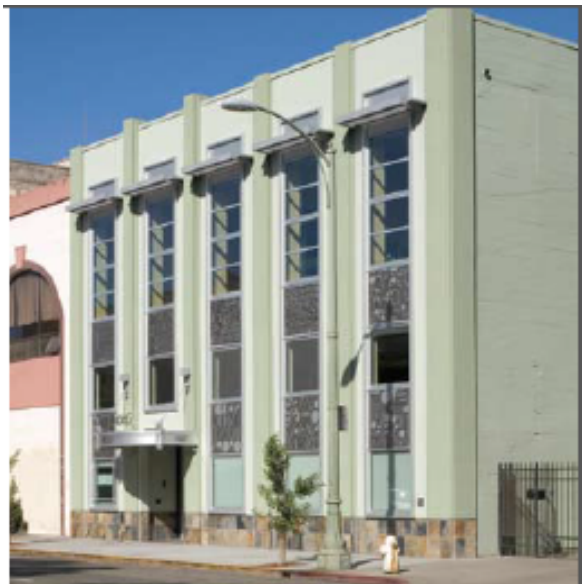
BUILDING OPERATION PLAN

LEED-EBOM

StopWaste.org
1537 Webster Street
Oakland, Ca.94612



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1.0 OVERVIEW

FACILITY DESCRIPTION

The original construction for 1537 Webster Street occurred in 1926 as a 2-story building. The building underwent renovations in 2007. The building is primarily used as office space with many structural and mechanical elements such as ducts, steel beams, and concrete columns left exposed. A large boardroom on the ground floor can accommodate as many as 75 people. The building's gross square footage is 14,000 square feet. The facility consists of the following:

- 2-story building, class A, air conditioned office building

The mechanical equipment serving the facility is summarized as follows:

- (4) Packaged roof top units (RTU) located on the roof
- (28) VAV Therma Fusers 1st and 2nd floor
- (1) A.O. Smith 60 gallon natural gas DHW heater
- (3) Exhaust Fans

The lighting systems are described as follows:

- The lighting control system controls interior, exterior, and exhaust fan on/off schedules. The lighting throughout the building area is composed of multiple types of fluorescent lamps. There is one skylight that provides natural lighting to the main stairwell and entry area. The primary space lighting on the first floor are 36 and 42 watt CFL's. The primary lighting for the second floor open office space and private offices is primarily composed of 4-foot fluorescent luminaries' lit with 28-watt T5 lamps. Interior lights are controlled with occupancy sensors.

The Building Operations Plan outlines the HVAC and domestic water equipment and operations for 1537 Webster Street. The objectives of this project are as follows:

- Establish specific operating guidelines for different equipment in the facility
- Document equipment and the sequences of operation,
- Satisfy the LEED-EB prerequisite for Existing Building Commissioning

This Building Operations Plan provides a summary of the building schedule and operation, equipment, and expectations for building performance.

The Building Operations Plan addressed the following systems:

- HVAC Systems
- Water Systems
- Lighting Systems
- Fire Life Safety Systems

2.0 LEED REQUIREMENTS

LEED-EBOM for Existing Buildings Reference Guide provides the guidelines for meeting the Energy and Atmosphere Prerequisite 1 Existing Building Commissioning. There are five requirements that must be met:

1. **Building Operating Plan:** Develop a comprehensive building operation plan that meets the requirements of current building usage, and addresses the heating system, cooling system, humidity control system, lighting system, safety systems and the building automation controls.
2. **Systems Narrative:** The systems narrative must include all the systems used to meet the operating conditions stated in the operating plan, including at minimum, heating, cooling, ventilation, lighting and any building controls systems.
3. **Sequence of Operations:** This is provided in Appendix A.
4. **Preventative Maintenance:** Create a narrative of the preventive maintenance plan for equipment described in the systems narrative and document the preventive maintenance schedule during the performance period. The preventative maintenance plan is provided in section 4 and the maintenance schedule is provided in a separate document.
5. **Energy Audit:** Conduct an energy audit that meets the requirements of the ASHRAE Level I walk-through assessment. (This is addressed in a separate document.)

The following is a summary of how these requirements will be met:

1. This Building Operations Plan meets the requirements for the facility.
2. All non-functioning equipment will be documented and an implementation plan will be prepared to repair or upgrade the equipment in five years or less.

