GLUMAC
A TETRA TECH COMPANY

Technology Integration

Statement of Qualifications

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University of Oregon Jane Sanders Stadium - Eugene, Oregon

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THE GLUMAC APPROACH

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TECHNOLOGY INTEGRATION

Our Technology Integration team are experts in systems convergence – bringing all network-based building systems together into one platform. Intelligently planning for interoperability of various systems which leverage current and future technologies, and providing safe, secure, and efficient built environments are our goals. Taking advantage of efficiencies of scale in space, equipment and databases can provide significant savings, some initial and some long-term. Glumac helps our clients make informed decisions regarding technology systems today, with an eye on the future.

Glumac's design services include:

INTERNET OF THINGS (IOT)/SMART BUILDING DESIGN

- Internet of things and Smart Building Planning
- Convergence of IP systems
- Telecomm infrastructure/Cabling
- Telecommunications Pathways and Spaces
- Telecom master planning
- OSP (outside plant) and service provider coordination
- Wireless local area network (WLAN), local area network (LAN), wide area network (WAN)
- Master Plan for Utilities
- System (DAS), microwave and free space optics (lasers)

SMART DISTRICTS/SMART CITY PLANNING & DESIGN

- 5G cellular data design
- Autonomous Transportation
- Wide-Range WiFi
- RFID Tracking

VIDEO SURVEILLANCE & RECORDING

- Network Video Recorders (NVR)
- Network/Internet accessible monitoring and management
- Handheld PDA/PC monitoring and management
- Video motion detection

SECURITY SYSTEMS

- Access Control
  - Integrated security systems
  - Card readers and keypads
  - Biometric ID (fingerprint, hand geometry, retinal scan)
  - Building Automation System interconnectivity
- Intrusion Detection
  - Motion sensors
  - Perimeter/Zone door and property security
  - Audio and sight sensors

AUDIO VISUAL

- Integrated System Design - user friendly interface to high-tech solutions
- Audio Distribution Design using acoustic modeling software
- Video display, video wall, matrix switching and signage
- CATV/MATV/SATV and Mass Notification System
  - Fiber optic, copper and coaxial cabling systems
  - Building entrance equipment
  - Intra-building video distribution equipment
  - Digital storage and distribution
  - Local program origination

Seamless Integration of Technology into Office Space

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HOSPITAL TECHNOLOGY INTEGRATION

Our approach to Hospital Technology Integration is based on developing a technology environment capable of supporting all campus applications; users and staff; support; and building support systems required by the Information Systems (IS) and Network departments, in an extremely dynamic campus environment.

The Telecommunications infrastructure supporting hospital campus life and future demands needs to be robust, with bandwidth capable of carrying data, voice, video, and all other cutting-edge low voltage systems throughout the campus. We are capable of integrating campus infrastructure into the integrated LAN / WAN inter-building backbone connecting integral communication systems from the campus head end (Data Center / PBX / MDF) to other buildings on the Hospital campus network. This is done is a way that is scalable, allowing new applications and uses to be implemented with no major infrastructure upgrades required.

To ensure the new campus network infrastructure design meets the Hospital network requirements and standards, which include robust speed, and systems based on an open architecture (vendor-neutral protocols), we utilize the latest technologies that are proven cost-effective and reliable platforms for a campus environment.

SMART BUILDING APPROACH

Our smart campus/building strategy is focused on delivering a state-of-the-art user experience while maximizing IP convergence efficiency on each campus building. Our smart systems design approach must allows for IT and Facilities staff to better manage their inside plant and outside plant by including strategies that allow for future growth and scalability of systems. Ease of management systems allow for monitoring of IP systems from a simple PC dashboard platform, hand-held device or wireless tablet, allowing the hospital to reduce operational costs, improve workplace productivity, optimize space utilization, and simplify operations.

A digital building solution maximizes effectiveness of any application by converging the building systems into a single accessible network, integrating a wide range of sensors and controls, and then applying the data collected to improve performance.

DIGITAL BUILDING SOLUTIONS INCLUDE:

- Converged data wired/wireless networks
- Lighting devices and controls
- Access control system
- Video surveillance
- Building automation devices and controls
- Audiovisual and digital signage
- HVAC, fire alarm and protection
- Vertical transportation, clocks, windows shades, etc.

INTEGRATING ELECTRIC METERS WITH THE BUILDING MANAGEMENT SYSTEM:

- Receptacles
- Elevators
- Plumbing
- HVAC
- Lighting

INTEGRATING WATER METERS WITH THE BUILDING MANAGEMENT SYSTEM:

- Potable
- Non-Potable

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ABOUT GLUMAC

FULL-SERVICE CONSULTING ENGINEERING

We specialize in cost-effective, sustainable design of advanced technology, healthcare, institutional, educational and commercial facilities worldwide. With offices in the United States and China, we are well positioned to serve our clients. Our passion is engineering green buildings that work. Our services include mechanical, electrical and plumbing (MEP) consulting engineering, building commissioning, CFD modeling, lighting design, technology integration, energy services and 3D modeling. We provide comprehensive sustainable building services engineering as a single coordinated package to our clients.

A FOCUS ON SUSTAINABILITY

Glumac is proud to be a leader in sustainable design. We are longtime, active members in the U.S. Green Building Council and International Living Future Institute, the leading green building organizations in the United States. Glumac's staff includes more than 100 LEED APs, and a growing roster of Living Building Ambassadors and WELL APs. We have helped design more than 370 LEED Certified projects and projects pursuing Living Building Challenge certification. Glumac takes particular pride in the energy-efficient and sustainable building technologies that we incorporate into projects, such as radiant heating and cooling, daylight and rainwater harvesting, and renewable energy systems.

A HISTORY OF GROWTH

Dick Glumac immigrated to North America when his Yugoslavian water polo team defected to the West in 1951. Twenty years later, Dick founded a San Francisco engineering company. In 1984, the company incorporated as Glumac & Associates. Over the following 35 years, the firm expanded, opening opening offices across the United States and China. In 2000, the separate offices of Glumac & Associates merged into a single corporation and in 2017, Glumac was acquired by Tetra Tech. The firm continues to grow, with plans to open additional offices to meet the needs of our increasing client base.

Glumac San Diego


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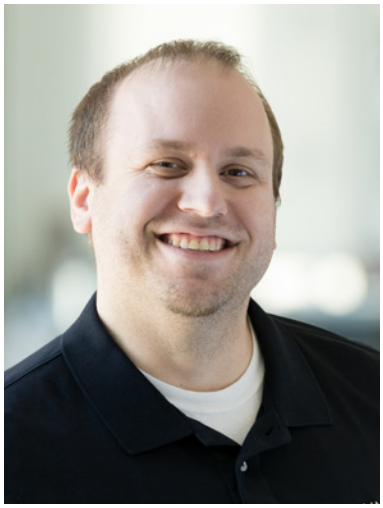

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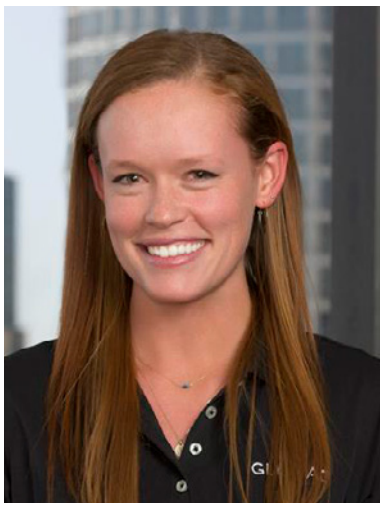

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YOUR TEAM

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YOUR TEAM

SUPPORTED BY TECHNOLOGY SPECIALISTS

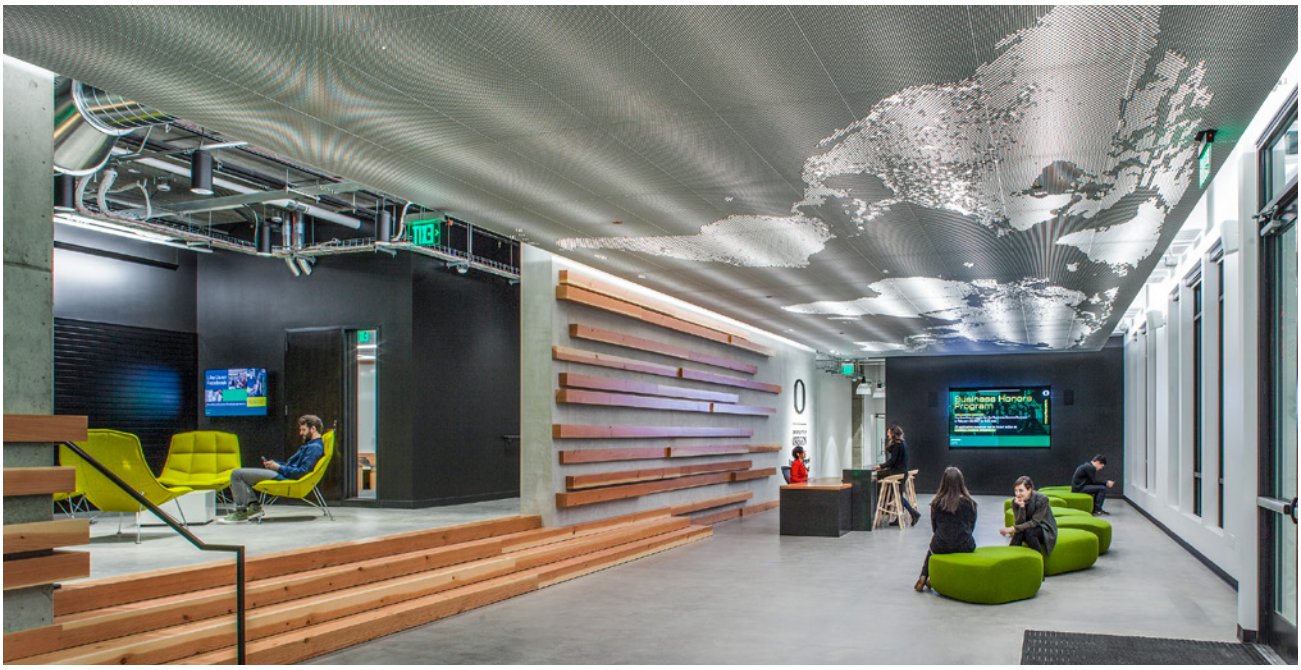
Glumac's Technology integration group is a dynamic team that features Registered Communications Distributions Designers (RCDD); Data Center Design Consultants (DCDC); Outside Plant Designers (OSP); and Certified Technology Specialists (CTS). Our technology designers understand how to work with multiple stakeholders on projects and deftly balance project requirements with owner needs. Our team also works closely with Glumac's Commissioning group, who can develop Owners Project Requirement documents and verify systems are installed to those requirements.

