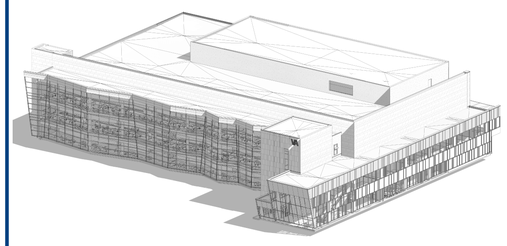
INTERDISPLINARY TEAM DESIGN
VETERANS AFFAIRS AMBULATORY CARE CENTER | OMAHA, NE

PROJECT DESCRIPTION

OMAHA VA AMBULATORY CARE CENTER



*The Omaha U.S. Department of Veterans Affairs (VA) Ambulatory Care Center is a **three-story 157,000 SF medical office building** that expands upon the existing Omaha VA Medical Center Campus in Omaha, NE. The building focuses on providing additional **outpatient services** through three primary care services, a dedicated women's health clinic, a radiology unit, five ambulatory surgical rooms, as well as numerous other specialty clinics.*

BUILDING DESIGN GOALS

RESILIENCY
Designing for occupant safety and building longevity

HARMONY
Cohesive design decisions between disciplines

INNOVATION
Implementation of design solutions that push industry standards.

PROTECTION OF HEALTH, SAFETY, AND WELFARE OF THE PUBLIC

OCCUPANT HEALTH AND WELFARE

Our goal of achieving WELL Silver Certification acted as the basis of designing our building with occupant health & welfare in mind.

AIR · WATER · NOURISHMENT · LIGHT · MOVEMENT · THERMAL COMFORT · SOUND · MATERIALS · MIND · COMMUNITY

- Acoustical comfort was achieved by providing a sound masking system and strategic duct routing.
- Mitigation of vibration caused by human footfall by utilizing a composite steel framing system.
- Circadian lighting is achieved with a high ratio of windows to total building area.
- Individualized thermostat control allowing varying occupant comfort levels to be obtained.
- Monumental stair design, emphasizing occupant movement.

OCCUPANT SAFETY

As a federally funded facility, the Department of Veteran's Affairs provides minimum design requirements for occupant safety.

IMPACT RATED BARRIERS

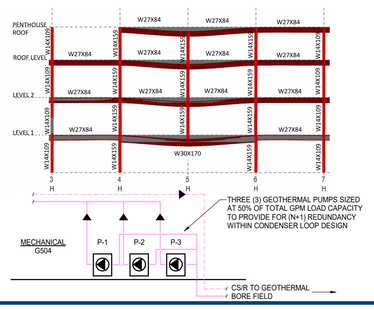
To protect occupants from exterior threats and achieve our modularity goal, our team utilized precast, impact-rated barrier planters around exterior facades.

PROGRESSIVE COLLAPSE DESIGN

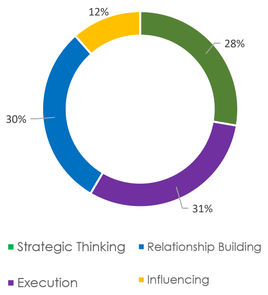
The structural system was designed for progressive collapse to prevent a failure of a primary structural component leading to the failure of others through increased member sizes and a continuous moment frame.

REDUNDANT EQUIPMENT

Our team utilized redundant utility connections as well as redundant equipment that included paralleled generators and an N+1 pump configuration for the geothermal system.



KNOWLEDGE AND SKILLS GAINED



Working as a team and individually over the duration of the project allowed various soft and technical skills utilized by Professional Engineers to be further developed. The Clifton Strengths survey was taken by all team members to determine leadership roles and tasks.

SOFT SKILLS

Leadership:
- Project planning and scheduling
- Ability to listen
- Develop ideas
- Appreciate the work of others

Communication:
- In-person communication
- Remote communication
- Technical writing
- Public speaking

Collaboration:
- Conflict resolution
- File sharing and storage
- Ability to accept feedback
- Receive guidance from professionals

TECHNICAL SKILLS

Electrical:
- Software: Revit 2023, SKM Power Tools, and 3DS Max 2023
- Normal and essential electrical distribution design
- Lighting controls system design

Mechanical:
- Software: Revit 2023, Trane Trace 700, and OpenStudio
- HVAC and mechanical piping sizing and distribution
- Load estimation

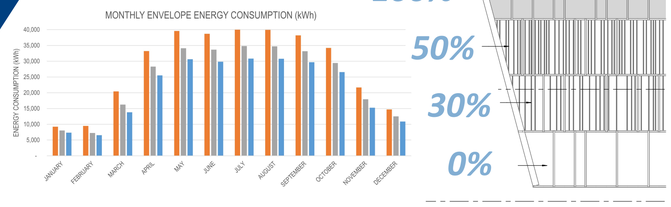
Structural:
- Software: Revit 2023, RAM Structural System
- Steel, foundation, and earth retention design

MULTIDISCIPLINARY PARTICIPATION

ENVELOPE IMPROVEMENT

- Vertical fritted glass on the west curtain wall glazing with varying frit density
- Precast sandwich panels for non-glazing exterior walls
- Reduced solar heat gain and direct glare from solar radiation and sunlight

To decrease solar heat gain and reduce glare caused by the glass curtain wall and orientation of the building, Vision Engineering implemented innovative vertical fritted glass elements on the upper portions of the west façade and utilized precast sandwich panels on non-glazing façades. Linear façade lighting was mounted to the mullion to illuminate the frit and create a stunning display that elevates the design and pays homage to the prominence and honor of the VA.



