



# SUNNYLANDS

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MECHANICAL

PENNSTATE



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## EXECUTIVE SUMMARY

Technical Report 3 is third of three reports and is an examination of the benefits and draw backs mechanical design currently in place on the Sunnylands campus. Additionally, Technical Report 3 describes a complete breakdown of LEED documentation and projected LEED accreditation. Additionally, this report reiterates the conclusions and relevant information presented in Technical Reports 1 and 2.

The occupants of Sunnylands campus, the Annenberg Foundation Trust, desires the additions to the Sunnylands campus are meant to be innovative, environmentally conscious and user friendly. A major component of meeting the goals set forth by the owner is a strong mechanical system. In order to be innovative, the systems employ non-standard air distribution methods in the main office space. By designing a system minimal water consumption, the mechanical design is conscious of the droughts that have been plaguing California for years. Additionally, with smaller zones and adjustable thermostats in the open office area, the occupants get the final say in the way their environment feels.

The four buildings being added to Sunnylands' campus are served individually, without a central plant. Despite the efficiency benefits of a central plant, the cost of installing more equipment as well as the distribution paths from the central plant to the new buildings on site far outweighed the efficiency benefits. Therefore, a new rooftop unit and VRV outdoor unit has been selected for every new building. All buildings are served with preconditioned air from the rooftop units and then distributed into an open plenum where it can be taken into a fan coil unit and treated further to meet the needs of the individual zones.

Finally, the owner has requested that all new buildings on site be LEED accredited. Since the Sunnylands campus is heavily in the public eye due to its intended use, there is a social obligation to design the additions in an environmentally conscious way. Since the LEED metric is one of the most easily understood, recognized and accepted means to quantify environmental impact, the owner has requested the buildings be designed with the LEED scoring methods in mind. Therefore, for in this report, a LEED analysis is performed for the four buildings being added to Sunnylands campus using the version 4 scorecard. Through this analysis, it is predicted two of the buildings being added to the Sunnylands campus will achieve LEED Silver, one building will achieve LEED Gold, and the final building will achieve LEED Platinum.

## BUILDING OVERVIEW

Sunnylands North Campus is a new complex of administration buildings totaling to approximately 45,500 square feet. The complex is located in Rancho Mirage, California on the North side of an existing campus. The new construction package will include four buildings designed to house administrative services, archives, operations management offices as well as support buildings. Figures 1 and 2 depict the location of the site and the relative location of the buildings respectively.



FIGURE 2 SITE LOCATION



FIGURE 1 ADDITION TO EXISTING SITE

Set into the beautiful Sunnylands campus, the new buildings are intended to attract the best technical employees to further develop and oversee the nonprofit organization known as the Annenberg Foundation. This is accomplished through high performance, state-of-the-art facilities that can be marketed by the Annenberg Foundation as an innovative and inspirational work environment. Embodying these high performance qualities are two quantifiable goals for this project: LEED Platinum certification and net zero status.

In addition to the technological innovation incorporated throughout the campus, the architectural designs of the buildings are meant to inspire those who work on the campus. Exterior materials include plaster, CMU blocks, and aluminum. The interior spaces are designed to keep employees happy, comfortable and focused.

## DESIGN CONSIDERATIONS

### OBJECTIVES

The purpose of this design package is to provide administrative, technical support and storage space to the Annenberg Foundation Trust. In addition to providing spaces which accommodate the needs of the occupants, the owners also requested that the spaces be innovative, energy efficient, and user friendly. The mechanical system played an important role in bringing these requests to life. Below in table 1, the major objectives for each new building are outlined as well as the response from the mechanical design team aimed at achieving those goals.

TABLE 1 BUILDING OBJECTIVES AND MECHANICAL DESIGN STRATEGIES

Building Name	Goals	Mechanical Strategies
Storage	<ul style="list-style-type: none"> <li>• Create space for maintenance vehicle storage and repair</li> </ul>	<ul style="list-style-type: none"> <li>• Garage space to be exhausted based on Carbon Dioxide levels</li> </ul>
Operations	<ul style="list-style-type: none"> <li>• Create office space for grounds crew</li> <li>• Provide storage for equipment and spare parts</li> <li>• Provide safe workspace where grounds crew may potentially use grinders, paints and oils</li> </ul>	<ul style="list-style-type: none"> <li>• Standard office HVAC design on West side of building</li> <li>• Fume hood accommodation on East side of building with options to expand</li> </ul>
Archive	<ul style="list-style-type: none"> <li>• Provide space for archival experts to determine needs of donated items</li> <li>• Create spaces suitable to house various types of valuable goods</li> </ul>	<ul style="list-style-type: none"> <li>• All spaces include acute temperature control</li> <li>• Long term storage areas include acute temperature and humidity controls</li> <li>• Multiple zones able to accommodate different storage and lighting requirements</li> </ul>
Administration	<ul style="list-style-type: none"> <li>• Provide modern workspace for the Annenberg Foundation Trust</li> <li>• Work space must have views to scenic Rancho Mirage mountains</li> <li>• Space conditions able to be controlled by individuals</li> </ul>	<ul style="list-style-type: none"> <li>• Open air distribution strategy in main office</li> <li>• Coordinate with architects to determine best glazing and overhand to prevent solar gains</li> <li>• Open office split into six zones</li> </ul>

### REQUIREMENTS

#### Outdoor Design Conditions

Set in Rancho Mirage, the buildings at Sunnylands must be designed to handle high levels of heat and sun for the vast majority of the year. Based on ASHRAE 90.1 classification, the Sunnylands campus falls in climate zone 3B which indicates a dry, warm climate. This is quantifiable in figure 3 below which documents less than 4.5 total inches of precipitation a year and average high temperatures hovering between 70 and 120 degrees Fahrenheit. The design conditions for the additions to the Sunnylands accommodate 99.6% of the days in the year.