ENGINEERS FOR A SUSTAINABLE FUTURE

In our nearly 50 years of operation, Glumac has held energy-efficiency and sustainable design as a core value. Today, our exclusive focus is making every project we work on energy-efficient and environmentally responsible. This goal does not necessarily require spending large amounts of money on complex systems. It does, however, require innovative design, collaboration with an integrated project team, and getting more out of less. This goal has helped us to attract the best design and engineering talent. We are passionate about designing and delivering green buildings that work. We are Engineers for a Sustainable Future.

A GLOBAL GREEN BUILDING PARTNERSHIP

Located across the West Coast and China, this group also draws on the broad expertise, experience, and bandwidth of Tetra Tech's High Performance Buildings Group - an organization of 2500 smart building designers from across the globe with staff ready to deliver a combination of global expertise and local service to any project.



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LOUIS OSUNA, RCDD, ASSOCIATE
ROLE: TECHNOLOGY INTEGRATION DESIGNER

Louis has over 15 years of experience with providing low voltage technologies planning, design and project management in the A/E/C industry. His experience includes project management and design for hotel towers, commercial office, mixed use and data centers. His experience range from large campus-wide ground-up projects to renovations and fit-up processes. Louis' dive into the details of coordinating with the IT and Network teams to ensure the network architecture and topology is followed and implemented. Louis' Technology Integration design and coordination expertise includes telecommunications networked systems, wireless systems, building management systems and fiber optic distribution; as well as electronic safety and security systems and audiovisual integration and design. Louis provides a comprehensive skill set and value for each and every design team.

PROJECT EXPERIENCE

ADVANCED TECHNOLOGY

- **Broad Comm - 19000 MacArthur,** Irvine, CA
  - Due Diligence Report for 20,000 sf Data Center
  - Review and report on existing LV/Telecom system

COMMERCIAL

- **1 Embaracadero Center Tower,** San Francisco, CA
  - Renovation and expansion of the main building office tower lobby
  - New HVAC, lighting and security system
- **380 E Union,** Pasadena, CA
  - New, four-story building including three levels of underground parking
  - Space includes 3,091 sf of retail and 65,838 sf of office
  - Targeting LEED Platinum
- **Bayer B60 Office Renovation,** Berkeley, CA
  - The renovation of existing offices and break area, relocation of an entry and the conversion of lab space to office

QUALIFICATIONS

- Instituto Technológico de Tijuana, Mexico
  - B.S. Architecture
- Registered Communications Distribution Designer
  - 171109R

PROFESSIONAL AFFILIATIONS

- Building Industry Consulting Services, International, Member
- Institute of Electrical and Electronics Engineers, Member
- PMI

* Projects completed prior to joining Glumac

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RICHARD L. FARIS, RCDD, DCDC
ROLE: TECHNOLOGY INTEGRATION DESIGNER

Richard has over 25 years of professional experience in telecommunications and technology implementation. He has designed numerous state-of-the art systems for clients in commercial, educational, industrial and medical industries. His design capabilities include Voice, Data and Video Infrastructure, IPPBX Systems Design, Internetworking Design Services, Private Video Distribution/ System Design, Technology Implementation (Project Management), Campus Telecommunications Systems Design, Voice, Data & Video Equipment Specifications and Electronic Security and Safety design.

PROJECT EXPERIENCE

- **Northrup Grumman Ship Building Facility,** Pascagoula, MS*
  - 247,000 square foot office and industrial space
  - Renovation and upgrade of all telecommunications spaces throughout the facility
- **Keesler Air Force Base Hospital,** Biloxi, MS*
  - 140,000 square foot emergency care facility
  - Installation of fiber optic backbone system
- **IBM 600 Anton Agile Workplace Renovation,** Costa Mesa, CA
  - Low voltage services for 39,000 sf on floors 2, 3, and 4
  - Consolidating three buildings into one increasing seat count
- **Family Services,** San Antonio, TX*
  - 14,000 square foot family services building, tenant finish out
  - Project included design and RFP composition for court admissible video surveillance system
- **Hoechst Celanese Chemical Plant,** Pampa, TX*
  - 22 acer Industrial campus 300,000 square foot office building, 25,000 square foot lab space
  - Design build and project management of all low voltage systems for offices and labs
  - Project management and construction administration for a state of the art, campus wide SONIT fiber optic campus loop.
- **Clear Channel Worldwide Information Technology Center,** San Antonio, TX*
  - 30,000 sf Level 4 Data Center and 200,000 sf Office space, VoIP, data and video systems design

QUALIFICATIONS

- Abilene Christian College, Abilene, TX
  - Attended 1986-1987
- United States Marine Corps, Non-Commissioned-Officers-School
- Registered Communications Distribution Designer RCDD # 122565
- DCDC – Data Center Design Consultant
- Siemon System Certified Designer # 00012109 – G
- Certified Systimax Designer # 95098
- OSHA-30 Certification

PROFESSIONAL AFFILIATIONS

- Building Industries Consulting Services International - BICSI
- IEEE Communications Society

YEARS AT GLUMAC

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* Projects completed prior to joining Glumac

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MICHAEL SOTO, RCDD
ROLE: LOW VOLTAGE DESIGNER

Michael joined Glumac in 2020 as a low voltage designer. He has over 19 years of extensive experience in professional design build/construction communications low voltage infrastructure, security, A/V, technology migration, power system analysis, CAD/ Revit/Visio and project management. He takes creative, strategic and innovative approaches to problem solving, sales strategy development and fulfillment of business goals in healthcare, data centers, higher education, single/multi-tenant, industrial, commercial, semi-conductor, aviation and government projects. Michael holds strong organizational skills and keeps up with the latest industry standards.

QUALIFICATIONS

- BICSI Certified Installer
- Registered Communications Distribution Designer (RCDD)

PROJECT EXPERIENCE

- **UC Davis Medical Center,** Sacramento, CA*
  - Master telecommunications summary and assessment for medical campus
  - Telecommunications system supports over 12,000 staff, patients, etc.
- **Mercy General Hospital,** Sacramento, CA*
  - Expansion and renovation
  - Low voltage telecommunications design
- **Children's Medical Center,** Dallas, Texas*
  - Heart Center
  - Low voltage telecommunications design and project management
- **Our Lady of the Lake,** Baton Rouge, LA*
  - Tower expansion, including 75 beds
  - Low voltage telecommunications and security access control design, and project management
- **Benewah Community Hospital,** St Maries, ID*
  - Expansion and renovation of admin and operating rooms
  - Low voltage telecommunications design, and project management
- **Roche Sequencing,** San Jose, CA*
  - Biotech lab campus renovations; 225k sf, including three buildings
  - Responsible for all low voltage telecommunications & migration

* Projects completed prior to joining Glumac

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MATTHEW BLAIR, CTS,
ROLE: TECHNOLOGY DESIGNER

Matthew began interning with Glumac in 2013 as an Electrical Designer. Mentored by seasoned Electrical Engineers, he developed a foundation and understanding of electrical engineering that he now applies to the design of Low-Voltage systems. Matthew specializes in Telecommunications and Security (access control, intrusion detection & video surveillance systems), audio/visual systems, intercom/paging, CATV, and nurse call systems. He looks forward to utilizing the latest technologies and his fresh and innovative outlook to create systems that are both functional and cutting edge.

PROJECT EXPERIENCE

ADVANCED TECHNOLOGY

- **Confidential Semiconductor Manufacturing Client**, Hillsboro, OR
  - Confidential Projects
  - Full Design for a Large Tenant Improvement Space Including Audio, Visual and an Industrial Space

COMMERCIAL

- **Daimler Trucks North America**, Portland, OR
  - Daimler "Nova" Trucks North America Headquarters is a new 265,000 sf, 9-story, Class A office building
  - Pursuing LEED Platinum certification
- **Hassalo on Eighth**, Portland, OR
  - New four block Development includes street level retail, 3 multi-family residential towers, an existing high-rise office building. Three LEED Platinum certifications.
  - Includes over one million sf of new construction; over 600 apartment units; 44,000 sf of retail; and 1,200 below-grade parking stalls.
- **The Blocks at Oregon Square**, Portland, OR
  - 1.5 million sf, 1039-unit, mixed-use development comprised of four high-rise apartment buildings with 30,000 sf retail over a 3-story, 2,000 car garage
- **Northwest Natural**, Portland, OR

QUALIFICATIONS

- Oregon State University, Corvallis, OR
  - B.S., Electrical Engineering
- University of Oregon, Eugene, OR
  - B.S., Psychology

PROFESSIONAL AFFILIATIONS

- Institute of Electrical and Electronics Engineers, Member
- Avixa (Infocomm), Certified Technology Specialist (CTS)

* Projects completed prior to joining Glumac

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CLIFF ALVARADO
ELECTRICAL DESIGNER

Cliff joined Glumac in 2015 with over 15 years of experience. As an electrical designer, he has worked on a diverse range of projects, including commercial tenant improvements, new construction, residential high rise buildings, and mixed-use facilities. Cliff also has experience with high end lighting controls, life safety systems, and emergency power generation. His professional interests include lighting and power design, photometric studies, and 3D visualization.

