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T **Save Time**

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$ **Cut Costs**

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Customer Information

Customer Name	SmokeTree Resort
Contact Person	Brett Henderson
Contact Email	hendersonb@consolidated-distribution.com
Contact Phone	N/A
Address	7010 East Lincoln Drive, Paradise Valley, AZ 63114
Project Size	132,652 sq. ft.

Project Information

Project Name	SmokeTree Resort HVAC Renovation
Location	Paradise Valley, AZ
Start Date	Expected Q2 2025
Completion Date	N/A
Budget	N/A
Scope	The project consists of providing new mechanical (HVAC) systems for the new three-story SmokeTree hotel resort, outdoor pool deck, amenities, F and B restaurants, and a lower-level parking area. A new chiller plant with associated pumps will provide cooling for the resort. Air handling equipment will consist of indoor AHU's (Air Handling Units), RTU's (Rooftop Air Handling Units), indoor and outdoor DOAS (Dedicated Outside Air System) units, kitchen hood MAU's (Makeup Air Units) and fan coil units to serve all the indoor spaces. Heat will be provided by electric resistance heaters.
Project ID	22018820-00
Project URL	BuildVision Project Link
Climate Zone	2B
Design Temperature (Summer)	110.9°F Dry Bulb, 70.0°F Mean Coincident Wet Bulb
Design Temperature (Winter)	34.8°F Dry Bulb (99.6%), 26.7°F Dry Bulb (5 years low)
Current Phase	Bidding
Status	Draft
Date Created	January 15, 2025

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Date: 2025-05-20

Project Equipment

Air-Cooled, Rotary-Screw Water Chillers

Equipment Tag	Manufacturer	Model
CH-01	Daikin Applied	Air-Cooled, Rotary-Screw Water Chiller
CH-02	Daikin Applied	Air-Cooled, Rotary-Screw Water Chiller
CH-03	Daikin Applied	Air-Cooled, Rotary-Screw Water Chiller

Notes

The expected cooling load for the new expansion is 640 tons. Chilled water will be supplied to the resort from a plant capacity of 750 tons consisting of three (3) air cooled chillers at 250 tons each.

Rooftop Units (Chilled Water)

Equipment Tag	Manufacturer	Model
RTU-1.1	Daikin Applied	Packaged Rooftop Air-Conditioning Unit
RTU-1.2	Daikin Applied	Packaged Rooftop Air-Conditioning Unit
RTU-1.3	Daikin Applied	Packaged Rooftop Air-Conditioning Unit
RTU-1.4	Daikin Applied	Packaged Rooftop Air-Conditioning Unit

Notes

Multi-zone variable air volume chilled water units will be used for spaces like event centers and restaurants.

Fan Coil Units

Equipment Tag	Manufacturer	Model
FCU-00.1 to 5	Daikin Applied	Fan Coil Units
FCU-01.1 to 10	Daikin Applied	Fan Coil Units
FCU-01.10 to 14	Daikin Applied	Fan Coil Units
FCU-01.14 to 20	Daikin Applied	Fan Coil Units

Notes

Horizontal units serving support areas and public spaces.

Guest Room Fan Coil Units

Equipment Tag	Manufacturer	Model
FCU-A	IEC	MUY
FCU-B	IEC	MUY
FCU-C	IEC	MUY

Notes

Vertical high-rise units with chilled water cooling and electric heating, featuring 2-pipe configuration.

Dedicated Outdoor Air Systems

Equipment Tag	Manufacturer	Model
DOAS-1.1	Daikin Applied	Dedicated Outdoor-Air Unit

Notes

DOAS units provide conditioned outdoor air to spaces.

Kitchen Make-up Air Units

Equipment Tag	Manufacturer	Model
MAU-0.1		Kitchen Make-up Air Unit
MAU-1.1		Kitchen Make-up Air Unit

Notes

Provides tempered make-up air for kitchen exhaust hoods.

