiller	38	64
76	26	100%	26	96	Chiller	34	62
74	58	100%	58	87	Chiller	31	56
72	70	100%	70	77	Chiller	27	50
70	138	100%	138	67	Chiller	23	44
68	98	100%	98	58	Chiller	20	38
66	205	100%	205	50	Chiller	17	33
64	303	100%	303	43	WSE	14	29
62	383	100%	383	36	WSE	11	25
60	696	100%	696	30	WSE	9	21
58	462	100%	462	24	WSE	7	17
56	394	100%	394	20	WSE	6	14
54	304	100%	304	16	WSE	4	11
52	253	100%	253	13	WSE	4	10
50	147	100%	0	0	WSE	-	-
48	120	100%	0	0	WSE	-	-
46	93	100%	0	0	WSE	-	-
44	25	100%	0	0	WSE	-	-
42	26	100%	0	0	WSE	-	-
40	4	100%	0	0	WSE	-	-
38	2	100%	0	0	WSE	-	-
36	2	100%	0	0	WSE	-	-
34	0	100%	0	0	WSE	-	-
32	1	100%	0	0	WSE	-	-
TOTAL	3,911		3,490				

Note: Use AHU loads after retrofits that affect the cooling load have been taken into account.

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Plant System Simulation Measure Name: Dual Duct VAV Based on Sheet: (CIM-5) CHP Summary Chiller Template - v1.6.4

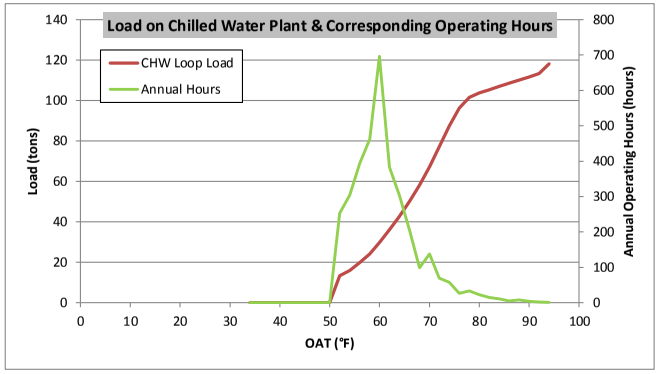
Notes: This sheet estimates the load on each chiller and then summarizes the chilled water system operation, including the chiller performance, chilled water pumps, condenser pumps, and cooling tower fans.

Sheet Inputs: System configuration, Chiller staging, CHW Resets, CW Resets, Chilled water loop information and secondary (or primary) pump information.

Chillers - Inputs		
CH-1 Size	100	tons

CHWST SP Reset	
OAT	CHWT
66	55
80	45

CWST SP Reset	
OA WBT	CWT
45	58
70	29



System Demand (kW) & Energy (kWh)			
Component	kW	kWh	$
Chillers [CH]	70.4	23,521	6,432
Prim. CHW Pumps [CHWP]	4.7	16,453	3,162
Cooling Tower Fans [CTF]	6.8	19,681	3,891
Condensing Water Pumps [CWP]	4.5	15,691	3,015
Total	**86.4**	**75,345**	**16,500**

Chilled Water Loop Design		
System Type	Primary Only	
Cooling Coil Design Entering CHWT	45	°F
Cooling Coil Design MAT	75.9	°F
2-Way Valves	TRUE	
Load at Design	100%	
CHW Loop Design Load	100	tons
CHW Loop Load Design Flow	0	gpm

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hours & Load					Chiller 1					Primary Pumps		CW Pumps & Cooling Tower Fans				System	Utility	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Annual Hours	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Efficiency	Chiller Power	Chiller Usage	Prim. Pump 1 Power	Prim. Pump 1 Usage	Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Average Electricity Rate	Force Number of CHW Pumps
°F	°F	hours	tons		hours	tons	kW/ton	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW/ton	$/kWh	#
94	67.4	1	118	1	1	118	0.64	76.0	109	4.7	7	4.5	6	6.8	10	0.78	0.3453	1
92	66.8	2	113	1	2	113	0.64	72.2	155	4.7	10	4.5	10	6.8	15	0.78	0.3453	1
90	64.7	4	112	1	4	112	0.62	68.7	245	4.7	17	4.5	16	6.8	24	0.76	0.3453	1
88	64.6	8	110	1	8	110	0.61	67.6	531	4.7	37	4.5	35	6.8	54	0.76	0.3453	1
86	64.5	5	109	1	5	109	0.61	66.5	333	4.7	24	4.5	22	6.8	34	0.76	0.3453	1
84	64.3	11	107	1	11	107	0.61	65.4	700	4.7	51	4.5	48	6.8	73	0.76	0.3220	1
82	63.3	14	105	1	14	105	0.60	63.3	905	4.7	67	4.5	64	6.8	97	0.75	0.3241	1
80	63.5	22	104	1	22	104	0.60	62.5	1,385	4.7	104	4.5	100	6.8	151	0.76	0.3070	1
78	63.1	34	102	1	34	102	0.58	58.4	1,960	4.7	158	4.5	151	6.8	229	0.73	0.2703	1
76	62.0	26	96	1	26	96	0.54	52.2	1,380	4.7	125	4.5	119	6.8	180	0.71	0.2736	1
74	61.1	58	87	1	58	87	0.51	44.4	2,571	4.7	273	4.5	260	6.8	394	0.69	0.2536	1
72	60.8	70	77	1	70	77	0.48	37.1	2,586	4.7	328	4.5	313	6.8	474	0.69	0.2549	1
70	59.5	138	67	1	138	67	0.45	30.1	4,136	4.7	648	4.5	618	6.4	876	0.68	0.2714	1
68	58.9	98	58	1	98	58	0.42	24.7	2,422	4.7	463	4.5	442	5.1	505	0.67	0.2555	1
66	58.3	205	50	1	205	50	0.40	20.0	4,103	4.7	968	4.5	923	4.0	819	0.66	0.2569	1
64	57.2	303	43	1	303	43	0.00	0.0	0	4.7	1,428	4.5	1,362	6.8	2,063	0.37	0.2463	1
62	56.4	383	36	1	383	36	0.00	0.0	0	4.7	1,803	4.5	1,720	6.8	2,605	0.44	0.2160	1
60	55.7	696	30	1	696	30	0.00	0.0	0	4.7	3,283	4.5	3,131	6.8	4,743	0.54	0.1747	1
58	54.2	462	24	1	462	24	0.00	0.0	0	4.7	2,179	4.5	2,078	6.8	3,148	0.66	0.1512	1
56	52.5	394	20	1	394	20	0.00	0.0	0	4.7	1,855	4.5	1,769	5.0	1,974	0.72	0.1447	1
54	50.8	304	16	1	304	16	0.00	0.0	0	4.7	1,431	4.5	1,365	2.5	745	0.73	0.1399	1
52	49.0	253	13	1	253	13	0.00	0.0	0	4.7	1,194	4.5	1,138	1.8	468	0.83	0.1456	1
50	47.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1486	0
48	45.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1379	0
46	43.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1275	0
44	42.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1167	0
42	39.5	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1080	0
40	38.1	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1120	0
38	36.6	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
36	34.4	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
34	32.7	0	0	0	0	0	0.00	0.0	0	0.0	0	0.0	0	0.0	0	0.00	0.1014	0
		hours		Max #	hours				kWh		kWh		kWh		kWh	kW/ton		
Total		3,490		1	3,490				23,521		16,453		15,691		19,681	0.62		

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19
Hours & Load					Chiller 1							CW Pumps & Cooling Tower Fans				System	Sec. CHWP
OAT Bin	Mean Coinc. Wetbulb	Date & Time	CHW Loop Load	# of Chillers	Hours	Chiller Load	Chiller Eff.	Chiller Power	Chiller Usage			Cond. Pump Power	Cond. Pump Usage	Fan Power	Fan Usage	System Efficiency	Force Number of CHW Pumps
°F	°F		tons		hours	tons	kW/ton	kW	kWh			kW	kWh	kW	kWh	kW/ton	#
82	68.0	7/17 2 PM	117	1	1	117	0.64	74.2		4.7		4.5		6.8		0.77	1
82	67.0	7/17 3 PM	116	1	1	116	0.63	72.6		4.7		4.5		6.8		0.76	1
76	66.0	7/17 4 PM	115	1	1	115	0.56	64.6		4.7		4.5		6.8		0.70	1
88	68.0	7/18 2 PM	122	1	1	122	0.63	77.1		4.7		4.5		6.8		0.77	1
82	67.0	7/18 3 PM	119	1	1	119	0.62	74.0		4.7		4.5		6.8		0.76	1
82	66.0	7/18 4 PM	118	1	1	118	0.61	72.1		4.7		4.5		6.8		0.75	1
76	68.0	7/19 2 PM	115	1	1	115	0.58	66.8		4.7		4.5		6.8		0.72	1
76	68.0	7/19 3 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
76	68.0	7/19 4 PM	114	1	1	114	0.58	66.1		4.7		4.5		6.8		0.72	1
								70.4		**4.7**		**4.5**		**6.8**			

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Chiller Bin Simulation

Measure Name: Dual Duct VAV

Based on Sheet: (CIM-5) CH1

Chiller Template - v1.6.4

Notes:

Chiller Specifications		
Chiller Make	Trane Screw Chiller	
Chiller Model	RTWA00904XC01D3D1WFNT	
Chiller Type	Water Cooled Screw	
Rated Capacity	99.9	tons
Rated Efficiency	0.780	kW/ton
Design Condensing Temp	85.0	°F
Design CHWST	44.0	°F
Rated Input Power	77.9	kW
DOE-2 EIR-FT	0.999	
In. Power @ ARI Conditions	78.0	kW
DOE-2 CAP-FT	1.000	
Capacity @ ARI Conditions	99.9	
Min PLR before Cycling	25%	
Min PLR	10%	

Primary Pump Specifications		
Pump Make		
Pump Model		
Pump Impeller Size		Inches
Pump Motor Rated Size	8	hp
Pump Motor Efficiency	88.5%	
Design Flow Rate	295	gpm
Design Head Pressure	60	ft H20
Design Hydrolic Power	4.5	hp
Pump Efficiency	80%	
Design Pump Shaft Power	5.6	hp
Pump Motor Input Power	4.7	kW
Operating Conditions		
Fixed Operating Flow	100%	
Pump Speed Controls	Const Speed	
Prim. Pump Cycleswith Chiller	NO	

Chilled Water Loop Design		
System Type	Primary Only	
CHWST SP Reset	OAT	CHWST
	56	60
	80	45

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
Prim. Pump Operates with WSE	YES	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Useful Chiller Load	CHWST Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR after Duty Cycle	EIR-FT	EIR-FPLR	Chiller Input Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F	hours	tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
94	67.4	1	118	45.0	80.2	1.05	105.2	112%	100%	112%	0.91	1.08	76.0	0.64	109	5.6	4.7	7
92	66.8	2	113	45.0	79.3	1.06	105.7	107%	100%	107%	0.89	1.04	72.2	0.64	155	5.6	4.7	10
90	64.7	4	112	45.0	77.6	1.07	106.8	105%	100%	105%	0.87	1.02	68.7	0.62	245	5.6	4.7	17
88	64.6	8	110	45.0	77.4	1.07	107.0	103%	100%	103%	0.87	1.00	67.6	0.61	531	5.6	4.7	37
86	64.5	5	109	45.0	77.2	1.07	107.1	101%	100%	101%	0.86	0.99	66.5	0.61	333	5.6	4.7	24
84	64.3	11	107	45.0	77.0	1.07	107.3	100%	100%	100%	0.86	0.98	65.4	0.61	700	5.6	4.7	51
82	63.3	14	105	45.0	76.1	1.08	107.8	98%	100%	98%	0.85	0.96	63.3	0.60	905	5.6	4.7	67
80	63.5	22	104	45.0	76.1	1.08	107.8	96%	100%	96%	0.85	0.95	62.5	0.60	1,385	5.6	4.7	104
78	63.1	34	102	46.3	75.5	1.11	110.8	92%	100%	92%	0.82	0.91	58.4	0.58	1,960	5.6	4.7	158
76	62.0	26	96	47.5	74.2	1.14	114.2	84%	100%	84%	0.80	0.84	52.2	0.54	1,380	5.6	4.7	125
74	61.1	58	87	48.8	72.6	1.18	118.0	74%	100%	74%	0.77	0.74	44.4	0.51	2,571	5.6	4.7	273
72	60.8	70	77	50.0	71.4	1.22	121.5	63%	100%	63%	0.74	0.64	37.1	0.48	2,586	5.6	4.7	328
70	59.5	138	67	51.3	69.7	1.26	125.5	54%	100%	54%	0.72	0.54	30.1	0.45	4,136	5.6	4.7	648
68	58.9	98	58	52.5	69.2	1.29	128.7	45%	100%	45%	0.70	0.45	24.7	0.42	2,422	5.6	4.7	463
66	58.3	205	50	53.8	68.8	1.32	132.0	38%	100%	38%	0.69	0.37	20.0	0.40	4,103	5.6	4.7	968
64	57.2	303	43	55.0	64.1	1.38	137.9	31%	100%	31%	0.66	0.28	0.0	0.00	0	5.6	4.7	1,428
62	56.4	383	36	56.3	62.6	1.42	142.0	25%	100%	25%	0.64	0.21	0.0	0.00	0	5.6	4.7	1,803
60	55.7	696	30	57.5	61.2	1.46	146.1	20%	82%	25%	0.64	0.19	0.0	0.00	0	5.6	4.7	3,283
58	54.2	462	24	58.8	59.2	1.51	150.6	16%	64%	25%	0.63	0.19	0.0	0.00	0	5.6	4.7	2,179
56	52.5	394	20	60.0	57.9	1.55	154.7	13%	51%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,855
54	50.8	304	16	60.0	57.9	1.55	154.7	10%	41%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,431
52	49.0	253	13	60.0	57.9	1.55	154.7	10%	40%	25%	0.63	0.18	0.0	0.00	0	5.6	4.7	1,194
50	47.4	0	0	60.0	50.7	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
48	45.6	0	0	60.0	48.9	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
46	43.6	0	0	60.0	48.6	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
44	42.1	0	0	60.0	48.3	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
42	39.5	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
40	38.1	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
38	36.6	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
36	34.4	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
34	32.7	0	0	60.0	0.0	0.00	0.0	0%	0%	0%	0.00	0.00	0.0	0.00	0	0.0	0.0	0
		hours													kWh			kWh
Total		**3,490**													**23,521**			**16,453**

DEER Peak Demand

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Chiller Load	CHWT Setpoint	Condensing Temp	CAP-FT	Chiller Capacity	Adjusted PLR	Duty Cycle	Adjusted PLR with Duty Cycle	EIR-FT	EIR-FPLR	Chiller Power	Chiller Efficiency	Chiller Usage	Primary Pumping Power	Total Motor Power	Total Motor Usage
°F	°F		tons	°F	°F		tons	%	%	%			kW	kW/ton	kWh	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	45.0	79.5	1.06	105.6	111%	100%	111%	0.90	1.06	74.2	0.64		5.6	4.7	
82	67.0	7/17/00 3:00 PM	116	45.0	78.7	1.06	106.1	109%	100%	109%	0.88	1.05	72.6	0.63		5.6	4.7	
76	66.0	7/17/00 4:00 PM	115	47.5	77.1	1.12	112.3	103%	100%	103%	0.83	0.99	64.6	0.56		5.6	4.7	
88	68.0	7/18/00 2:00 PM	122	45.0	79.9	1.05	105.4	115%	100%	115%	0.90	1.10	77.1	0.63		5.6	4.7	
82	67.0	7/18/00 3:00 PM	119	45.0	78.7	1.06	106.1	112%	100%	112%	0.88	1.07	74.0	0.62		5.6	4.7	
82	66.0	7/18/00 4:00 PM	118	45.0	78.0	1.07	106.6	110%	100%	110%	0.87	1.06	72.1	0.61		5.6	4.7	
76	68.0	7/19/00 2:00 PM	115	47.5	78.6	1.11	111.4	103%	100%	103%	0.85	1.00	66.8	0.58		5.6	4.7	
76	68.0	7/19/00 3:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
76	68.0	7/19/00 4:00 PM	114	47.5	78.6	1.11	111.4	102%	100%	102%	0.85	0.99	66.1	0.58		5.6	4.7	
													70.4				**4.7**	

Chiller Performance Curves

Type Water Cooled Screw
Heat Rejection Water
Curve Source DOE-2.2
Curve Type Bi-quadratic

	a	b	c	d	e	f
CAP-FT	0.89823067	0.00045350	0.00023690	-0.00104750	-0.00002930	-0.00002035
EIR-FPLR	-0.11699212	1.26354504	-0.21946673	0.00294536	0.00001688	-0.00185917
EIR-FT	0.62493622	-0.00099309	0.00017366	-0.00086447	0.00019627	-0.00033770

Primary Pump Performance Curve, %bhp = f(%Flow)

Pump Type Const Speed
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01		

Energy Partnership Program - East Bay Regional Parks District

2950 Peralta Oaks Court

Cooling Tower Bin Simulation Measure Name: Dual Duct VAV Based on Sheet: (CIM-5) CT

Notes:

Total Number of Cells	1
Cooling Tower Design Specs - One Cell	
Make	Baltimore Air Coil
Model	VXT-95C
Design EWT (i.e. CWRT)	90.0 °F
Design LWT (i.e. CWST)	80.0 °F
Design WBT	67.0 °F
Cell Design CW Flow	313 gpm
Design Approach	13.0 °F
Design Range	10.0 °F
Capacity (tons)	131 tons
Flow Capacity @ CTI	245 gpm
Tower Performance Curve	Open Tower (DOE 2.2)

CW Loop Design Specs - One Chiller		
Chiller Design CW Flow	293	gpm
Chiller Min CW Flow	146	gpm
Chiller Max CW Flow	293	gpm
CWST Setpoint Reset	OA WB	CWST SetP
	45	58
	70	79

Cooling Tower Fan Specs - One Cell		
Motor Make		
Motor Model		
Motor Rated Size	10	hp
Motor Efficiency	95.0%	
Load Factor	85%	
Motor Input Power	6.7	kW
Minimum Fan Speed	30%	
Affinity Law Exponent	2.4	
VFD efficiency	98%	
CT Fan Speed Control	Two-speed	

Water-Side Economizer Specs		
HX Available	YES	
OAT for WSE Staging	65	°F
HX Approach	2.0	°F

Condensing Water Pump Specs			
Pump Make			
Pump Model			
Pump Impeller Size		Inches	
Number of Pumps	1		
Motor Rated Size	7.5	hp	
Motor Efficiency	91.7%		
Design Flow per Pump	318	gpm	
Design Head Pressure	55	ft H2O	
Hydraulic Power	4.4	hp	
Pump Efficiency	80.0%		
Pump Shaft Power	5.5	hp	
Motor Input Power	4.5	kW	
Operating Conditions			
Pump Speed Controls	Const Speed		
Target CW Range	10	°F	
Flow per Pump Min	100%	Max	100%
Flow per Pump Min	318 gpm	Max	318 gpm
Pump Staging: # of Pumps	All		

CT 2-Speed Fans	
High Speed	100%
Low Speed	68%

CT 2-Speed Fan Power vs Speed	
Speed	kW
100%	6.8
68%	2.7
0%	0.0

Note for Template Users: (Delete)
This template assumes all enabled cells (column 11) operate at the same conditions (range, approach, wet bulb), i.e. need the same airflow and therefore the same fan speed. For more complex controls in the baseline, if the model error can't be considered negligible, use data.