QUALIFICATIONS

- Oregon Polytechnic Institute, Portland, OR
  - AAS, Computer Aided Drafting
- Autodesk University, Portland, OR
  - AU Professional Training

REPRESENTATIVE PROJECT EXPERIENCE

HOSPITALITY EXPERIENCE

- **American Masala Restaurant**, San Francisco, CA*
- **Disney – Aulani**, Oahu, HI*
- **Hyatt Place**, Eugene, OR
  - 89,500 sf, 3-story, 130-key hotel on top of a new 7-story building. Hotel includes kitchen, bar and pool
  - Services: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design
- **Roy's Restaurants**, Oahu, HI*

HEALTHCARE EXPERIENCE

- **Kaiser Permanete**
  - Portland OR*
  - Maui, HI*
  - Oahu, HI.*

EDUCATIONAL EXPERIENCE

- **Evergreen Public Schools**, Vancouver, WA
  - 80,000 sf Administration Building
  - Services: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design, Energy Analysis, Commissioning Services
- **UCLA Luskin Conf. Ctr.**, Los Angeles, CA*
  - Exterior and interior ligthing for new build included exterior photometric analysis and egress lighting calcs
- **Stanford University**, Palo Alto, CA*
- **Portland State University**, Portland, OR*

* Projects completed prior to joining Glumac

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KONRAD CALAUSTRO
ROLE: TECHNOLOGY INTEGRATION DESIGNER

Konrad has 14 years of professional experience and has designed systems for healthcare, education and mixed use projects. He consistently produces project deliverables that meet project requirements and client expectations. His diversity of expertise includes: telecom, network systems, wireless, access control, CCTV, CATV, nurse call, audiovisual systems, and other technology systems. Around the office his fellow coworkers refer to him as a BIM guru.

PROJECT EXPERIENCE

- **1380 E Union Pasadena New Office**, Pasadena, CA
  - New four-story building including three (3) levels of underground parking
  - Retail space: 3091 sf on 1st floor
  - Office: 65,838 sf on 1st through 4th floors
  - Ground floor parking: 6,300 sf with 14 spaces and loading dock
  - Underground parking: 89,940 sf with 261 parking spaces
- **9000 Wilshire Blvd Office Building**, Beverly Hills, TX
  - New 36,000 sf core and shell three (3) story building
  - Telecommunications spaces
  - Pathways, including cable trays, conduits, and ancillary supports
  - Distributed Antenna System for Emergency Responder Radio Coverage
  - Security System includes CCTV cameras, monitors, restricted access at exterior doors, door alarm at exterior doors.
- **Capital One 6801 Hollywood Boulevard**, Los Angeles, CA
  - Due Diligence Report
  - 10,100 sf cafe style workspace
- **Pearl Office Development**, San Antonio, TX
  - 371,000 sf structured parking above and below grade
  - 16,400 sf retail space
  - 312,000 sf office space
- **The District Midtown**, Houston, TX
  - 1.3 million sf mixed-use project to include office, retail and residential area

QUALIFICATIONS

- ITTTechnical Institute, Sylmar, CA
  - Bachelor of Science in Computer Visualization Technology
- ITTTechnical Institute, San Diego, CA
  - Associate of Science in Computer Aided Drafting Technology

* Projects completed prior to joining Glumac

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PROJECT EXPERIENCE

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WILSHIRE GRAND RESTAURANT, SPA AND FITNESS

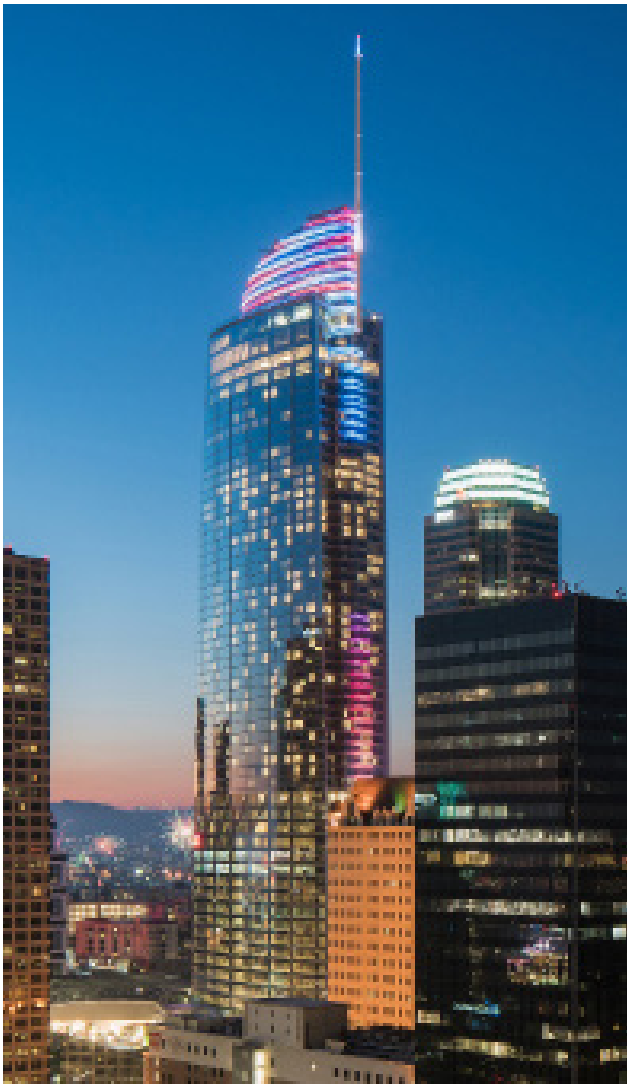
Los Angeles, California

The Wilshire Grand tower replaces the iconic Wilshire Grand Hotel as the revitalization of LA's downtown continues. The 73-story, 1,100 foot tower now stands as the tallest building in the Western United States and includes 80,000 square feet of retail space, 889 rooms, and 35 elevators; and five dining options. The glass skyscraper stands not only as symbol of revitalization, but also as a showcase for innovative and sustainable engineering.

Glumac provided MEP design and energy analysis for the Los Angeles landmark and was heavily involved in the envelope analysis. Viracon glass was used to reject heat and enhance the efficiency of the climate control system. A thermal energy storage system functions as a load shedding strategy that charges a large water tank overnight to reduce the number of chillers running during the day. Glumac designed a stormwater and condensate harvesting system to operate the open air cooling towers used for climate control. With this system, the facility stands to save as much as 550,000 gallons of water per year. Radiant heating and cooling systems optimize comfort levels on the ground floor and sky lobbies, and efficient lighting controls reduce usage by 30%.

The technology integration scope for the restaurants, kitchen, fitness center and spa included:

- Inside Plant Design
- Information Technology Infrastructure (LAN)
- Wi-Fi Systems Design (WLAN)
- Security Design



TENANT IMPROVEMENT SIZE: 41,100 sf

EST. COMPLETION DATE: 2017

OWNER: Korean Airlines

ARCHITECT: AC Martin Partners

CONTRACTOR: Turner Construction

SERVICES: Mechanical, Electrical, and Plumbing Engineering; Energy; Technology Integration

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DOWNTOWN COMMONS

Sacramento, California

The Downtown Commons project consists of three major elements:

EAST AND WEST RETAIL & RESTAURANT SHELL SPACES

This work includes the re-configuration and renovation of approximately 156,200 sf of existing retail space of the mall as well as limited façade improvements at the office building, re-configuration of the existing office building lobby, cinema entrance and lobby space. The existing parking garage will be reconfigured for improved connections to the remodeled areas above.

NEW APARTMENT AND HOTEL TOWER

The 16-story apartment and hotel tower will be new construction. The hotel will include approximately 250-keys with meeting spaces and support areas. The apartment levels are anticipated to include 44 units ranging from one-bedroom to penthouse units. The tower is expected to be approximately 630,000 sf plus approximately 5,540 sf of restaurant space at the podium level. This scope includes approximately 46,300 sf of retail shell space, 41,000 sf of office space, as well as the development of two levels of new below grade parking, totaling 205,600 sf.

SITE, PLAZA AND COMMON AREA DEVELOPMENT

The re-configuration of the public open spaces and plazas in the west area as well as the re-configuration of the structural bridge with new restaurant shell structures above total approximately 130,000 sf.

TECHNOLOGY INTEGRATION SERVICES

- Site Utility Coordination
- Outside Plant Design Distribution (WAN)
- Information Technology Infrastructure (LAN)
- Wi-Fi Systems Design (WLAN)
- Security Design

SIZE: Approximately 1.1 million sf

PROJECT COST: $175 million

COMPLETION DATE: 2017

OWNER: JMA Ventures

ARCHITECT: House & Robertson Architects, Inc.

SERVICES: Mechanical, Electrical and Plumbing Engineering; Technology Integration; Energy Analysis

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WESTERN OREGON UNIVERSITY HEALTH AND WELLNESS CENTER

Monmouth, Oregon

Glumac provided engineering, low-voltage and lighting design services for the 15,000 square foot renovation and 65,000 square foot new addition to the original physical education building at Western Oregon University. 20,000 square feet of the new addition is dedicated to office and classroom space.