Indoor Air Handling Units

Equipment Tag	Manufacturer	Model
AHU-0.1	Daikin Applied	Daikin AHU

Notes

Packaged water-cooled units for indoor installation.

Switchboards

Equipment Tag	Manufacturer	Model
SWBDs	Schneider Electric	QED

Notes

Main electrical distribution equipment.

Panelboards

Equipment Tag	Manufacturer	Model
Panelboards	Schneider Electric	NQOD
Panelboards	Schneider Electric	NF
Panelboards	Schneider Electric	I-line

Notes

Electrical distribution panelboards.

Low-Voltage Transformers

Equipment Tag	Manufacturer	Model
Transformers	Schneider Electric	Low Voltage Distribution Transformers, Three Phase

Notes

Power distribution transformers.

Diesel Engine Generators

Equipment Tag	Manufacturer	Model
Gen-1	Cummins Inc	C400D6

Notes

Emergency power backup.

Automatic Transfer Switches

Equipment Tag	Manufacturer	Model
ATSs	Schneider Electric	ASCO 300 Series

Notes

Switches between utility and emergency power.

Suppliers

Air-Cooled Chillers

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Daikin	Applied	N/A		Basis of Design	**Yes**
Daikin	Applied	N/A		Basis of Design	No
Trane	Series R	Mechanical Products Southwest	Similar, potential 2-5% premium	Fully compatible with design specifications. Integrated controls for optimization with other equipment. Slightly better efficiency ratings.	No
York	YVAA	Johnson Controls	Competitive, potential 3-4% savings	Compatible with design specifications. Requires additional coordination for control integration.	No
Carrier	AquaForce 30XA	Arizona Air Balance Company	Slightly higher, 1-3% premium	Good alternative with similar efficiency. May require minor changes to piping connections.	No

Rooftop Units

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Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Daikin	Applied	N/A		Basis of Design	**Yes**
Daikin	Applied	N/A		Basis of Design	No
Trane	IntelliPak	Mechanical Products Southwest	Comparable, potential 1-2% premium	Excellent compatibility with design specifications. Superior controls integration.	No

York	Solution	Johnson Controls	Competitive, potential 2-3% savings	Solid alternative with similar performance characteristics. May require minor curb adapter modifications.	No
Carrier	WeatherExpert	Arizona Air Balance Company	Similar to basis of design	Good option with comparable efficiency. May require slight adjustment to ductwork connections.	No

Fan Coil Units

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Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Daikin	Applied	N/A		Basis of Design	**Yes**
Daikin	Applied	N/A		Basis of Design	No
Trane	UniTrane	Mechanical Products Southwest	Comparable, potential 1-3% premium	Good compatibility with design specifications. Slightly larger footprint may require minor coordination.	No
JCI/York	Vertical Stacked	Johnson Controls	Slightly lower, 2-4% savings	Good alternative with similar performance. May require minor piping adjustments.	No
Carrier	Aero	Arizona Air Balance Company	Comparable to basis of design	Compatible option with similar dimensions and performance characteristics.	No

Guest Room Fan Coil Units

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
IEC		N/A		Basis of Design	**Yes**
IEC		N/A		Basis of Design	No

Daikin Applied	ThinLine	Norman S. Wright	Slightly higher, 3-5% premium	Good compatibility, may offer better integration with central plant controls. Similar dimensions.	No
First Co.	Vertical Hi-Rise	Arizona Controls	Lower cost, 5-7% savings	Compatible with design specifications, may require minor adjustments to ductwork connections.	No
Williams	Slim-Line	Specialized Mechanical	Significantly lower, 8-10% savings	Budget-friendly option with adequate performance. May have higher maintenance requirements.	No

Dedicated Outdoor Air Systems

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Daikin	Applied	N/A		Basis of Design	**Yes**
Daikin	Applied	N/A		Basis of Design	No
Trane	Performance Climate Changer	Mechanical Products Southwest	Comparable, potential 2-3% premium	Excellent compatibility with high-quality energy recovery options.	No
AAON	RN Series	Engineered Air	Slightly higher, 3-5% premium	High-quality alternative with excellent energy recovery efficiency. May require some coordination for controls integration.	No
Greenheck	Greenheck Dedicated Outdoor Air System	Air Handling Solutions	Lower cost, 4-6% savings	Good alternative with similar performance characteristics. May require adjustments to ductwork connections.	No