Weather & Hours			Tower Performance															Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Annual Oper. Hours	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump Motor Input Power	Pump Motor Usage
°F	°F	hours	tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
94	67.4	1	118	1	0.64	140	293	1	318	1	102%	10.5	76.8	81.1	91.6	80.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	10	100%	5.5	4.5	6
92	66.8	2	113	1	0.64	134	293	1	318	1	102%	10.1	76.3	80.2	90.3	79.3	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	15	100%	5.5	4.5	10
90	64.7	4	112	1	0.62	131	293	1	318	1	102%	9.9	74.5	78.5	88.4	77.6	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	24	100%	5.5	4.5	16
88	64.6	8	110	1	0.61	129	293	1	318	1	102%	9.8	74.4	78.3	88.0	77.4	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	54	100%	5.5	4.5	35
86	64.5	5	109	1	0.61	127	293	1	318	1	102%	9.6	74.4	78.0	87.7	77.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	34	100%	5.5	4.5	22
84	64.3	11	107	1	0.61	126	293	1	318	1	102%	9.5	74.2	77.8	87.2	77.0	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	73	100%	5.5	4.5	48
82	63.3	14	105	1	0.60	123	293	1	318	1	102%	9.3	73.4	76.9	86.2	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	97	100%	5.5	4.5	64
80	63.5	22	104	1	0.60	122	292	1	318	1	102%	9.2	73.5	76.9	86.0	76.1	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	151	100%	5.5	4.5	100
78	63.1	34	102	1	0.58	118	283	1	318	1	102%	8.9	73.2	76.3	85.2	75.5	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	229	100%	5.5	4.5	151
76	62.0	26	96	1	0.54	111	267	1	318	1	102%	8.4	72.3	74.9	83.3	74.2	100%	318	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	180	100%	5.5	4.5	119
74	61.1	58	87	1	0.51	100	240	1	318	1	102%	7.5	71.5	73.2	80.7	72.6	100%	317	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	394	100%	5.5	4.5	260
72	60.8	70	77	1	0.48	88	210	1	318	1	102%	6.6	71.3	71.9	78.5	71.4	100%	319	100%	0%	0%	0%	100%	0%	6.8	0.0	0.0	6.8	474	100%	5.5	4.5	313
70	59.5	138	67	1	0.45	76	182	1	318	1	102%	5.7	70.2	70.2	75.9	69.7	97%	321	100%	0%	0%	89%	0%	0%	6.4	0.0	0.0	6.4	876	100%	5.5	4.5	618
68	58.9	98	58	1	0.42	65	156	1	318	1	102%	4.9	69.7	69.7	74.6	69.2	87%	323	100%	0%	0%	59%	0%	0%	5.1	0.0	0.0	5.1	505	100%	5.5	4.5	442
66	58.3	205	50	1	0.40	56	146	1	318	1	102%	4.2	69.2	69.2	73.4	68.8	78%	322	100%	0%	0%	31%	0%	0%	4.0	0.0	0.0	4.0	819	100%	5.5	4.5	923
64	57.2	303	43	1	0.00	43	146	1	318	1	102%	3.2	53.0	64.3	67.6	64.1	100%	322	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,063	100%	5.5	4.5	1,362
62	56.4	383	36	1	0.00	36	146	1	318	1	102%	2.7	54.3	62.8	65.5	62.6	100%	322	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	2,605	100%	5.5	4.5	1,720
60	55.7	696	30	1	0.00	30	146	1	318	1	102%	2.2	55.5	61.4	63.6	61.2	100%	322	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	4,743	100%	5.5	4.5	3,131
58	54.2	462	24	1	0.00	24	146	1	318	1	102%	1.8	56.8	59.3	61.1	59.2	100%	321	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8	3,148	100%	5.5	4.5	2,078
56	52.5	394	20	1	0.00	20	146	1	318	1	102%	1.5	58.0	58.0	59.5	57.9	86%	319	100%	0%	0%	56%	0%	0%	5.0	0.0	0.0	5.0	1,974	100%	5.5	4.5	1,769
54	50.8	304	16	1	0.00	16	146	1	318	1	102%	1.2	58.0	58.0	59.2	57.9	62%	318	68%	0%	0%	91%	0%	0%	2.5	0.0	0.0	2.5	745	100%	5.5	4.5	1,365
52	49.0	253	13	1	0.00	13	146	1	318	1	102%	1.0	58.0	58.0	59.0	57.9	47%	318	68%	0%	0%	69%	0%	0%	1.8	0.0	0.0	1.8	468	100%	5.5	4.5	1,138
50	47.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	50.7	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
48	45.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.9	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
46	43.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.6	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
44	42.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	48.3	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
42	39.5	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
40	38.1	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
38	36.6	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
36	34.4	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
34	32.7	0	0	0	0.00	0	-	0	-	0	0%	0.0	58.0	0.0	0.0	0.0	0%	0	0%	0%	0%	0%	0%	0%	0.0	0.0	0.0	0.0	0	0%	0.0	0.0	0
		hours																											kWh				kWh
Total		**3,490**																											**19,681**				**15,691**

DEER Peak Demand

Weather & Hours			Tower Performance														Cooling Tower Fan Perfor										Condenser Water Pump			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
OAT Bin	Mean Coinc. Wetbulb	Date & Time	Total Chiller Load	Number of Operating Chillers	Avg. Chiller Efficiency	Total Cooling Tower Load	Needed CW Flow at Chillers	Operating CW Pumps	CW Flow per Pump	Number of Active Cells	CW Flow As % of Available Capacity	Expected System Range	CWS Temp. Set Point	Achieved CWS Temp.	CWR Temp.	Effective Chiller-Perceived CWST	Cell Fan Airflow	CW Flow Capacity per Cell	CT Fan 1 Speed	CT Fan 2 Speed	CT Fan 3 Speed	CT Fan 1 Duty Cycle	CT Fan 2 Duty Cycle	CT Fan 3 Duty Cycle	CT Fan 1 Mean Power	CT Fan 2 Mean Power	CT Fan 3 Mean Power	Total CT Fan Power	Total CT Fan Usage	CW Flow per Pump	Total Pump Brake Horse Power	Pump & Motor Input Power	Pump & Motor Usage
°F	°F		tons	#	kW/ton	tons	gpm	#	gpm	#	%	°F	°F	°F	°F	°F	% of Design	gpm	%	%	%	%	%	%	kW	kW	kW	kW	kWh	%	bhp	kW	kWh
82	68.0	7/17/00 2:00 PM	117	1	0.64	123	293	1	318	1	102%	9.3	77.3	80.3	89.6	79.5	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/17/00 3:00 PM	116	1	0.63	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	66.0	7/17/00 4:00 PM	115	1	0.56	111	267	1	318	1	102%	8.4	75.6	77.9	86.3	77.1	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
88	68.0	7/18/00 2:00 PM	122	1	0.63	129	293	1	318	1	102%	9.8	77.3	80.7	90.5	79.9	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	67.0	7/18/00 3:00 PM	119	1	0.62	123	293	1	318	1	102%	9.3	76.5	79.6	88.9	78.7	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
82	66.0	7/18/00 4:00 PM	118	1	0.61	123	293	1	318	1	102%	9.3	75.6	78.8	88.1	78.0	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 2:00 PM	115	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 3:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
76	68.0	7/19/00 4:00 PM	114	1	0.58	111	267	1	318	1	102%	8.4	77.3	79.3	87.7	78.6	100%	318	100%	0%	0%	100%	0%	0%	6.8	0.0	0.0	6.8		100%	5.5	4.5	
																												6.8				**4.5**	

Water Usage

Note: The psychrometric functions used in that section are protected. These functions are based on ASHRAE correlations.
More details are available at http://kw-engineering.com/resources/psychrometrics.php

Cooling Tower Water Usage Parameters		
Total CT Rated Airflow	15,000	cfm
Air Pressure	#NAME?	psia
Drift Losses Rate	0.2%	of CW flow
Makeup Water Dissolved Solids Ratio	70	ppm
Target CW Dissolved Solids Ratio	230	ppm
Blow Down Cycles	3.3	
Water Specific Weight	8.33	lb/gallon
1 Gallon (US) =	0.13368	ft³

CT Total Water Usage	
#NAME?	gallons per year
#NAME?	ft³ per year
#NAME?	100 ft³ per year

Performance Curves

Cooling Tower Performance Curve, Cap = Cap @ CTI conditions * f1(App, WBT) / f2(Range, WBT) * f3(%Design Airflow)
Max cooling tower flow capacity is calculated using DOE 2.2 Cooling Tower Curves

f1 (Approach, Wet Bulb)						f2 (Range, Wet Bulb)						f3 (% Design Airflow)		
a	b	c	d	e	f	a	b	c	d	e	f	a	b	c
5.01E-01	5.88E-03	2.16E-04	-1.91E-02	2.24E-04	1.06E-03	8.35E-02	1.12E-01	-1.36E-03	3.42E-05	3.13E-05	-3.40E-04	4.98E-02	1.05E+00	-9.65E-02

Condensing Water Pump Performance Curve, %bhp = f(%Flow)
Curve Type Quadratic **Expression** ax^3+bx^2+cx+d

	a	b	c	d	e	f
%bhp	0.00E+00	-2.10E-01	8.40E-01	3.70E-01	0.00E+00	0.00E+00

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Hot Water System **Base Case Simulation** **Measure Name:** Dual Duct VAV **Based on Sheet:** (CIM-5) Heating Hot water

Notes: This boiler simulation models the boiler operation prior to any other EEMs

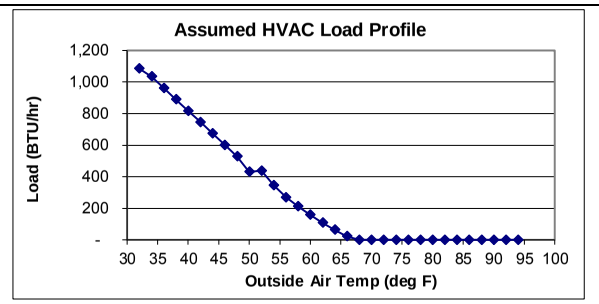
Scenario	Base

Heating Load Inputs		
Conditioned Area	75,000	
Design Heating Load	2,000	*kBtu/hr*
Minimum Load [% of Max]	0%	*[%]*
Inflection Point Load [% of Max]	50%	*[%]*
Peak Load [% of Max]	100%	*[%]*
Peak Load/Area	26.67	*BTU/hr/sf*
Heating Design Temperature	37	*°F*
Inflection Point Temperature	46	*°F*
Assumed Balance Point	55	*°F*
Pipe Losses	5.0%	*Most pipes inside*
Avg. Space Temp.	70	*°F*
Pre-occupancy warm-up time	1	*h*
Days per week with warm-up	5	*d*

Boiler Staging Inputs

Share loading when possible? TRUE

Boiler #	Boiler Output Capacity	% Load to Stage On	Load to Stage On	QTY Boilers Running	System Capacity When On
1	1806	0%	1	1	1806
2			n/a	0	1806
3			n/a	0	1806
4			n/a	0	1806



HHW Reset and OAT Lockout	
OAT	HWS
45	160
65	100
Heating OAT Lockout	72 *°F*

Optimization² (for proposed cases)		
Total Electrical Energy		*kWh/yr*
Total Gas Usage		*therms/yr*
Total Electrical Cost		
Total Gas Cost		
Total Predicted Cost	$ -	
Calibration for Basecase¹		
Annual Gas Bill Usage		*therms/yr*
Predicted Usage	-	*therms/yr*

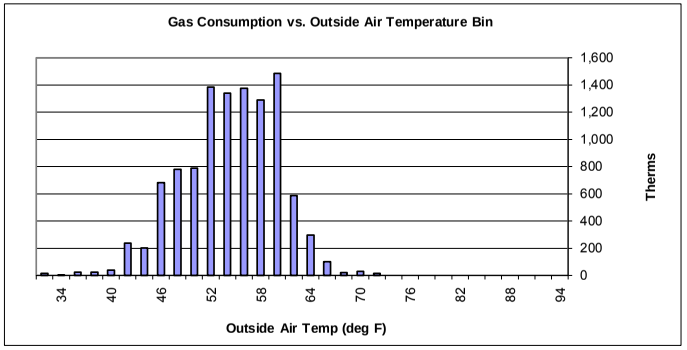
Hot Water Delivery Design				Min Flow	Flow at Design
Coil Design EWT	200 °F				
Coil Design EAT	63 °F	Required/Primary System		30%	100%
2-way valves	TRUE	Secondary System		30%	100%
Primary Pumps	**1**	**Total Design Flow**		**145**	***gpm***
Pump Name	PHWP-1				
Pump Motor HP	2.0				*hp*
Design Flow	145				*gpm*
Design Head Pressure	27				*ft H20*
Hydraulic hp	1.0	0.0	0.0	0.0	*hp*
Pump eff	45%				
Brake Pump Power	2.2	0.0	0.0	0.0	*hp*
Pump Motor Eff	84%				
Pump Motor kW	2.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)	0%				*Design Flow*
Pump Curve	Const Flow				
Secondary Pumps	**0**	**Total Design Flow**		**0**	***gpm***
Pump Name					
Pump Motor HP					*hp*
Design Flow					*gpm*
Design Head Pressure					*ft H20*
Hydraulic hp	0.0	0.0	0.0	0.0	*hp*
Pump eff					
Brake Pump Power	0.0	0.0	0.0	0.0	*hp*
Pump Motor Eff					
Pump Motor kW	0.0	0.0	0.0	0.0	*kW*
Pump Enabled (% Flow)					*Design Flow*
Pump Curve	Typical VFD				

Hot Water System Loads and Operation										Hot Water System Pump Energy												Deg-hrs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
OAT	Occupied Hrs	Hot Water System Enabled	HVAC Load	Pipe Losses	DHW Load	Total System Load	# of Blrs Running	Primary Loop HWS	Primary Loop HWR	Flow Adjustment Factor	Required System Flow (% Total)	Primary Flow (% Total)	Primary Flow (% Ea. Pmp)	Secondary Flow (% Total)	Secondary Flow (% Ea. Pmp)	Primary Pump BHP	Secondary Pump BHP	Primary Pump kW	Secondary Pump kW	Primary Pump kWh	Secondary Pump kWh	RAT vs Avg Water Temp
F	Hrs	Hrs	kBtu/h	kBtu/h	kBtu/hr	kBtu/hr		F	F							hp	hp	kW	kW	kWh	kWh	deg-hrs
94	1	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
92	2	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
90	4	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
88	8	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
86	5	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
84	11	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
82	14	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
80	22	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
78	34	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
76	26	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
74	58	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-	-	-	-	-	-	-
72	70	70	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	136	-	2,068
70	138	138	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	269	-	4,084
68	98	98	-	-	-	-	-	100	100	370%	0%	100%	0%	0%	0%	2.2	-	2.0	-	192	-	2,917
66	205	205	22	-	-	22	1	100	100	370%	30%	100%	100%	0%	0%	2.2	-	2.0	-	401	-	6,068
64	303	303	63	-	-	63	1	103	102	343%	30%	100%	100%	0%	0%	2.2	-	2.0	-	592	-	9,772
62	383	383	108	-	-	108	1	109	108	298%	30%	100%	100%	0%	0%	2.2	-	2.0	-	747	-	14,518
60	696	696	158	-	-	158	1	115	113	263%	30%	100%	100%	0%	0%	2.2	-	2.0	-	1,360	-	30,374
58	462	462	211	-	-	211	1	121	118	236%	30%	100%	100%	0%	0%	2.2	-	2.0	-	903	-	22,757
56	394	394	270	-	-	270	1	127	123	214%	30%	100%	100%	0%	0%	2.2	-	2.0	-	769	-	21,584
54	304	304	345	-	-	345	1	133	128	196%	34%	100%	100%	0%	0%	2.2	-	2.0	-	593	-	18,311
52	253	253	438	-	-	438	1	139	133	180%	39%	100%	100%	0%	0%	2.2	-	2.0	-	495	-	16,631
50	147	147	431	-	-	431	1	145	139	167%	36%	100%	100%	0%	0%	2.2	-	2.0	-	287	-	10,529
48	120	120	528	-	-	528	1	151	144	156%	41%	100%	100%	0%	0%	2.2	-	2.0	-	234	-	9,247
46	93	93	601	-	-	601	1	157	149	146%	44%	100%	100%	0%	0%	2.2	-	2.0	-	182	-	7,696
44	25	25	673	-	-	673	1	160	151	141%	48%	100%	100%	0%	0%	2.2	-	2.0	-	48	-	2,096
42	26	26	745	-	-	745	1	160	150	141%	53%	100%	100%	0%	0%	2.2	-	2.0	-	52	-	2,235
40	4	4	817	-	-	817	1	160	149	141%	58%	100%	100%	0%	0%	2.2	-	2.0	-	8	-	330
38	2	2	890	-	-	890	1	160	148	141%	63%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	179
36	2	2	962	-	-	962	1	160	147	141%	68%	100%	100%	0%	0%	2.2	-	2.0	-	4	-	178
34	0	0	1,034	-	-	1,034	1	160	146	141%	73%	100%	100%	0%	0%	2.2	-	2.0	-	1	-	29
32	1	1	1,085	-	-	1,085	1	160	145	141%	77%	100%	100%	0%	0%	2.2	-	2.0	-	2	-	88
Morning Warmup[5]		**260**	1,085	100	-	1,185	1	160	144	141%	84%	100%	100%	0%	0%	2.2	-	2.0	-	508	-	21198
	hrs/yr	hrs/yr																kW	kW	kWh	kWh	deg-hrs
TOTAL	**3,911**	**3,726**																**2.0**	**-**	**7,277**	**0**	**181,691**
																				$ -	**$ -**	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Boiler 1 **Base Case Simulation** **Measure Name:** Dual Duct VAV **Based on Sheet:** (CIM-5) Bo

Notes: This boiler simulation models the boiler operation prior to any other EEMs

Inputs for	Boiler 1	
Manufacturer	AJAX	
Model	WEG2500	
Type	Forced Draft Boiler	
Boiler Number for Staging	1	
Rated Output Capacity (kBTU/hr)	1,806	*Nameplate*
Min Turndown	20%	*Nameplate*
Max Return Temp	151	°F
Share loading when possible?[2]	TRUE	
Operating Eff (100% Load)	85%	*Mech Schedule*
Boiler Jacket Losses[1]	1.0%	*Copper finned tube w/ power burner*