Notably, the project meets the requirements of SEED and was designed to LEED Gold standards. The project's lighting energy was designed to perform 20% below state energy code limits.

Electrical consulting work included updating, servicing original switch gear and cabling, as well as a complete condition assessment and repair for the campus' 12.47 KV electrical distribution loop that serves twelve buildings on the "west" campus. Glumac provided the following electrical design and consulting services:

- For electrical testing services and cost estimation
- Arc flash studies for each building on campus
- Design of installation of an emergency generator in the West Heating Plant.
- Custom designed lighted climbing wall. With artistic color changing LED lighting system to highlight this focal point
- Daylight and flexible lighting for gym and track area to increase visibility and functionality for athletics, commencements and other school/community events
- Low-glare lighting system to increase occupant comfort in activity rooms where the focus is drawn directly toward the lighting
- Electrical upgrades to the West Campus
- Commissioning support

SIZE: 80,000 sf

PROJECT COST: $30 million

COMPLETION DATE: 2010

ARCHITECT: Opsis Architecture

SERVICES: Electrical, Technology Integration, Lighting Design

CALIFORNIA STATE UNIVERSITY NORTHRIDGE STUDENT HOUSING PHASE 2

Northridge, California

Glumac provided mechanical, electrical, plumbing and technology integration design services, as well as energy modeling services.

The design-build project consisted of the construction of three new four and five-story residential buildings with 396 beds in 100,000 square feet. In addition to the three new buildings, the project included renovation of the existing Building 18, which was built in Phase 1. Building 18 is a single-story recreation center which underwent a re-design of the recreation area and modification of half of the building into a coffee shop.

The project achieved LEED Gold certification and was the recipient of the AIA Merit Award for Design Excellence form the San Fernando Valley Chapter.

FEATURES

The project incorporates sustainable design and construction principles for efficient use of space and resources.

- Water saving plumbing fixtures
- Occupancy sensor controls in common areas
- LED Luminaires
- Daylight Switching/Dimming

SIZE: 100,000 sf
COMPLETION DATE: 2015
ARCHITECT: A.C. Martin Partners
GENERAL CONTRACTOR: CW Driver
PROJECT BUDGET: $29,000,000
CLIENT REFERENCE: Nat Wilson 818/ 677-2561
SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis

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CALIFORNIA STATE UNIVERSITY STANISLAUS STUDENT UNION

Turlock, California

This design-build project included the removal of portions of the existing Student Union Facility and construction of new 47,500 square feet of space, as well as the conversion of the existing 24,000 sf bookstore into an event space.

The program for the project included lecture halls, theater space, offices, and food service vendor spaces.

he technology services included:

- Campus Site Utility Coordination
- Outside Plant Design Distribution (WAN)
- Information Technology Infrastructure (LAN)
- Wi-Fi Systems Design (WLAN)
- Security Design
- Audio Visual Design

SUSTAINABLE DESIGN GOALS

The University established LEED Silver compliance.

- Dynamic daylight via glazing type, orientation, and shading.
- Improved envelope with limited thermal short circuits.
- Operable windows and views to nature outdoors.
- Color-corrected LED lighting to maintain human circadian rhythms.
- Continuous indoor air quality monitoring for health awareness.
- Photovoltaic systems integrated with the building and/or landscape as an aesthetic feature.
- Storm water collection and/or reuse to introduce/ experiment with new concepts.

SIZE: 47,500 sf

PROJECT COST: $35,000,000

END DATE: est. 2020

ARCHITECT: AC Martin

CONTRACTOR: Turner Construction

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis

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CONFIDENTIAL MICROELECTRONICS MANUFACTURER

Hillsboro, Oregon

A confidential computer chip manufacturing giant, needing to develop an advanced space to manufacture its next-generation of technology, decided to expand the foot print of its campus in Hillsboro, Oregon, and build a new, state-of-the-art high-tech research and development facility. Glumac provided a full complement of A and E services as the prime consultant for this greenfield building project.

Glumac utilized Revit as the single platform for all of the design on the project. Due to very strict manufacturing parameters for successful product development, the building was designed to be one of the most vibration sensitive lab facilities in the world. Silicon intake and clean product outflow, gowning, quality assurance testing laboratories, class 1000 cleanrooms, automated material handling transport are a few of the building process functions in this five story manufacturing support building. It is constructed 60 feet into the ground and features critical lab spaces, non-critical fab labs, gowning room, wafer starts, parts clean, automation lab, and an Automated Material Handling System (AMHS).

The building was designed to achieve LEED Silver, and Glumac's designs helped it achieve 20% water savings and 15% energy savings, and made heavy use of recycled and locally sourced materials.

FEATURES

- Glumac has also performed separate design packages for both the initial Core & Shell and subsequent lab fit-out.
- We performed all design work in Revit and issued a "clash-free model" at IFC.

SIZE: 460,000 sf

CONSTRUCTION COST: Confidential

START / END DATE: 2012 / 2013

ARCHITECT: Group Mackenzie

CONTRACTOR: Turner Construction Company

OWNER: Confidential

SERVICES: MEP, Energy Analysis, Lighting Design, Technology Integration, Construction Management, Sustainability Consulting

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MTA EXPOSITION LINE OPERATIONS AND MAINTENANCE FACILITY

Los Angeles, California

Glumac is providing MEP and energy services for the Operations and Maintenance Facility during Phase 2 of the Exposition Line Light Rail Project. The facility will optimize efficiency and functionality of rail operations. and utilize the latest energy efficient systems such as LED lights and radiant floors.

The Operations and Maintenance Facility is located on two adjacent properties and is comprised of four buildings: a Maintenance Building, a Wash Building, a Secondary Building and a Cleaning Building. The facility will consist of six storage tracks for three-car train sets, a light maintenance/repair shop, administration facility, blow-down facility, run-through wash plant, double-track interior car-cleaning platform and a traction power sub-station, designed to maintain the fleet of 43-45 vehicles.

The site will have parking for staff and visitors, paved aprons, ramps, and roadways; and a 24/7 guarded entry.

FEATURES

- LED lighting for site light and Maintenance Building lighting
- Radiant floors
- 100% stand by power back up
- Underfloor air distribution
- Demand controlled ventilation
- Solar system that powers the domestic hot water and radiant floors

SIZE: 70,000 sf / 8.3 acres
ESTIMATED PROJECT COST: $100 million
ESTIMATED COMPLETION DATE: 2014
OWNER: Exposition Metro Line Construction Authority
PROJECT MANAGEMENT: Maintenance Design Group
ARCHITECT: RNL Design
AWARDS:

LEED Gold
Electrical Excellence Awards Winner, 2016, Sponsored by the Los Angeles County Chapter National Electrical Contractors Association (NECA)
ENR California's Best Projects 2017
Sustainable Innovation Awards Winner, 2017

GLUMAC
A TETRA TECH COMPANY

HIGH DESERT HEALTH SYSTEM MULTI-SERVICE AMBULATORY CARE CENTER

Lancaster, California

This formerly dilapidated plot of land has been developed into a brand new, eco-friendly state-of-the-art medical facility. The building houses programs designed specifically for the needs of the community and includes services such as: the Antelope Valley Hope Center HIV/AIDS Clinic, the regional Foster Care HUB Clinic, the SCAN clinic for children who are suspected victims of sexual or physical abuse, an oncology clinic and disease management programs for patients suffering from diabetes and asthma.

Glumac provided full-service, LEED Fundamental and Enhanced Commissioning for this new design-build project. The facility includes a two-story, 121,000 square foot Multi-Service Ambulatory Care Center (MACC), a 5,500 square foot Crafts Building and a 15.630 square foot Material Management and Central Plant Building.

Glumac's role in commissioning this project extended from the scoping phase through post-occupancy operations and maintenance review. The design included a curtain wall system that allows natural daylight to lessen overall energy usage and supports LEED certification. Additionally, heat gain is controlled by a louver system as part of the architectural design. The entire building is constructed in compliance with OSHPD-3 requirements within a space promoting physical wellness. The mechanical equipment includes four air-handler units and two exhaust fans which are located on the roof and concealed by a perforated mechanical screen with sunshades.

AWARDS/CERTIFICATIONS

- LEED Gold

SIZE: 142,000 sf
CONSTRUCTION COST: $98 million
COMPLETION DATE: 2014
CONTRACTOR: Swinerton Builders
ARCHITECT: Lionakis
OWNER: County of Los Angeles Department of Public Works
SERVICES: Commissioning

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UNIVERSITY OF OREGON JANE SANDERS SOFTBALL STADIUM

Eugene, Oregon

University of Oregon has long since made a name for itself in collegiate sports and its new Jane Sanders Softball Stadium has quickly proven to be another worthy addition to the celebrated tradition of the athletic department.

This new 1,500-seat stadium, 15,000 square foot team building and practice facility with an indoor softball field gives the University's softball team an iconic place to build their fan base, showcase their talents, and train at a professional level. As the Mechanical, Electrical and Plumbing (MEP) Engineers of Record, Glumac worked closely with the Architect and Contractor to fulfill the University's vision for the stadium. Creating systems that could not only meet the University's needs but are cost effective, energy efficient, and innovative.

Our technology and lighting designers, along with our MEP engineers, collaborated with the project team to design specific systems to enhance the experience of the team, the fans, and broadcast crews. Multi-level broadcast tie-ins make it easy for crews to plug-in and post out, and the field lighting was designed to enhance visual acuity and broadcast video quality. In the internal practice area, systems were integrated and protected so that they would neither detract nor be damaged by fervent practice. And in the locker rooms, the technology groups designed special USB outlets for players to charge their digital devices. Special attention was given to the aesthetics of the fan areas as well, as the University wanted an inviting and exciting place for fans to come and enjoy this growing sport. A place of particular interest is the outdoor canopy. Our lighting group worked closely with the Architects to design showcase lighting into the structure that highlights the wings and other

architectural details without distracting from the design.

