

Mechanical Design Engineering Excellence

VA Hospital

Large-scale healthcare facility mechanical infrastructure engineered for flawless operational reliability, stringent patient comfort requirements, and absolute multidisciplinary BIM coordination.



HEALTHCARE ASSET



INTEGRATED MEP DESIGN



SUSTAINABLE CARBON



BIM COORDINATED



HVAC SYSTEM DESIGN & ANALYSIS

- **Critical Zone Control:** Advanced air distribution loops with tight temperature and pressure parameters for medical environments.
- **Chilled Water Systems:** Scalable equipment selections optimized for extreme seasonal cooling profiles.
- **Air Handling Units (AHU):** HEPA filtration loops and dedicated ventilation/pressurization control mapping.

Deliverables: Cooling Load Calculations, Equipment Sizing, Duct Routing Layouts, and Airflow Dynamics Modeling.

LIFE SAFETY & WATER SYSTEMS DESIGN

Fire Protection Infrastructure

Designed fully NFPA-compliant infrastructure including custom fire room layouts, high-pressure sprinkler grids, and hydraulic head balancing.

Fluid Networks

Developed domestic water distribution loops backed by specialized booster pump sizing matrices and high-velocity drainage network layouts.

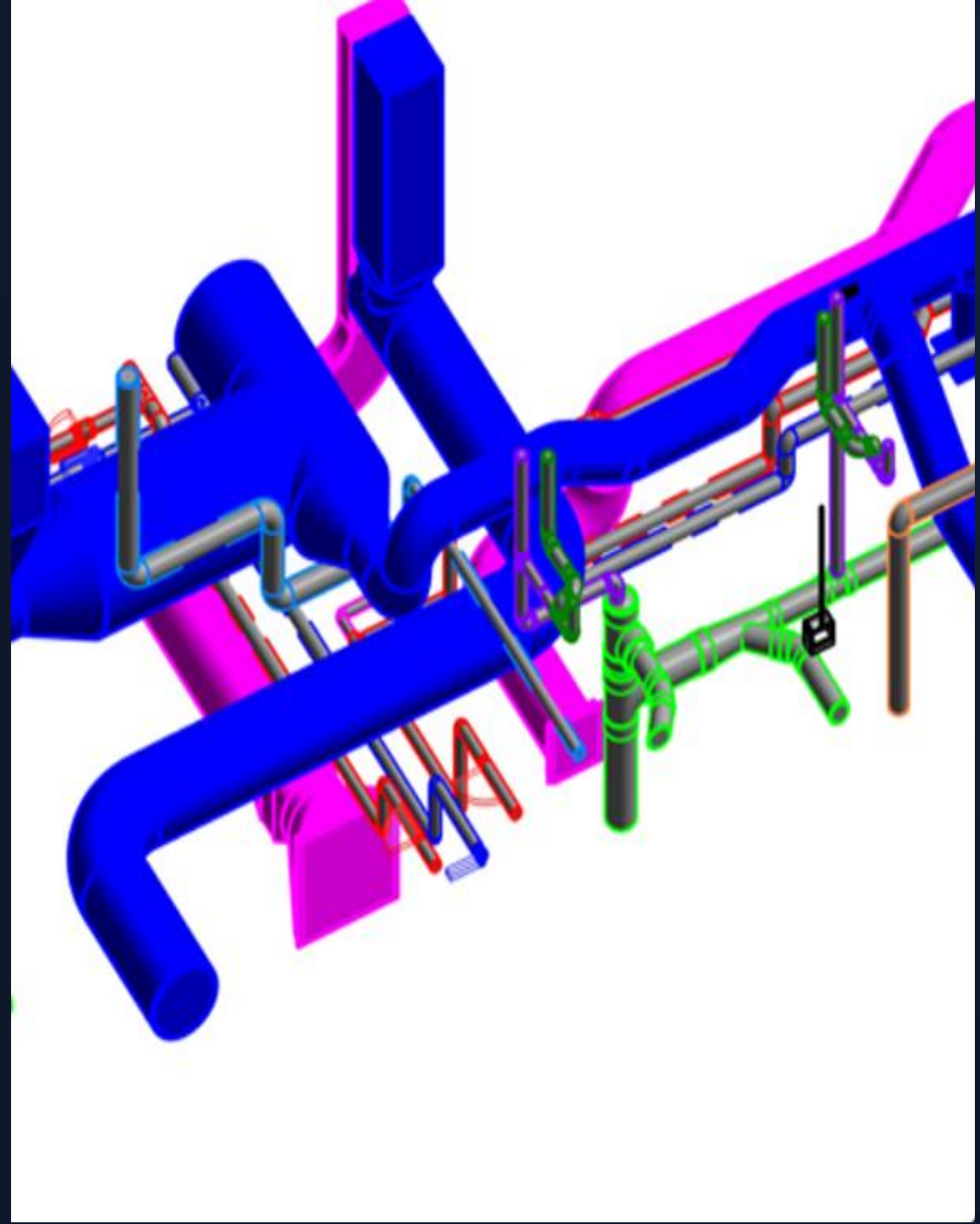


Verified Standards Alignment: NFPA • ASHRAE • ASME • Fire & Life Safety Code

BIM COORDINATION & VALIDATION

Synchronized spatial engineering pipelines within an intense multidisciplinary ecosystem:

- 🔍 **Clash Detection:** Real-time clash identification and matrix resolutions via Navisworks.
- 👥 **Interdisciplinary Sync:** Coordinated with structural framing and electrical pathways.
- 📄 **Model Validation:** High LOD construction drawings generated via BIM 360 cloud workflows.



DESIGN CHALLENGES & ENGINEERING SOLUTIONS

⚠️ Project Bottlenecks

High occupant density in critical hospital waiting areas.

Extremely tight ceiling voids restricting primary duct pathways.

Strict regulatory isolation criteria for infectious zones.

✅ Applied Solutions

Optimized flat-oval duct configurations to reclaim overhead clearance.

Integrated demand-controlled ventilation with energy recovery loops.

Advanced equipment spatial grouping ensuring maintenance access.

Delivered optimized, space-saving engineering solutions without expanding architectural footprints.

PROJECT OUTCOMES & ACHIEVEMENTS

- ✓ **100% Code Compliance:** Fully compliant under international healthcare frameworks.
- ✓ **Pre-emptive Coordination:** Achieved near-zero major site conflicts via BIM.
- ✓ **Sustainable Baseline:** Lowered long-term building lifecycle operation metrics.
- ✓ **Construction Ready:** Validated shop models delivered directly for procurement.

"Delivering Innovative, Sustainable, and High-Performance Mechanical Engineering Solutions Through Advanced Design, Analysis, and BIM Coordination."