Our team exceeded our 30% improvement over ASHRAE 90.1 & IECC. Our developed energy model for the entire building showed a 44% energy usage improvement. Design choices that aided in envelope improvement included:

- ***Sustainable geothermal bore field,***
- ***Energy recovery through AHUs***
- ***Energy-efficient equipment selection.***

44%
ENERGY IMPROVEMENT

Our team also modeled the envelope separately to show the implications of our facade choices. When isolating these modifications, our design performed 24% better than the ASHRAE 90.1 envelope and 11.2% better than the IECC envelope. A life cycle cost analysis was also completed and showed the payback period for the Vision proposed envelope was 30 years as compared to ASHRAE 90.1 and 50 years to IECC.

WELL SILVER CERTIFICATION

51 POINTS

- Sound masking
- Circadian lighting design
- Individual thermostat control
- Increased water quality
- Supply air filtration

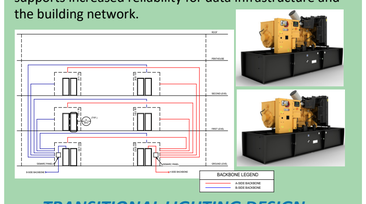
MODULAR DESIGN & CONSTRUCTION

- Prefabricated patient headwalls
- MEP trade racks in corridors
- Prefabricated PACT partition pods
- Prefabricated precast concrete sandwich panels
- Modular OR ceiling unit

ELECTRICAL

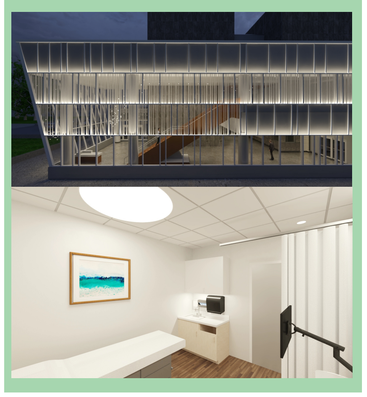
REDUNDANT DESIGN

The electrical and telecommunications systems were designed to feature multiple forms of redundancy. The VA's focus on resilient design and the surgical capacity of the facility led to a design approach that minimizes a single point of failure. Dual paralleled generators minimize interruption of critical medical processes, including risks in the five operating suites. Additionally, redundant backbone distribution for the telecommunications systems supports increased reliability for data infrastructure and the building network.



TRANSITIONAL LIGHTING DESIGN

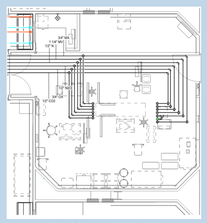
The lighting designed for the facility aimed to support Vision Engineering's human-centric design goal. Innovative lighting techniques strengthen the architectural symbolism of the facility, ultimately creating an environment centered around the most meaningful patrons – the Veterans themselves. To achieve this, a transitional concept was applied, using luminaires and controls to emphasize strong front-end spaces while facilitating relaxing patient care environments. A networked lighting control system was designed to provide flexibility and increased user control for staff and patients.



MECHANICAL

MEDICAL GAS

The VA Ambulatory Care Center routinely performs outpatient medical procedures. Due to the nature of the procedures performed, medical gas is required in the facility. Specialty medical gas equipment such as a medical gas air compressor, vacuum, and distribution are designed for the facility. These systems are meant to ensure the safe distribution and disposal of the gases.



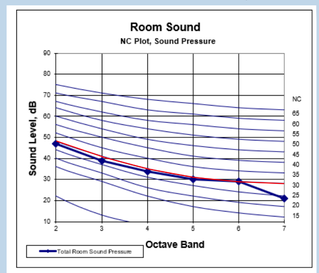
MEDICAL GAS PLAN - OPERATING ROOM

Manifolds, emergency alarms, and disposal systems are provided. Each OR and post-op room areas are served on individual manifolds. Gas can continue to serve the remaining areas even while one is isolated. Continuous monitoring ensures the safe usage of the necessary gases required for the facility.

ACOUSTICS

Since the VA facility offers health and medical services to veterans and active service members, acoustic privacy is a top priority. Each patient exam room was designed to meet acoustic ratings of NC-30 or higher. Wall materials meet the necessary STC ratings of 35, 45, and 50 based on the adjacent rooms surrounding the exam rooms. The secondary mechanical equipment is placed to provide ambient mechanical noise to mask any unwanted sound from entering and leaving the exam room.