3.0 SPACE TYPES AND SCHEDULES

Space types in the facility consist of enclosed and open plan offices and conference rooms. Ancillary spaces include corridors, stair ways, lobbies, break rooms and restrooms. 1537 Webster Street is generally occupied 7:30 am to 6:00 pm, Monday through Friday. During the operating hours, the building is required to be conditioned.

The interior lighting enable on schedule is from 7am to 9pm Mondays through Friday. Occupancy sensors turn lighting on when spaces are occupied.

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3.1 Building Level Performance

3.1.1 Outside Air Introduction and Exhaust Systems

3.1.1.1 Outside Air Introduction

The packaged roof top units located on the roof of the building have full economizer capability. The RTUs outside air (OA) damper has a set minimum position to provide minimum ventilation air. The OA damper provides up to 50% outside air capability when outside ambient conditions can meet the cooling load of the building.

3.1.1.2 Exhaust Air Systems

There are three fractional horsepower exhaust fans: One for general exhaust, one for the elevator room and one serves the shower area. The elevator room exhaust fan operates to maintain a room temperature set-point of 88 degree F.

3.1.2 Space Temperature

During occupied mode, the intended office space temperature is 72 °F. The existing space thermostats are programmed through the building automation system (BAS) to be adjusted within a +/-2°F range. The thermostats are not under a locked box and can be adjusted by the occupants.

3.1.3 Space Pressurization

The design pressurization requirements for the building are to be slightly positive. There are no active building pressure controls.

3.1.4 Air-side HVAC Systems

This section provides an overview of the air handling systems in the building that provide temperature control and ventilation.

The cooling system for the building consists of four roof top packaged AC units; three systems feature a gas heating mode and variable frequency drives. The afore mentioned units serve thermafuer supply registers throughout the building, varying air flow to the area served base on the temperature control located within the register (set-point 72 degree F.). All four roof top units feature an outside air (OA) economizer with flow measuring stations to provide free cooling and ventilation see Table 3.1.

Table 3.1: Packaged DX Box Car Air Handler Units

Unit #	Manufacturer	Model / Type	# of Units	Heat Capacities / Efficiency	Supply Fan HP System FLA	Control
Roof						
AC-1	AAON	RM-013/ PRTU	1	Output: 132.2 MBH Eff.: 10.8 EER	7.5 HP 21 amps	BMS
AC-2	AAON	RM-006/PRTU	1	Output: 94.5 MBH Eff.: 11.8 EER	3 HP 34 amps	BMS
AC-3	AAON	RM-006/PRTU	1	Output: 51.2 MBH Eff.: 11.8 EER	3 HP 23 amps	BMS
AC-3	AAON	RM-A01/PRTU	1	N/A Eff.: 12.8 EER	1 HP 21 amps	BMS

There are two exhaust fans located on the roof, EF-1 for general exhaust and EF-2 that serves the elevator room with thermostatic temperature control set-. A third exhaust fan that serves the shower room is interlocked with the light switch.

3.1.5 Domestic Water Systems

Water Efficiency

The water fixtures throughout the building consist of the following types;

1. 7 Dual flush toilets rated at 1.1 and 1.6 gallons per flush.
2. 1 Waterless urinal.
3. 6 Low flow restroom faucets rated at 0.5 gallons per minute.
4. 2 Break rooms with faucets that rate at 2.2 gallons per minute.
5. 1 Shower

The domestic hot water is provided by one domestic extra high efficiency gas hot water heater set-point 118 degree F.

3.1.6 Lighting Control Systems

The lighting control system controls interior, exterior, and exhaust fan on/off schedules. The lighting throughout the building area is composed of multiple types of fluorescent lamps and occupancy sensors.

4.0 SYSTEM MAINTENANCE PROGRAM

In accordance with LEED-EB Outside Air Introduction and Exhaust Systems (EQp1) this section outlines the requirement for addressing maintenance associated with indoor air quality. The intent is to "implement an operations and maintenance plan to maintain an uncontaminated HVAC system."

