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PLAINS TALK

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Rapid City WPE: Aviation Fuel Tanks

• West Plains Engineering does more than just building HVAC and electrical design. WPE is also a provider of design services for a varied array of industrial projects. Projects like building backup generators, airport runway lighting design, and high voltage power line design. Some of the more interesting WPE projects include aviation fuel tanks and dispensing systems. Over the last few years we have been involved on a number of projects for storing and dispensing Avgas and Jet-A fuel. Many municipalities are upgrading their storage and dispensing systems at airports for off hour sales using credit cards or smart cards. The smart cards are used to track usage and bill the user. This is creating more competitive pricing and an opportunity for the airports and municipalities to pay off the upgraded equipment with extra sales.

Customers typically gain access to the fuel via remote fuel dispensers. In the past these dispensers looked like what you would see at a gas station with hose reels and long lengths of hose. This has changed to a new style of larger cabinet dispensers. These cabinet dispensers will usually contain most of the dispensing equipment in one location. That equipment can include a 75' fuel 1-1/2" hose with an over wing nozzle on a motorized hose reel, a self-retracting static grounding cable, fuel meter, filter/separator and water detection probe. New codes for Jet-A aviation fueling have made the addition of water detection probes and inlet and outlet filtering of the fuel a must. The filter/separator for Jet-A fuel conforms to code requirements. Avgas dispensers don't require the special filtering or monitoring at this time. The fuel pump can also be mounted in the dispensing cabinet or at the fuel tank itself. Typically a credit card reading/fuel management system is located near dispenser location.

Parkston Airport Avgas and Jet-A Fuel Dispensers, Parkston SD

Avgas Dispenser at Sheridan County Airport, Sheridan, WY

Vermillion Airport Fuel Dispensing Island with both old and new style dispensers, Vermillion, SD

Fuels tanks for the different types of aviation fuel are built to different standards. Fuel tanks for Jet fuel should be steel and have an epoxy lining suitable specifically for jet fuel service. Av-gas tanks do not require the epoxy coating. The tanks should have an access manway, inlet diffuser, and floating suction. The tanks should also have a way to sample the fuel and check for water contamination. Some states require railings around the top of the tank and stairs to access the equipment on top of the tank if it is an aboveground tank. Special signage may be required in some states. In Wyoming the verbiage and location of the signs is determined by the State Fire Marshal. Wyoming requires the tanks to be UL2085 rated.

The design of aviation fuel tank and dispensing projects has really changed over the last few years. With the help of engineers at all of our offices and our contacts in the fueling industry, we can help our clients stay abreast of the changes.

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Sioux Falls WPE: High Performance Building Projects

• There have been many advancements and changes in the Green movement in the recent years. With the International Green Construction Code (IgCC) set to adopt ASHRAE 189.1 as a codified version of a model energy code ready for adoption by jurisdictions around the country, it has become more important for the design team to work together as a single entity from the beginning of the project through the operation of the facility. LEED v4 is on the horizon as the newly updated green building rating system from USGBC. The implementation of LEED v4 is coming and will be even more stringent than previous versions which will demand more efficient HVAC, Plumbing and Lighting systems along with complementary Building Envelope systems, site selection and orientation. Additional requirements of these updated standards are pushing on-site renewable energy, not necessarily required at day one, but the initial construction must accommodate future implementation of such energy sources in many cases.

Public Universities & Research Center - Sioux Falls, SD

Each year, the South Dakota Bureau of Administration through the Office of the State Engineer (OSE) produces an Annual Project Report which summarizes the facility projects which were overseen by the OSE. The report published for CY2013 discussed high performance buildings, and the fact that the State of SD is striving to design and construct their new building stock to a higher standard of sustainability and energy efficiency. The report can be viewed at this URL: http://boa.sd.gov/divisions/engineer/documents/LEEDReport2013_000.pdf. As a part of this report, there were 3 projects showcased to demonstrate the improvements in energy efficiency made by facilities designed to these increased standards. West Plains Engineering staff were involved in two of those 3 projects.

West Plains Engineering employees provided the design services for the Dolly-Reed Plaza office facility renovation located in Pierre, SD for the Office of the State Engineer while employed with a previous firm. This project included geo-thermal heat pump systems tied to active chilled beams for the HVAC system which has provided a very efficient approach to heating and cooling this facility. Electrically, this project included photo-voltaic cells and urban friendly vertical wind turbines for generating electrical power for the facility.

This same report also discussed the performance of the Public Universities & Research Center in Sioux Falls, SD. This was the second facility constructed within two years on this campus. This facility achieved a LEED Silver Certification while the original building was constructed prior to the LEED Silver requirement, so no such certification was sought. This facility utilized a heat recovery chiller to provide the chilled water for the facility while rejecting the waste heat to the heating system to limit the operation of the boiler system. The air handling systems were fit with energy recovery on the fresh air to conserve wasted energy from the exhausted air from this facility, including on the laboratory exhaust systems.

