

## September/October 2019

Keeping Up with Demand: Graystone Heights Apartments Strategic Direction Report: Heating (& Cooling) Home Sweet Home Purpose-Driven Passive Housing: Copper Pass Apartments Mixed-Use Modern: Hieronymus Square

westplainsengineering.com

Photo courtesy of Stone Group Architects

MECHANICAL ELECTRICAL PLUMBING POWER

# IN THIS EDITION...

Residential housing complexes can be just that...complex.

Whether it's an apartment, condo, townhome or mixed-use multiplex, each individual unit is considered by its residents to be a home. As MEP engineers, it's our job to create home environments that are not only comfortable for those living there...but efficient and economical for owners.

It's a tricky balance. The sheer number of options for mechanical and electrical systems, based on unit size and layout, building construction, utility metering for billing, energy efficiency, and system cost, are staggering. (*Check out the Page 4 for a list of options for HVAC alone.*) Add to that aesthetics, owner preferences, rentability and special standards for energy savings and it's clear that design flexibility (and design team communication) are critical.

Our team has designed 25 multi-family housing projects firm-wide in the past four years alone. Many of these are in large metros like Sioux Falls and Iowa City where the population base demands housing options. But as the Upper Midwest continues to grow, and younger generations shift priorities away from home ownership, we expect this trend to expand in smaller communities. Wherever they're built, the goal will be the same – creating efficient, economical...homes.

#### **Casper Welcomes New Office Manager**

We are pleased to welcome a new team member in Casper who took over as office manager in late August.

Robert Armstrong, P.E. has worked in the A/E/C industry for more than 30 years as an Electrical Engineer in multiple states – most recently, Ohio. He joins us after spending the past seven years as a Senior Electrical Engineer for Heapy Engineering in Dayton where he served as the healthcare practice technical leader. Rob is an avid outdoor sports enthusiast and is excited to pursue those passions in Wyoming.

John Huntley, P.E. served our firm this past year as office manager, and we're grateful for the time and energy he's

given our clients and staff in Wyoming. John will remain in Casper for a while to assist in the transition and provide mechanical engineering support. Ultimately, he will resume his role as a Mechanical Engineer based in Rapid City, working with clients in both our Wyoming and South Dakota markets. We want to thank John for his leadership this past year, and extend a warm Wyoming welcome to Rob!

Costello Companies' **Majestic Ridge Apartments** is currently under construction in Sioux Falls and is scheduled to open yet this Fall.



## It's Client Appreciation Event Season!



Our Wyoming team welcomed guest to Gruner Brothers Brewery in Casper on Thursday, Sept. 5. WPE provided MEP design for the 22,180 square foot building renovation, which now features brew tanks, a canning facility, walk-in keg cooler, tap room, event space and deck.





In Iowa, clients and friends met up with us at Lion Bridge Brewing in Downtown Cedar Rapids on Sept. 19. First built as a supermarket, the building was thankfully saved from the City's demolition chopping block. WPE worked on the lighting for the space, helping create a community gathering spot (with some pretty great beer).





Photo courtesy of Stone Group Architects

#### **KEEPING UP WITH DEMAND**

As our society shifts priorities, and the next generation of home-buyers emerges, we're seeing a fundamental shift away from purchasing houses in favor of apartments. Sioux Falls is a leading example of that shift. A recent study by the National Multifamily Housing Council and National Apartment Association placed Sioux Falls among the top places in the nation in needing more apartments. In fact, the metro area will need more than 4,500 new apartments in the next decade to keep up with demand.

The city has made strides recently with several multifamily housing projects. One of the largest and most luxurious to date is Graystone Heights Apartments.

West Plains Engineering provided mechanical and electrical design services for the newly developed fourbuilding complex, which includes 331 units with an underground parking garage, community and fitness centers, theatre, spa, indoor and outdoor pools. Primary electrical service for each building is a pad mounted transformer and provides a secondary voltage of 208/120 volts, 3 phase, 4-wire. Each building has approximately 80 units with only one master meter to provide the tenants their utilities as part of their rent.

The mechanical systems consist of heating and cooling provided by high-efficiency gas-fired furnaces and Dx cooling. High-efficiency furnaces provide the heating, cooling and ventilation to each apartment. Exhaust





Harlan Osterloo has been an Electrical Designer in our Sioux Falls office for more than 27 years. He was the lead electrical designer for Graystone Heights Apartments, and is currently the Project Manager for Majestic Ridge Apartments. harlan.osterloo@westplainsengineering.com

fans were provided for each restroom to remove moisture laden air. An exhaust fan is also provided to remove odors from each trash chute vestibule on each floor. A central group of high-efficiency gas-fired water heaters were used to provide hot water to each apartment. Each building has a central gas and water meter, and gas and water utilities are included in the rent, allowing the building tenants a fixed expense. **Strategic Direction Report** 