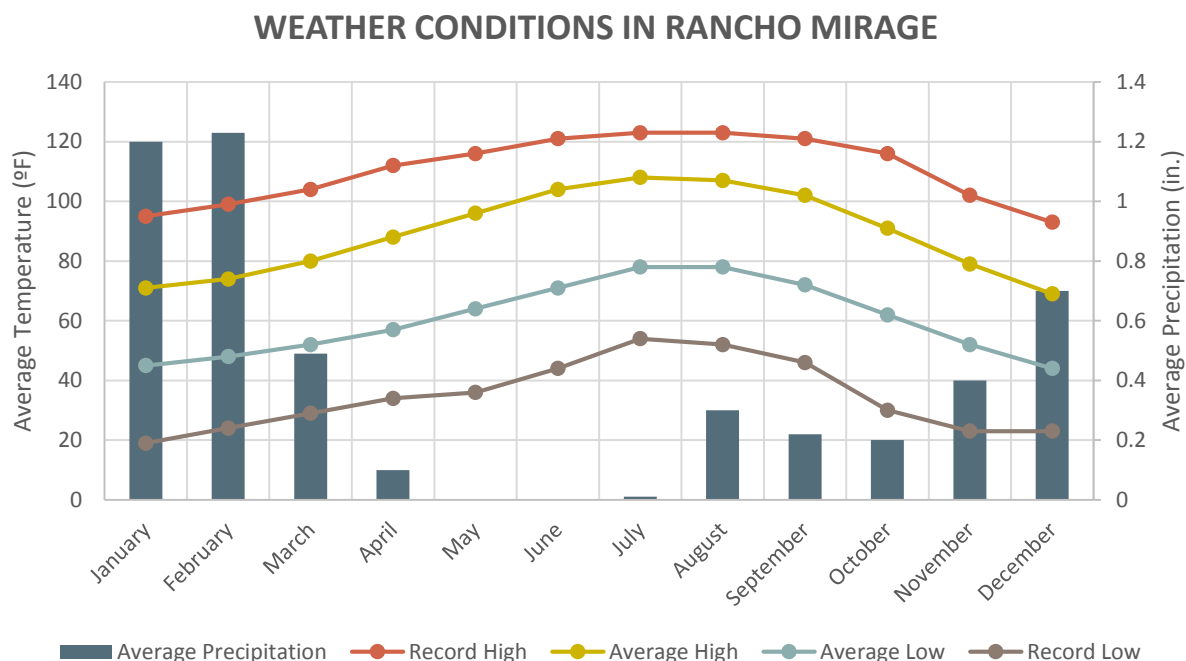


FIGURE 3 WEATHER CONDITIONS IN RANCHO MIRAGE

### Indoor Design Conditions

The indoor design conditions vary by building and are documented below in table 3. Furthermore, it should be noted that the indoor design conditions for the Archive building vary by zone. More information is provided below.

TABLE 2 INDOOR DESIGN CONDITIONS BY BUILDING

Building	Cooling Dry Bulb	Heating Dry Bulb	Humidity	Sensors
Storage	N/A	N/A	N/A	CO2
Operations	75°F	75°F	50%	T in zones
Archive	55°F – 75°F	55°F – 75°F	30%-70%	T and CO2 in zones
Administration	75°F	75°F	50%	T in zones, T and CO2 in meeting spaces

The indoor design conditions for the Archive building vary by zone due to the different preservation requirements of the historic works that will be housed there. Each different zone has the potential to have vastly different temperature and humidity set points. Some of the varied storage requirements for the items being stored are listed below.

There are seven main spaces in the archival building, all outlined below in table 3, all of which have different requirements for the mechanical and lighting designs.

TABLE 3 ARCHIVAL REQUIREMENTS

Space Type	Temperature	Humidity	Lighting
Cold Storage	60°F ± 3°F	35% ± 7%	UV Filtering
Archival Storage	65 °F ± 3°F	40% ± 10%	UV Filtering
Object Storage	68 °F ± 5°F	45% ± 10%	UV Filtering
High Security Storage	65°F ± 3°F	40% ± 10%	UV Filtering
Intake Area	70 °F ± 5°F	45% ± 10%	UV Filtering
Object Conservation	70 °F ± 5°F	45% ± 10%	Brightness control, task specific lighting, UV Filter
Photo Studio	70°F ± 5°F	45% ± 10%	Brightness control, task specific lighting, UV Filter

### Ventilation Requirements

In all buildings, more than enough ventilation air is supplied to the spaces. HGA Architects and Engineers, the mechanical design team on the project, was working toward a better IAQ goal set forth by the client. In addition to satisfying client requests, the extra outside air helps satisfy some LEED requirements in the team's pursuit of a LEED Platinum rating for these additions. The Storage Building is treated as a semi-conditioned space. The Rooftop units provide air for ventilation to the space. If the RTU isn't running in the Storage building, the exhaust fans run to keep toxic gasses from vehicles building up within the space.

