

## PROJECT OVERVIEW

# Luxury Residential Home Mechanical Design

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40,000 sqft Ultra-Luxury Villa Development

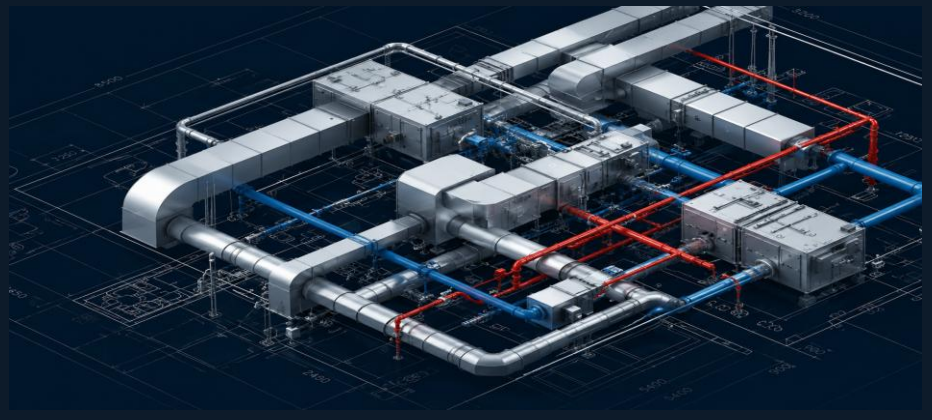
**ASHRAE / NFPA / ASME**

International Compliance

**US REGULATIONS**

Building Codes Verified

# MECHANICAL DESIGN STRATEGY



## Design Philosophy

- ✓ Superior Thermal Comfort
- ✓ High Indoor Air Quality (IAQ)
- ✓ Exceptional Energy Efficiency
- ✓ Sustainable Building Performance

## Core Responsibilities

- ⚙️ System Planning & Concept Design
- 📊 HVAC Load & Equipment Sizing
- 👥 Multidisciplinary Coordination
- 📋 Compliance & Standards Verification

# HVAC SYSTEM DESIGN

## Engineering Scope

**Load Calculations:** Room-by-room cooling analysis with solar heat gain assessments.

**System Selection:** High-efficiency cooling with zoned temperature control.

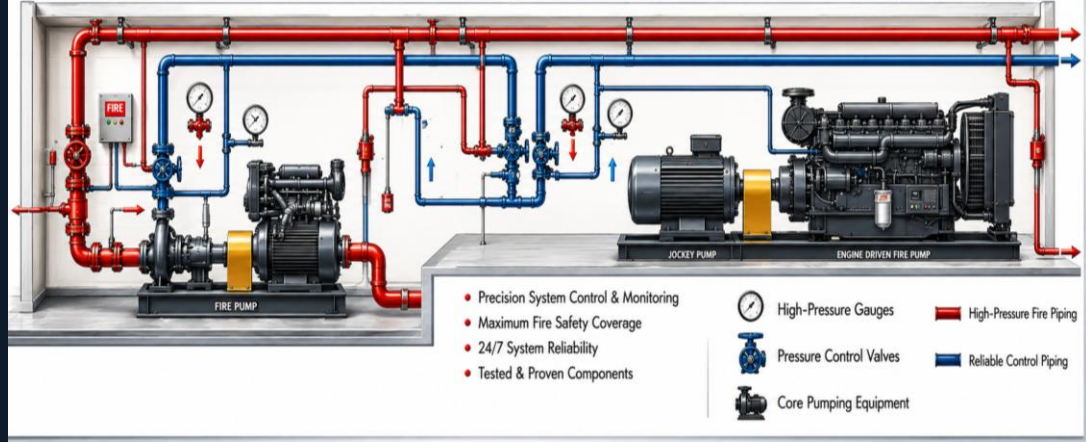
**Ventilation:** Fresh air intake managed via energy-efficient distribution.

**Design Tools:** Revit MEP, AutoCAD, and HVAC Engineering Platforms.

*"Optimized occupant comfort while significantly reducing building energy consumption."*

*HVAC BIM Model*

# PIPING & FIRE PROTECTION



## Domestic Water

**Booster Pumps:** Variable speed piping systems with pressure zoning and redundancy for reliability.

**Boiler System:** Energy-efficient hot water generation with precise capacity sizing.

## Fire Protection

**Compliance:** NFPA-compliant infrastructure including hydraulic calculations and fire pipe sizing.

**Life Safety:** Seamless coordination with integrated building safety systems.

Reliable and code-compliant water and fire protection infrastructure.

# BIM COORDINATION

## Design Development

Comprehensive 3D mechanical modeling covering mechanical rooms, pump rooms, and fire protection networks.

- ⚡ Electrical System Integration
- 🔍 Clash Detection & Resolution
- 📄 Construction Documentation
- 📐 Architectural & Structural Coordination



**Result: Zero construction conflicts and seamless multidisciplinary integration.**

# SUSTAINABILITY OPTIMIZATION



## Energy Efficiency

High-efficiency HVAC with smart control integration and optimized sizing.



## Environment Quality

Enhanced ventilation strategies and precise IAQ management.



## Lifecycle Value

Reduced operating costs and increased mechanical equipment life cycle.

## ENGINEERING GOAL

Create future-ready infrastructure aligned with modern sustainability objectives.

# FINAL PROJECT OUTCOME

## Key Achievements

- 100% Government Regulation Compliance
- ASHRAE, ASME & NFPA Standards
- Optimized Energy Performance
- Construction-Ready BIM Documentation

## Deliverables Summary

Full package including HVAC calculations, equipment schedules, piping designs, and comprehensive technical specifications.

## SUCCESSFUL DELIVERY

High-performance mechanical infrastructure for a flagship 40k sqft residential development.