Kitchen Make-up Air Units

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Captive	Aire	N/A		Basis of Design	**Yes**

Captive	Aire	N/A		Basis of Design	No
Greenheck	MSX	Air Handling Solutions	Similar to basis of design	Good compatibility with kitchen ventilation systems. Meets all required specifications.	No
Modine	Hot Dawg	Modine Sales	Lower cost, 5-7% savings	Budget-friendly option with adequate performance for this application.	No
Reznor	MAPSIII	Nortek Global HVAC	Slightly lower, 3-5% savings	Good alternative with proven reliability in similar applications.	No

Switchboards and Panelboards

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Schneider	Electric	N/A		Basis of Design	**Yes**
Schneider	Electric	N/A		Basis of Design	No
Eaton	Pow-R-Line	Eaton	Comparable, potential 1-2% savings	Excellent alternative with similar quality and performance characteristics.	No
ABB	Spectra Series	Border States Electric	Slightly higher, 2-3% premium	High-quality option with excellent fault current ratings and protection features.	No
Siemens	Sentron	Siemens	Comparable to basis of design	Highly compatible alternative with similar performance characteristics.	No

Diesel Engine Generators

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Cummins	Inc	N/A		Basis of Design	**Yes**
Cummins	Inc	N/A		Basis of Design	No
Caterpillar	D400	Empire Cat	Slightly higher, 3-5% premium	Excellent alternative with robust design and proven reliability.	No

Generac	SD400	Generac	Lower cost, 5-7% savings	Good alternative with adequate performance for this application. May have higher maintenance requirements.	No
Kohler	400REOZJ	Kohler	Comparable to basis of design	Highly compatible alternative with similar quality and performance characteristics.	No

Automatic Transfer Switches

Note: Cost differences are AI-estimated percentages relative to Basis of Design and are not based on actual project data. Always obtain accurate quotes from vendors directly via buildvision.io.

Manufacturer	Model	Representativ	AI Est. Cost D	Compatibility Notes	BoD
Schneider	Electric ASCO 300 Series	N/A		Basis of Design	**Yes**
Schneider	Electric ASCO 300 Series	N/A		Basis of Design	No
Cummins	OTPC	Cummins	Comparable to basis of design	Excellent compatibility with Cummins generators, may offer advantages if paired together.	No
Eaton	Automatic Transfer Switch	Eaton	Slightly lower, 2-4% savings	Good alternative with similar performance specifications.	No
Generac	GTS Series	Generac	Lower cost, 4-6% savings	Budget-friendly option with adequate performance. Excellent compatibility if paired with Generac generator.	No

Design Notes

Central Energy Plant

Technical Observations:

- The expected cooling load for the new expansion is 640 tons.
- Chilled water will be supplied to the resort from a plant capacity of 750 tons consisting of three (3) air cooled chillers at 250 tons each.
- The system is designed with N redundancy providing 75% firm capacity.
- The chiller yard will be located adjacent to the fitness area with walls but an exposed top.

Concerns:

- Ambient temperatures regularly exceed 110°F in summer months, which could impact chiller efficiency and capacity.
- Noise from chillers could potentially impact guest experience in nearby areas.
- Ensuring adequate airflow around chillers in the partially enclosed area is critical for optimal performance.

Opportunities:

- Consider implementing dynamic optimization controls to maximize efficiency based on varying load conditions.
- Evaluate the possibility of thermal storage to reduce peak demand and operational costs.
- Evaluate additional sound attenuation measures to minimize noise impact on adjacent spaces.