TABLE 4 OUTDOOR AIR BY BUILDING

Building	RTU	Supply CFM Required	OA Required	Actual Supply	RTU OA%	OA Supplied
Storage	RTU – 1A	1426 CFM	175 CFM	3750 CFM	100%	3750
Operations	RTU – 1B	1046 CFM	105 CFM	2000 CFM	55%	1100
Archive	RTU – 1C	2370 CFM	200 CFM	1250 CFM	100%	1250
Administration	RTU – 1D	3363 CFM	275 CFM	3750 CFM	64%	2400

### Heating & Cooling Requirements

In Technical Report 2, heating and cooling requirements were calculated by space using Trace 700 energy modeling software. The outputs calculated using Trace 700 are shown below in table 5 in comparison to the design conditions employed by HGA Architects and Engineers. Again, the Storage building is treated as a semi-conditioned space. The purpose of the mechanical equipment in this building is to ensure safe breathing air, not comfort.

TABLE 5 HEATING AND COOLING REQUIREMENTS

Building	Total Supply (CFM)		Cooling (MBH)			Heating (MBH)		
	Design	Calculated	Design RTU	Design VRV	Calculated	Design RTU	Design VRV	Calculated
Storage	3750	1426	142.25	-	-	102	-	-
Operations	2000	1046	57.1	98.3	132.4	68.2	144.4	132
Archive	1250	2370	83.3	166.2	224.5	68.2	272	144
Admin	3750	3363	142.25	417	499.2	102	631	209

The discrepancies in the design conditions and those calculated for these reports can be attributed to knowledge of use. Some of the spaces are expected to be open to the exterior during certain times of the year which will effectively make some interior zones act as exterior zones. For simplification, this wasn't modeled in the Trace 700 models documented in this report. However, this information was taken into account when sizing equipment for the actual design of the buildings.

Additionally, with previous experience in similar building types no more than five miles away from this site, HGA has some first-hand knowledge about how people use the spaces they design. By studying their original energy models in comparison to the actual energy consumption of a similar project, they were able to make small adjustments in their design to create a more accurate representation of user expectations and energy consumption at Sunnylands.

## ENERGY SOURCES

### Fuel Type

The only fuel supply line to the addition to the North side of the Sunnylands campus is electricity. There's an option to expand in the future and bring a natural gas line onto this portion of the site. However, as it stands, all four new buildings on the Sunnylands campus are supplied with electricity as the lone fuel source.

### Rates

The electricity provider for the Sunnylands campus is Southern California Edison Energy. The rate structure agreed upon between Sunnylands and Edison is their packaged GS-2 with Time-of-Use option which is documented below in table 6. Through this rate structure, electricity consumption during off peak hours is rewarded with a lower rate than the standard G-1 package. With solar harvesting on site, this option was selected to reduce overall costs since daytime use can be avoided.

TABLE 6 EDISON ENERGY RATE STRUCTURE

Charge Category	Rate	Frequency
Fixed Monthly	0.05600	per day per meter
Time-Of-Use Meter	0.25000	per day per meter
Total Demand Charge Summer	0.00000	per kw
Total Demand Charge Winter	0.00000	per kw
Summer On-Peak	0.20874	per kwh
Summer Mid-Peak	0.17832	per kwh
Summer Off-Peak	0.13844	per kwh
Winter Mid-Peak	0.18138	per kwh
Winter Off-Peak	0.14258	per kwh

For the purposes of this report and the previous report (Technical Report 2), energy was modeled with the rate structure above and assuming no energy is harvested on site. A breakdown of energy costs per building can be found below in figures 4 and 5.

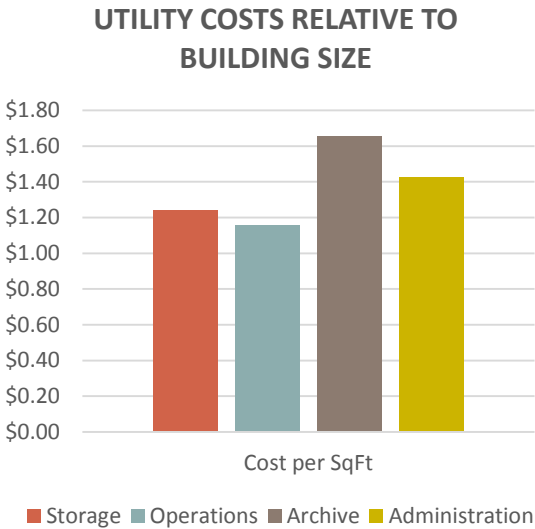


FIGURE 5 UTILITY COSTS RELATIVE TO BUILDING SIZE

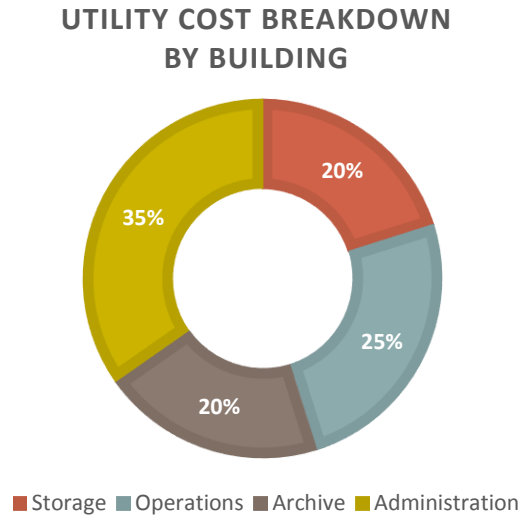


FIGURE 4 UTILITY COST BREAKDOWN BY BUILDING

### Annual Energy Use

The energy use of the Sunnylands campus shown below is a product of the Trace 700 model generated for the purposes of Technical Report 2. This section outlines the cost of operating the additions to the Sunnylands campus. Figure 6 below details the monthly energy consumption of the Administration Building, the most complex building being added to the Sunnylands campus