4.1 HVAC

Check Points:

1. Thoroughly inspect and clean interior and exterior of machine with vacuum (remove panels).
2. Clean drain pan and note excessive corrosion. Treat rusted areas with rust inhibitor. Ensure that the rust inhibitor chemical does not add volatile organic compounds or contaminants to the drain pan. If possible, rinse well after application or choose a less hazardous material. Consult the chemicals Material Safety Data Sheet (MSDS) for this information.
3. Perform checks according to the type of unit.
    a) Direct expansion units:
        i. Check for refrigeration leaks on all lines, valves, fittings, coils, etc., using a halogen leak detector or similar testing device. If leaks are not able to be stopped or corrected, report leak status to supervisor.
4. Check condition of cooling and reheat coils. Use fin comb if need to straighten fins.
5. Clean coils. Use detergent solution and warm water if coil is heavily soiled.
6. Drain and clean humidifier pan or pad, whichever applies. Replace pad if required. Remove corrosion as needed.
7. Clean and lubricate motor and squirrel cage fan(s). Check alignment of motor and fan. Check bearings for excessive wear.
8. Check belt tension and condition. Adjust or replace as required.
9. Replace pre-filters if needed.
10. Replace final filter if needed.
11. Run machine, check action of controls, relays, switches, etc., to see that:
    a) Direct expansion units:
        i. Discharge air temperature is set properly.
12. Check and adjust vibration eliminator mountings if equipped. Repair or replace if required.
13. If applicable, clean and test condensate pump and alarm

4.2 Domestic Hot Water Heater

Check Points:

1. Attach drain hose. Drain several gallons from tank to remove sediment.
2. Manually check operation of safety valve. Check for corrosion around valve. Verify the safety valve inspection tag is in place. Ensure that no personnel are in area of relief piping discharge.
3. Check all connections - electric, gas and water. Tighten as necessary.
4. Check operation and setting of aquastat. Check hot water temperature with dial thermometer, and set aquastat at minimum value required for all uses.
5. Clean sight glasses on tanks.

6. Clean strainer, check condition of traps. Report and repair leaks.
7. Clean pump, controls, switches, and starters. Check operation of pump and condition of pump seal or packing, and replace as required.
8. If applicable, Remove and inspect Anode, replace if necessary
9. Clean up work area and recycle scraps and remove trash.

4.3 Photovoltaic System

Special Instructions:

1. Remove any debris. Clean PV panels per manufacturer's recommendations. At a minimum, rinse seasonally with water to remove accumulated dust, debris, and stains.
2. Perform visual inspection of combiner boxes and control panels. Clean combiner boxes and control panels using compressed air and vacuum. Verify wiring is neat and orderly, Panduit and control covers are in place.
3. Test PV arrays voltage/current at the combiner boxes
4. Inspect components for moisture, verify proper operation of any panel temperature controls.
5. Grease actuator gears and top off hydraulic fluid on tracker components (if applicable).
6. Test of SCADA and meterological connections and signal strength.
7. Install any software, firmware updates.
8. Inspect cables for binding or wear (tracking systems).
9. Check and calibrate sensors.

4.4 Lighting

Fluorescent Lighting Fixture, Washing and Re-lamping

Check Points:

1. Disassemble fixture. Wash all removable parts with warm water and a mild detergent. Rinse and allow to drip dry.
2. Damp wipe remaining body of fixture in place.
3. Remove old fluorescent lamps and install new lamps.
4. Test light fixtures. Replace starters and ballasts where necessary. Note and report any needed electrical repairs.
5. Reassemble all removable parts to fixture.
6. Clean up area and recycle scraps and remove any trash.

Lighting, Special Feature

This standard card applies to special lighting fixtures such as found in lobbies and for fixtures above 12 feet.

Check Points:

1. Clean fixture thoroughly.
2. Check all sockets, replace as needed.

3. Inspect anchors or anchoring device, tighten as needed.
4. Examine fixture glass, side panels, diffusers, etc., for cracks, breaks, etc. Replace if necessary.
5. If group relamping is due, change all lamps; otherwise, replace only those that are burned out.
6. Check operation.
7. Clean up work area and recycle scraps and remove trash.

Lighting, Outside Incandescent and Fluorescent

This standard card applies to perimeter lighting, and provides for maintenance of such fixtures outside the building.

Check Points:

1. Open and tag switch.
2. Remove old lamp and clean fixture including reflector, refractor, and globes.
3. Inspect condition of wiring, contacts, terminals, and sockets. Look for evidence of overheating.
4. Install new lamp and assemble checking gaskets for proper seat.
5. Test operation of automatic switches.
6. Inspect lamp standards and mounting devices.
7. Clean up work area and recycle scraps and remove trash.