Hot Water System Loads and Operation | Boiler Operation - Occupied Hours

1	2	3	4	5	6	7	8	9	10	11	12	13	14
OAT	Hot Water System Enabled	# of Blrs Running	Total System Load	Load on this Boiler	Load with Jacket Losses	Primary Loop HWR	PLR	HIR [DOE-2]	PLR/HIR [DOE-2]	Part Load Efficiency	Boiler Output	Duty Cycle	Boiler Energy
F	hrs		kBtu/hr	kBtu/hr	kBtu/hr	°F	%				kBtu/hr	%	therms
94	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
92	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
90	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
88	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
86	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
84	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
82	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
80	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
78	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
76	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
74	-	-	-	-	-	-	0%	0.00	0.00	0%	-	0%	0
72	70	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	15
70	138	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	30
68	98	-	-	-	18	100	20%	0.21	0.97	82%	361	5%	22
66	205	1	22	22	40	100	20%	0.21	0.97	82%	361	11%	100
64	303	1	63	63	81	102	20%	0.21	0.97	82%	361	22%	298
62	383	1	108	108	126	108	20%	0.21	0.97	82%	361	35%	586
60	696	1	158	158	176	113	20%	0.21	0.97	82%	361	49%	1,486
58	462	1	211	211	229	118	20%	0.21	0.97	82%	361	64%	1,288
56	394	1	270	270	288	123	20%	0.21	0.97	82%	361	80%	1,376
54	304	1	345	345	363	128	20%	0.21	0.97	82%	363	100%	1,339
52	253	1	438	438	456	133	25%	0.26	0.98	83%	456	100%	1,383
50	147	1	431	431	449	139	25%	0.25	0.98	83%	449	100%	789
48	120	1	528	528	546	144	30%	0.31	0.99	84%	546	100%	779
46	93	1	601	601	619	149	34%	0.34	0.99	85%	619	100%	682
44	25	1	673	673	691	151	38%	0.38	1.00	85%	691	100%	201
42	26	1	745	745	763	150	42%	0.42	1.00	85%	763	100%	237
40	4	1	817	817	836	149	46%	0.46	1.00	85%	836	100%	39
38	2	1	890	890	908	148	50%	0.50	1.00	85%	908	100%	23
36	2	1	962	962	980	147	54%	0.54	1.00	85%	980	100%	25
34	0	1	1,034	1,034	1,052	146	58%	0.58	1.00	85%	1,052	100%	4
32	1	1	1,085	1,085	1,103	145	61%	0.61	1.01	85%	1,103	100%	14
Warmup	260	1	1,085	1,085	1,103	144	61%	0.61	1.01	85%	1,103	100%	3,356
	hrs/yr												therms
TOTAL	**3,726**												**14,070**

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court

Summary of Lighting Measures

		Peak kW	kWh/yr
CIM-7a	Lighting Controls Upgrade	0	51,501
CIM-7b	Lighting Efficiency Upgrade	17.0	55,758
CIM-8	Exterior Lighting Upgrade	0	9,004
CIM-9	Parking Lighting Upgrade	0	10,854

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Lighting Inventory Table

GENERAL						PRE INSTALLATION												MEASURE CODES			POST INSTALLATION										SAVINGS			
Line #	Bldg	Floor	Space Desciption	Drawing Fixt	Group Code	Pre Fixt Number	Pre Fixt. Code	Fixture Type	Pre kW/Fixt.	NOP	Pre kW/ Space	Pre Operating hours	Pre kWh	Exist Ctrl	Exist. Number of Ctrls.	Photo-cell?	Number of Photo-cells?	Fixture EEM	Occ. Sensor EEM	Photo Sensor EEM	Post Fixt Number	Post Fixt Code	Post kW/ Fixt	Post kW/ Space	Post Op. Hours	Post kWh	Prop. Ctrl	Prop. Number of Ctrls.	Photo-cell?	Daylighting Hour Reduction	kW Saved	Efficiency kWh Saved	Control kW	Control kWh Saved
1	EBRPD HQ	1	Board room	A	Board Room	20	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		1.7	750	1,245	MS	1	N		#N/A			20	F43ILL (3)	0.083	1.7	750	1245	MS		N		0.0	0	0.0	0
2	EBRPD HQ	1	Break Room	Z	Break Room	22	F24ILL	2x2 Troffer with Dropped White Lens	0.061		1.3	2990	4,013	MS	1	N		#N/A			22	F24ILL	0.061	1.3	2243	3009	MS		N		0.0	0	0.4	1003
3	EBRPD HQ	1	IS Staff Area	A	Open Office	4	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.3	4680	1,554	MS	1	N		#N/A			4	F43ILL (3)	0.083	0.3	4056	1347	MS		N		0.0	0	0.1	207
4	EBRPD HQ	1	Payroll	A	Open Office	4	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.3	4680	1,554	MS	1	N		#N/A			4	F43ILL (3)	0.083	0.3	4056	1347	MS		N		0.0	0	0.1	207
5	EBRPD HQ	1	CFO Office	A	Private Office	4	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.3	4680	1,554	MS	1	N		#N/A			4	F43ILL (3)	0.083	0.3	2093	695	MS		N		0.0	0	0.4	859
6	EBRPD HQ	1	Finance Dept	A	Open Office	24	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		2.0	4680	9,323	MS	1	N		#N/A			24	F43ILL (3)	0.083	2.0	4056	8080	MS		N		0.0	0	0.3	1243
7	EBRPD HQ	1	Finance Dept	B	Open Office	2	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.4	4680	2,022	MS	2	N		#N/A			2	F48ILL/2	0.216	0.4	4056	1752	MS		N		0.0	0	0.1	270
8	EBRPD HQ	1	Finance Dept	B1	Open Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	3	N		#N/A			1	F44ILL (3)	0.108	0.1	4056	438	MS		N		0.0	0	0.0	67
9	EBRPD HQ	1	Finance Dept	Z	Open Office	4	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.2	4680	1,142	MS	4	N		#N/A			4	F24ILL	0.061	0.2	4056	990	MS		N		0.0	0	0.0	152
10	EBRPD HQ	1	Hallway	Z	Hallway	3	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.2	4680	856	MS	5	N		#N/A			3	F24ILL	0.061	0.2	3510	642	MS		N		0.0	0	0.1	214
11	EBRPD HQ	1	Server Room	B1	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	6	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
12	EBRPD HQ	1	Server Room	B	Private Office	1	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.2	4680	1,011	MS	7	N		#N/A			1	F48ILL/2	0.216	0.2	2093	452	MS		N		0.0	0	0.3	559
13	EBRPD HQ	1	Server Room Closet	Z	Storage	1	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.1	500	31	MS	8	N		#N/A			1	F24ILL	0.061	0.1	500	31	MS		N		0.0	0	0.0	0
14	EBRPD HQ	1	Copier Room	B	Private Office	2	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.4	4680	2,022	MS	9	N		#N/A			2	F48ILL/2	0.216	0.4	2093	904	MS		N		0.0	0	0.5	1118
15	EBRPD HQ	1	Copier Room Office	A	Private Office	1	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.1	4680	388	MS	10	N		#N/A			1	F43ILL (3)	0.083	0.1	2093	174	MS		N		0.0	0	0.1	215
16	EBRPD HQ	1	Copier Room Storage	Z	Storage	3	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.2	500	92	MS	11	N		#N/A			3	F24ILL	0.061	0.2	500	92	MS		N		0.0	0	0.0	0
17	EBRPD HQ	1	IS Help Desk	B	Open Office	3	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.6	4680	3,033	MS	12	N		#N/A			3	F48ILL/2	0.216	0.6	4056	2628	MS		N		0.0	0	0.1	404
18	EBRPD HQ	1	Mail Room	B	Open Office	1	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.2	4680	1,011	MS	13	N		#N/A			1	F48ILL/2	0.216	0.2	4056	876	MS		N		0.0	0	0.0	135
19	EBRPD HQ	1	Mail Room Office	B1	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	14	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
20	EBRPD HQ	1	Main Hallway	Z	Hallway	14	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.9	4680	3,997	MS	15	N		#N/A			14	F24ILL	0.061	0.9	3510	2998	MS		N		0.0	0	0.3	999
21	EBRPD HQ	1	Board Room Kitchen	A	Board Room	4	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.3	750	249	MS	16	N		#N/A			4	F43ILL (3)	0.083	0.3	750	249	MS		N		0.0	0	0.0	0
22	EBRPD HQ	1	Board Conf Room	A	Conf. Room	7	F43ILL (3)	2x4 Recessed Troffer w/Dropped White Lens	0.083		0.6	4680	2,719	MS	17	N		#N/A			7	F43ILL (3)	0.083	0.6	1944	1129	MS		N		0.0	0	0.8	1590
23	EBRPD HQ	1	Elevator Lobby	K	Hallway	1	F42ILL (3)	16"x4' Wide Surface Wrap	0.054		0.1	4680	253	MS	18	N		#N/A			1	F42ILL (3)	0.054	0.1	3510	190	MS		N		0.0	0	0.0	63
24	EBRPD HQ	1	Men's RR Vestibule	L	Hallway	1	I60/2	10.5" Diameter Surface Puff	0.046		0.0	4680	215	MS	19	N		#N/A			1	I60/2	0.046	0.0	3510	161	MS		N		0.0	0	0.0	54
25	EBRPD HQ	1	Men's Restroom	M	Restroom	2	I60/2	12.5" Diameter Surface Puff	0.046		0.1	4680	431	MS	20	N		#N/A			2	I60/2	0.046	0.1	1645	151	MS		N		0.0	0	0.2	279
26	EBRPD HQ	1	Men's Restroom	G	Restroom	1	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	253	MS	21	N		#N/A			1	F42ILL (3)	0.054	0.1	1645	89	MS		N		0.0	0	0.1	164
27	EBRPD HQ	1	Women's Restroom	M	Restroom	4	I60/2	12.5" Diameter Surface Puff	0.046		0.2	4680	861	MS	22	N		#N/A			4	I60/2	0.046	0.2	1645	303	MS		N		0.0	0	0.3	559
28	EBRPD HQ	1	Women's Restroom	G	Restroom	2	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	505	MS	23	N		#N/A			2	F42ILL (3)	0.054	0.1	1645	178	MS		N		0.0	0	0.2	328
29	EBRPD HQ	1	Janitor/Trash Room	R	Storage	2	I60/1	Pendant Fixture	0.023		0.0	500	23	MS	24	N		#N/A			2	I60/1	0.023	0.0	500	23	MS		N		0.0	0	0.0	0
30	EBRPD HQ	1	Storage Well	C	Storage	8	F42ILL (3)	Two-Lamp Strip Fixture	0.054		0.4	500	216	MS	25	N		#N/A			8	F42ILL (3)	0.054	0.4	500	216	MS		N		0.0	0	0.0	0
31	EBRPD HQ	1	IT Equip Storage	C	Private Office	6	F42ILL (3)	Two-Lamp Strip Fixture	0.054		0.3	4680	1,516	MS	26	N		#N/A			6	F42ILL (3)	0.054	0.3	2093	678	MS		N		0.0	0	0.4	838
32	EBRPD HQ	2	Entrance Driveway	S	Exterior 24/7	5	F46ILL/2	Exterior Driveway Domes	0.162		0.8	8760	7,096	MS	27	N		#N/A			5	F46ILL/2	0.162	0.8	8760	7096	MS		N		0.0	0	0.0	0
33	EBRPD HQ	2	Entrance Driveway	U	Not-In-Use	41	I60/1	Low-Use	0.023		0.9	0	-	MS	28	N		#N/A			41	I60/1	0.023	0.9	0	0	MS		N		0.0	0	0.9	0
34	EBRPD HQ	1	Exit Signs	X-W	Emergency 24/7	4	ECF8/2	Ceiling-Mounted Exit Sign	0.024		0.1	8760	841	MS	29	N		#N/A			4	ECF8/2	0.024	0.1	8760	841	MS		N		0.0	0	0.0	0
35	EBRPD HQ	2	Office M3	E2	Private Office	1	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		0.2	4680	1,137	MS	30	N		#N/A			1	F49ILL/3	0.243	0.2	2093	509	MS		N		0.0	0	0.3	629
36	EBRPD HQ	2	Office M4	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	31	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
37	EBRPD HQ	2	Office M5	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	32	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
38	EBRPD HQ	2	Conf Room M6	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	33	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
39	EBRPD HQ	2	Office M7	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	34	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
40	EBRPD HQ	2	Conf Room M8	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	35	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
41	EBRPD HQ	2	Office M9	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	36	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
42	EBRPD HQ	2	Office M10	E2	Private Office	1	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		0.2	4680	1,137	MS	37	N		#N/A			1	F49ILL/3	0.243	0.2	2093	509	MS		N		0.0	0	0.3	629
43	EBRPD HQ	2	Open Office	E2	Open Office	6	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		1.5	4680	6,823	MS	38	N		#N/A			6	F49ILL/3	0.243	1.5	4056	5914	MS		N		0.0	0	0.2	910
44	EBRPD HQ	2	Open Office	F	Open Office	8	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		1.9	4680	9,098	MS	39	N		#N/A			8	F49ILL/3	0.243	1.9	4056	7885	MS		N		0.0	0	0.3	1213
45	EBRPD HQ	2	Open Office	E3	Open Office	8	F412ILL/4	42"x192" Surface Mount w/ Dropped White Lens	0.284		2.3	4680	10,633	MS	40	N		#N/A			8	F412ILL/4	0.284	2.3	4056	9215	MS		N		0.0	0	0.3	1418
46	EBRPD HQ	2	Open Office	F1	Open Office	16	F412ILL/4	42"x192" Surface Mount w/ Dropped White Lens	0.284		4.5	4680	21,266	MS	41	N		#N/A			16	F412ILL/4	0.284	4.5	4056	18430	MS		N		0.0	0	0.7	2835
47	EBRPD HQ	2	Open Office	X-W	Emergency 24/7	1	ECF8/2	Ceiling-Mounted Exit Sign	0.024		0.0	8760	210	MS	42	N		#N/A			1	ECF8/2	0.024	0.0	8760	210	MS		N		0.0	0	0.0	0
48	EBRPD HQ	2	Lobby Area	B4	Lobby	6	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		1.3	4680	6,065	MS	43	N		#N/A			6	F48ILL/2	0.216	1.3	3510	4549	MS		N		0.0	0	0.4	1516
49	EBRPD HQ	2	Conference Room	EE	Conf. Room Occ	3	F43ILL (3)	2x4 Parabolic Troffer	0.083		0.2	1944	484	MS	44	N		#N/A			3	F43ILL (3)	0.083	0.2	1944	484	MS		N		0.0	0	0.0	0
50	EBRPD HQ	2	Big Stairs	B4	Open Office	2	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		0.4	4680	2,022	MS	45	N		#N/A			2	F48ILL/2	0.216	0.4	4056	1752	MS		N		0.0	0	0.1	270
51	EBRPD HQ	3	Private Offfice (Steve)	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	46	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
52	EBRPD HQ	3	Private Office 2	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	47	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
53	EBRPD HQ	3	Private Office 3	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	48	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
54	EBRPD HQ	3	Private Office 4	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	49	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
55	EBRPD HQ	3	Private Office 5	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	50	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
56	EBRPD HQ	3	Private Office 6	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	51	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
57	EBRPD HQ	3	Private Office 7	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	52	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
58	EBRPD HQ	3	Private Office 8	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	53	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
59	EBRPD HQ	3	Private Office 9	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	54	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
60	EBRPD HQ	3	Private Office 10	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	55	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
61	EBRPD HQ	3	Private Office 11	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	56	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
62	EBRPD HQ	3	Private Office 12	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	57	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
63	EBRPD HQ	3	Private Office 13	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	58	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
64	EBRPD HQ	3	Private Office 14	E2	Private Office	1	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		0.2	4680	1,137	MS	59	N		#N/A			1	F49ILL/3	0.243	0.2	2093	509	MS		N		0.0	0	0.3	629
65	EBRPD HQ	3	Private Office 15	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	60	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
66	EBRPD HQ	3	Private Office 16	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	61	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
67	EBRPD HQ	3	Private Office 17	B3	Private Office	1	F44ILL (3)	4x4 Recessed Troffer w/Dropped White Lens	0.108		0.1	4680	505	MS	62	N		#N/A			1	F44ILL (3)	0.108	0.1	2093	226	MS		N		0.0	0	0.1	279
68	EBRPD HQ	3	Copier Room	E1	Copier Room	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	63	N		#N/A			1	F46ILL/2	0.162	0.2	2243	363	MS		N		0.0	0	0.2	395
69	EBRPD HQ	3	Copier Room	E	Copier Room	1	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.1	4680	388	MS	64	N		#N/A			1	F43ILL (3)	0.083	0.1	2243	186	MS		N		0.0	0	0.1	202
70	EBRPD HQ	3	Open Office	B2	Open Office	24	F48ILL/2	4x8 Recessed Troffer w/Dropped White Lens	0.216		5.2	4680	24,261	MS	65	N		#N/A			24	F48ILL/2	0.216	5.2	4056	21026	MS		N		0.0	0	0.8	3235
71	EBRPD HQ	3	Open Office	E3	Open Office	12	F412ILL/4	42"x192" Surface Mount w/ Dropped White Lens	0.284		3.4	4680	15,949	MS	66	N		#N/A			12	F412ILL/4	0.284	3.4	4056	13823	MS		N		0.0	0	0.5	2127
72	EBRPD HQ	3	Open Office	E	Open Office	1	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.1	4680	388	MS	67	N		#N/A			1	F43ILL (3)	0.083	0.1	4056	337	MS		N		0.0	0	0.0	52
73	EBRPD HQ	3	Men's Restroom	M	Restroom	2	I60/2	12.5" Diameter Surface Puff	0.046		0.1	4680	431	MS	68	N		#N/A			2	I60/2	0.046	0.1	1645	151	MS		N		0.0	0	0.2	279
74	EBRPD HQ	3	Men's Restroom	G	Restroom	1	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	253	MS	69	N		#N/A			1	F42ILL (3)	0.054	0.1	1645	89	MS		N		0.0	0	0.1	164
75	EBRPD HQ	3	Women's Restroom	M	Restroom	2	I60/2	12.5" Diameter Surface Puff	0.046		0.1	4680	431	MS	70	N		#N/A			2	I60/2	0.046	0.1	1645	151	MS		N		0.0	0	0.2	279
76	EBRPD HQ	3	Women's Restroom	G	Restroom	1	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	253	MS	71	N		#N/A			1	F42ILL (3)	0.054	0.1	1645	89	MS		N		0.0	0	0.1	164
77	EBRPD HQ	3	Restroom Vestibule	N	Restroom	1	I60/3	14.5" Diameter Surface Puff	0.069		0.1	4680	323	MS	72	N		#N/A			1	I60/3	0.069	0.1	1645	113	MS		N		0.0	0	0.1	209
78	EBRPD HQ	4	Conference Room	EE	Conf. Room	2	F43ILL (3)	2x4 Parabolic Troffer	0.083		0.2	4680	777	MS	73	N		#N/A			2	F43ILL (3)	0.083	0.2	1944	323	MS		N		0.0	0	0.2	454
79	EBRPD HQ	4	Elevator Lobby	K	Hallway	1	F42ILL (3)	16"x4' Wide Surface Wrap	0.054		0.1	4680	253	MS	74	N		#N/A			1	F42ILL (3)	0.054	0.1	3510	190	MS		N		0.0	0	0.0	63
80	EBRPD HQ	4	Private Office 1	F2	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	75	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
81	EBRPD HQ	4	Private Office 2	F2	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	76	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
82	EBRPD HQ	4	Private Office 3	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	77	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
83	EBRPD HQ	4	Private Office 4	E	Private Office	2	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.2	4680	777	MS	78	N		#N/A			2	F43ILL (3)	0.083	0.2	2093	347	MS		N		0.0	0	0.2	429
84	EBRPD HQ	4	Private Office 5	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	79	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
85	EBRPD HQ	4	Private Office 6	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	80	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
86	EBRPD HQ	4	Copier Room	E	Copier Room	1	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.1	4680	388	MS	81	N		#N/A			1	F43ILL (3)	0.083	0.1	2243	186	MS		N		0.0	0	0.1	202
87	EBRPD HQ	4	Private Office 7	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	82	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
88	EBRPD HQ	4	Private Office 8	E	Private Office	2	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.2	4680	777	MS	83	N		#N/A			2	F43ILL (3)	0.083	0.2	2093	347	MS		N		0.0	0	0.2	429
89	EBRPD HQ	4	Private Office 9	E1	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	84	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
90	EBRPD HQ	4	Private Office 10	F2	Private Office	3	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.5	4680	2,274	MS	85	N		#N/A			3	F46ILL/2	0.162	0.5	2093	1017	MS		N		0.0	0	0.6	1257
91	EBRPD HQ	4	Private Office 11	F2	Private Office	1	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.2	4680	758	MS	86	N		#N/A			1	F46ILL/2	0.162	0.2	2093	339	MS		N		0.0	0	0.2	419
92	EBRPD HQ	4	Private Office 12	E2	Private Office	2	F49ILL/3	42"x144" Surface Mount w/ Dropped White Lens	0.243		0.5	4680	2,274	MS	87	N		#N/A			2	F49ILL/3	0.243	0.5	2093	1017	MS		N		0.0	0	0.6	1257
93	EBRPD HQ	4	Private Office 12	E1	Private Office	2	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.3	4680	1,516	MS	88	N		#N/A			2	F46ILL/2	0.162	0.3	2093	678	MS		N		0.0	0	0.4	838
94	EBRPD HQ	4	Private Office 13	E	Private Office	4	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.3	4680	1,554	MS	89	N		#N/A			4	F43ILL (3)	0.083	0.3	2093	695	MS		N		0.0	0	0.4	859
95	EBRPD HQ	4	Private Office 14	E1	Private Office	2	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.3	4680	1,516	MS	90	N		#N/A			2	F46ILL/2	0.162	0.3	2093	678	MS		N		0.0	0	0.4	838
96	EBRPD HQ	4	Private Office 15	E1	Private Office	2	F46ILL/2	42"x96" Surface Mount w/Dropped White Lens	0.162		0.3	4680	1,516	MS	91	N		#N/A			2	F46ILL/2	0.162	0.3	2093	678	MS		N		0.0	0	0.4	838
97	EBRPD HQ	4	Copier Room	E	Copier Room	2	F43ILL (3)	42"x48" Surface Mount w/Dropped White Lens	0.083		0.2	4680	777	MS	92	N		#N/A			2	F43ILL (3)	0.083	0.2	2243	372	MS		N		0.0	0	0.2	405
98	EBRPD HQ	4	Kitchen	Z	Break Room	2	F24ILL	2x2 Troffer with Dropped White Lens	0.061		0.1	2990	365	MS	93	N		#N/A			2	F24ILL	0.061	0.1	2243	274	MS		N		0.0	0	0.0	91