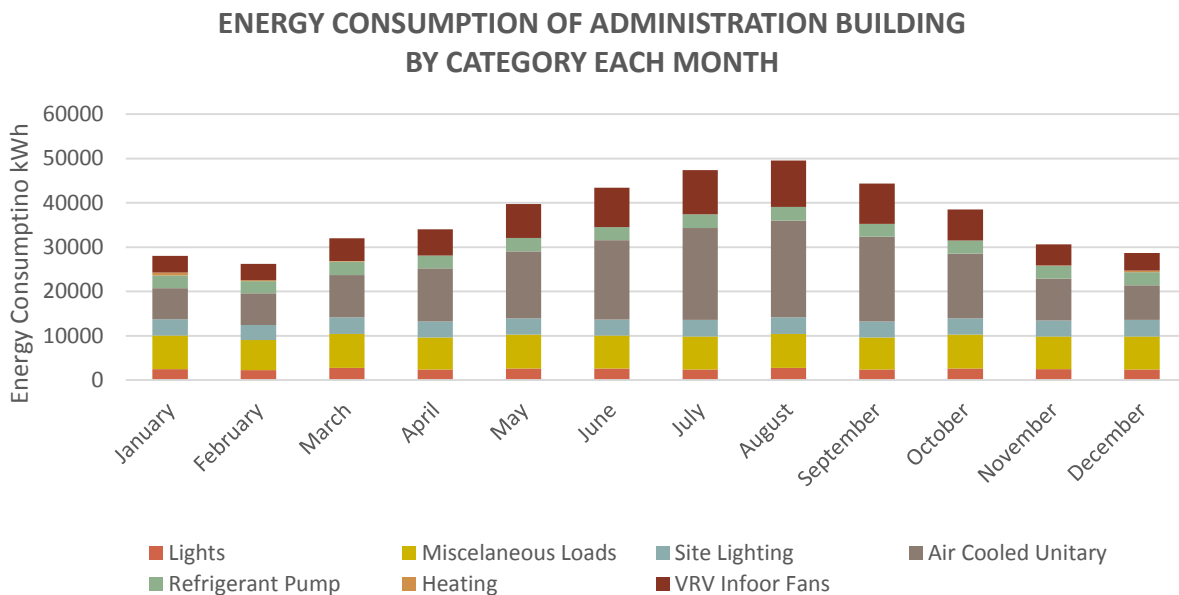


FIGURE 6 ENERGY CONSUMPTION OF ADMIN BUILDING BY CATEGORY EACH MONTH

The Administration building was the focus of Technical Report 2 and is therefore document more thoroughly. However, figure 7 below documents the monthly energy consumption of all buildings on campus. The energy consumption trends are roughly the same between all buildings as expected because most of them will operate on a small office schedule and are experience the same climate conditions.