Immediately after its opening, the University discovered the stadium was so popular that its 1,500 seats weren't enough. This has led to the project team designing additional outfield seating for increased attendance capability. In the end, this new sports complex not only achieved its goals but far exceeded them, setting new standards for softball spaces and sports facilities alike.

The stadium has achieved LEED NC Gold certification.

SIZE: 1,500-seat Stadium/ 96,390 sf
CONSTRUCTION COST: $17.2 million
START/END DATE: March 2016
ARCHITECT: SRG Partnership, Inc
CONTRACTOR: Howard S. Wright
OWNER: University of Oregon
SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design

GLUMAC
A TETRA TECH COMPANY

IBM WATSON TENANT IMPROVEMENT - 505 HOWARD STREET

San Francisco, California

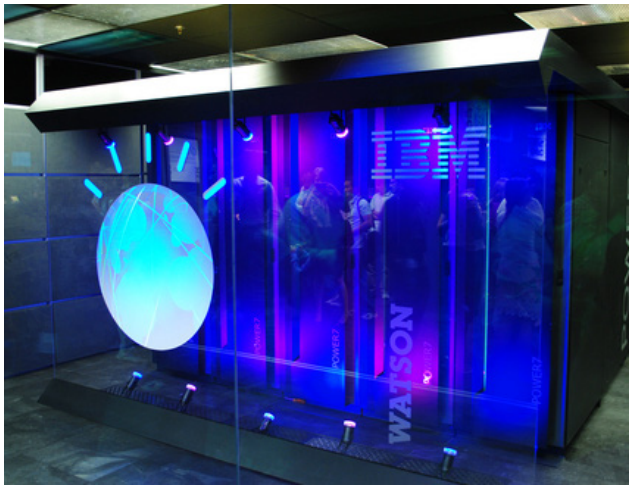
Glumac provided mechanical, electrical, plumbing, and technology design services for this office space interior fit-out of approximately 85,000 square feet. The proposed space will occupy floors 6 and 7, and approximately half of floor 8. The project will create an experience and environment that will attract customers to IBM in San Francisco and will showcase the following IBM business units:

- Watson
- Commerce
- Analytics
- Cloud
- GBS Interactive
- Marketing and Communications
- Research

The design shall comply with LEED Gold per City of San Francisco local ordinance.

Our technology design services include:

- Audio Visual (AV) Systems for lobby and conference rooms
- Telecommunications spaces
- Pathways, including cable trays, conduits, and ancillary supports
- Voice/Data cabling infrastructure to support Internet Protocol (IP) devices
- CATV Systems
- Building Security system and Access Control



SIZE: 85,000 sf

OWNER: IBM

ARCHITECT: Gensler

DATE: 2017

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration

GLUMAC
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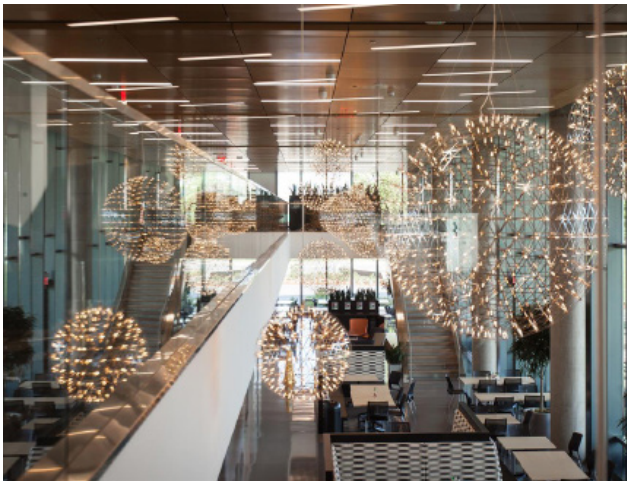
DAIMLER TRUCKS NORTH AMERICA HEADQUARTERS

Portland, Oregon

This 265,000 square foot, nine-story, Class A office building is the new corporate headquarters for Daimler Trucks North America. Located on the industrial Swan Island in Portland, Oregon, the building has sweeping views of the Willamette River and Downtown Portland.

Glumac provided the engineering services for Nova, including mechanical, electrical, plumbing (MEP) system design, technology integration, energy modeling, lighting design, CFD modeling, and sustainable consulting services. Our team collaborated with the Owner and Architect to integrate sustainable systems such as natural and directional LED lighting, radiant heating and cooling, dedicated outdoor air systems and solar hot water to create a cost-effective, energy-efficient and comfortable built environment.

The headquarters includes a first floor and mezzanine plus eight stories of open and private office spaces. Positioned in proximity to the engineering and manufacturing facilities, the building offers a range of amenities including a conference center and a full-service kitchen and dining area.



SIZE: 265,000 sf

CONSTRUCTION COST: $125m

START/END DATE: May 2013/November 2015

OWNER: Daimler AG

ARCHITECT: Ankrom Moisan Architects

CONTRACTOR: Hoffman Construction Company

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis, Lighting Design, CFD Modeling, Sustainability Consulting

FEATURES

- Dedicated Outside Air System (DOAS)
- Active and passive chilled beams
- Radiant floor heating and cooling
- LED Lighting
- Stormwater re-use for water features
- Solar hot water
- High efficiency building envelope
- Photovoltaic systems
- Green Wall

AWARDS/CERTIFICATIONS

- LEED Platinum

GLUMAC
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VESTAS AMERICAS HEADQUARTERS

Portland, Oregon

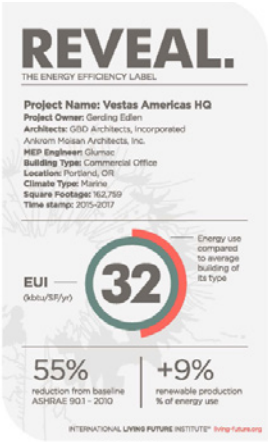
When Vestas – one of the world's largest manufacturers of wind turbines – decided to move its North American headquarters into the historic Meier & Frank Delivery Depot in Portland, Oregon, they were challenged with sustainably modernizing a building that has stood for nearly a century and is listed on the National Register of Historic Places. Glumac was tasked with helping them meet that challenge, providing mechanical, electrical and plumbing design, as well as lighting, fire alarm, telecom and security systems design. The result was a LEED Platinum designation, an Energy Star score of 99, and the International Living Future Institute's (ILFI) energy efficiency REVEAL label, making this historic Portland landmark the most energy-efficient building on record in 2014 in the United States.

Glumac also provided energy modeling services, CFD analysis, LEED scoping and sustainable planning sessions, including recommendations on sustainable design elements. A rainwater collection/reuse system was implemented to decrease water usage and waste. And a central, multi-story atrium was constructed to reduce energy use by providing much of the interior with strong natural lighting. The building now also features the largest roof-mounted solar energy area in the city's central business district. The building now also features five floors of work space for some 400 employees, with built-in flexibility to accommodate up to 200 more for future expansion, making this a place Vestas and co-tenants can call home for years to come.

With maintaining the building's early-20th century look and feel as a critical goal, the new Vestas Americas headquarters stands out as an example of the real success in redeveloping and repurposing historic structures.

AWARDS/CERTIFICATIONS

- LEED Platinum
- ILFI's REVEAL Label
- Energy Star score of 99
- 2012 IIDA People's Choice Award
- WAN Commercial Shortlist 2014



SIZE: 172,000 sf

CONSTRUCTION COST: $66.3 million

END DATE: 2012

ARCHITECT: Ankrom Moisan, GBD, Peter Meijer

DEVELOPER: Gerding Edlen

ADDITIONAL ENGINEERS: KPFF, HHPR

OWNER: Vestas Americas

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design, Energy Analysis, CFD, Sustainable Services

GLUMAC
A TETRA TECH COMPANY

PROVIDENCE PARK

Portland, Oregon

Drawing inspiration from open air arenas worldwide, including the famed "La Bombonera" in Buenos Aires and London's original Globe Theater, this expansion completes the original vision for Providence Park, which dates back to 1925, while adding a modern form.

The renovation to the stadium's east side included adding more than 4,000 seats across four-levels, club seating with a full service restaurant, grandstands with concessions, an open public arcade, a street level concourse, and major facade renovations. A new 120' steel cantilevered roof protects most of the seating from Portland's constantly changing weather. A new training facility; renovated locker rooms and restrooms; and a new low-impact synthetic playing surface completed the renovation.

Glumac provided MEP, technology integration, energy analysis, and lighting design services. Our design team spearheaded LED field lighting replacement for the entire stadium, reducing total power consumption by 15%. The Glumac plumbing department worked closely with the architect to design a rainwater reclamation system that captures rain from the rooftop and routes it to field level, where it is held in tanks before being released into an underground creek. The multitude of glass enclosed spaces feature a highly efficient interior conditioning system. Oregon Energy Code allows for 30% glass on a building of this size; Providence Park is 70% glass and still beats the code's energy use requirements by 10%. The technology integration team provided security cameras sensitive enough to capture the brand name of an AA battery from 300 feet. Finally, the kitchen is designed to scrub, clean, and route exhaust away from fans, improving stadium air quality.