99	EBRPD HQ	4	Storage Room	R	Storage	3	I60/1	Pendant Fixture	0.023		0.1	500	35	MS	94	N		#N/A			3	I60/1	0.023	0.1	500	35	MS		N		0.0	0	0.0	0
100	EBRPD HQ	4	Stairwell Lobby	L	Hallway	1	I60/2	10.5" Diameter Surface Puff	0.046		0.0	4680	215	MS	95	N		#N/A			1	I60/2	0.046	0.0	3510	161	MS		N		0.0	0	0.0	54
101	EBRPD HQ	All	South Stairwell	H	Stair	5	F42ILL (3)	4' Corridor Wrap	0.054		0.3	8760	2,365	MS	96	N		#N/A			5	F42ILL (3)	0.054	0.3	6570	1774	MS		N		0.0	0	0.1	591
102	EBRPD HQ	All	North Stairwell	H	Stair	9	F42ILL (3)	4' Corridor Wrap	0.054		0.5	8760	4,257	MS	97	N		#N/A			9	F42ILL (3)	0.054	0.5	6570	3193	MS		N		0.0	0	0.2	1064
103	EBRPD HQ	4	Restroom Vestibule	M	Hallway	2	I60/2	12.5" Diameter Surface Puff	0.046		0.1	4680	431	MS	98	N		#N/A			2	I60/2	0.046	0.1	3510	323	MS		N		0.0	0	0.0	108
104	EBRPD HQ	4	Women's Restroom	G	Restroom	1	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	253	MS	99	N		#N/A			1	F42ILL (3)	0.054	0.1	1645	89	MS		N		0.0	0	0.1	164
105	EBRPD HQ	4	Women's Restroom	M	Restroom	2	I60/2	12.5" Diameter Surface Puff	0.046		0.1	4680	431	MS	100	N		#N/A			2	I60/2	0.046	0.1	1645	151	MS		N		0.0	0	0.2	279
106	EBRPD HQ	4	Men's Restroom	M	Restroom	1	I60/2	12.5" Diameter Surface Puff	0.046		0.0	4680	215	MS	101	N		#N/A			1	I60/2	0.046	0.0	1645	76	MS		N		0.0	0	0.1	140
107	EBRPD HQ	4	Men's Restroom	G	Restroom	1	F42ILL (3)	1x4 Surface Wrap	0.054		0.1	4680	253	MS	102	N		#N/A			1	F42ILL (3)	0.054	0.1	1645	89	MS		N		0.0	0	0.1	164
108	EBRPD HQ	Exterior	East Face (Hillside)	EXT-1	Exterior	2	HPS70/1	70W HPS Wall Pack	0.095		0.2	4100	779	MS	102	N		#N/A			2	35W LED Wall	0.035	0.1	615	43	MS		N		0.1	492	0.4	244
109	EBRPD HQ	Exterior	South Driveway	EXT-2	Exterior	2	HPS150/1	150W HPS Wall Pack	0.188		0.4	4100	1,542	MS	102	N		#N/A			2	75W LED Wall	0.079	0.2	615	97	MS		N		0.2	894	0.9	551
110	EBRPD HQ	Exterior	West Picnic Tables	EXT-2	Exterior	2	HPS150/1	150W HPS Wall Pack	0.188		0.4	4100	1,542	MS	102	N		#N/A			2	75W LED Wall	0.079	0.2	615	97	MS		N		0.2	894	0.9	551
111	EBRPD HQ	Exterior	Stairwell Exit Lights	EXT-4	Exterior	3	CFQ26/1	26W CFL Exterior Wallpack	0.033		0.1	4100	406	MS	102	N		#N/A			3	CFQ26/1	0.033	0.1	615	61	MS		N		0.0	0	0.6	345
112	EBRPD HQ	Exterior	South Roofline	EXT-3	Exterior	2	HPS250/1	250W HPS Floods (2 35W LEDs)	0.295		0.6	4100	2,419	MS	102	N		#N/A			4	35W LED Wall	0.035	0.1	615	86	MS		N		0.5	1845	0.8	488
113	EBRPD HQ	Exterior	North Roofline	EXT-3	Exterior	2	HPS250/1	250W HPS Floods (2 35W LEDs)	0.295		0.6	4100	2,419	MS	102	N		#N/A			4	35W LED Wall	0.035	0.1	615	86	MS		N		0.5	1845	0.8	488
114	EBRPD HQ	Exterior	North Stairwell Exit	EXT-1	Exterior	1	HPS70/1	70W HPS Wall Pack	0.095		0.1	4100	390	MS	102	N		#N/A			1	35W LED Wall	0.035	0.0	615	22	MS		N		0.1	246	0.2	122
115	EBRPD HQ	Parking	Existing Parking Lot	PK-1	Exterior	6	MH250PS/1	250W PSMH Parking Lot Fixture	0.288		1.7	4100	7,085	MS	102	N		#N/A			6	35W/90W LED	0.125	0.8	615	461	MS		N		1.0	4010	4.3	2614
116	EBRPD HQ	Parking	Future Parking Lot	PK-2	Exterior	6	MH150PS/1	150W PSMH Parking Lot Fixture	0.184		1.1	4100	4,522	MS	102	N		#N/A			6	75W LED Area	0.079	0.5	615	292	MS		N		0.6	2578	2.7	1652
117	EBRPD HQ	Roof	Flag Light	EXT-5	Exterior-NoCtrl	1	HPS250/1	250W HPS Flag Flood	0.295		0.3	4100	1,210	MS	102	N		#N/A			1	35W LED Floo	0.115	0.1	4100	472	MS		N		0.2	738	0.0	0
					Totals	412				0	50.6		221,747							416				47		149,651				3.3	13,542		58,554
											45.1		216,015	Sums for Energy Balance																				

NOP	0.0%	If NOPs are greater than 10%, NOPs must be subtracted from the baseline.

11 35W LED Wall Packs
4 75W LED Wall Pack

**** NOTE: The electronic version (Excel) of the lighting equipment survey is programmed so that shaded values are automatically calculated or taken from the usage group summary or Administrator approved lighting table. Calculation cells are programmed to automatically calculate savings.**

DESCRIPTION OF TABLE INPUTS

Building - Building Number/Name
Flr - Floor in the building on which that line item is located
Area Description - Description of the location in which that line is found and corresponds to the site map in DPA.3
Usage Group Type - Descriptive name for the usage group to which that line belongs
Pre Fixt Number - Number of fixtures on that line item before the retrofit
Pre Fixture Code - Fixture code from the Administrator Table of Standard Fixture Wattages
Pre kW/Fixture - Value taken from the Administrator Table of Standard Fixture Wattages
NOP - Number of non-operating (broken, intended for repair) fixtures on that line item
Pre kW/Space -Total demand energy of the line item prior to the retrofit [kW/Fixt * Pre Fixt Number]
Pre Operating Hours (relevant for controls projects) - Operating hours of the fixtures prior to installation of the retrofit equipment
Exist. Cont. - Indicate the pre-installation control device for the line item.
Post Fixt Number - Number of fixtures on that line item after the retrofit
Post Fixture Code - Fixture code from the Administrator Table of Standard Fixture Wattages
Post kW/Fixture - Value taken from the Administrator Table of Standard Fixture Wattages
Post kW/Space - Total demand energy of the line item after the retrofit [kW/Fixt * Post Fixt Number]
kW Saved - Demand savings for each line item [Pre kW/Space - Post kW/Space]
Efficency kWh Saved - Energy saved by the lighting efficiency retrofit [kW Saved * Post Operating Hours]
Controls kWh Saved - Energy saved by the lighting controls retrofit [Change in Operating Hours*Post kW/Space]

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Lighting Schedules

Group Schedules Table

GROUPS			HOURS		kW DEMAND						KWH ENERGY		
Group Code		Group Population Count	Pre Operating Hours	Final Operating Hours	Pre-Measure kW	Post-Measure kW	Average Efficiency kW Savings	Average Control kW Savings	Total kW Savings	% Total kW Savings	Efficiency kWh Savings	Control kWh Savings	Total kWh Savings
Board Room		2	750	750	2.0	2.0	0.0	0.0	0.0	0%	0	0	0
Break Room		2	2990	2243	1.5	1.5	0.0	0.4	0.0	0%	0	1,094	1,094
Conf. Room		2	4680	1944	0.7	0.7	0.0	0.4	0.4	7%	0	2,044	2,044
Conf. Room Occ		1	1944	1944	0.2	0.2	0.0	0.0	0.0	0%	0	0	0
Copier Room		4	4680	2243	0.5	0.5	0.0	0.3	0.3	4%	0	1,204	1,204
Emergency 24/7		2	8760	8760	0.1	0.1	0.0	0.0	0.0	0%	0	0	0
Exterior 24/7		1	8760	8760	0.8	0.8	0.0	0.0	0.0	0%	0	0	0
Exterior-NoCtrl		1	4100	4100	0.3	0.1	0.2	0.0	0.2	3%	738	0	738
Exterior		9	4100	615	5.1	2.0	3.1	1.7	4.8	76%	12,804	7,054	19,857
Hallway		7	4680	3510	1.3	1.3	0.0	0.3	0.3	5%	0	1,555	1,555
Lobby		1	4680	3510	1.3	1.3	0.0	0.3	0.3	5%	0	1,516	1,516
Not-In-Use		1	0	0	0.9	0.9	0.0	0.0	0.0	0%	0	0	0
Open Office		16	4680	4056	23.6	23.6	0.0	3.2	0.0	0%	0	14,744	14,744
Private Office		48	4680	2093	9.5	9.5	0.0	5.2	0.0	0%	0	24,514	24,514
Restroom		13	4680	1645	1.0	1.0	0.0	0.7	0.0	0%	0	3,172	3,172
Restroom Occ		0	1645	1645	0.0	0.0	0.0	0.0	0.0	0%	0	0	0
Stair		2	8760	6570	0.8	0.8	0.0	0.2	0.0	0%	0	1,656	1,656
Storage		5	500	500	0.8	0.8	0.0	0.0	0.0	0%	0	0	0
					0.0	0.0	0.0	0.0	0.0	0%	0	0	0
	Totals	**117**			**50.6**	**47.3**	**3.3**	**12.7**	**6.4**	**1.0**	**13,542**	**58,554**	**72,096**

Operating Hours Calculations

Hours	Schedule	Description	Calculation
8760	24/7	Emergency Fixtures, Always On Fixtures	
4680	6:30 a.m. - 9:30 p.m.; Mon-Fri	Scheduled Operation	
2990	6:30 a.m. - 6:00 p.m.; Mon-Fri	Occupancy	
4100		Typical Exterior Hours	
500		Assumed Low-use Area	
750		Board Room Operations (assumed)	
2243	Break Room w/Occ	Occupancy Less NRR-DR Reduction	
1944	Conference room w/Occ	Occupancy Less NRR-DR Reduction	
2243	Copier room w/Occ	Occupancy Less NRR-DR Reduction	
3510	Hallway/Lobby w/Occ	Scheduled Less NRR-DR Reduction	
2093	Private Office w/Occ	Occupancy Less NRR-DR Reduction	
1645	Restrrom w/Occ	Occupancy Less NRR-DR Reduction	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Fixture Inventory