ENERGYGUIDE

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# ing phil HEATING (&COOLING) HOME SWEET HOME

**Residential Housing HVAC Options** 

PTAC (Electric Cooling and Electric Heating)

LENNOX

PTAC (Air Source Heat Pump) VTAC (Electric Cooling and Electric Heating) VTAC (Air Source Heat Pump) VTAC (Air Source Heat Pump with Supplemental Electric Heat) VTAC (Electric Cooling and Gas Heating) VTAC (Variable Refrigerant Flow, VRF) VTAC (Building Source Heat Pump) VTAC (Ground Source Heat Pump) AHU/Fan Coil (Electric Cooling and Electric Heating) AHU/Fan Coil (Air Source Heat Pump) AHU/Fan Coil (Air Source Heat Pump with Supplemental Electric Heat) AHU/Fan Coil (Variable Refrigerant Flow, VRF) AHU/Fan Coil (Building Water Source Heat Pump) AHU/Fan Coil (Ground Water Source Heat Pump)

AHU/Furnace (Electric Cooling and Gas Heating) AHU/Furnace (Hybrid, Air Source Heat Pump with Gas Heating) When it comes to housing, there is no single answer for which PTAC units, the lowest cost solution often used in smaller mechanical system works best. However, things like apartment apartments, and are also common in hotels and assisted living size and layout, building construction, utility metering for facilities. PTACs are installed directly in the outside wall and tenant billing, energy efficiency, and system cost are discussion come with the condensing unit built into it. This can save a points that will help find the best fit. lot of headaches trying to locate dozens of condensing units on a limited site. However, some people find them to be How the owner plans to handle utility billing can make a big unattractive, and they stick out from the wall into the living difference in what type of mechanical system can be used. If space, which can cause issues with furniture layouts. PTACs the owner is going to cover the cost of some or all of the gas or have a wider range of sizes on the lower end of heating/cooling electrical utilities, instead of separate billings for each tenant, a capacity than compared to furnaces, which means a better fit central or hybrid HVAC system can be implemented. for smaller living spaces. They often have no ducting capability though, which can be problematic when dealing with larger Utilities being covered in the rent is common practice in spaces or spaces with multiple rooms since they will struggle assisted livings, nursing homes, and dormitories. In this case, a to get the air where it's needed. This could result in needing central system such as geothermal heat pumps or a boiler and multiple PTAC units for one living space apartment.

chiller system can improve building-wide energy efficiency

over several standalone systems. VTAC units are a middle ground option between furnaces and PTACs. The unit is located in a mechanical closet much like a Hybrid systems can occur when the building owner is willing furnace so it is hidden from view. However, that closet may be to shoulder some of the utility load. A geothermal heat pump located on an exterior wall (similar to a PTAC) which hinders system where the geothermal pumps and loop is covered by window space and can be challenging for room layouts. On a the owner, but the heat pumps for each unit are covered by positive note, the VTAC is designed to handle short duct runs, making it more flexible than a PTAC. It also has the same low the renter is a hybrid system. Variable Refrigerant Flow (VRF) is another example of a system that can provide several benefits range heating/cooling capacity options, which makes its sizing to a project. Refrigerant cooling and heating can be shared a great fit for most residential applications. However, some between units, meaning if one unit is calling for heating, and manufacturers of VTAC units have limited higher heating/ the other for cooling, heat from one unit can be transferred to cooling capacities and ducting capabilities. the other.

There is no one right answer when it comes to selecting HVAC Central systems aren't without their draw backs. Large systems for serving residential housing buildings. But, there equipment can take up large amounts of space, and when it are number of good solutions that can be pared down to find comes to apartment buildings, space is money. Standalone the right blend of space, cost, efficiency, and flexibility that systems, such as PTACs (Package Terminal Air Conditioners), best fits each project's specific needs. VTACs (Vertical Terminal Air conditioners), and fan coils/ **Download Other Strategic Direction Reports** furnaces, while typically not as efficient as a central system, can save space and remove complexity from a job. When something Visit www.westplainsengineering.com/SDR or follow the QR code below to download other FREE engineer-authored white breaks, only one person is affected and building maintenance doesn't need to be familiar with large commercial equipment. papers from West Plains Engineering.

Unit size and layout certainly plays a large role in which system is selected. Electric fan coils and gas furnaces have system capacities that are varying enough that they can serve both small and large housing units. They require ductwork to deliver air to the space, and airflow is easy to adjust with volume dampers in the faces of the supply diffusers which will increase occupant comfort. Ductwork however, comes with its own issues. Exposed ductwork may be desirable if the owner wants the aesthetics of the apartments to have an industrial loft style. Otherwise, soffits are needed to conceal the ducts or the ductwork needs to be routed in the floor/ceiling assembly which requires additional fire dampers and adds cost to the project.