Ultimately, the energy conservation movement is heading to a Net Zero site energy use for new construction. Achieving a Net Zero (NZ) energy facility is not only a collaborative undertaking, but also a way of life for those who will work in these facilities. One of the things to keep in mind is that there are only certain things that the design team can achieve with the bricks and mortar, equipment and control sequences – the rest of the energy savings must come from a disciplined approach to reduce energy consumption by every occupant of the facility. There are numerous ways to achieve this, and West Plains Engineering will work with all of the stakeholders to help establish Standard Operating Procedures (SOPs) which help achieve this goal. One item to remember, is that NZ does not necessarily mean that there will not be an energy bill. By generating power on-site, there may not be an electric bill, but there is still possibly a gas bill if natural gas is used within the facility. To achieve NZ, the energy produced must offset the energy used.

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Sioux Falls WPE: High Performance Building Projects, continued

West Plains Engineering is capable of providing the energy modeling for our projects through on-staff energy modelers, or working with other energy modeling consultants. By having the MEP design team members providing these services, there is no miscommunication or lag between design concepts and energy analysis of those "what-if" scenarios. The best way to approach this is to have the energy model begin early in the project programming process to first establish the building orientation on the site. The perceived front of building may not be the most energy efficient orientation of the building which will lead the team to selecting an alternate siting to achieve the desired curb appeal. The next steps involve comparing multiple energy source and envelope options to achieve the best life cycle alternatives.

Dolly Reed Plaza – Pierre, SD

The entire design team should be engaged early in the programming phase to establish priorities and goals of the high-performance project. These goals would not only include physical space requirements and end-state appearance, but would also include other less tangible aspects such as how we get to the end-state, desired temperature operating ranges, lighting levels, energy budgets, Operation and Maintenance requirements, public and/or stakeholder perception of the project, etc.

Upon consensus and documentation of these goals and priorities, WPE would work with the rest of the design and construction team to develop the path forward to provide a successful project. This would begin with discussion of energy conservation and sustainability objectives. "What-if" modeling should be performed to assist the team members in selecting the most life-cycle appropriate design and construction solutions. The newer rating systems, energy codes and standards are also now requiring documentation of Operation and Maintenance of the facility to ensure that the facility is being utilized and functioning per the original design intent. The building envelope is becoming a crucial component to the overall energy usage. With the mechanical systems being "right sized" and matched to the design intent of the facility, there is little room for additional heat loss or gain through inferior construction materials or methods and these systems must be commissioned similar to the energy consuming systems within the facility.

West Plains Engineering is a strong advocate for environmentally sound projects and we take a comprehensive, integrated approach to Sustainable Design. WPE has been focused on energy efficient designs that are comfortable, reliable, and user friendly since the firm began more than 30 years ago. We use several energy modeling techniques, the latest software tools, and years of experience to incorporate practical Sustainable Design concepts into all projects and arrive at the best design for the user.

With the inception of the LEED rating system, our engineers have embraced the opportunity to learn and share the practices that meet strict energy and environmental standards. We know to successfully take a project to the level of LEED Certification, the entire project team must understand the importance of maintaining clear communication and solid teamwork. West Plains Engineering has been involved in many projects pursuing LEED certification.

WPE, as a member of the United States Green Building Council (USGBC), has multiple LEED Accredited Professionals (LEED AP) on staff at all WPE office locations. Our commitment to the environment is strong and we continually train in the concepts, practices, and methods required to promote the use of sustainable principles in engineering.

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Casper WPE: Wyoming Medical Center - McMurry West Tower

• Wyoming Medical Center recently opened the new McMurry West Tower to the community. The 4-story tower serves as the new "front door" to the Wyoming Medical Center in Casper, Wyoming. The McMurry West Tower adds 100,000 square feet for state-of-the-art medical care designed to be a welcoming entrance to the Wyoming community.

In order to provide better spaces and better accommodations, the tower includes a new main entrance that offers free valet parking and curbside drop-off and pick up under a canopy that protects from Wyoming's unpredictable weather. A hydronic snow melt system embedded in the concrete keeps the sidewalks clear of snow in the winter as well. A healing garden, located on the south side, offers visitors a quiet place to relax and enjoy the fresh air.

A look at the exterior and interior of the entrance welcoming guests to McMurry West Tower

Walk inside the expansive main entrance to find the first floor marketplace. The marketplace includes a new dining area and bistro that includes a grill, pizza oven, salad bar, and deli. Along with the new full service commercial kitchen, the McMurry West Tower doubled the capacity of the old cafeteria.

The second floor is home to the new chapel and spacious lobby with a large fireplace and comfortable seating. Other features include a gift shop and a full service coffee shop that overlooks the front lobby.

Third floor is the Mother Baby Unit devoted entirely to mothers, babies and families. It features six labor and delivery suites with full private bathrooms, a dedicated cesarean section operating suite with state-of-the-art equipment, ten spacious private rooms with pull-out couches for dads and families, and a Level II nursery equipped to care for premature babies.

Fourth floor is the surgical recovery floor designed to shorten recovery times for the Orthopedic, Spine, and General Surgery Center. It features 25 private patient rooms, three bariatric patient rooms, an extended family area, and an orthopedic rehabilitation gym.

With 41 new patient rooms, a true lobby with convenient patient drop-off and pick-up, and a new dining area that doubles previous capacity and food options, the $42 million McMurry West Tower was designed to be a comfortable, welcoming place that promotes healing.

West Plains Engineering provided mechanical, electrical, and plumbing design services and is proud to be part of the design team led by GSG Architecture and Davis Partnership Architects.

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