Assumed Photometric Performance

50 lu/W

Fixture Level Analysis

1	2	3	4	5	6	7	8	9	10	11	12	13	16	17	18	19	20	21	22	23	24	25	26	27	#REF!					
BASE CASE														PROPOSED CASE																
Short Hand Code	Fixture Discription	Fixture Code	Fixture Efficiency	Luminaire Dirt Depreciation	Fixture Wattage	Ballast Type	Light Output	Ballast Factor	Lamp Type	Lamp Qty	Lamp Quality	Lamp	Lamp Lumens	SP Ratio 0.78	Light Output	Fixture Code	Fixture Efficiency	Luminaire Dirt Depreciatio	Fixture Wattage	Ballast Type	Light Output	Ballast Factor	Lamp Type	Lamp Qty	Lamp Quality	Lamp	Lamp Lumens	SP Ratio 0.78	Light Output (lumens)	Energy Saved	Standard Lighting Perform.	Scotopic Lighting Perform.	Measure	Quantity
A	2x4 Recessed Troffer w/Dropped White Lens	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	0.000	100.0%	100.0%		68
B	4x8 Recessed Troffer w/Dropped White Lens	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	0.000	100.0%	100.0%		9
B1	4x4 Recessed Troffer w/Dropped White Lens	F44ILL (3)	80.00%	0.00%	0.108	PREM-IS	NLO	0.88	T8	4	PREM	F32T8-H41	2,915	1.58	12,983	F44ILL (3)	80.00%	0.00%	0.108	PREM-IS	NLO	0.88	T8	4	PREM	F32T8-H41	2,915	1.58	12,983	0.000	100.0%	100.0%		3
B2	4x8 Recessed Troffer w/Dropped White Lens	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	0.000	100.0%	100.0%		24
B3	4x4 Recessed Troffer w/Dropped White Lens	F44ILL (3)	80.00%	0.00%	0.108	PREM-IS	NLO	0.88	T8	4	PREM	F32T8-H41	2,915	1.58	12,983	F44ILL (3)	80.00%	0.00%	0.108	PREM-IS	NLO	0.88	T8	4	PREM	F32T8-H41	2,915	1.58	12,983	0.000	100.0%	100.0%		6
B4	4x8 Recessed Troffer w/Dropped White Lens	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	0.000	100.0%	100.0%		8
B5	4x8 Recessed Troffer w/Dropped White Lens	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	F48ILL/2	80.00%	0.00%	0.216	PREM-IS	NLO	0.88	T8	8	PREM	F32T8-H41	2,915	1.58	25,967	0.000	100.0%	100.0%		0
C	Two-Lamp Strip Fixture	F42ILL (3)	90.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	7,303	F42ILL (3)	90.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	7,303	0.000	100.0%	100.0%		14
D	2x4 Two-Lamp Troffer w/ Dropped White Lens	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	0.000	100.0%	100.0%		0
E	42"x48" Surface Mount w/Dropped White Lens	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	0.000	100.0%	100.0%		13
E1	42"x96" Surface Mount w/Dropped White Lens	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	0.000	100.0%	100.0%		28
E2	42"x144" Surface Mount w/ Dropped White Lens	F49ILL/3	80.00%	0.00%	0.243	IS	NLO	0.88	T8	9	PREM	F32T8-H41	2,915	1.58	29,212	F49ILL/3	80.00%	0.00%	0.243	IS	NLO	0.88	T8	9	PREM	F32T8-H41	2,915	1.58	29,212	0.000	100.0%	100.0%		11
E3	42"x192" Surface Mount w/ Dropped White Lens	F412ILL/4	80.00%	0.00%	0.284	IS	NLO	0.88	T8	12	PREM	F32T8-H41	2,915	1.58	38,950	F412ILL/4	80.00%	0.00%	0.284	IS	NLO	0.88	T8	12	PREM	F32T8-H41	2,915	1.58	38,950	0.000	100.0%	100.0%		20
F	42"x144" Surface Mount w/ Dropped White Lens	F49ILL/3	80.00%	0.00%	0.243	IS	NLO	0.88	T8	9	PREM	F32T8-H41	2,915	1.58	29,212	F49ILL/3	80.00%	0.00%	0.243	IS	NLO	0.88	T8	9	PREM	F32T8-H41	2,915	1.58	29,212	0.000	100.0%	100.0%		8
F1	42"x192" Surface Mount w/ Dropped White Lens	F412ILL/4	80.00%	0.00%	0.284	IS	NLO	0.88	T8	12	PREM	F32T8-H41	2,915	1.58	38,950	F412ILL/4	80.00%	0.00%	0.284	IS	NLO	0.88	T8	12	PREM	F32T8-H41	2,915	1.58	38,950	0.000	100.0%	100.0%		16
F2	42"x96" Surface Mount w/Dropped White Lens	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	0.000	100.0%	100.0%		6
F3	42"x48" Surface Mount w/Dropped White Lens	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	F43ILL (3)	80.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41	2,915	1.58	9,737	0.000	100.0%	100.0%		0
G	1x4 Surface Wrap	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	0.000	100.0%	100.0%		7
H	4' Corridor Wrap	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	0.000	100.0%	100.0%		14
K	16"x4' Wide Surface Wrap	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	F42ILL (3)	80.00%	0.00%	0.054	PREM-IS	NLO	0.88	T8	2	PREM-ES	F32T8-H41	2,915	1.58	6,492	0.000	100.0%	100.0%		2
L	10.5" Diameter Surface Puff	I60/2	70.00%	0.00%	0.046					2		CFL23-XL27	1,280	1.00	1,792	I60/2	70.00%	0.00%	0.046					2		CFL23-XL2	1,280	1.00	1,792	0.000	100.0%	100.0%		2
M	12.5" Diameter Surface Puff	I60/2	70.00%	0.00%	0.046					2		CFL23-XL27	1,280	1.00	1,792	I60/2	70.00%	0.00%	0.046					2		CFL23-XL2	1,280	1.00	1,792	0.000	100.0%	100.0%		15
N	14.5" Diameter Surface Puff	I60/3	70.00%	0.00%	0.069					3		CFL23-XL27	1,280	1.00	2,688	I60/3	70.00%	0.00%	0.069					3		CFL23-XL2	1,280	1.00	2,688	0.000	100.0%	100.0%		1
P	Jelly Jar w/Guard	I60/1	70.00%	0.00%	0.023					1		CFL23-XL27	1,280	1.00	896	I60/1	70.00%	0.00%	0.023					1		CFL23-XL2	1,280	1.00	896	0.000	100.0%	100.0%		0
R	Pendant Fixture	I60/1	70.00%	0.00%	0.023					1		CFL23-XL27	1,280	1.00	896	I60/1	70.00%	0.00%	0.023					1		CFL23-XL2	1,280	1.00	896	0.000	100.0%	100.0%		5
S	Exterior Driveway Domes	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	F46ILL/2	80.00%	0.00%	0.162	PREM-IS	NLO	0.88	T8	6	PREM	F32T8-H41	2,915	1.58	19,475	0.000	100.0%	100.0%		5
U	Low-Use	I60/1	50.00%	0.00%	0.023					1		CFL23-XL27	1,280	1.00	640	I60/1	50.00%	0.00%	0.023					1		CFL23-XL2	1,280	1.00	640	0.000	100.0%	100.0%		41
Z	2x2 Troffer with Dropped White Lens	F24ILL	80.00%	0.00%	0.061	IS	NLO	0.88	T8	4	STD	F17T8-H41	1,450	1.44	5,891	F24ILL	80.00%	0.00%	0.061	IS	NLO	0.88	T8	4	STD	F17T8-H41	1,450	1.44	5,891	0.000	100.0%	100.0%		49
X-W	Ceiling-Mounted Exit Sign	ECF8/2		0.00%	0.024					2						ECF8/2		0.00%	0.024					2		0				0.000	100.0%	100.0%		5
X-C	Wall-Mounted Exit Sign	ECF8/2		0.00%	0.024					2						ECF8/2		0.00%	0.024					2		0				0.000	100.0%	100.0%		0
EE	2x4 Parabolic Troffer	F43ILL (3)	70.00%	0.00%	0.083	PREM-IS	NLO	0.88	T8	3	PREM	F32T8-H41				F43ILL (3)	70.00%	0.00%	0.083							F32T8-H41				0.000	100.0%	100.0%		
EXT-1	70W HPS Wall Pack	HPS70/1	65.00%	0.00%	0.095					1		HPS70	5,450	0.69	2,440	35W LED Wall Pack	100.00%	0.00%	0.035					1		TWR1 LED	2,126	1.80	3,827	0.060	60.0%	156.8%		3
EXT-2	150W HPS Wall Pack	HPS150/1	65.00%	0.00%	0.188					1		HPS150	14,400	0.69	6,447	75W LED Wall Pack	100.00%	0.00%	0.079					1		TWR2 LED	6,979	1.80	12,562	0.109	74.6%	194.9%		4
EXT-3	250W HPS Floods (2 35W LEDs)	HPS250/1	65.00%	0.00%	0.295					1		HPS250	24,300	0.69	10,879	35W LED Wall Pack	100.00%	0.00%	0.035					1		TWR1 LED	4,252	1.80	7,654	0.260	26.9%	70.4%		4
EXT-4	26W CFL Exterior Wallpack	CFQ26/1	65.00%	0.00%	0.033					1		CFQ26	1,440	1.00	936	CFQ26/1	65.00%	0.00%	0.033					1		CFQ26	1,440	1.80	1,685	0.000	100.0%	180.0%		3
EXT-5	250W HPS Flag Flood	HPS250/1	65.00%	0.00%	0.295					1		HPS250	24,300	0.69	10,879	35W LED Flood	100.00%		0.115					1						0.180	100.0%	100.0%		1
PK-1	250W PSMH Parking Lot Fixture	MH250PS/1	65.00%	0.00%	0.288					1		MH250/PS	15,000	1.36	13,307	35W/90W LED dual	100.00%	0.00%	0.125					1						0.163	100.0%	100.0%		6
PK-2	150W PSMH Parking Lot Fixture	MH150PS/1	65.00%	0.00%	0.184					1		MH150/PS	8,100	1.36	7,186	75W LED Area Light	100.00%	0.00%	0.079					1		DSX1 LED	6,979	1.80	12,562	0.105	132.6%	174.8%		6

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
CIM-7b Improve Lighting System Design

The recommendation for this measure includes improving the overall interior lighting design.Rather than reusing fixtures, it is recommended to use new suspended fixtures, targetted wall washing, and new task lights. The over all lighting design should target office-area illuminances of 30 foot-candles on the workplane with 50 foot-candles achieved using task lights under the control of individual occupants.

Since this design is radically different than the existing lighting design, it will require a lighting design professional to assist in the design of the project. Since the design is slightly open-ended, the energy savings are based on the lighting power density and typical lighting hours after the implementation of CIM-7a.

Existing Lighting Energy Consumption

Installed Lighting Power	45.141	kW	
Installed Energy Use after CIM-7a	147,935	kWh/yr	
Building Area	43,273	ft²	
Installed Lighting Power Density	1.04	W/ft²	
Mean Operationg Hours:	3,277.2	hrs/year	

Proposed Lighting Energy Consumption

			0.75 from AEDG for Small/Medium Office
Lighting Power Density	0.65	W/ft²	-0.10 for improved daylighting controls
Mean Operating Hours	3,277.2	hrs/yr	
New Lighting System Power	28.127	kW	
New Lighting System Energy Use	92,177	kWh/yr	

Savings

Peak Power Reduction	17.014	kW
Energy Savings	55,758	kWh/yr

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
PC Power Management Software

An LBNL study was used to find the power consumption levels while the computer is operating in different modes (on, off, sleep). A different LBNL study was used to determine the rate at which employees turn off their computers without any software assistance. Using this information, energy savings if PC power management software is installed on each employee's computer can be determined. Incentives are based on PG&E's Business Computing Rebate Catalog.

Number of Computers	150	*estimate*

Average Computer Power Consumption

On, idle	73.97	W	LBNL Study
Off	2.84	W	LBNL Study
Sleep	21.13	W	LBNL Study

Baseline

Weeks per year per computer	48	weeks
Days per week	5	days
Typical working hours per day	8	h
Occupied Hours	1,920	h/yr
Peak Demand	**11**	kW

Unoccupied Hours	6,840	h/yr	
Overnight Turnoff rate	36%		2004 LBNL Study
Overnight Sleep rate	6%		2004 LBNL Study
Overnight Idle rate	58%		2004 LBNL Study
Unoccupied Demand	**7**	kW	

NEW Unoccupied Schedule

Unoccupied Hours	6,840	h/yr
Overnight Turnoff rate	36%	
NEW Overnight Sleep rate	64%	
NEW Overnight Idle rate	0%	
Unoccupied Demand	**2**	kW

MEASURE SUMMARY	**Savings**	
Baseline - Occupied Use	**21,303**	**kWh**
Baseline - Unoccupied Use	**46,368**	**kWh**
Baseline - Total Use	**67,671**	**kWh**
Retrofit - Occupied Use (no change)	**21,303**	**kWh**
Retrofit - Unoccupied Use	**14,924**	**kWh**
Retrofit - Total Use	**36,227**	**kWh**

Energy Savings (PC Management Software)		**31,000**	**kWh**
Cost Savings (PC Management Software)	**$**	**-**	

rounded to 1000

Simple payback	#DIV/0!	yrs

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Smart Power Strips

Energy and cost savings were determined by assuming desk peripherals consume a rate of 20W per terminal. Smart power strips turn off the peripherals when an occupant is not at his/her desk using either a occupancy sensor or a master desk appliance that will trigger the power strip to turn off such as a monitor or computer when it is turned off, likely by PC power management software.

Number of occupants	150		
Estimated standby power of peripherals, per desk	20	W	Based on PG&E Workpaper for plugload controls
Current hours of operation of peripherals	8,760	hrs/yr	
Proposed hours of operation of peripherals	2,500	hrs/yr	
Savings per workstation	125.2	kWh/yr	
Total savings	18,780	kWh/yr	

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
PC Power Management Software

By virtualizing the information on the Park District's servers, they can save the energy used by the servers and the HVAC equipment used to maintain appropriate temperatures in the server room. The net cost savings is based on the current kWh used by the different equipment minus the virtualization cost.

Baseline

Loads	Calculations							Utilization	Peak kW Load	Hours Per Day	Days Per Year	kWh/year	Cost
Data Center									**17.1**			**99,607**	**$15,559**
Server Equipment									**7.5**			**39,420**	**$6,157**
3-Electrical (kW)	Count	kW Read					kW ea.						
UPS + Servers	1	7.5					7.5	0.60	7.5	24	365	39,420	
CRAC Cooling System									**9.1**			**56,580**	**$8,838**
2-Electrical (amp)	Count	Voltage	Phase	Amps	PF		kW ea.						
Cooling System	1	208	3	20.7	0.90		6.7	0.60	6.7	24	365	35,277	
Fan System	1	208	3	7.5	0.90		2.4	1.00	2.4	24	365	21,303	
Split System Fan for Ventilation									**0.4**			**3,607**	**$563**
1-Nameplate hp	Count	HP	Motor Eff.	LF			kW ea.						
Fan Only	1	0.5	77.0%	85.0%			0.4	1.00	0.4	24	365	3,607	
							-		-			-	
Total													

Proposed

Loads	Calculations							Utilization	Peak kW Load	Hours Per Day	Days Per Year	kWh/year	Cost
Data Center									**4.4**			**24,554**	**$0**
Server Equipment									**1.3**			**6,570**	**$0**
3-Electrical (kW)	Count	kW Read					kW ea.						
UPS + Servers	1	1.3					1.3	0.60	1.3	24	365	6,570	
CRAC Cooling System												**-**	**$0**
2-Electrical (amp)	Count	Voltage	Phase	Amps	PF		kW ea.						
Cooling System	1	208	3	20.7	0.90		6.7	-		0	0	-	
Fan System	1	208	3	7.5	0.90		2.4	-		0	0	-	
Split System Fan for Ventilation									**0.4**			**3,267**	**$510**
1-Nameplate hp	Count	HP	Motor Eff.	LF			kW ea.						
Fan Only	1	0.5	85.0%	85.0%			0.4	1.00	0.4	24	365	3,267	
							-		-			-	
Split System Compressor									**2.8**			**14,717**	**$2,299**
10-Tons Cooling	Count	Tons	kW/ton				kW ea.						
Fan Only	1	3.0	0.93				2.8	0.60	2.8	24	365	14,717	
							-		-			-	

Avg cost per kW at this site $ 0.1562 per billing this site's billing data

12.7 75,052

Savings

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Weather Data

Location San Leandro ,CA

Weather Design Condtions

ASHRAE Design Conditions (See 2009 ASHRAE HANDBOOK, CH 14)

	FLH	DB	WB
Heating	2,677	37.2	n/a
Cooling	349	81.8	67.6

Note: Design conditions shown for reference city: Oakland

Weather Data Source

Bin 3 CEC C.Z. 3
Bin 724930 OAKLAND METROPOLITAN ARPT

Temperature Bins for CEC Zone 3 during the DEER Peak Period.

Month	Day	Hour*	DBT	WBT	DB_Bin	Date	Time Bin
7	17	14	81	68	82	7/17/20	2
7	17	15	80	67	82	7/17/20	2
7	17	16	79	66	77	7/17/20	2
7	18	14	87	68	87	7/18/20	2
7	18	15	84	67	82	7/18/20	2
7	18	16	82	66	82	7/18/20	2
7	19	14	79	68	77	7/19/20	2
7	19	15	78	68	77	7/19/20	2
7	19	16	78	68	77	7/19/20	2

WARNING! - The DEER Peak weather data displayed is not adjusted to account for the operating schedule of the facility.
* See "DEER Peak Notes" tab

OSA	MCWB	ALL HOURS Period																							
F	F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
118	0																									0
116	0																									0
114	0																									0
112	0																									0
110	0																									0
108	0																									0
106	0																									0
104	0																									0
102	0																									0
100	0																									0
98	0																									0
96	0																									0
94	67													1	1											2
92	67														2	1										3
90	65												1	1		1	1	1								5
88	65												2	2	3	2	2									11
86	64											1	1	2	1	1		1								7
84	64											1	1	4	3	3	1	2								15
82	63												4	3	4	3	3	1	2							20
80	63										1	2	7	6	3	7	2	1	2							31
78	63									2	5	7	3	5	3	3	9	7	1	2						47
76	62									2	1	5	2	2	7	3	5	3	3	2	2					37
74	61								4	3	5	4	8	12	12	13	8	5	4	2	1					81
72	61								3	4	6	4	14	15	12	14	9	4	6	2	2	2	1			98
70	59							1	2	3	3	16	21	28	39	29	23	13	6	5	2	1	2	1		195
68	59							3	1	2	7	11	21	19	13	18	14	18	6	4	1	1				139
66	58	1						4	5	11	14	34	23	35	39	34	37	22	14	8	5	4	1		1	292
64	57	2	2	3	2	1	2	2	7	13	42	29	45	34	45	49	48	41	35	14	9	10	4	7	4	450
62	56	8	9	7	6	8	8	14	25	42	39	43	45	47	36	42	48	52	43	31	20	9	13	10	7	612
60	56	40	39	34	30	28	30	53	70	76	75	74	55	44	50	49	51	62	79	88	79	68	57	53	51	1335
58	54	69	65	60	55	53	58	57	58	53	44	30	24	22	24	19	30	39	43	59	68	70	71	63	69	1203
56	52	60	54	49	57	57	58	55	44	35	30	28	21	30	22	31	29	30	39	40	55	60	59	64	55	1062
54	51	31	35	53	51	57	47	37	33	33	20	21	21	20	25	24	24	22	25	33	34	50	43	41	37	817
52	49	42	44	33	36	33	38	33	21	19	28	30	24	20	14	10	13	23	26	30	31	28	42	45	45	708
50	47	29	27	22	23	28	25	17	16	15	22	10	12	8	3	4	5	12	13	23	24	20	20	20	23	421
48	46	25	20	28	34	21	23	23	20	21	10	9	7	3	3	4	2	4	13	11	15	23	23	23	28	393
46	44	30	39	36	27	25	22	24	28	21	10	5	2	2	1	1	1	2	5	9	14	9	17	24	27	381
44	42	15	15	23	21	24	19	9	10	5	2	1	1							2	1	5	6	6	7	172
42	39	7	8	7	13	18	24	20	13	4	1										2	4	6	7	8	142
40	38	3	4	3	6	4	5	5	1	1												1		1	2	36
38	37	3	3	3	2	4	3	4	1																1	24
36	34		1	2	2	3	2	2	2																	14
34	33			2		1	1	1																		5
32	31							1	1																	2
30	0																									0
28	0																									0
26	0																									0
24	0																									0
22	0																									0
20	0																									0
18	0																									0
16	0																									0
14	0																									0
12	0																									0
10	0																									0
8	0																									0
6	0																									0
4	0																									0
2	0																									0
Total		365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	8,760

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Schedule - Base Case

Baseline Schedule

	12AM	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mon	0	0	0	0	0		0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0	0
Tues	0	0	0	0	0		0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0	0
Wed	0	0	0	0	0		0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0	0
Thurs	0	0	0	0	0		0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0	0
Fri	0	0	0	0	0		0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0	0
Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	36%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	36%	0%	0%

TMY3 Weather Data Combined with Schedule (Enabled Hrs)