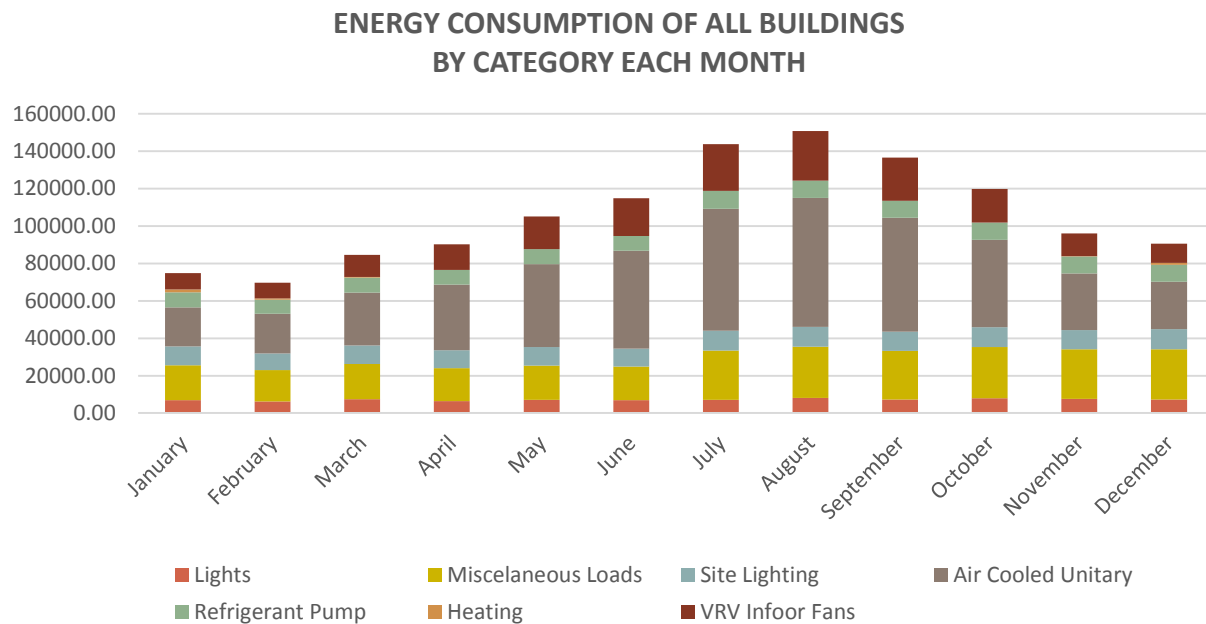


FIGURE 7 ENERGY CONSUMPTION OF ALL BUILDINGS BY CATEGORY EACH MONTH

## REBATES

As previously mentioned, since Sunnylands plans to use solar panels to harvest the energy they need on site, Sunnylands will be on a rate structure that allows lower rate structures in outside of 9am to 9pm Monday through Friday. While this isn't a rebate in the typical sense, it's a money saving strategy that will help balance out the costs at the Sunnylands campus. Since the rate structured so that energy costs are much higher during the day, energy will be harvested and sent back into the grid for a profit. When the peak time passes, energy may be drawn from the grid if needed at a lower rate. Through this set up, the solar panels do not need to have storage capacity which adds further cost savings for the Sunnylands campus.

The additions to the Sunnylands campus are eligible and pursuing to five rebates as well, an agricultural – Water Savings Incentive Program (\$0.60 per thousand gallons saved), the California Solar Incentive (upfront savings on cost of installation), Cash for Grass (up to \$2.00 per SQ FT of grass replaced with low water using plants and/or rocks), ENERGY STAR Window/Glass Door (\$1 per SW FT), and Programmable or Occupancy-Based Thermostats (\$150 per thermostat).

## EXISTING MECHANICAL SYSTEM

### EQUIPMENT

#### Heating

##### **Air**

With very few heating days, the heating can be accomplished with electric resistance heating located in the rooftop units positioned atop each building. This treats the air enough to make it acceptable to enter the building. Each building has the potential for a different hot air temperature as shown below in table 7. Once inside the buildings, the air may be heated further depending on the demands of the zone. If this secondary heating is required, it is accomplished with the aid of VRV outdoor units.

TABLE 7 HEATING COILS COURTESY OF HGA ARCHITECTS AND ENGINEERS

Building	RTU	Electric Heating Coil MBH	Leaving Air Temperature
Storage	RTU – 1A	102	87.8°F
Operations	RTU – 1B	68.2	101.2°F
Archive	RTU – 1C	68.2	93.2°F
Administration	RTU – 1D	102	87.8°F

##### **Water**

Domestic Cold water enters each building, is metered and then exits its building to an outside water heater. There are four point-of-use electric water heaters selected for the new buildings at Sunnylands, one for each building. Each unit is required to have a scald-guard thermostat, safety high-limit with a manual reset. This hot water is only for domestic use, none of the water is used in the mechanical systems as per request of the owner.

TABLE 8 ELECTRIC WATER HEATER COURTESY OF HGA ARCHITECTS AND ENGINEERS

Building	EWB	Temperature Rise at 1GPM	Amps	KW	Maximum Temperature
Storage	POU-1	28°F	15	4.15	110 °F
Operations	POU-2	38°F	20	5.54	110 °F
Archive	POU-3	57°F	30	8.32	110 °F
Administration	POU-4	57°F	30	8.32	120 °F

#### Cooling

With such a warm climate, the Sunnylands campus buildings are nearly always in cooling mode. The outside air is treated two times to meet the temperature requirements for each zone. First, the air is treated inside the air handling unit and its temperature is brought down to approximately 70 degrees. At this point, it can enter the building. Then, once inside the building, it is taken up through the fan coil units and cooled further to the zones requirements from the VRV outdoor units.

## SYSTEM OPERATION & SCHEMATICS

All fully conditioned buildings on the addition to Sunnylands campus are conditioned using the same strategy. For the purposes of this report, this report will focus on the Administration Building for continuity since it was the focus of Technical Report 2 as well.

### Air Distribution

The overall air distribution plan can be used as the main map for the analysis of the system operation. This overall plan can be seen below in figure 8. The rooftop unit above the office space delivers air to an open plenum in the ceiling cavity. The ceiling is made from wooden slats which allows the air to freely fall into the office space below. In order to maintain space temperatures, there are fan coil units located above each zone that allows for the distribution of adequately conditioned air to the zones below. The fan coil units have primary and secondary fans that draw air in and from the plenum and push air down into the occupied zone below. While air passes through these boxes, it is heated or cooled as it passes through a heat exchanger that is fed from an outdoor VRV unit.