4.5 Sensors electronic

Check points:

1. Check that sensor is mounted securely and free of obstructions
2. Check physical condition of sensor
3. Check that sensor is located appropriately
4. Check the voltage, amperage, or resistance of the sensor in accordance with manufacturer's specifications. If the device falls out of this range, adjust or replace the device.
5. Check that physical location is consistent with graphical representation on BAS front end.
6. If the sensor has an associated setpoint, verify and confirm that the setpoint is reasonable and consistent with values specified in building documentation (e.g. building operating manual, controls as-built drawings, commissioning reports, re-commissioning reports)
7. Compare BAS value with field measurement using a calibrated handheld device at least as accurate as the desired BAS accuracy
8. For calibration of CO and CO_2 sensors use a gas canister to create high readings for both the handheld device and the BAS sensor.
9. Record at least five (5) separate readings from the BAS and handheld device.
10. Where BAS readings are outside accuracy specified for sensor, either calibrate or replace sensor.

End Devices

Typical Sensors and Actuators to be checked or calibrated:

1. Outside air temperature

2. Mixed air temperature
3. Return air temperature
4. Discharge or supply air temperature
5. Coil face discharge air temperatures
6. Chilled water supply/return temperature
7. Condenser water supply/return temperature
8. Heating water supply/return temperature
9. Wet bulb temperature or relative humidity (RH) sensors
10. Enthalpy Sensors
11. Space temperature sensors
12. Economizer and related dampers
13. Cooling and heating coil valves
14. Static pressure transmitters
15. Differential pressure transmitters
16. Air or water flow
17. Terminal unit dampers and flows
18. General dampers
19. Transducers and relays

Electronic:

20. Check that sensor is mounted securely and free of obstructions
21. Check physical condition of device. Clean if needed.
22. Check electrical connections.
23. Check that device is located appropriately
24. Check that physical location is consistent with graphical representation on BAS front end
25. Check voltage and/or resistance readings are consistent with manufacturer's specifications for the device. Calibrate or replace if necessary.
26. Check the device through its range and ensure that the controlled equipment responds correctly to the given command.
27. Compare BAS value with field observation, i.e. open or closed, start or stop, to ensure device operation.

4.6 Mold Prevention

While the building does not reside in a humid climatic zone, presence of water can lead to mold development. Prevention of water infiltration is critical to maintaining a mold-free facility.

Recognizing areas where water accumulates is a key element to mold prevention. The following are areas of the facility that need to be inspected on an annual basis at a minimum or as noted.

- Landscape watering: inspect surrounding building areas noting areas of water accumulation and time period to dry (make special note of the building's northern exposure; monitor flow of water run-off). Check for leaks or excessive drainage from neighboring irrigation and property that flows into landscaped area.
- Rain: visually inspect all areas of the facility during rain and after rain to identify any problem areas with water penetration into the building, improper run-off flow or clogged drains, and excessive water accumulation.
- HVAC Condensate Drains: Condensate drains should be inspected during normal rounds.
- Plumbing Fixtures: Cleaning staff should notify building maintenance if water leaks or water accumulation is found anywhere in the facility.

4.6.1.1 Response Guidelines

Upon detection of water accumulation, leaking plumbing fixtures, areas that maintain moisture, clogged drains, and improper water flow should contact building maintenance so that the problem can be investigated. Building maintenance shall perform the following upon receiving notification of a potential problem:

- Document when the problem was reported
- Inspect the problem area to identify the problem source
- Take measures to resolve the problem or limit the damage until a solution can be provided.
- Remove all water within 24 hours
- Dry all building materials within 24-48 hours; discard/replace all building materials that cannot be dried.
- Document resolution or note if the problem requires continual monitoring
- Bring in a third party company to inspect if mold is suspected

4.7 Particulate Accumulation

4.7.1.1 General Housekeeping

Outside Air Intakes

All outside air intake areas of the facility shall be kept clear of debris and clear of any products that produce any level of odor. Included is the Make-Up Air Fan serving the parking garage.

Chemical Storage

Chemicals shall be stored in a clearly marked chemical storage closet with adequate ventilation to outside air that does not expose any building occupants.

Toilet Exhaust Fans

Annually, toilet exhaust fan shall be opened and wiped clean of dirt and tested for proper operation. The fan motor should run smoothly and balanced.

Facility Entry Areas

Facility entry areas (lobby, side, and back entry areas) shall maintain a method to minimize dirt from outside entering the facility. Entry mats shall be cleaned on a monthly basis. Mats shall also be provided to absorb moisture on rainy days to maintain safety and minimize moisture from tracking into the facility.

4.8 Smoking Policy

The building has been designated non-smoking. Smoking is not allowed within 25 feet of the walking paths of building entry.

Appendix A – Sequence of Operations