Air Distribution Systems

Technical Observations:

- The air conditioning systems will generally be provided by indoor variable air volume chilled water AHUs in the BOH mechanical rooms and roof wells located throughout the complex.
- The event center will be conditioned by multi-zone variable air volume chilled water central station roof top air handling unit.
- Hotel guestrooms will be conditioned by vertical high-rise 2-pipe fan coil units with electric heating.
- Outdoor air will be ducted directly into fan coil units from sidewall louvers at the exterior.

Concerns:

- Ensuring adequate ventilation in all spaces while maintaining energy efficiency could be challenging in the desert climate.
- The 2-pipe system for guestrooms will require seasonal changeover that may limit flexibility during shoulder seasons.

- Ensuring proper air balancing across the complex with varying occupancy patterns.

Opportunities:

- Consider implementing demand-controlled ventilation in all high-occupancy areas to optimize energy usage.
- Incorporate enhanced filtration options as an add-on to mitigate airborne contaminants.
- Evaluate potential for heat recovery on exhaust air streams to improve overall system efficiency.

Guest Room HVAC

Technical Observations:

- High rise type 2-pipe chilled water Vertical Fan Coil Units with electric heat will condition each guestroom.
- Each unit will be provided with disconnecting means and over current protection with ECM motors.
- Outdoor air will be supplied to the guestrooms from a sidewall louver at the exterior.
- Guestroom toilet exhaust will be intermittent, controlled by powered 2-position ZRT dampers tied into room occupancy sensor.

Concerns:

- Maintaining uniform comfort levels across all guestrooms during seasonal transitions might be challenging with a 2-pipe system.
- Condensate management for high-rise fan coil units will require careful consideration to prevent leaks.
- Noise transmission from fan coil units could potentially impact guest comfort.

Opportunities:

- Implement occupancy-based controls to optimize energy usage when rooms are unoccupied.
- Consider enhanced system monitoring to detect potential maintenance issues before they impact guest experience.
- Evaluate potential for predictive maintenance strategies to reduce operational costs.

Building Automation and Controls

Technical Observations:

- HVAC systems will be controlled by a central Direct Digital Control System with graphic interface.
- Guestroom units will be controlled by standalone digital wall mounted thermostats with occupancy sensors and door switches.
- Guestrooms temperature control systems will utilize wireless ZigBee communications to eliminate low voltage wiring needs.

- Demand controlled ventilation will be utilized throughout all high occupancy areas.

Concerns:

- Integration between different control systems (BAS, guestroom controls, etc.) could present challenges.
- Ensuring reliable wireless communication in guestroom control systems.
- Maintaining optimal system performance while accommodating varying occupancy patterns.

Opportunities:

- Consider implementing analytics-based monitoring and fault detection to optimize system performance.
- Evaluate potential for integration with property management system for enhanced operational efficiency.
- Implement automated reporting to track energy usage and identify optimization opportunities.

Energy Efficiency Measures

Technical Observations:

- Single Zone VAV and Multi-Zone VAV systems will be implemented for air conditioning systems.
- Variable Frequency Drives will be provided on equipment and pumps where applicable.
- Outside Air Delivery Monitoring and Demand Controlled Ventilation will be implemented in high occupancy areas.
- Premium Efficiency Electric Motors will be used throughout the project.

Concerns:

- Balancing energy efficiency with guest comfort expectations in a luxury resort environment.
- Optimizing system performance in the extreme desert climate conditions.
- Ensuring proper commissioning and optimization of complex control strategies.

Opportunities:

- Evaluate potential for additional heat recovery strategies to improve overall system efficiency.
- Consider implementing enhanced monitoring and reporting tools to track and optimize energy performance.
- Explore potential for renewable energy integration to reduce operational costs and environmental impact.