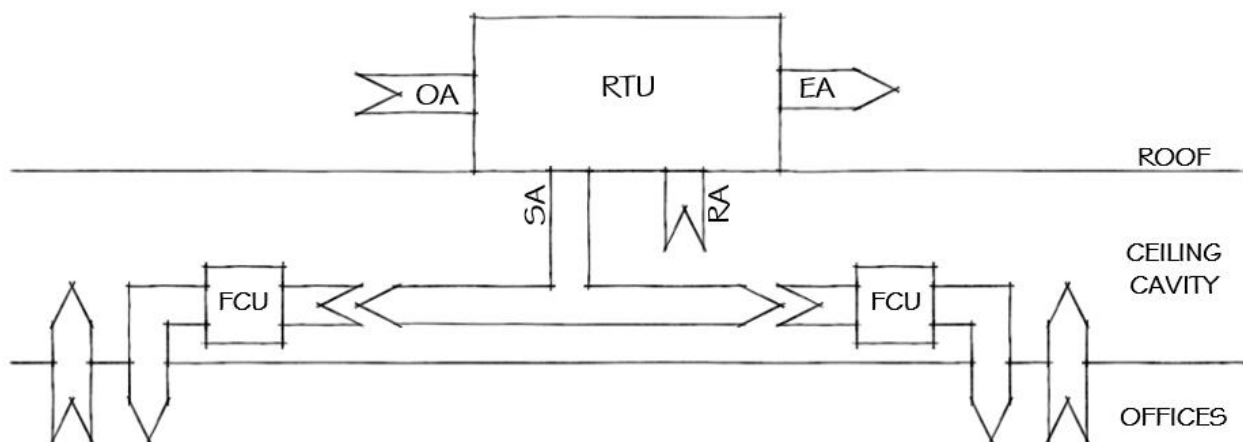


FIGURE 8 AIR DISTRIBUTION METHOD

A more detailed breakdown of the rooftop unit and the distribution from the VRV units can be found below in figures 9 and 10 respectively.

### Rooftop Unit

A schematic for the rooftop unit on the Administration Building can be seen below in figure 9. The air from the building is taken back into the air handler. After passing through a heat exchanger, some of the air is exhausted while the rest is re-circulated back into the building. The air that was exhausted from the system is replaced with outdoor air that passes through two filters before being drawn through the supply fan and passed over the coils. The first coil this air passes over is the DX cooling coil. Next, the air passes over an electric heating coil. Depending on the outdoor air conditions, the air will be treated by one of the aforementioned coils before being distributed to the open office space.

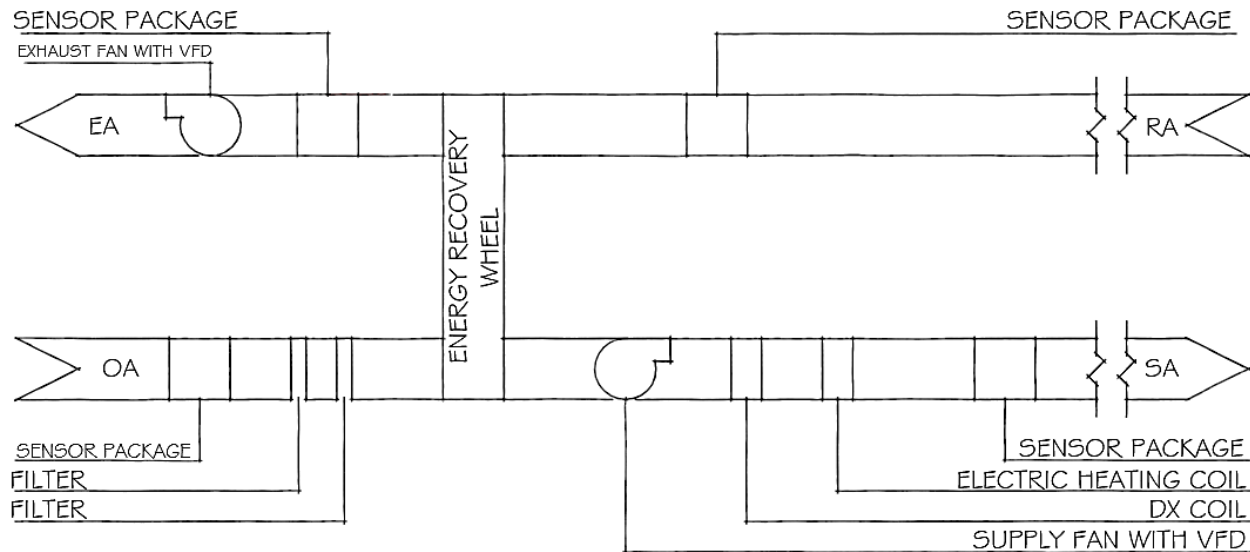


FIGURE 9 ROOFTOP UNIT SCHEMATIC

### ***Outdoor Variable Refrigerant Volume Unit***

Once the air makes it into the buildings, it's continually conditioned by the fan coil boxes until it gets exhausted from the building. The fan coil boxes condition the air by drawing it over coils that are fed by an outdoor VRV Unit. The VRV unit sits on top of the roof and supplies conditioned refrigerant to the fan coil units. The three-pipe VRV system is comprised of suction gas, liquid and discharge gas which are drawn in blue, red, and green respectively. These lines run to each box and to meet the cooling or heating needs of the zone. Once the fluid or gas has cycled through the system, it returns back to the rooftop unit where it exchanges heat with the outdoor air through an expansion process.