This project was named Engineering-News Record's Best Sports/Entertainment Project in 2019

SIZE: 82,000 sf / 25,218 seats

CONSTRUCTION COST: $50 million

START/END DATE: 2017 - 2019

ARCHITECT: Allied Works Architecture

CONTRACTOR: Turner Construction

OWNER: Peregrine Sports LLC

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis, Lighting Design

GLUMAC
A TETRA TECH COMPANY

THE ALLISON INN AND SPA

Newberg, Oregon

Since its opening in 2009, the Allison Inn & Spa in Newberg, Oregon, has regularly appeared in the pages of travel magazines listing it as one of the best hotels in the country. And though luxury is the forefront for this Willamette Valley resort and spa, it does not come at the cost of sustainability. Glumac provided mechanical, electrical, plumbing, and technology integration services for the hotel, helping it become one of the greenest hotels in the country at the time and achieve LEED Gold certification.

The resort has a high need for hot water, with 85 guest rooms, a 15,000 sf spa, a pool, and kitchen all demanding hot water at a moment's notice. Glumac designed what became the largest solar hot water system in Oregon, reducing the property's gas consumption and providing greater efficiencies in heating. Photovoltaic panels were also integrated directly in to the roof to harvest significant energy without impacting the luxury look and feel of the hotel. The two systems combine to offset nearly 20% of the energy consumed by the building annually. Overall, with Glumac's help, the Allison Inn was able to achieve more than 50% of energy savings as compared to similar facilities. Additionally, a variable refrigerant flow system was designed to maintain building comfort, and dedicated outside systems provide fresh air to the interiors.

Glumac's Lighting Studio designed a lighting system that gives staff and guests the ability to create custom conditions for the conference spaces and guest rooms. LED lighting above the guest room doors and in the spa were designed to maintain a unique ambiance while minimizing energy consumption. Glumac also acted as the Fundamental Commissioning Authority.

SIZE: 60,000 sf/six-story

PROJECT COST: $35 million

COMPLETION DATE: 2009

ARCHITECT: GGLO

CONTRACTOR: Lease Crutcher Lewis

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration

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HASSALO ON EIGHTH ECODISTRICT

Portland, Oregon

In the midst of a population boom, Portland has found itself in need of more residential space. With the city's infrastructure not able to keep up, new builds must find ways to accommodate a growing population while not damaging the surrounding environment. Hassalo on Eighth was conceived as an EcoDistrict – a series of buildings that share energy, water and waste infrastructure – to ease the city's housing squeeze, revitalize a neighborhood in need of development, and reduce tenants' carbon footprint by nearly a third.

Glumac provided mechanical, electrical, and plumbing design, energy analysis, technology integration, lighting design and commissioning services. With a focus on water reclamation to reduce increased strain on the Willamette River, which runs directly though Portland, an advanced central water system was built around a natural wastewater treatment system that cleans sewage using bacteria in an artificial tidal wetland, which appears as typical planting beds in the landscape between each building. It has the potential to transform up to 54,000 gallons of sewage into reusable gray water every day, which is then used in toilet flushing, cooling, and irrigation, with any available excess used for groundwater recharge. A central condenser water loop connects the buildings, facilitating thermal energy sharing throughout the district. In addition, the mechanical plant in an existing 12-story commercial building on the site was upgraded to serve commercial spaces in the new buildings.

Based on the savings gained in water, sewer, and system development charges, Hassalo on Eighth's water system will pay for itself in four years and achieved three LEED Platinum certifications.

It was also named USGBC's LEED for Homes Project of the Year in 2017.

SIZE: Four-city blocks (592,616 sf of housing; 31,707 sf of retail; 26,400 sf of retail tenant; 271,582 sf of office)

PROJECT COST: $192 million

COMPLETION DATE: 2015

ARCHITECT: GBD Architects

CONTRACTOR: Turner Construction

DEVELOPER: American Assets Trust

SERVICES: Mechanical, Electrical, Plumbing, Energy Analysis, Technology Integration, Lighting Design and Commissioning

GLUMAC
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INDIAN WELLS TENNIS GARDEN STADIUM II

Indian Wells, California

Each year, the Indian Wells Tennis Garden in Southern California plays host to the BNP Paribas Open, one of the largest tennis events in the world. The two-week event attracts thousands of attendees and is broadcast in high definition to millions across the globe. An event of that caliber requires a high standard of lighting. Glumac provided lighting design for the interiors and exteriors of the facility, meeting its unique aesthetic and technical needs.

The Tennis Garden is situated just outside Palm Springs, an area known as an Old Hollywood getaway, and features iconic architecture of that time period. The challenge for Glumac was to maintain that historic look while providing modern, energy-efficient solutions to meet strict high definition broadcasting standards. The ESPN standard for lighting demands high output levels, meeting at least 125 footcandles in the performance area. With Glumac's help, the Tennis Garden was able to reach 180, providing a dynamic event space for this world-class venue. And while such output can lead to heavy energy usage, Glumac was able to help mitigate that issue by installing variable controls that not only allow the facility to present their events in a variety of ways, but also tamp down usage during low-traffic times to conserve energy.

To maintain the facility's historic look, Glumac up-lit many of the palm trees that line the venue's walkways, providing a unique ambiance for attendees. After a large renovation, of which Glumac played an integral role, the Tennis Garden was named Facility of the Year by the United States Tennis Association.

SIZE: 174,240 sf + 8,000 seats

CONSTRUCTION COST: Undisclosed

START DATE / END DATE: February 2012 - March 2014

ARCHITECT: Keisker & Wiggle Architects, Inc.

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design, Commissioning

GLUMAC
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THE MIRABELLA

Portland, Oregon

This 30-story project was built on a former brownfield site and is the first LEED Platinum CCRC (Continuing Care Retirement Community) in the U.S.

The Mirabella offers 224 stylish apartment homes in an array of floor plans, which feature 9-foot-tall ceilings, extra-large windows, slab granite countertops, wood flooring, high-quality carpeting and spectacular views.

What makes this project great is the collaborative efforts of the team on its numerous sustainable attributes.

FEATURES:

- Reduced energy and water usage (each by more than 40%)
- Solar hot water
- Water source heat pumps with ultra high efficiency ECM motors
- High efficiency lighting
- Demand control ventilation
- Occupancy sensors
- Dual-flush toilets
- Low flow shower heads
- Green roofs
- Drought-tolerant plants

SIZE: 507,300 sf

PROJECT COST: $222 million

COMPLETION DATE: 2010

ARCHITECTS: AMAA Architects

CONTRACTOR: Hoffman Construction

OWNER: PRS

SERVICES: Mechanical, Electrical, Plumbing, Lighting Design; Energy; Low Voltage

DOWNTOWN COMMONS

Sacramento, California

The Downtown Commons project consists of three major elements:

EAST AND WEST RETAIL & RESTAURANT SHELL SPACES

This work includes the re-configuration and renovation of approximately 156,200 sf of existing retail space in the east and west areas of the mall as well as limited façade improvements at the office building, re-configuration of the existing office building lobby, cinema entrance and lobby space. The existing parking garage will also be reconfigured to allow for improved connections to the remodeled areas above.

NEW APARTMENT AND HOTEL TOWER

This component includes a 16-story apartment and hotel tower with two levels of below grade parking, all new construction. The hotel will include approximately 250-keys with meeting spaces and support areas in the lower two levels. The apartments at the upper five levels are anticipated to include 44 units ranging from one-bedroom to penthouse units. The total square footage in the tower is expected to be approximately 630,000 sf plus approximately 5,540 sf of restaurant space at the podium level. This scope includes approximately 46,300 sf of retail shell space, 41,000 sf of office space, as well as the development of two levels of new below grade parking, totaling 205,600 sf.

SITE, PLAZA AND COMMON AREA DEVELOPMENT

The re-configuration of the public open spaces and plazas in the west area as well as the re-configuration of the structural bridge with new restaurant shell structures above total approximately 130,000 sf.

SIZE: Approximately 1.1 million sf

PROJECT COST: $175 million

COMPLETION DATE: 2017

OWNER: JMA Ventures

ARCHITECT: House & Robertson Architects, Inc.

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis

GLUMAC
A TETRA TECH COMPANY

LOS GATOS LIBRARY

Los Gatos, California

Libraries are often seen as beacons of knowledge and learning in a community. The design of the Los Gatos Library in Los Gatos California takes that vision quite literally. Set among ample tree cover, the library is meant to resemble a lantern in the woods, both drawing attention to its interior and symbolizing a light in darkness.

The library is LEED Gold certified, and emphasizes visible sustainable systems, allowing its occupants to monitor the building's energy usage in real time. Glumac provided full design for the facility's mechanical, electrical, plumbing, data/telephone, and audio-visual systems and conducted the energy analysis.

The building draws much of its lighting and energy from the sun, with 70% of the structure having access to natural lighting. The lengthy structure has a nearly transparent façade, and is oriented to capture northern sunlight. The daylight harvesting techniques used in the facility are optimized by a system of louvers on the south and west exposure areas to reduce direct solar glare and create a comfortable ambiance for reading and browsing the stacks. At night, a mixture of white and colored LED lights illuminate the building and allow it to stand out among the surrounding trees, providing the lantern effect.

A 40kw photovoltaic system provides energy for the library, and its heated water is derived from a solar hot water system. Additionally, a raised access floor was designed to help provide more efficient and effective air distribution, and add to the overall level occupant comfort.

SIZE: 30,000 sf

CONSTRUCTION COST: $14.5 million

END DATE: 2012

ARCHITECT: Noll & Tam Architects

OWNER: Town of Los Gatos

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis

GLUMAC
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OREGON MILITARY DEPARTMENT CAMP WITHYCOMBE

Clackamas, Oregon

When the century-old Camp Withycombe underwent an expansion, the Oregon Military Department had obvious needs in modernizing its campus for the 1,300 service people stationed there. However, it also saw the opportunity to utilize emerging technologies to create a more sustainable and cost-efficient facility. OMD came to Glumac with some specific goals to achieve a higher level of sustainability and to create a positive image of the facility in the surrounding community, namely: decreasing its water consumption by 30-40% and lowering annual energy costs by 25%.