Additionally, reverberation times were calculated and adjusted by adding wall acoustic accessories where necessary to provide an acoustically comfortable space. Sound masking measures were also coordinated with the electrical team to ensure alarms and the PA system also provided a comfortable environment for all patients.



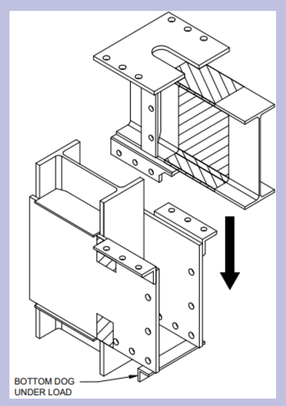
PATIENT EXAM ROOM NOISE CRITERIA GRAPH

STRUCTURAL

MODULAR SIDEPLATE CONNECTIONS

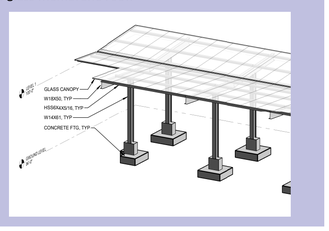
Vision Engineering utilized the Alternate Path Methodology to design for the event of a column removal. To achieve this, beams span over locations of column removal and utilize continuous moment connection around the exterior of the building. To maintain our goal of modularized design and reduce erection time, our team utilized SidePlate connections for our beam-to-column moment connections. Benefits of these connections include:

- *Better suited for large beams and reactions*
- *Fast construction due to shop-welded plates and field bolts*



ENTRANCE CANOPY

Along the North Entrance, our team designed an Architecturally Exposed Structural Steel (AESS) canopy to protect occupants upon entering the facility. An FEA model was utilized to calculate P-delta effects and design members. The canopy is categorized as a F*eatured Element in Close View* and utilizes HSS purlins to support the glass membrane roof.



INDUSTRY COLLABORATION

28 INDUSTRY MENTORS + 29 INDUSTRY EVALUATORS

$556,500
WORTH OF DONATED TIME

INDUSTRY MENTORS

Three teams of mentors consisting of electrical, mechanical, and structural engineers volunteered time to support and provided guidance to three student design teams. The mentors provided weekly support and direction throughout the various stages of the project.

INDUSTRY EVALUATORS

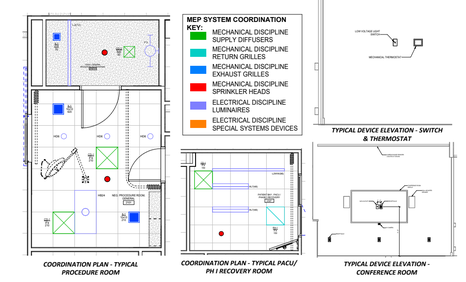
Professional engineers volunteered time to review student submittals and presentations at each milestone through written feedback and questions after presentations. Evaluators challenged and encouraged students to continuously improve our design solutions.

INTEGRATED DESIGN

MODULARIZED MEP DEVICE LAYOUT

Our MEP team ensured coordination in all typical spaces to provide modularized layouts. Ceiling devices include luminaires, air diffusers/grilles, fire sprinklers, fire alarm devices, and speakers. Additionally, coordination with ceiling architectural elements was an added challenge with many clinical spaces containing ceiling-mounted curtain tracks and medical booms. The figures below show typical coordinated RCPs with color-coded systems to highlight equipment types.

Additionally, typical patient headwall elevations were developed for MEP devices. In other clinical spaces, wall-mounted devices were coordinated for locations and heights to ensure each system design was integrated. Typical devices and wall elevations can be seen below.



OPERATING ROOM DESIGN

To support the goal of modularity and to increase coordination, a Cleansuite modular ceiling unit was selected. The unit contains boom and equipment as seen below. The integral equipment allowed the design to reach the increased VA requirements for the operating suite, including 300 fc at the surgical bed level and 2,200 CFM with a minimum of 20 air changes per hour. Additionally, our team designed a 2.25 kVA central inverter to supply power to perimeter luminaries in the event of a power failure. To support the increased weight of the ceiling unit, our team provided support framing using vertical HSS members. Additional bracing was provided to maintain rotation limitations.

UTILITY ENTRANCE COORDINATION

Vision Engineering has prioritized the coordination of underground utilities to avoid conflicts with structural foundations. To avoid penetrating the structural grade beam and to meet VA blast requirements, our team located MEP utilities beneath the grade beam. Additionally, all utility services are encased in concrete duct banks to meet VA blast resistance standards.

PROJECT IMAGERY

WEST LOBBY:

NORTH WAITING ROOMS:

TYPICAL PACT EXAM ROOM:

TYPICAL RECOVERY ROOM:

AUGUST 2023	AUGUST 2023	SEPTEMBER 2023	OCTOBER 2023	DECEMBER 2023	FEBRUARY 2024	APRIL 2024
PROJECT ISSUED	COORDINATION PLAN	CODE ANALYSIS	SCHEMATIC DESIGN	DESIGN DEVELOPMENT 1	DESIGN DEVELOPMENT 2	FINAL PRESENTATION