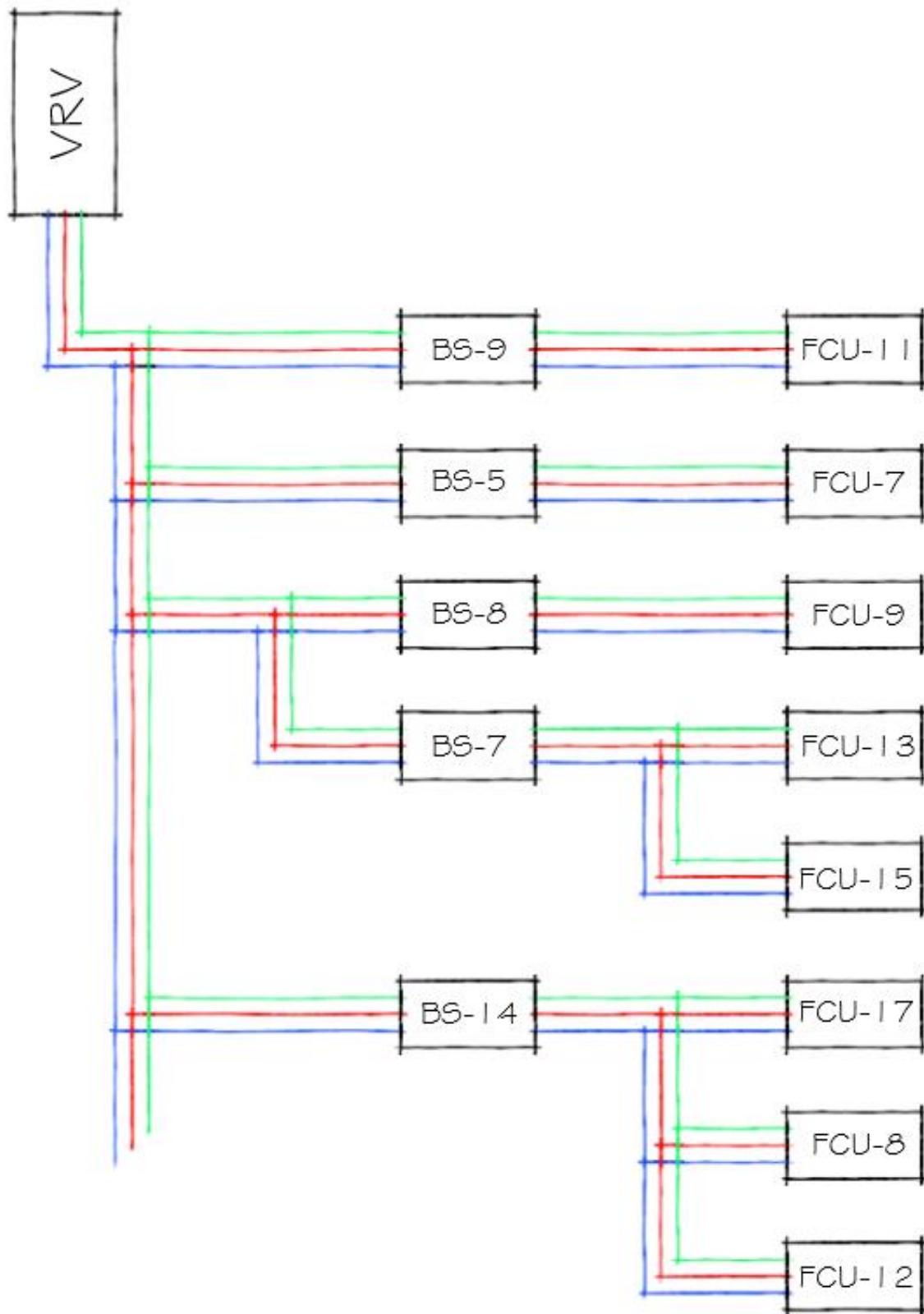


FIGURE 10 VRV SCHEMATIC

## SPACE CONSIDERATION

The mechanical equipment designed for the Sunnylands campus does not take up too much space. Most buildings have small mechanical rooms with less than 100 SQ FT of floor space. The majority of the mechanical equipment occupies space outside. The air handlers and VRV units sit ontop of the roofs of these buildings. All water heaters are small enough to be concealed behind shrubbery outside of the buildings.

The systems are rather small as well. The fan coil units, while they require more piping than some alternatives, generally take up very little space within the ceiling cavity. More importantly for this job, they are easily concealed in the ceiling cavity. With aesthetics of the occupiable spaces a major concern for this project, making sure the mechanical equipment would be out of sight was a key factor in selection. By using fan coil units, the design team was able to avoid a lot of ductwork that would have cluttered the small ceiling cavity. Furthermore, unless all ducts in the ceiling cavity were painted, they would have been visible from below the slotted ceiling which was again undesirable due to aesthetics.

Finally, while having individual equipment associated with each building takes up more overall space on the campus, the abundance of space and cost savings associated with keeping the buildings separate made the option of a central plant unfeasible.

## SYSTEM FIRST COST

As per request of the owner, the cost of the mechanical system is not revealed in this report. However, it can be noted that the decision making process in terms of the mechanical equipment was made with a priority of function and social responsibility. Cost was a secondary factor in the decision making process. The payback period for the equipment selected is expected to be longer than the theoretical life of the equipment. The owner has accepted this monetary loss in exchange for the positive environmental impact of the design.

## LEED EVALUATION

The LEED evaluation performed by HGA's design team was done so in LEED v3. For the purposes of this report, the additions to the North end of the Sunnylands campus are analyzed for LEED v4 credits.

### Energy & Atmosphere Credits

#### FUNDAMENTAL COMMISSIONING AND VERIFICATION

Prerequisite **MET**

There is a contract with qualified commissioning agent for basic scope of commissioning services.

#### MINIMUM ENERGY PERFORMANCE

Prerequisite **MET**

Building performance is projected to be 10+% over ASHRAE 90.1-2007

#### BUILDING-LEVEL ENERGY METERING

Prerequisite **MET**

There is a commitment to share the metering information on a monthly basis with USGBC for a minimum 5 year period.