Newly constructed facilities included offices, classrooms, community spaces, an auditorium, storage areas, a band practice space, a kitchen, and a physical fitness area designed to aid in the recruiting and training of National Guard and Reserve members.

These new additions to the existing campus made use of several sustainable concepts, including water reduction, skylight daylighting and LED lighting. Glumac's energy team was able to exceed OMD's initial goal by achieving a 40% energy cost reduction below code for the facility. Energy usage was optimized by providing each department its own thermal comfort and ventilation system to allow them the flexibility to use the system to meet their individual needs, negating potential excesses. A high-efficiency cooling and heating plant was designed to decrease natural gas usage and energy waste. Low flow plumbing fixtures saved nearly 370,000 gallons of water per year, while a more efficient landscape irrigation system cut back yearly water usage by approximately 2,667,000. The project achieved LEED Gold certification and won the 2012 DBIA Civic - National Design Build award.

SIZE: 248,960 sf

CONSTRUCTION COST: $63,835,000

END DATE: 2014

ARCHITECT: Barentine Bates Lee Architects

CONTRACTOR: Hoffman Construction

OWNER: Oregon Military Department

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design, Energy Analysis

GLUMAC
A TETRA TECH COMPANY

KING COUNTY COURTHOUSE

Seattle, Washington

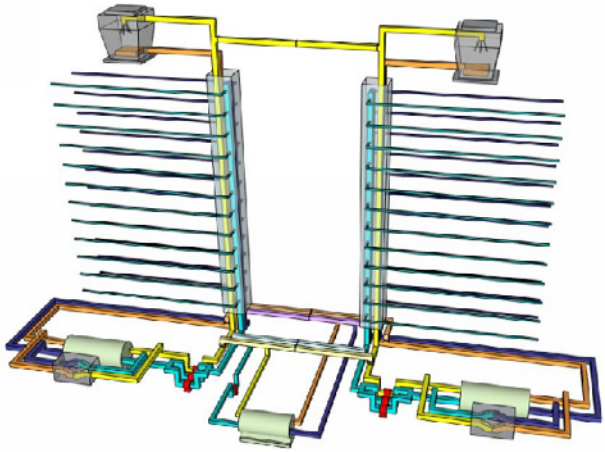
Surrounded by old brick buildings in Seattle's downtown and Pioneer Square neighborhoods, the King County Courthouse is a historic landmark. It was built in 1916, with additions and renovations in the decades that followed. Today, the County is committed to maintaining the building's historic charm, while assessing the building's systems for modern viability.

Glumac provided mechanical, electrical, plumbing and telecommunications site assessments for the aging 12-story building. Staff analyzed the systems to see which were in need of upgrades, replacement, code compliance and energy efficiency improvements. From there, Glumac made a priority list of the systems that King County should address, with unsafe systems at the top of the list and non-code-compliant systems next.

To make the report as accessible and digestible as possible, Glumac and the architect, Clark Design Group, decided to create a document with less written jargon and more imagery. Glumac created color-coded Google SketchUp diagrams of the building's different systems, which provided a clear, graphical representation of the site assessment.

King County also hired Glumac to take on the first of the recommended improvements from the site assessment. Electrical staff designed the replacement of the building's electrical bus ducts. The rigorous schedule in which the project was completed, with no interruption to the court rooms, earned the project team recognition by King County and a piece of the historic bus duct.

Photo credit: Joe Mabel



SIZE: 568,000 sf

CONSTRUCTION COST: N/A

START / END DATE: March 2016 / May 2018

ARCHITECT: Clark Design Group

CONTRACTOR: Skanska

OWNER: King County

SERVICES: Mechanical, Electrical, Plumbing and Telecommunications Site Assessments; Electrical Design for Upgrades

GLUMAC
A TETRA TECH COMPANY

SAMMAMISH COMMUNITY AND AQUATIC CENTER / YMCA

Sammamish, Washington

The Sammamish Community and Aquatic Center furthers the city's goal to create sustainable community spaces.

Glumac provided mechanical, electrical, and plumbing design; lighting design; energy modeling; and technology integration for the City of Sammamish's 60,000 square foot Community and Aquatic Center. The facility comprises a six-lane lap pool, activity pool, two-story water slide, hot tub, gyms, fitness rooms, locker rooms, track and community kitchen.

The project is the first fully LED-lit pool installation in Washington State and throughout the national YMCA network. Glumac designed a new LED product that allows the lights to share a single power supply, saving energy and preventing maintenance issues. Dimming controls in nearly every space allow for varying occupant needs.

Pool areas are typically intense energy consumers, due to the need to move high volumes of air, filter chlorine particles, and keep the air clean and safe for swimmers. In order to minimize energy consumption, Glumac modeled systems that use heat recovery in the pool area and a high-efficiency HVAC system in the support spaces.

Working closely with the civil engineers, Glumac was able to take rainwater from both from the roof and the entire site and use the captured graywater for flushing the building's toilets.

A City official shared his opinion that the facility has been a huge value-add for the community, demonstrating hard and soft returns on the investment, through its popularity and use, as well as the improved property values already stimulated by the new amenity.

SIZE: 60,000 sf

CONSTRUCTION COST: $26 million

START/END DATE: March 2013 / April 2016

ARCHITECT: Barker Rinker Seacat

CONTRACTOR: Porter Brothers

OWNER: City of Sammamish

END USER: YMCA

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design, Energy Analysis

GLUMAC
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UNIVERSITY OF OREGON STRAUB HALL

Eugene, Oregon

Originally designed in 1928 as a dormitory, the University of Oregon's Straub Hall was repurposed in the 1970s as a classroom facility for the Psychology department. Requiring a modernization to suit the needs of faculty and students, the university worked with Glumac's engineering staff to help usher this building into the 21st century, while maintaining its Colonial Revival aesthetic.

Glumac provided engineering and construction management services on the project. Low-profile systems were heavily utilized in the attic and basement spaces to maintain the integrity of the original design. Active chilled beams used water from the facility's existing central plant for small, easily hidden pipes over which air is passed to cool the interiors. A classroom space was added on to the u-shaped building to help accommodate 1,000 more classroom seats, and a state of the art lecture hall.

Glumac also provided lighting and technology integration design, integrating a large skylight to maximize daylighting and provide a biophilic connection for occupants, which improves overall attentiveness and productivity. A louver system gives the ability to shade the skylight, and a system of adjustable LED lights provide the flexibility to keep the white boards illuminated while the room is dark. The LED's, combined with advanced controls that give facility management control over the system, make the room five times more energy efficient than the standard system on the campus. Lighting in the vintage lobby was redone by integrating fixtures on top of existing crown molding, illuminating the ceiling as well as the art work that has adorned the walls for years. The room also features three connected HD screens.

SIZE: 58,000 sf

CONSTRUCTION COST: $44 million

END DATE: On going

ARCHITECT: Rowell Browkaw & Opsis Architecture

OWNER: University of Oregon

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Lighting Design

GLUMAC
A TETRA TECH COMPANY

PACIFIC NORTHWEST COLLEGE OF ART

Portland, Oregon

The Pacific Northwest College of Art (PNCA) sought to convert Portland's historic post office into a new campus and thriving center for 21st Century art and design education. Centrally located in the creative corridor of Portland's North Park Blocks, this historic renovation is a sustainable, state-of-the-art facility that serves as a cultural hub of galleries, theatre, and learning spaces for students, artists, and public programs.

Glumac designed the facility's energy-efficient mechanical, electrical, plumbing, lighting, and integrated technology systems. Glumac also provided Energy Analysis and Commissioning Services to tune the building to LEED Platinum Certification standards. All parties worked to conserve and restore existing systems and fixtures to reduce material costs and preserve parts of the buildings' rich history.

As a result of sustainable systems design, efficient HVAC systems, daylighting, electric lighting, and controls reduce energy-costs by a forecasted 40%, or $90,000/year compared to minimum code-standard design.

FEATURES:

- High-efficiency lighting + controls: LED Luminaires, daylit gallery spaces, and daylighting controls
- Highly flexible lighting layout and technology solutions that allow artists to tune spaces to their creative needs
- Access controls, telecom infrastructure + A/V wireless systems
- Thermal comfort + energy analysis for rooftop PV array for greater energy saving measures modeling for tax rebate incentives
- Fire Safety Design + Commissioning

SIZE: 145,000 SF

CONSTRUCTION COST: $34 Million

START/END DATE: 2011 - 2015

ARCHITECT: Allied Works Architecture

DEVELOPER: Gerding Edlen

CONTRACTOR: Howard S. Wright

OWNER: Pacific Northwest College of Art

AWARDS: IES Lighting Design National Award of Merit Winner, 2016

SERVICES: Mechanical, Electrical, Plumbing, Lighting Design, Technology Integration, Energy Modeling, Commissioning

GLUMAC
A TETRA TECH COMPANY

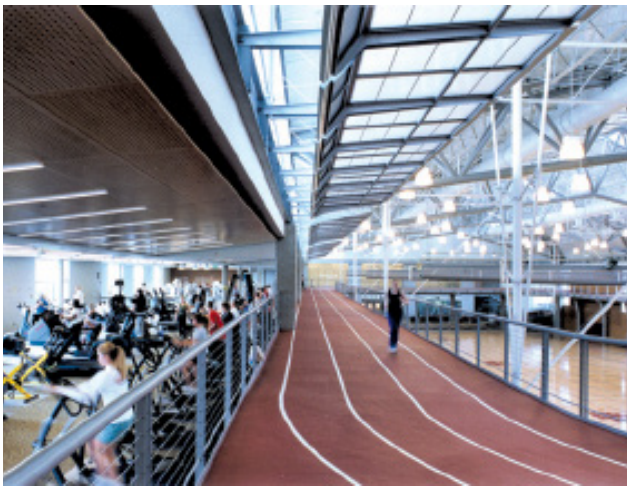
WASHINGTON STATE UNIVERSITY STUDENT RECREATION CENTER

Pullman, Washington

Glumac provided mechanical, electrical, plumbing and telecommunications design of a new 160,000 square foot facility housing four court and three court gymnasiums, multi-purpose and weight training rooms, jogging track, climbing wall, small leisure pool, instructional pool and racquetball courts. In addition, administration offices and support facilities such as lounge rooms, proshop, storage space and juice-bar will be provided.