OSA F	ALL HOURS TOTAL	Hour # # of Hours per year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	OSA F	Enabled Hrs
118	0																									118	0
116	0																									116	0
114	0																									114	0
112	0																									112	0
110	0																									110	0
108	0																									108	0
106	0																									106	0
104	0																									104	0
102	0																									102	0
100	0																									100	0
98	0																									98	0
96	0																									96	0
94	2													0.7	0.7											94	1
92	3														1.4	0.7										92	2
90	5												0.7	0.7		0.7	0.7	0.7								90	4
88	11												1.4	1.4	2.1	1.4	1.4									88	8
86	7											0.7	0.7	1.4	0.7	0.7		0.7								86	5
84	15											0.7	0.7	2.9	2.1	2.1	0.7	1.4								84	11
82	20												2.9	2.1	2.9	2.1	2.1	0.7	1.4							82	14
80	31										0.7	1.4	5.0	4.3	2.1	5.0	1.4	0.7	1.4							80	22
78	47									1.4	3.6	5.0	2.1	3.6	2.1	2.1	6.4	5.0	0.7	1.4						78	34
76	37									1.4	0.7	3.6	1.4	1.4	5.0	2.1	3.6	2.1	2.1	1.4	1.4					76	26
74	81								2.9	2.1	3.6	2.9	5.7	8.6	8.6	9.3	5.7	3.6	2.9	1.4	0.7					74	58
72	98								2.1	2.9	4.3	2.9	10.0	10.7	8.6	10.0	6.4	2.9	4.3	1.4	1.4	1.4	0.4			72	70
70	195							0.4	1.4	2.1	2.1	11.4	15.0	20.0	27.9	20.7	16.4	9.3	4.3	3.6	1.4	0.7	0.7			70	138
68	139							1.1	0.7	1.4	5.0	7.9	15.0	13.6	9.3	12.9	10.0	12.9	4.3	2.9	0.7	0.7				68	98
66	292							1.4	3.6	7.9	10.0	24.3	16.4	25.0	27.9	24.3	26.4	15.7	10.0	5.7	3.6	2.9	0.4			66	205
64	450							0.7	5.0	9.3	30.0	20.7	32.1	24.3	32.1	35.0	34.3	29.3	25.0	10.0	6.4	7.1	1.4			64	303
62	612							5.0	17.9	30.0	27.9	30.7	32.1	33.6	25.7	30.0	34.3	37.1	30.7	22.1	14.3	6.4	4.6			62	383
60	1,335							18.9	50.0	54.3	53.6	52.9	39.3	31.4	35.7	35.0	36.4	44.3	56.4	62.9	56.4	48.6	20.4			60	696
58	1,203							20.4	41.4	37.9	31.4	21.4	17.1	15.7	17.1	13.6	21.4	27.9	30.7	42.1	48.6	50.0	25.4			58	462
56	1,062							19.6	31.4	25.0	21.4	20.0	15.0	21.4	15.7	22.1	20.7	21.4	27.9	28.6	39.3	42.9	21.1			56	394
54	817							13.2	23.6	23.6	14.3	15.0	15.0	14.3	17.9	17.1	17.1	15.7	17.9	23.6	24.3	35.7	15.4			54	304
52	708							11.8	15.0	13.6	20.0	21.4	17.1	14.3	10.0	7.1	9.3	16.4	18.6	21.4	22.1	20.0	15.0			52	253
50	421							6.1	11.4	10.7	15.7	7.1	8.6	5.7	2.1	2.9	3.6	8.6	9.3	16.4	17.1	14.3	7.1			50	147
48	393							8.2	14.3	15.0	7.1	6.4	5.0	2.1	2.1	2.9	1.4	2.9	9.3	7.9	10.7	16.4	8.2			48	120
46	381							8.6	20.0	15.0	7.1	3.6	1.4	1.4	0.7	0.7	0.7	1.4	3.6	6.4	10.0	6.4	6.1			46	93
44	172							3.2	7.1	3.6	1.4	0.7	0.7							1.4	0.7	3.6	2.1			44	25
42	142							7.1	9.3	2.9	0.7										1.4	2.9	2.1			42	26
40	36							1.8	0.7	0.7												0.7				40	4
38	24							1.4	0.7																	38	2
36	14							0.7	1.4																	36	2
34	5							0.4																		34	0
32	2							0.4	0.7																	32	1
30	0																									30	0
28	0																									28	0
26	0																									26	0
24	0																									24	0
22	0																									22	0
20	0																									20	0
18	0																									18	0
16	0																									16	0
14	0																									14	0
12	0																									12	0
10	0																									10	0
8	0																									8	0
6	0																									6	0
4	0																									4	0
2	0																									2	0
Total	8,760																										3911

Energy Partnership Program - East Bay Regional Parks District
2950 Peralta Oaks Court
Schedule - Base Case

Baseline Schedule

	12AM	1AM	2AM	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	7PM	8PM	9PM	10PM	11PM
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mon	0	0	0	0	0	0.5	0.5																0	0
Tues	0	0	0	0	0	0.5	0.5																0	0
Wed	0	0	0	0	0	0.5	0.5																0	0
Thurs	0	0	0	0	0	0.5	0.5																0	0
Fri	0	0	0	0	0	0.5	0.5																0	0
Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	36%	36%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

OSA F	ALL HOURS TOTAL
118	0
116	0
114	0
112	0
110	0
108	0
106	0
104	0
102	0
100	0
98	0
96	0
94	2
92	3
90	5
88	11
86	7
84	15
82	20
80	31
78	47
76	37
74	81
72	98
70	195
68	139
66	292
64	450
62	612
60	1,335
58	1,203
56	1,062
54	817
52	708
50	421
48	393
46	381
44	172
42	142
40	36
38	24
36	14
34	5
32	2
30	0
28	0
26	0
24	0
22	0
20	0
18	0
16	0
14	0
12	0
10	0
8	0
6	0
4	0
2	0
Total	8,760

TMY3 Weather Data Combined with Schedule (Enabled Hrs)

OSA F	Hour # # of Hours per year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	OSA F	Enabled Hrs
118																									**118**	**0**
116																									**116**	**0**
114																									**114**	**0**
112																									**112**	**0**
110																									**110**	**0**
108																									**108**	**0**
106																									**106**	**0**
104																									**104**	**0**
102																									**102**	**0**
100																									**100**	**0**
98																									**98**	**0**
96																									**96**	**0**
94																									**94**	**0**
92																									**92**	**0**
90																									**90**	**0**
88																									**88**	**0**
86																									**86**	**0**
84																									**84**	**0**
82																									**82**	**0**
80																									**80**	**0**
78																									**78**	**0**
76																									**76**	**0**
74																									**74**	**0**
72																									**72**	**0**
70							0.4																		**70**	**0**
68							1.1																		**68**	**1**
66							1.4																		**66**	**1**
64						0.7	0.7																		**64**	**1**
62						2.9	5.0																		**62**	**8**
60						10.7	18.9																		**60**	**30**
58						20.7	20.4																		**58**	**41**
56						20.7	19.6																		**56**	**40**
54						16.8	13.2																		**54**	**30**
52						13.6	11.8																		**52**	**25**
50						8.9	6.1																		**50**	**15**
48						8.2	8.2																		**48**	**16**
46						7.9	8.6																		**46**	**16**
44						6.8	3.2																		**44**	**10**
42						8.6	7.1																		**42**	**16**
40						1.8	1.8																		**40**	**4**
38						1.1	1.4																		**38**	**3**
36						0.7	0.7																		**36**	**1**
34						0.4	0.4																		**34**	**1**
32							0.4																		**32**	**0**
30																									**30**	**0**
28																									**28**	**0**
26																									**26**	**0**
24																									**24**	**0**
22																									**22**	**0**
20																									**20**	**0**
18																									**18**	**0**
16																									**16**	**0**
14																									**14**	**0**
12																									**12**	**0**
10																									**10**	**0**
8																									**8**	**0**
6																									**6**	**0**
4																									**4**	**0**
2																									**2**	**0**
																										261

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

Departments: County Administrator's Office

TIME REQUIRED 1 hour (20 minute staff presentation; 45 minute discussion)

SUBJECT Mono County Strategic Planning Update and 2015 Goal setting

PERSONS APPEARING BEFORE THE BOARD Jim Leddy

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Presentation by Strategic Planning Steering Committee regarding Mono County Strategic Planning effort.

RECOMMENDED ACTION:

1) Receive update on Strategic Planning effort; 2) Review and amend as appropriate Draft Planning document; 3) Direct staff to circulate draft Strategic Planning document through County regional Planning Advisory Committees for feedback and then return back to Board of Supervisors.

FISCAL IMPACT:

There is no fiscal impact at this time.

CONTACT NAME: jleddy@mono.ca.gov

PHONE/EMAIL: (760) 932-5414 / jleddy@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY 32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

Click to download

- ☐ Mono County Strategic Plan review Cover Memo
- ☐ Mono County Strategic Plan Framework Graphic Revised
- ☐ Mono County Stratgeic Plan Framework Landscape

- [ ] Mono County All Day Session Report
- [ ] Mono County Stratgeic Plan Consultant summary document
- [ ] Mono County Strategic Plan 2013 Report

History

Time	Who	Approval
1/9/2015 12:48 PM	County Administrative Office	Yes
1/9/2015 2:48 PM	County Counsel	Yes
1/7/2015 2:37 PM	Finance	Yes

COUNTY OF MONO – County Administrative Office

P.O. BOX 696, BRIDGEPORT, CALIFORNIA 93517
(760) 932-5410 □ FAX (760) 932-5411

Jim Leddy
County Administrative Officer
Acting Human Resources Director

TO: Board of Supervisors
FROM: Jim Leddy, CAO
DATE: January 20, 2015

SUBJECT: Mono County Strategic Planning Process Update and 2015 Goal setting

Recommendation:

1) Review overview of proposed Mono County Strategic Planning process.
2) Endorse Strategic Planning frame work as represented by Attachments
3) Direct staff to launch public feedback effort through county advisory bodies and return with feedback by April 15th, 2015;

Fiscal Impact: The process of Strategic Planning will be covered by existing staff resources.

Background: The Mono County Board of Supervisors beginning in January of 2013, recognized the need for long term focused planning to marshal scarce county resources to address growing long term issues facing the County. The Board held five public sessions to identify issues. This process continued into the Fiscal Year 2013-2014 Budget process where additional issues and concerns were identified. In December 2013, the Board directed staff to work across all departments to develop a framework for Board consideration as well as engage all aspects of the county organization. Further, once this draft was completed it would be brought back to the Board for review and then sent to the many public advisory bodies the County employs to garner feedback.

Effective Strategic Planning goes beyond identifying and completing tasks but changes how we do business at the County and provides new methods to engage our employees in building a Higher Performing Organization. It builds context for all operations.

The draft documents being presented to the Board reflects the input and work of virtually every single county employee. An all employee session on May 1st had feedback from 177 employees. Bi-weekly steering committee meetings by volunteer employees have reviewed and drafted additional content. In addition, employee ambassadors went to every single department and held additional session to garner their ideas.

Staff we will review the draft documents and in addition ask for feedback. Part of the presentation will also ask for Board 2015 goals.

If you have any questions regarding this item, please feel free to contact me at (760) 932-5414.

Mono County
Outstanding Community Services, Quality of Life Beyond Compare

Vision

Mission

Mono County's Mission:
To support all our communities by providing superior services while protecting our unique rural environment.

Values

Customer Service
We commit to exceptional service by managing the resources entrusted to us with integrity, trust, respect, and accountability.

Integrity
We demonstrate our integrity by ensuring our work is performed with consistency, credibility, and confidentiality.

Excellence
We strive to achieve the highest standards of excellence; continuously learn, develop, and improve; and take pride in our work.

Collaboration
We commit to responsible communication and respectful partnerships to achieve common goals.

Innovation
We strive to foster innovation and creative thinking, embrace change and challenge the status quo, listen to all ideas and viewpoints, learn from our successes and mistakes.

Results Orientation
We strive to set challenging goals, focus on output, assume responsibility, and constructively solve problems.

Strategic Directions

- Promote a Strong Diverse Economy
- Protect Natural Resources & Enhance Public Access
- Understand & Address Community Needs
- Support Healthy People in Healthy Communities
- Embrace and Reward Innovation
- Effectively Use Resources
- Workforce Workplace Wellness
- Strengthen County Culture

MONO COUNTY

Best Mono Imaginable

Mono County: Outstanding Community Services, Quality of Life Beyond Compare - To support all our communities by providing superior services while protecting our unique rural environment.

Strategic Directions	Promote a Strong Diverse Economy	Strengthen County Culture	Effectively Use Resources	Protect Natural Resources & Enhance Public Access	Embrace and Reward Innovation	Understand & Address Community Needs	Workforce/ Workplace Wellness	Support Healthy People in Healthy Communities
Methods…	v Investing in 21st century infrastructure including transportation, technology (D395) housing and economic systems; v Providing stronger customer service for businesses; v Creating business attraction and retention effort; v Ensuring local goods access to marketplace; v Investing in a world class education at local levels; v Promoting responsible growth to compliment local communities character; v Developing and broadening economic sectors in addition to tourism – Year round, sustainable economy; v Becoming a conference destination; v Providing county supports for local businesses by purchase of local goods and services; v Creating a reputation for excellence in public safety	v Increasing transparency; v Strengthening interconnection between county offices; v Holding more All Employee recognition and appreciation events; v Creating a countywide family climate; v Assuring all county job positions have career ladder even if they move from one department to another; v Ensuring all positions have accurate job descriptions to allow for best performance evaluation and recognition; v Modeling behaviors to promote public safety	v Strengthening County's Fiscal Standing; v Enhancing use of technology for service provision; v Eliminating redundancy and streamline systems; v Creating organizational agility and responsiveness; v Rewarding wise use of funds and investment in Strategic objectives; v Providing public safety oversight to protect resources	v Strengthening community awareness of preservation and enjoyment of natural resources; v Ensuring the County is an active partner with resource agencies to ensure robust public access; v Making natural resource stewardship a top priority; v Investing in a world class transportation systems – road/bike/pedestrian and transit; v Investing in public land access infrastructure (roads, campgrounds, trails, etc.); v Broadening alternative energy use; v Practicing environmentally and fiscally sustainable energy policies;	v Increasing connection between offices; v Promoting culture of opportunity built on healthy relationships; v Supporting creative problem solving and effective program/ project delivery; v Providing career ladder opportunities; v Becoming a nationally recognized model of local government for high quality services, innovation and pro-activity; v Cross-training and creating leadership development and advancement opportunities	v Collaborating with other agencies to share services; v Establishing stronger social media presence for County; v Strengthening education and communication on County Services v Surveying community – use feedback to guide service improvement; v Engaging and connecting remote areas; v Increasing effectiveness of Regional Planning Advisory Committees and other County advisory bodies; v Increasing civic engagement – town halls, satellite Board meetings, Online transmission of county meetings; v Assuring the highest level of public safety is meeting the needs of the community.	v Providing access to mental health services; v Ensuring employees have access to affordable quality child care; v Supporting policy initiatives and workforce collaboration that drive improved employee health, well- being, productive work place engagement and work satisfaction; v Providing access to affordable and safe physical fitness; v Encouraging provision of health food at employee functions; v Providing safe work environments	v Fostering community wide social emotional health across the lifespan for all residents; v Ensuring communities have access to affordable quality child care; v Accessing to affordable healthy housing; v Addressing and preventing harmful and habitual addictive behaviors through environmental intervention and policy (alcohol, tobacco and other drugs); v Providing access to youth internships for career exploration; v Providing safe sustainable, accessible and affordable transportation; v Assuring public safety concerns are addressed in a timely and effective manner

Strategic Directions … Methods… with Success measured…through resourced projects

Mono County: Outstanding Community Services, Quality of Life Beyond Compare - To support all our communities by providing superior services while protecting our unique rural environment.

Strategic Directions	Promote a Strong Diverse Economy	Strengthen County Culture	Effectively Use Resources	Protect Natural Resources & Enhance Public Access	Embrace and Reward Innovation	Understand & Address Community Needs	Workforce/ Workplace Wellness	Support Healthy People in Healthy Communities
Success measured by:	• All communities have Last Mile internet provider and Gigabit County; • Balanced housing stock in all communities with increase in the number of single family homes built; • Better transit options; • Consumer access to more goods; • Increased in diversity of business type increases; • Higher Road Pavement Indexes; • Increase and maintain school age families and in number of college ready High School graduates; • Increase in economic activity due to fishing industry; • Increase in number of home based businesses and year round open businesses and new business startups and retention and new job creation; • Increased north county winter season based recreational activities; • Increases in number of tourists; • Increases in year over year measured by quarter Tourist Occupancy Taxes, sales tax figures and property values; • Local business owners have full access to local markets without disruption; • Local employee pool of skilled workers increases; • Reduced unemployment, business bankruptcy rates; • Public has access to all goods and services needed for high quality of life; • Reduction in commercial vacancy rates; • Reduction in need for social, health and welfare services; • Year over year increase in conferences held;	• All departments have online presence with more website and social media visits; • Higher employee participation at events; • Expand Board Update articles from Employees; • Friendlier work environment/reduced stress among employees; • Greater employee awareness of County functions across all departments; • Greater skill set among employees; • Less siloed departments and lower employee turnover; • Lower long term liabilities and less debt; • Mono County programs imitated in other jurisdictions; • More applicants for promotions; • More Inter/Intra Department work groups coming together to solve issues; • Organizational proactivity; • Skill building courses for employees; • Stronger sense of one organization among employees – Less "Us vs. Them";	• Cost reduction and elimination of redundancy; • All departments have online presence with more website visits, social media activity and online services; • Greater employee awareness of County functions across all departments; • Greater skill set among employees; • Increased Budget reserves along with lower long term liabilities and debt; • Cohesive and partnering departments; • Lower employee turnover; • More proactive on unexpected issues; • National/State awards for excellence; • Reduced response time;	• Better conditions on public lands even with greater use; • Less violations for destruction of natural resources; • County's issues reflected in state and federal policy; • Enhanced access to public lands more miles of trails; • Higher Pavement Index Roads – Less potholes; • Higher transit use rates; • Higher visitor satisfaction as measured by survey; • Increased access to and use of public lands with user friendly outdoor opportunities; • Increased public support for joint agency efforts; • Local issues considered by state federal decision makers; • More green energy production in low impact distributed systems; • More investment in trails, bike and pedestrian routes and public access with outdoor amenities – picnic tables; bathrooms; bike racks; • Power from alternative sources; • Reduced energy use/cost; • State and federal resources support county/public priorities; • Support for revenues and resources for public land investments; • Zero Net Energy for County facilities.	• Better County service systems; • Higher turnout at County recognition events; • County is recipient of National/State awards for excellence; • Friendlier work environment/reduced stress among employees – measured by survey annually; • Greater employee awareness of County functions across all departments; • Greater skill set among employees- more cross trained employees; • Less siloed departments; • Lower employee turnover; • Mono County programs imitated in other jurisdictions; • More applicants for promotions; • More Inter/Intra Department work groups coming together to solve issues; • More skill building courses for employees offered by the County;	• Stronger support for county initiatives with Higher public awareness and approval of County services; • Greater use of the Eastern Sierra Council of Governments (ESCOG) and More Shared Service and regional agreements; • Increase web traffic to County pages; • More applicants for and increased attendance to RPAC meetings; • More attendance to county meetings; • More information provided to community through Annual Report and State of the County; • Better services tailored to individual community needs;	• Employees report adequate child care through annual survey Health outcomes; • Healthy work environment measured by employee survey; • Increase number of people participating in Snowcreek Athletic Club, Double Eagle and Bridgeport Health center; • Increased frequency of membership visits; • Monitor collaborative group efforts to supply quality affordable child care; • Less workers compensation claims.	• Less crime with fewer arrests and public safety violations. • Higher health standards of residents; • Lower disease rates;

Strategic Directions … Methods…with Success measured…through resourced projects

Mono County: Outstanding Community Services, Quality of Life Beyond Compare - To support all our communities by providing superior services while protecting our unique rural environment.