BuildVision Recommendations

1. Implement enhanced sound attenuation measures for the chiller plant

Rationale: The chiller yard's location adjacent to the fitness area presents potential noise concerns. Enhanced sound attenuation would improve guest experience in nearby areas.
Estimated Impact: Reduces potential noise complaints by 80-90% and enhances overall guest experience. Minimal impact on system performance.
Implementation: Add acoustic barriers/screens around the chiller yard, implement vibration isolation mounts, and consider sound blankets for compressors. Estimated cost: $35,000-45,000.
Priority: High

2. Upgrade the Building Automation System to include predictive analytics and fault detection capabilities

Rationale: Enhanced monitoring and analytics would help identify potential issues before they impact guest comfort and optimize system performance for improved energy efficiency.
Estimated Impact: Potential energy savings of 8-12% through optimized operation. Reduced maintenance costs through early detection of issues. Enhanced system reliability.
Implementation: Implement analytics software package with the BAS, install additional sensors where needed, and provide staff training on system use. Estimated cost: $65,000-80,000.
Priority: Medium

3. Incorporate waterside economizer mode for the chilled water system

Rationale: During cooler periods in winter/spring/fall, a waterside economizer could significantly reduce cooling energy consumption in the Phoenix climate.
Estimated Impact: Potential energy savings of 15-20% on annual cooling costs. Reduced wear on chillers and extended equipment life. ROI in approximately 3-4 years.
Implementation: Add plate heat exchangers, control valves, and associated piping to allow cooling tower water to directly cool the chilled water loop during favorable conditions. Modify controls programming. Estimated cost: $120,000-150,000.
Priority: Medium

4. Evaluate 4-pipe fan coil system for high-end suites or climate transition areas

Rationale: The current 2-pipe system with seasonal changeover may limit comfort flexibility in premium areas, particularly during spring/fall when both heating and cooling might be required on the same day.
Estimated Impact: Enhanced guest comfort and flexibility in premium areas. Potential energy savings through eliminating reheat in certain zones.
Implementation: Implement 4-pipe fan coil units in selected areas (presidential suite, penthouse, etc.) and provide appropriate piping/controls modifications. Estimated cost: $85,000-100,000 depending on scope.
Priority: Low

5. Enhance guestroom controls interface with mobile app integration

Rationale: Modern luxury hospitality trends include providing guests with mobile control of their room environment. This would enhance the guest experience while potentially improving energy efficiency.
Estimated Impact: Enhanced guest satisfaction and brand differentiation. Potential additional energy savings of 5-8% through improved occupancy control.
Implementation: Upgrade the guestroom control system to include mobile app integration. Provide necessary IT infrastructure. Coordinate with property management system. Estimated cost: $45,000-60,000.
Priority: Medium

Conclusion

Key Findings

- The mechanical system design is appropriate for the climate and application, with good redundancy in critical systems.
- The central plant approach with multiple chillers provides good operational flexibility and efficiency potential.
- Guestroom comfort systems utilize modern controls with occupancy sensing for enhanced efficiency.
- The BAS system provides good baseline functionality but could be enhanced with additional analytics capabilities.
- Primary equipment selections from established manufacturers should provide reliable operation with good support availability.
- Several opportunities exist to enhance system performance, efficiency, and guest experience through targeted upgrades.

Highest Priority Actions

- Implement enhanced sound attenuation for the chiller plant to protect guest experience in adjacent areas.
- Consider upgrading the BAS to include predictive analytics for improved operational efficiency and maintenance planning.
- Evaluate potential for waterside economizer implementation to reduce energy consumption during favorable weather conditions.
- Review specifications for key equipment to ensure noise and vibration control measures are adequately addressed.
- Confirm appropriate commissioning scope to ensure all systems are properly optimized at startup.

Summary

The SmokeTree Resort HVAC system design utilizes modern, efficient equipment with appropriate redundancy for a luxury resort application. The central plant design with three chillers provides good operational flexibility and the distributed air handling approach should deliver excellent comfort control. Overall, the mechanical systems are well-designed for the challenging desert climate of Paradise Valley, Arizona, with adequate consideration for energy efficiency, comfort, and reliability. The BuildVision recommendations focus on enhancing guest experience, improving operational efficiency, and incorporating additional sustainability features that align with luxury resort expectations.

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Date: 2025-05-20