FEATURES

- Natatorium heat reclaim system
- Extensive daylighting and daylighting controls
- Automatic natural ventilation
- Tuned glazing systems



SIZE: 160,000 sf

PROJECT COST: $150 million

COMPLETION DATE: 2003

ARCHITECT: Yost Grube Hall Architects

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration

GLUMAC
A TETRA TECH COMPANY

TRINITY TERRACE

Fort Worth, Texas

To respond to the growing need for wellness-focused senior living facilities, Fort Worth's Trinity Terrace development elected to expand its space with a high-rise addition planned to feature 120 new units.

Glumac played an integral role in the creation of this latest development, providing mechanical, electrical, and plumbing design, energy analysis, as well as technology integration and lighting design. Air quality standards are critical in senior living facilities, and to meet these requirements, Glumac's mechanical team designed a dedicated outdoor air system – a rare system for this type of high-rise facility. A modernized security system was designed to monitor the safety of residents throughout the facility, particularly in the memory-care units. And, special attention was given to the lighting scheme, with a focus on combining direct and indirect lighting that illuminates the ceilings and walls rather than only directly on the residents. This is to reduce glare from fixtures and create a comfortable ambiance. The high-rise also utilizes daylighting, with large windows that provide direct views of downtown Fort Worth.

Ground floor townhouses, apartments and top-floor penthouses comprise the 120 new units. Other amenities will include a community garden, a terrace dining area, and an outdoor barbecue area.

SIZE: 305,000 sf

CONSTRUCTION COST: n/a

START/END DATE: 2014/September 2017

ARCHITECT: Ankrom Moisan Architects

OWNER: Pacific Retirement Services

CONTRACTOR: Manhattan Construction Company

SERVICES: Mechanical, Electrical, Plumbing, Technology Integration, Energy Analysis, Lighting Design

GLUMAC
A TETRA TECH COMPANY

SECURITY DESIGN PROJECT EXPERIENCE

Southern California Edison, Alhambra, CA
- Video Surveillance
- Data Center

PG&E, Various Locations, CA
GRC 2014 / SERVICE CENTER OPTIMIZATION PLANNING INITIATIVE PROJECTS
- Access Control
- Video Surveillance

Confidential Energy Client, San Ramon, CA
- Access Control

Pinole Valley High School, Pinole, CA
NEW CAMPUS
- Access Control
- Intrusion Detection

Azusa Pacific University, Azusa, CA
SEGERSTROM SCIENCE CENTER
- Access Control
- Video Surveillance

CSU Long Beach, Long Beach, CA
PETERSON HALL 3 REPLACEMENT BUILDING
- Laboratories
- Access Control
- Video Surveillance

CSU Northridge, Northridge, CA
STUDENT HOUSING PHASE 2
- Access Control

County of Sacramento, Sacramento, CA
SEWER AND WATER BUILDING
- Access Control
- Intrusion Detection
- Video Surveillance

Autodesk, San Francisco, CA

San Mateo County, San Mateo, CA
YOUTH SERVICES CENTER
- Access Control
- Video Surveillance

Las Colinas Women's Detention and Re-entry Facility, Santee, CA
- Access Control
- Intrusion Detection
- Video Surveillance

Lockheed Martin, Sunnyvale, CA
B156 DESCOPE PH 4A
- Access Control

St Mary's Medical Center, San Francisco, CA
CANCER CENTER
- Access Control
- Video Surveillance

SFIAP - Secure Terminal Connector, San Francisco, CA
- Video Surveillance

535 Mission Street, San Francisco, CA
- Access Control

GLUMAC
A TETRA TECH COMPANY

SECURITY DESIGN PROJECT EXPERIENCE

Glumac's Technology Integration group provides security design services to keep both people and properties safe. Communication with our clients is essential to meet expectations of safety and to achieve sustainability standards of low energy use costs. The following is a brief list of projects for which Glumac provided security design services utilizing access control, intrusion detection or video surveillance.

Sacramento Downtown Plaza, Sacramento, CA
- Access Control
- Video Surveillance
- Mixed-Use: Residential, Retail, Parking Garage

Confidential Tech Client, Sunnyvale, CA
- Intrusion Detection
- Access Control
- Data Center
- Laboratories
- Office and Support Spaces

Sunset + Gordon, Los Angeles, CA
- Access Control
- Intrusion Detection
- Video Surveillance
- Mixed-Use: Residential, Office, Retail, Parking Garage

Wilshire Grand Hotel and Office Tower, Los Angeles, CA
- Access Control
- Video Surveillance

Miyako Hybrid Hotel, Los Angeles, CA
- Access Control
- Intrusion Detection
- Video Surveillance

IBM, Costa Mesa, CA
- Access Control
- Relocation of existing server and lab equipment

812 S Grand Parking Structure, Los Angeles, CA
- Video Surveillance

One Market, San Francisco, CA

2ND FLOOR, AUTODESK
- Access Control
- Intrusion Detection
- Video Surveillance

4TH FLOOR, AUTODESK
- Access Control
- Intrusion Detection
- Video Surveillance

One Maritime, San Francisco, CA

DEL MONTE HEADQUARTERS
- Intrusion Detection

Chase Bank - 400 Post, San Francisco, CA
- Access Control
- Intrusion Detection
- Video Surveillance

Sunset + Gordon, Los Angeles, CA

Image provided courtesy of GBD Architects.

GLUMAC
A TETRA TECH COMPANY

LOW-VOLTAGE & TELECOM PROJECT EXPERIENCE

Taking advantage of efficiencies of scale in space, equipment and databases can provide significant savings, some initial and some long term. Glumac helps our clients make informed decisions regarding technology systems today with an eye on the future. The following is a brief list of projects for which Glumac provided low-voltage and telecommunication systems design services.

1333 Bon View, Ontario, CA
- Tenant Improvements

Anaheim Fire Department, Anaheim, CA
- Fire Station 11

CalOptima - 505 City Parkway, Orange, CA

CalPoly Pomona Collins College Expansion, Pomona, CA

Carlsbad Fire Station #6, Carlsbad, CA

Cathedral City Fire Station 411, Cathedral City, CA

CSU Long Beach, Long Beach, CA
- Pyramid Lockers Renovations

California State University Northridge, Northridge, CA
- Student Housing Phase 1
- Student Housing Phase 2

Deloitte, Seattle, WA
- Tenant Improvements

Edison High School, Relocatables Modification, Huntington Beach, CA

Ernst & Young, Los Angeles, CA

Escondido Department, Escondido, CA
- Fire Station 3
- Fire Station 6
- Fire Station 7

Exposition Metro Line Operations and Maintenance Facility, Los Angeles, CA

Fremont High School Modernization, Los Angeles, CA

High Desert Health System Multi Ambulatory Care Center, Lancaster, CA

IBM Upgrades, Renovations and Tenant Improvements,
- Multiple Locations in the United States
- 1001 East Hillsdale, Foster City, CA
- 600 Anton Floors 2, 3, 4, Costa Mesa, CA
- 8th Floor Repurposing, Glendale, CA
- 8th Floor, Glendale, CA
- Beaverton, OR
- Big Fix 425 Market St., San Francisco, CA
- Big Fix Server Room Cooling Evaluation,
- Emeryville, CA
- Blade 1, 2, 3A and 3B, San Jose, CA
- DemandTec, Foster City, CA
- Engineering Services for Oracle Lab, Foster City, CA
- Kirkland, Seattle, WA
- Lab 942 HT-3 UPS Harbor Gateway, Costa Mesa, CA
- Morgan Stanley, San Jose, CA

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LOW-VOLTAGE & TELECOM PROJECT EXPERIENCE

- Phoenix, AZ
- Relocation, Hillsboro, OR
- Tivoli Relocation, Costa Mesa, CA

Katella High School, Anaheim, CA
- Site Renovations

LAX ARFF Fire Station 80, Los Angeles, CA

LBUSD New High School Browning Site,
- Long Beach, CA

Los Alisos Middle School, Norwalk, CA

Marina High School, Huntington Beach, CA
- Modernization

Mark Keppel Elementary School, Anaheim, CA

Ontario City Hall, Ontario, CA
- Annex Basement Emergency Operations Center
- West Renovations

Ontario Fire Department, Ontario, CA
- Fire Station 9

Orange County Fire Authority, Tustin, CA
- Replacement Fire Station 37

Palmdale Conference Center, Palmdale, CA
- Peace Health University District, Eugene, OR

Phonecian Ballroom, Scottsdale, AZ

Pierce College Performing Arts Building Renovation,
Woodland Hills, CA

Pierce College Modular Buildings, Woodland Hills, CA

Risk Management Solutions (RMS), Newark, CA

Riverside Fire Department, Cabazon, CA
- Fire Station 24

San Marcos Fire Department, San Marcos, CA
- Fire Station 4

Santa Monica College, Santa Monica, CA
- Student Services Center

Thousand Palms, Thousand Palms, CA
- Fire Station & Training Center

USPS Customer Contact Center, Los Angeles, CA

Yosemite Community College, Modesto, CA
- Columbia & Modesto New Data Center

GLUMAC
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