#### FUNDAMENTAL REFRIGERANT MANAGEMENT

Prerequisite **MET**

There are no CFC refrigerants used in building HVAC & R equipment. Additionally, there is a phase out plan for existing CFC equipment in the existing buildings on the East side of the Sunnylands Campus.

#### ENHANCED COMMISSIONING

Up to 6 points **6 points**

A contract is in place with qualified commissioning agent for extensive scope of commissioning services.

#### OPTIMIZE ENERGY PERFORMANCE

Up to 18 points **15-18**

Solar arrays are yet to be determined in the project scope. The number of arrays will be determined at the end of the project by assessing the remaining budget. If the photovoltaic panels can be installed within the project boundary, they can benefit the energy optimization. Currently, the project is projected to develop a PV array that will achieve net-zero status (18 points) but a conservative measure puts the building at 42% optimized.

#### ADVANCED ENERGY METERING

Up to 1 point **1 point**

In all Sunnylands buildings, there will be ongoing monitoring and correction of building energy consumption while in operation.

#### DEMAND RESPONSE

Up to 2 points **1 point**

The Sunnylands buildings will form a contract with their energy provider to be on a demand response schedule with real-time pricing programs with a local utility provider.

#### RENEWABLE ENERGY PRODUCTION

Up to 3 points **3 points**

Energy will be produced on-site to offset a percentage of total yearly energy use. On-site energy sources include solar, wind, geothermal, hydro, biomass, and biogas. There will be a central PV system installed on-site.

#### ENHANCED REFRIGERANT MANAGEMENT

Up to 1 point **1 point**

Use refrigerants in HVAC & R equipment that minimize contribution to ozone depletion & global warming. Likely HFC type refrigerants only used when required.

**GREEN POWER AND CARBON OFFSETS**Up to 2 points **2**

The Sunnylands campus plans to be net zero through the implementation of onsite solar, wind, geothermal, hydro, biomass, and biogas.

**Indoor Environmental Air Quality Credits****MINIMUM INDOOR AIR QUALITY PERFORMANCE**Prerequisite **MET**

Sunnylands is compliant with option 1, using the local equivalent to ASHRAE Standard 62.1-2010, Title 24 as per California code.

**ENVIRONMENTAL TOBACCO SMOKE CONTROL**Prerequisite **MET**

The Sunnylands campus is a smoke-free environment.

**ENHANCED INDOOR AIR QUALITY STRATEGIES**Up to 2 points **2 points**

Three of the additions to the Sunnylands campus meet the requirements for mechanically vented spaces while the Storage Building meets requirements for mixed-mode systems.

**LOW-EMITTING MATERIALS**Up to 3 points **3 points**

All products used inside the building envelope shall comply with the recognized standards for low VOC content. Flooring products shall comply with "FloorScore" standard, carpet to be Green Label Plus certified. All flooring adhesive to be low VOC. All products used inside the building envelope shall contain no added urea-formaldehyde.

**CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN**Up to 1 point **1 point**

Sunnylands will implement a construction indoor air quality plan per recognized standards, protect on-site materials, and install MERV 8 filters in any permanent HVAC equipment used during construction. Additionally, Sunnylands will implement a construction indoor air quality plan for building flush out before occupancy, per LEED standards.

**INDOOR AIR QUALITY ASSESSMENT**Up to 2 points **2 points**

Sunnylands will contract a team to conduct baseline IAQ tests using protocols consistent with those established for LEED purposes.

**THERMAL COMFORT**Up to 1 point **1 point**

Design HVAC systems to meet ASHRAE 55-2004 standards for thermal comfort. Implement a thermal comfort survey of building users at 6 to 18 months after occupancy, and plan for corrective action at a 20% dissatisfied response.

**INTERIOR LIGHTING**Up to 2 points **1 point**

All individually occupied areas will contain lighting controls that enable occupants to adjust the lighting to suit their individual tasks. All regularly occupied spaces use lighting fixtures with luminance of less than 2500cd/m<sup>2</sup>. All fixtures are CRI 80 or higher. Furniture is selected in accordance with LEED requirements and 75% of the regularly occupied floor area, meet ratio of average ceiling illuminance.

**DAYLIGHT**Up to 3 points **3 points**

Design the building such that 75% of occupied spaces receive adequate daylight, as calculated or tested per LEED ref guide.

**QUALITY VIEWS**Up to 1 point **1 point**

Design the building such that 90% of occupied spaces have views to the outside, as calculated or tested per LEED ref guide.

**ACOUSTIC PERFORMANCE**Up to 1 point **0 points**

This point was not targeted in the Sunnylands additions.

**LEED Analysis Summary**

An overview of the credits from the Energy & Atmosphere and Indoor Environmental Air Quality categories are outlined below in table ##. The buildings at Sunnylands hope to achieve LEED Platinum certification. At this time, it is projected that they may fall two points short of that goal. Currently, the design teams are working to find ways to potentially secure up to four more credits. They aim to do so through the innovation category with an engineered wetlands which will address the biggest concern of the site, water consumption. Hopefully, with approval of these credits, the additions to the Sunnylands campus will achieve LEED Platinum certification.

**OVERALL MECHANICAL SYSTEM EVALUATION**

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## APPENDIX A

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## APPENDIX B

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