Strategic Directions	Promote a Strong Diverse Economy	Strengthen County Culture	Effectively Use Resources	Protect Natural Resources & Enhance Public Access	Embrace and Reward Innovation	Understand & Address Community Needs	Workforce/ Workplace Wellness	Support Healthy People in Healthy Communities
Potential Projects	Economic Development Strategic Plan; June Lake Ski Area/Rodeo Grounds; June Lake Ball Field; Extend Water/sewer Lines from Mammoth Community Water District to Sierra Business Center; Bridgeport Valley Nordic Ski center; Implement RPAC Priorities (Main Street Revitalization, expand Recreational; opportunities, Multiagency visitors center, Gateway monuments); Lower Rock Creek development; Promote Bridgeport at Gateway to Bodie; Improve Mammoth Airport Road; Regional air service (out of Bishop); Digital 395; Permanently waive building fees for private solar projects;	Review County staff organizational Structure; Public service accountability; Live Streaming of Board meetings; Re-organize weekly Board meetings; Promote public attendance; Public recognition events.	Facilities: Old Clinic; Bridgeport Campus Plan; Memorial Hall improvements; Antelope Community Center; ADA Issues; Conway Ranch; Paramedics Program sustainability; Sheriff Substation Use; June Lake/Rodeo grounds; Oversight Committees; Vehicle replacement – CARB Compliance; Social Services office space needs; Replace Election equipment; Review A-87 Charges; Comprehensive County Facilities Plan; Biomass Feasibility study; Landscape Screen on South/West Bridgeport Yard and replace non compatible Dark light fixtures; Reduce County Fuel usage; Repaint Mono County entry signs; Solarization of County facilities;	Conway Ranch; Develop infrastructure to connect lands with progress of Regional Trail system; Ambassadors / education; Create Bridgeport Valley Nordic Ski Center; Implement RPAC Priorities (Main Street Revitalization, expand Recreational opportunities, Multiagency visitors center, Gateway monuments); Geothermal: facilitate replacement of machinery at existing plant; Lower Rock Creek Development; Help Finance Last-mile paving to Bodie; Deer Fence/Grade separation at Sonoma Junction; Deer/Snow/Airport/Safety Fence: SR 203/Hwy395 – Deer under-crossings; Improve water quality at Crowley Lake; North Conway passing lane; Tioga Pass Heritage project; Fix Auchoberry Pit Eroding slopes; Initiate single use plastic bag ban; Sheep fencing around Conway and Mattley ranches;	Employee recognition	Live streaming of Board meetings; Develop Legislative Agenda; Reorganize board meetings to promote attendance; Tri valley Flood Control Ditch; Bridgeport Fire Safe Council; Assist public at satellite locations for animal control; Implement RPAC Priorities (Main Street Revitalization, expand Recreational; opportunities, Multiagency visitors center, Gateway monuments); Tri valley EMS service; Mono Basin planning efforts through RPAC; Crowley Community Service Area 1 projects;		Affordable Housing for workforce; Develop local food system

Strategic Directions … Methods…with Success measured…through resourced projects

Mono County - Next Immediate Steps after May 1st All Staff Meeting

Words from all comments about "Best Imaginable Mono County"

Mono County's Staff Vision of Best Imaginable Mono County

Mono County employees gathered May 1, 2014 in Lee Vining for an All Staff Meeting. Prior to the meeting each staff member was given the opportunity to contribute to the vision of "Best Imaginable" Mono County by emailing or faxing their descriptions to the Kiely Group. The responses sorted into the following categories*:

- One Mono County
- Healthy, Happy Citizens
- Effective Use of Resources
- Embracing Innovative Solutions
- Protected Natural Resources
- A Model to Other Government Agencies
- Attractive to Businesses
- County Employees a High Performing Team

*The names for these categories are labels from KGi, and should not be seen as significant by themselves. Addendum #1 contains the supporting data/definition for each label.

Sample vision statement:

"One Mono County" where citizens, organizations, county staff, and visitors work together toward the best imaginable Mono while valuing and preserving our assets, our diversity, and our uniqueness.

Recommended Next Immediate Steps on Finalizing the Vision Statement

1. Distribute this document to all staff
2. Set a date for the Strategy Planning Group (Thursday Meeting) to take the data and develop a draft vision for the County. Let people know there is more to come; these are the most immediate next steps.
3. Decide who will participate in the facilitation training for "Ambassadors" to prepare for taking the vision and plan to the internal and external communities
4. During next Strategy Planning Group, work on draft of vision statement and begin developing "Ambassadors"
5. Seek responses from those staff who did not attend the all staff meeting. Ask them to answer the question, "Addendum 1 is our working draft of the vision for Mono County, what do you think we need to do to achieve this vision?"
6. Ambassadors facilitate external community town halls and interviews for public feedback
7. Finalize the vision (should clearly answer the question: "What Mono County Employees are solving for.")
8. If this will be a document for the public, present the draft vision to the Board of Supervisors for comment
9. Based on how this process goes, revise any next steps at this point

How to Achieve the Vision:

After setting some context and creating a new frame of reference for working together, the participants took a look at the vision the employees defined for Mono County. They had a discussion about what it would take to achieve this vision. The ideas recorded from this activity can be found in Addendum #2 of the retreat document. The ideas are categorized into the following areas:

- Mono County Team Mentality
- Staff Feeling Appreciated
- Culture of Innovation & Trust
- Solution Orientation
- Economic Strength & Stability
- Thriving Citizens & Natural Resources
- Efficient System
- Equipped for the Work
- Policies to support work

The list of ideas generated from this discussion included both short and long term solutions. Some could be implemented very quickly for little to no cost, while others are more in-depth approaches, requiring a more planning for execution. Alternatively,

there are ideas that require no authority to put in place, while others require a more sophisticated decision-making process. The matrix below highlights examples of each:

	Low level of decision-making	High level of decision-making
Easy to Implement	• Show appreciation for work of others • Network with other counties to find what has or hasn't worked for them	• Collaborate on community outreach efforts - improve cultural competency and initiatives, positive relationships with community while educating about resources • More county-wide activities to learn what each dept. does, which can lead to interdepartmental functionality
Complex to Implement	• Do a little cross-training between employees, with dept/agency • More openness and trust between management and employees	• Energy efficiency projects (more) protect natural resources, increase fees • Take leadership in the county for vocational training for local kids in non-confidential service areas, e.g. animal control, public works, parks • Streamline processes, infrastructure, customers

Recommended Next Steps for Working Toward the Vision:

1. Have a small workgroup use the matrix above to sort the ideas in Addendum 2 and the new responses generated from the people who were not in attendance at the all staff meeting
2. This same group should then review the list of unique/innovative ideas generated at the all staff meeting and from the people who were not in attendance (this data is collected but not included here in this document)
3. Schedule a session of the Strategy Planning Group to prioritize the ideas in each quadrant with the intention of determining 1- and 3- year goals

One Mono County

- A county wide Family-like climate
- Interconnected workplace between Mammoth & Bridgeport
- Strong Team Spirit
- The small communities within county receive services designed to improve functioning, resident involvement, and quality of life within the community

Protected Natural Resources

- Stewardship of the environment is top priority
- Be as environmentally friendly as possible
- Community awareness in regards to the preservation and enjoyment of our beautiful natural resources
- Bring awareness to all residents about protecting our beautiful natural resources
- Preserve the environment for future generations

A Model to Other Government Agencies

- A nationally recognized model of local government for innovation and highest quality services which others seek out to learn from
- A leader for California as to how to work together to create a live, active, meaningful, sustainable process that allows us to address difficulties and promote healthy relationships with self and others
- Being the most efficient County, Nationwide

Attractive to Businesses

- Incentives for the locals in order to keep dollars local
- Quicker response for the end users
- Strong, diverse local economy
- A county that promotes controlled growth – residential & economic
- Reduce the county's economic dependency on tourism

Healthy, Happy Citizens

- Driven by the principles of honesty, fairness, compassion and social justice
- Services designed with the needs of County residents prioritized
- Understanding the needs of the people we serve
- Simple, streamlined, easy to understand services for county residents and visitors
- Safe place to raise children
- A place where you can live and work without struggling to afford rent and buy groceries
- Outstanding quality of life for residents
- All Mono County residents a sense of community by providing Cultural Competence Awareness based on respect, trust and appreciation
- Outstanding service to constituents and visitors to our County
- North county desperately needs more medical services and a pharmacy
- Without emotional and physical health, no one person can lead a productive life, personally and professionally

Effective Use of Resources

- Functional infrastructure
- less redundancy
- Interconnected workplace between Mammoth Bridgeport
- Organizational Agility
- Fiscally healthy
- Opportunity for career development and salaries that keep talented people
- Stop the age old application of “Use it or lose it” budgeting
- Develop Career Paths for all county positions, for employees to have a goal to achieve, and to improve employee satisfaction and commitment.
- I think IT could have a bigger presence with all departments

Embracing Innovative Solutions

- Creative problem solving and perseverant project delivery
- Promote a culture of opportunity
- Embrace and implement new ideas

County Employees / High Performing Teams

- Open (and much better) communication between Departments, Public and even within our own offices
- Take pride in our work
- We develop and use resources to enable the first line provider of service to effectively meet citizen needs
- Function as a cohesive, collaborative, and complete organization
- Reduce/eliminate the use of “that’s not in my job description”
- Team focus
- Policies that encourage departments with common interests, goals and missions, to work together
- A government whose services inspire the awe of the public as the Sierra does to the world
- Leadership is modeled from the top down
- Employees at all levels are eager to jump in and help each other out

Addendum #2

Mono County Team
Support our employees in volunteering at other agencies, businesses, etc. as part of the their county job/work hours
More county-wide activities to learn what each dept. does, which can lead to interdept functionality
Understand other dept roles
Much more communication between departments
More team work
More cohesion between depts.
A couple times/year have someone from other departments come to staff meeting and discuss issues, give contact details, know/learn what's going on across county
Team building
Team approach
Unsiloed
Heal the splits
Consistent meetings with all county - build teams
More whole county events to know each other
Relationship
Information
Model to other government agencies, training, increase revenue to afford training, fund maintenance support vehicles & buildings
One Mono County - make constituencies and coworkers feel like they are important, answer the phone in a friendly manor. Try
One Mono county – communication, implementation, leader allowed to lead make mistakes
Have county-wide events where employees engage with new people through ice breakers, games or other interactive activities
Organize after-hours activities where employees can socialize in a fun environment
knowing our roles and how or where we fit into and support other departments and projects with goals and objectives
More community events to Bridgeport (fun) - coordination between communities
Reduce North/South polarization of the County
Communication

Staff Appreciation
Employee Wellness Program
Create an appreciation program (community) that goes around the county giving special thanks to each agency by providing them with a full service lunch or brunch
Show appreciation for work of others
Real career paths
Encourage and reward positive, trustworthy behavior
Get out of your comfort zone
Fairness, training, consistent appreciation
Culture of Innovation and Trust
Tell Why
More openness and trust between management and employees
Embrace all ideas
Project planning includes everyone
Patience
Be okay with change
Build our own relationships internally to build relationship others externally- build bridges between longer tenured employees and newer employees
Positive/proactive vs. responses
Transparency
Remote & encourage risk taking
Denote negativity
Be organized
Cut entitlement
Insensitive
Give and take
A model government implementation of ideas
Accountability
Commitment
Leaders allowed to lead without fear
Proactive meetings, revenue generation, user friendlly
Open minded
Collaboration
Training, planning, tracking, communication, follow-up
Build trusting relationships to improve communication
Solution Orientation
Target the right employees by surveying who is interested in which idea, then collect input from them that will put it into action

Opportunities to create new ideas
Learn about what specialties people within depts have to consult on cases (e.g. working with public health personnel to assist/advise on livability concerns of a home)
Meetings with IT on what directions our depts want to go
Implementation of ideas not just planning
Economic Strength & Stability
Promote self-sustaining services
Promote vision
County buy from small, local businesses for trainings
Digital 395 up to date/speed
Attractive to business - Do not reduce dept on tourism. Find new tourism opportunities. Legalize marijuana growth. Sell plant tag. Reduce road blocks to new business i.e. Buster's parking lot
Diversify our product offering - move from tourism to digital
Competition: improve business performance
Incentivize private business - bring in new commerce
Attractive to business - make the process easier
Need ways to generate revenue
Increase affordability of healthy foods in Mono County
Year round stable economy wih less dependency on tourism
Support quality affordable child care for all, you can't invite business without it
Sustainable economy
Thriving Citizens & Natural Resources
Encouraging more citizen involvement
Collaborate on community outreach efforts - improve cultural competency and initiatives, positive relationships with community while educating about resources
Commitment to integrating services to remote areas
Educate the public on reality
Clear goals toward community health
Meeting the basic needs - housing, food, medical
Protect natural resources begin at home model off road use on good example i.e. mammoth snowmobile trails
Empower and rely on end user/customer, inform, train, hire carefully
Energy efficiency projects (more) protect natural resounces, increase fees
Healthy happy economy
Balanced natural resource / multiuse based plan
Community promotion
Make Mono County user friendly
Market quality of life (our competitive advantage)

Emphasize family fun - not partying in tourism and local events
Ensure adequate health and wellness services for all life stages
Public transportation between communities at variety of hours
Ensure maintenance of preventative behavioral health services in schools
Take leadership in the county for vocational training for local kids in non-confidential service areas, e.g. animal control, public works, parks
Reliable services
Renewable & efficient
Create HHS team to visit rural areas, PHN, Behavioral Health, Social Services, WIC, clerical
Mandatory recycling (beyond cans)
Efficient System
Sustainable and responsible fiscal decisions
Reduce/eliminate burdensome and unnecessary regulations
Develop budget that enables first line service provider to work effectively
Streamline systems, contract, purchase orders, time cards
Service redesign - simplify processes, consolidate depts, eliminate reqs, ask why
ensure adequate resources to meet goals and expectations of board constraints
Stop use it or lose it budgeting mentality and practice
Do not loose state grant money due to county furloughs and cuts
Loosing granted state money will alter allocations for the future
Restructure
Streamline processes, infrastructure, customers
Cross training
Network with other counties to find what has or hasn't worked for them
Do a little cross-training between employees, with dept/agency
Equipped for the Work
Educated
Leadership development program
Learn technology
Policies to support work
Promote /legislate health policy that enhances health and prevents chronic disease. Research shows legislated health policy is not bad for business
Promote progressive health policies for businesses so it supports positive community behavior

I. Thriving People & Places

- Driven by the principles of honesty, fairness, compassion and social justice
- Services designed with the needs of County residents prioritized
- Understanding the needs of the people we serve
- Simple, streamlined, easy to understand services for county residents and visitors
- Safe place to raise children
- A place where you can live and work without struggling to afford rent and buy groceries
- Outstanding quality of life for residents
- All Mono County residents a sense of community by providing Cultural Competence Awareness based on respect, trust and appreciation
- Outstanding service to constituents and visitors to our County
- North county desperately needs more medical services and a pharmacy
- Without emotional and physical health, no one person can lead a productive life, personally and professionally
- The small communities within county receive services designed to improve functioning, resident involvement, and quality of life within the community
- Quicker response for the end users

A. Strong Economy

- Incentives for the locals in order to keep dollars local
- Strong, diverse local economy
- A county that promotes controlled growth – residential & economic
- Reduce the county's economic dependency on tourism

B. Protected Natural Resources

- Stewardship of the environment is top priority
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- Community awareness in regards to the preservation and enjoyment of our beautiful natural resources
- Bring awareness to all residents about protecting our beautiful natural resources
- Preserve the environment for future generations

II. County Employees / High Performing Teams

- Open (and much better) communication between Departments, Public and even within our own offices
- Take pride in our work
- Function as a cohesive, collaborative, and complete organization
- Reduce/eliminate the use of "that's not in my job description"
- Team focus
- Policies that encourage departments with common interests, goals and missions, to work together
- A government whose services inspire the awe of the public as the Sierra does to the world
- Leadership is modeled from the top down
- Employees at all levels are eager to jump in and help each other out
- A county wide Family-like climate
- Strong Team Spirit
- Being the most efficient County, Nationwide
- Interconnected workplace between Mammoth & Bridgeport

A. Effective Use of Resources

- Functional infrastructure
- Less redundancy
- Organizational Agility
- Fiscally healthy
- We develop and use resources to enable the first line provider of service to effectively meet citizen needs
- Opportunity for career development and salaries that keep talented people
- Stop the age old application of "Use it or lose it" budgeting
- Develop Career Paths for all county positions, for employees to have a goal to achieve, and to improve employee satisfaction and commitment.
- I think IT could have a bigger presence with all departments

B. Embracing Innovative Solutions

- Creative problem solving and perseverant project delivery
- Promote a culture of opportunity
- Embrace and implement new ideas
- A leader for California as to how to work together to create a live, active, meaningful, sustainable process that allows us to address difficulties and promote healthy relationships with self and others
- A nationally recognized model of local government for innovation and highest quality services which others seek out to learn from

Mono County Strategic Planning Process

Background

Strategic planning is a process which focuses an organization on long-term issues, establishes clear purpose for all staff and produces a system of results oriented measurement that reinforces how best to use scarce resources for maximum return. In local governments, as resources have diminished over the last 15 years and more dramatically in the last 6, Strategic Planning has given the public and policy makers the ability to focus not merely on the next year but the next five, ten and twenty years, build an effective understanding of services and focused investment on service improvement.

Effective strategic planning goes beyond identifying and completing tasks but changes how we do business at the County and provides new methods to engage our employees in building a Higher Performing Organization. It builds context for all operations.

Local governments across California, including Mono County, have seen a growing imbalance of resources and responsibilities. As state and federal governments have shifted responsibility for service delivery and reduced overall resources, counties have seen growing financial pressures. This shift, coupled with reductions in local revenues (such as property taxes, local sales and tourism taxes), has made the ability of the County to plan for the long term difficult. As counties deliver or provide 75% of all services that constituents receive, the budgeting process has become a triage from year to year, being dependent on the next economic bubble.

It is customary for private and other public agencies to utilize the strategic planning process. The lack of resources, the lack of clarity of purpose and the increasing expectation of the public for services require us to follow suit.

Mono County faces a series of long-term liabilities and reduced resources to address them. In addition, the Board has identified a number of community issues which also need focus. The County long term liabilities and issues were touched upon during the 2013-2014 FY Budget Hearings. They are detailed in Attachment A – Table of Liabilities from Budget 2013-2014 hearings. The Board through five public sessions created a series of projects (Attachment B) which reflected short, medium and long term issues the County must also address.

A process to coalesce all of these elements and issues together into one cohesive plan is before the Board today. The development, refinement and adoption of a Strategic Plan will provide an evolving road map for the next five, ten and 20 years. It must be a living document built with the employees, public and the Board which creates a direction to guide decisions and focus resources on the most important needs. It will never be complete as issues and circumstances change but it must be absolute in its target of the long term challenges.

Strategic planning supports broader education and understanding by the public of what counties do and why, helps employees improve the services they provide and allows policy makers to have measurable results to guide future policy decisions. It will not be quick, easy or simple and requires discipline and commitment to be successful. When the County

has developed and launched a Strategic Plan, County liabilities and the projects identified should have a place within the plan and should be prioritized. Future issues that arise will be viewed thru a lens for guiding where scarce resources go. As there are limited resources, there will be some things which are not funded.

Good strategic planning takes time, commitment and involvement from all parts of the organization. As an organization moves through the process, the end result will focus what we are doing and why.

A strategic plan is not a one-time project, but a system an organization adopts and commits to, wherein it constantly reviews, measures and improves services and prioritizes where it commits resources.

There are key components to a strategic plan:

- Vision – Where are we going and what will we be when we get there?
- Mission – what is our purpose, our reason for existing?
- Goals – What are we going to achieve and how?
- Values – What motivates our service? What Principles do we live by?
- Results – How will we measure success?

For Mono County which has been impacted by the feast and famine of outside economic forces, inconsistent weather patterns and a county where over 94% of the land is controlled by federal and state agencies, some guiding questions include:

1. Where are we going?
2. Who do we want to be?
3. How will we provide the best services that matter most to our residents and visitors?
4. How are we accountable for service delivery?
5. How will we know success?

The following proposal reflects the first needed step to the process. It includes a process timeline, constituencies, and methods for engaging people in this process. It will take time and be an exercise in engaging and listening to constituents, creating options, weighing choices and choosing a path. Once a full Strategic Plan is adopted, we can use it to guide our budgets, focus and measure service improvement and invest in Mono County. The strategic planning process will help us to create our future as Mono County, the future we all desire.

I. **Mono County Strategic Planning Elements**

a. **Vision** – What is the future we intend to create for the County? What defines what we do and how do we know if we are doing it well?

b. **Values** – Why do we want to be high performing in first place and what principles will we live by?

c. **Mission** – What is our purpose and reason for existing? Are we delivering the key services and products with high value to our constituents?

d. **Results** – How can we measure the results of our services

i. Customer value, quality and financial performance?
ii. How will results guide future service improvements?
iii. What measurement outcome tools do we need?
1. Customer satisfaction surveys
2. Employee surveys
3. Return on Investments
4. Benchmarking

II. **Mono County Strategic Plan Development**

a. Schedule and Engagement of Constituencies

i. All Employee sessions – January – April
1. Host sessions with employees – south and north county
2. Department level discussions
a. Strength, weakness, Opportunity and Threat inventory
b. Mission, vision, value development
c. Draft Plan created
d. Bring back to Board

ii. Board sessions – March-May
1. Regular Board items updates
2. Board holds final adoption

iii. Public and virtual town halls/align with Budget – April-June 2014

1. Online input and feedback

iv. Host series of Public meetings to receive feedback from draft

1. RPACS - Circulate draft Plan through all RPACS for feedback into plan;

2. Town Halls - 1 per Supervisorial District in addition to RPACs)

III. Ensure integration of existing identified projects and long term issues

a. Board's Priority projects – Attachment B
b. 2013-2014 Budget Project Matrix Attachment C– Annual Budget Work Projects

IV. Ongoing commitment to review and update of MCS Plan

a. Schedule annual review of Plan before Board – Pre Budget Adoption or as part of Budget

i. Project completion update
ii. New projects/removal of completed projects - adding, completion, subtraction, and re-focus

V. Creating measurable outcome and measuring results/tools

a. Possible outcomes measurements -
   i. Long term liability reductions – Table A
   ii. Increasing Reserves – Annual growth to match policy of 15% recommended Reserves
   iii. Long term debt reduction
      1. Unaccrued Actuarial Liability (Pension debt)
      2. General Obligation Bonds
      3. Credit Rating Improvement
   iv. Capital investment and improvement
      1. Higher Pavement Management System Index for Roads
      2. Less maintenance expense for County facilities
      3. Reduction in energy use of fleet and facilities

b. Constituent/customer survey – Approval Rating
   i. Data Gathering
      1. Online feedback thru website
      2. Annual survey of public
      3. Customer survey at all public accessible offices

c. Employee annual survey
   i. E-survey
   ii. Annual All employee meeting – check in and feedback

VI. **Budgeting to strategic priorities** – Strategic Plan as lens to focus budget priorities

a. Bringing all agenda items under one of the Strategic Goal Areas
b. Tracking investments in each Strategic Goal Areas
c. Budget and Department efforts part of a designated Strategic Goal Areas

Table A - MONO COUNTY Long Term Liabilities and Unmet Needs			
Issues	**Potential Remaining costs**	**Cause**	**Timeline**
California Air Resources Board (CARB) Clean Air Compliant vehicles	**$25 million[1]**	**State mandate for clean air vehicles**	**2028**
Solid Waste Issues – Landfill closures and monitoring	**$6.68 Million[2]**	**State Law**	**2023/2029**
New Jail	**$25 Million[3]**	**Population growth/use**	**2020-2025**
Prudent Reserves	**$3.7 Million[4]**	**County Fiscal Policy**	**2018**
Infrastructure (Roads, Parks, community center upgrades)	**TBD**	**Replacement and maintenance**	**As warranted**
New elections system	**$225,000[5]**	**State mandate/ Aging technology**	**2016-2017**
Improved County Information Technology	**TBD**	**Ensure adequate technology to support county services**	**??**
Social and Health Safety Net Services	**TBD**	**Serving resident unmet needs**	**??**
Increased Economic Development Investment	**TBD**	**Grow the Economy**	**ASAP**
Labor costs	**1% COLA[6] = $255,000 annually**	**Attract, retain and employ top employees**	**??**
TOTAL	**$ 60.6 million**	**Does not include Labor any potential compensation increases.**	

[1]*= Prior purchases of Clean Air vehicles have reduced liability and 2013-2014 Recommended Budget proposes $1 million for vehicle replacement. First deadline is 2019 and approximately $5 million.*
[2]*= Benton Crossing Closure and post closures costs in Enterprise Fund $3.2 and 3.48 for Pumice Valley if closes in 2029*
[3]*= New Jail will be required as AB 109 (State Realigned Prisoners) impacts grow long term inmate population at County jail.*
[4]*= FY 2012-2013 Reserves are $1.7 million. By County Policy it is recommended Reserves be at least 15% of General Fund Expenses. Current GF expenditures are $36 million and 15% would be 4.3 million. The FY 2013-2014 Recommended Budget would add $50,000 to Reserves.*
[5]*= Changes in State election law require county to review and investigate replacing current voting machines. Cost for replacement is estimated at $225,000 but alternative systems may be option which may cost less.*
6=a one (1) percent Cost of Living Adjustment would cost approximately $225,000 annually if granted to all employees.

Table B - Board of Supervisors Planning Workshops
January 15, 2013; March 12, 2013; April 9, 2013; May 14, 2013; May 21, 2013

Supervisor Alpers	Supervisor Fesko	Supervisor Hunt	Supervisor Johnston	Supervisor Stump	Public Input	Staff Input	Planning Commission
	Facilities: old clinic, Bridgeport campus plan, Memorial Hall, Antelope Valley Community Ctr		Facilities: Bridgeport campus plan, landscape Lee Vining Community Center	Facilities: ADA, jail, maintenance, energy efficiency, planning; prioritize funding		**Public Works** ADA issues Facilities Asset Protection	Facilities: Old Clinic (convert to solar)
	Solid Waste Plan	Solid Waste Plan: long-term plan	Solid Waste Plan: Benton Landfill	Solid Waste Plan: long-term and contingency plans			Landfill
Economic Development	Economic Development	Economic Development	Economic Development		Econ Dev Countywide: assist growth of new/ existing business; solarization; access to health srvs; creative financing for long-term replacement needs		
Organizational Structure/Staffing: public service accountability		Organizational Structure/Staffing: HR Director	Organizational Structure/Staffing: facilities, engineering, HR	Organizational Structure/Staffing: HR Director	Staffing: as it relates to budgeting (top to bottom review); professionalism		
	Conway Ranch	Conway Ranch: success	Conway Ranch		Conway Ranch: enhancement/ manager		Conway Ranch: better management
Employee Recognition: public achievement	Employee Recognition	Employee Recognition	Employee Recognition				
	Paramedic Program	Paramedic Program: reorganization/review	Paramedic Program	Paramedic Program: cost containment			
	Substation	Substation	Substation (off demolition list)				Substation: revisit dog sled use permit
June Lake: ski		June Lake: ski	June Lake: ski				June Lake

area/rodeo grounds		area/rodeo grounds	area/rodeo grounds				Ball Field: multi-use concept (i.e. soccer, concerts, etc.)
		Oversight Committees: Finance, Public Safety	Oversight Committees	Oversight Committees			
	Parking Ordinance		Parking Ordinance				Parking Ordinance
		Live Streaming of BOS Meetings	Live Streaming of BOS Meetings		**Value of live interaction vs. video**		
		Develop Legislative Agenda	Develop Legislative Agenda				
Supervisor Alpers	**Supervisor Fesko**	**Supervisor Hunt**	**Supervisor Johnston**	**Supervisor Stump**	**Public Input**	**Staff Input**	**Planning Commission**
MISCELLANEOUS		**MISCELLANEOUS**	**MISCELLANEOUS**	**MISCELLANEOUS**	**MISCELLANEOUS**	**MISCELLANEOUS**	**MISCELLANEOUS**
Reorganize Weekly Board Mtgs: promote public attendance and Supervisor education		Progress on Regional Trail System	Public Recognition	Vehicle Replacement	Public Lands Access: develop infrastructure to connect lands; maintain amenities; ambassadors; education	**Social Services** Potential space needs due to Health Care Reform (pre-enrollment begins 10/1/13)	
			Extend Water/Sewer Lines from MCWD to Sierra Business Park	Review A87 Charges	Bridgeport Fire Safe Council	**Clerk** Elections Equipment Space Needs	
			Bridgeport Valley Nordic Ski Ctr	Tri Valley Flood Control Ditch	Bridgeport Valley: economic dev; implement	**Animal Control** Assist public at satellite locations	

					RPAC priorities (Main St. revitalization, expand recreation opps, multiagency visitor's center, gateway monuments)		
			Geothermal: facilitate replacement of machinery at existing plan	Tri Valley EMS Service	Implement Mono Basin Community Plan	**Health Care Services** Implementation of Affordable Care Act	Mono Basin planning efforts through RPAC
			Biomass Feasibility Study	Lower Rock Creek Developmen t	Help Finance Last-Mile Paving to Bodie		
			Affordable Housing for Workforce	Crowley CSA 1 Projects (County improve communicati on with CSA)	Develop local regional food system		
			Deer Fence/Grade Separation at Sonora Junction		Promote Bridgeport as Gateway to Bodie		
			Improve Mammoth Airport Road		Improve water quality at Crowley Lake		
			Deer/Snow/Air port Safety Fence: SR 203 and Hwy 395; deer under-crossings		Develop one water system in Crowley Lake		
			North Conway Passing Lane Project		Regional air service for the Eastern Sierra (out of Bishop)		
Supervisor Alpers	**Supervisor Fesko**	**Supervisor Hunt**	**Supervisor Johnston**	**Supervisor Stump**	**Public Input**	**Staff Input**	**Planning Commission**
			Tioga Pass Heritage Highway Project		Digital 395: broadband service to homes and free		Digital 395

					wireless to community main streets		
			Fix Auchoberry Pit Eroding Slopes		Update and upgrade the County General Plan avalanche section		
			Landscape Screen on South/West side of Bridgeport Yard and Replace Non-Compatible Dark Sky Light Fixtures				
			Permanently Waive Building Fees for Private Solar Projects				
			Initiative to Ban Single-Use Plastic Bags				
			Goals to Reduce County Fuel Usage				
			Training/Team Building at All Organizational Levels				
			Repaint Mono County Entry Signs				
			Solarization of County Facilities				
			Sheep fencing around Conway and Mattley ranches				

FY 2013-2014 Budget Follow Up items- Updated 10/29/2013

Department	Request	Notes	Expected completion date	Completion Date
Sheriff	Can we develop a Reserve Deputy corps to reduce costs	There is a Reserve Academy underway	October 15, 2013	October 15, 2013
	Can we reduce or eliminate overtime through permanent hires?	Bring back at Midyear.		
District Attorney	Number of Investigations completed annually?	Bring back at Midyear.	February 11, 2014	
Probation	Will there be an analysis of the types of offenders under Probation in order to understand impacts of AB 109	Yes - CCP will be providing	October 15th, 2013	
Community Development	Overtime reduction possible	Department is fully staffed and will review.	Completed	September 3rd, 2013
	How many permits in 2012?	112 Permits exceeding $50,000 valuation =17 6 Single Family Homes plans by August of last year.	August 14, 2013	August 14, 2013
	How many permits in 2013 to date	170 (as of August 14th, 2013) Permits exceeding $50,000 valuation =18. Single family residential permits = 8		
	Waiver of Solar fees to enable greater solar deployment?	Analysis as part of Master Fee/Permit Workshop	November 12th, 2013	
	Should Mammoth Lakes Housing manage county owned housing units	Department will analyze and bring back recommendation.	October 15th, 2013	
	There was $250,000 impact fees - where is it?	There is $237,000 in fund 291 – EIR/Planning	n/a	
	LAFCo Membership needs north county representative	One may be pending	As soon as possible.	
	Do we have contract building inspection services	Yes	August 13, 2013	August 13, 2013
Airports	Should Airport Land Use committee be reactivated?	Policy Discussion for Board	December 2014.	
Economic Development	Do we have Economic development Specialist for D395 post completion?	Discussion point for Mid year Recruitment for half item position underway	January 2014	

		(9/11/2013)		
Public Works	Do we have contract engineer services?	Yes	August 14, 2013	August 14, 2013
Campgrounds	Should we raise County Campground fees to improve and maintain county campgrounds?	Master Fee/permit workshop	November 2013	
	How do County fees compare with state and federal campgrounds?	Master Fee/permit workshop		
Capital Improvement	What was previous vehicle replacement program?	Schedule Board workshop	November 12th, 2013	
	Request analysis and staff presentation on financing alternatives to meet CARB Compliance - Options such as borrowing from County Treasury;	Finance will begin analysis on financing options.		
	What is status of Treasury Advisory Committee and can they review CARB financing proposal?	Finance will begin analysis on financing options.		
	What is County responsibility for cemetery maintenance and can we explore alternative model (i.e. Antelope Valley)?	Public Works to analyze and report back to Board Memo will be prepared.	November 2013	
	County Service Area Annual report requested	Public Works will craft Board item	December 10th, 2013	
Facilities	Do we have Backup Documentation of cross training in facilities?	Public Works/Human Resources will craft report for Board.	November 2013	
Motor Pool	Is our vehicle replacement schedule too strict and costing county unnecessarily?	Schedule Board workshop	November 2013	
	What is the repair history of Mono County fleet?			
	What is size of the fleet?			
Roads	Should we consider augmentation for roads - supports tourism?	Asset Management System needs to be online	January 14th, 2014	
	Does the Town of Mammoth Lakes have a road striping machine county can use to save money?	CAO consult Town Manager Public Works will pursue MOU with Town for review	November 2013	
Information Technology	Review the painting of poles in General Plan review of communication towers/power poles.	IT working through the Communications Element of General Plan currently.	December 17th, 2013	

	Costs of requiring undergrounding?			
Public Health	Can we explore cost of portable generators for emergency use for communities?	Public Health/Public Works to analyze cost and provide Board with update Memo?	December 2013	
Social Services	Need ESAAA Update at Midyear	Social Services will provide report	January 14th, 2014	
	Can we develop volunteer program to augment services (such as senior meals)?			
	Need to augment Foster Parent program - Public Service Announcements?	Social Services will review and report back. Memo being prepared (9/11/13)	November 2013	
Paramedics	Countywide Fire District worth exploring?	Public Health, CAO, Finance and Human Resources to analyze. Bring forward discussion to Board.	April 15th, 2014	
	Seek legislation to allow Fair Labor Standards Act Exemption for Paramedics?			
	Can we secede from ICEMA and be treated based upon unique circumstance?			
	Request Doctor Johnson to provide Board update on the benefits of being in ICEMA.			
	Move First Responder Fund out of paramedic budget	It is in the operating transfer budget	September 3rd, 2013	
Finance	Bring forward plan for a better use of the Old Hospital space.	CAO/Finance/Public Works to develop options and bring to Board.	March 11th, 2014	
Board of Supervisors	Shift Prop. 172 funds into paramedics (25%) and supplant with GF from departments that they are shifted from.	FY 2013-2014 Budget	October 2013	
	Replace First responder funds with Prop 172 - supplant loss to other departments.			
	Need resolution to re-allocate Prop. 172			
	Strategic Plan development and Adoption	CAO to bring forward Strategic Plan Process schedule by November	November 2013 to February 2014	

Other Issues Item	Request	Notes	Expected completion date	Completion Date
Property Tax Assessment	A-87 changes warrant broader discussion	Finance will schedule A-87 workshop	Sept. 10, 2013	September 10, 2013
Fee and permit workshop	Discussion of fees, permits, costs and uses.	Finance /CAO will work with departments for Board workshops	November 12th, 2013	
Midyear Budget Session	Review expenditures/revenues of FY 2013-2014 and request adjustments if needed. Establish FY 2014-2015 Budget development guidelines	CAO/Finance will schedule.	February 11th, 2014	
FY 2013-2014 3rd Quarter Budget session	Review expenditures /revenues of FY 2013-2014 and request adjustments if needed.	CAO/Finance will schedule.	April 15th, 2014	
Board Rules	Create Board reviewed and adopted rules for Board meeting, assignments	CAO/County Counsel will develop	January 7th, 2014	
Legislative Platform	Create Mono County Legislative Platform	CAO/Department will create draft and bring to Board	December 1st, 2013	

OFFICE OF THE CLERK
OF THE BOARD OF SUPERVISORS

REGULAR AGENDA REQUEST

☐ Print

MEETING DATE January 20, 2015

TIME REQUIRED

SUBJECT Closed Session--Human Resources

PERSONS APPEARING BEFORE THE BOARD

AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Marshall Rudolph, John Vallejo, Leslie Chapman, and Jim Leddy. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

RECOMMENDED ACTION:

FISCAL IMPACT:

CONTACT NAME:

PHONE/EMAIL: /

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR
PRIOR TO 5:00 P.M. ON THE FRIDAY
32 DAYS PRECEDING THE BOARD MEETING

SEND COPIES TO:

MINUTE ORDER REQUESTED:

☐ YES ☑ NO

ATTACHMENTS:

Click to download

No Attachments Available

History

Time	Who	Approval

12/29/2014 3:33 PM	County Administrative Office	Yes
1/9/2015 2:46 PM	County Counsel	Yes
12/9/2014 4:04 PM	Finance	Yes