Hidden Creek Apartments in Cedar Rapids features a mechanical closet in each unit with an air source heat pump with supplemental electric heat and water heater





David Clark, P.E. is a Mechanical Engineer in our Cedar Rapids office. David joined our team in 2011 and has nearly 20 different multi-family and senior housing projects in his portfolio. david.clark@westplainsengineering.com



#### **PROJECT PROFILE**

#### **NEW CONSTRUCTION**

**Copper Pass Apartments** Sioux Falls, SD

Team VanDeWalle Associates Costello Companies BlackWing Elite Builders



In the Upper Midwest, our first priority in housing design is occupant comfort. Our climate is harsh and unpredictable, so homes need to stand up to the elements. Frequently however, how efficiently that goal is achieved is somewhat of a sidebar – especially in multi-family residences where budgets, schedules are tight and hitting the "proforma" is everything. But as we all become more conscientious of our impact on the environment, and more sophisticated at developing systems that are both effective AND efficient, that sidebar has come to the forefront of the conversation.

In 2018, the doors opened on the Copper Pass Apartments - the first multi-family housing complex in South Dakota to meet Passive Housing standards. The brain child of Costello Companies in Sioux Falls, Copper Pass was designed with laser-like focus on space heating and cooling demand, primary energy demand, airtightness and thermal comfort. The result – a building that requires very little energy to achieve occupant comfort year-round.

West Plains Engineering provided mechanical and electrical design for the 30-unit affordable housing complex. The property offers one-, two- and three-bedroom rentals and units are reserved for families who qualify for federal low-income housing guidelines (earning 60 percent of medium income or less).

The most important lesson everyone involved with the project learned early was that nobody was allowed to think or use the phrase "how we normally do it." Designing and constructing to a Passive Housing standard was a new adventure and there was no normal anywhere on this project. From the design and construction of the insulation along the foundation and below the slab, to the windows which were imported from Europe, to the extremely tight envelop construction, we all had something that was another level above what we "normally" do.



Marty Christensen is a Principal Mechanical Engineer and our corporate Building Services Division manager. He has been with West Plains Engineering more than 25 years, and was the Project Manager and Lead Mechanical Engineer for the Copper Pass Apartment complex. marty.christensen@westplainsengineering.com

The MEP systems were no different. Mechanically, a central domestic water heating system was employed with central recirculation. The hot water system had to be designed to provide hot water to each fixture very quickly by designing the piping to limit the total volume of hot water to each fixture, which may become stagnant and cool down.

Each floor had its' own Energy Recovery Ventilation (ERV) system to remove the exhaust from each unit, as well as deliver tempered ventilation air into each bedroom. Each tenant space was provided with a duct-free mini-split heat pump system and back-up electric heat. The building is so well insulated and tightly constructed, that with the ERV taking care of the ventilation load, many of the tenant units could be heated with a hair dryer on a design day.

Electrically, LED lighting is installed throughout the building, in both tenant and public spaces. Photovoltaic (PV) solar collector arrays have been installed on the roof and set to optimize the electric generation for the facility. Each unit was provided with condensing dryers to eliminate 30 penetrations through the exterior envelop. A building-wide energy monitoring system has been installed to log energy use for each tenant. This information is graphically displayed in the public area of the building for all tenants to see and compare their energy use (or preferably lack of) against their neighbors.

## Team Spotlight

## **CONNOR SWIONTEK**



Title: Mechanical Designer Years with WPE: 4 Years Home Team: The Minnesota Vikings

Connor Swiontek is a North Dakota guy at heart. Raised in Devils Lake, he graduated from NDSU and joined West Plains Engineering in 2015 in our Bismarck office. But a few years ago, we asked Connor to join our team south of the border in Sioux Falls. He accepted and has since made a home in South Dakota's largest city. For Connor, the growing community has been a welcome adventure with new options for entertainment and recreation popping up what seems like every month.

Another major area of growth in Sioux Falls has been the housing market. Connor has been involved in several multi-family housing projects to support it, including both passive housing and standard design. He's noticed consistent challenges in the two (i.e. making room for mechanical equipment without sacrificing living space), but the biggest difference, he feels, is planning. The ability to lay systems out properly from the beginning, as opposed to adjusting later, can change a building's ability to meet rigid passive housing standards. With more than 10 multi-family housing projects already under his belt, it's an important lesson learned for a young engineer.

We like to think our amazing culture and team brought Connor to Sioux Falls, but in reality, it may have been the shorter commute to the Twin Cities. The die-hard Minnesota Vikings fan has been a season-ticket holder since 2016.

## Partner Spotlight Costello



6 Plains Talk





#### **Costello Companies**

By the time the Low Income Housing Tax Credit Program (LIHTC) was passed in 1987, Thomas Costello had already been working to provide subsidized housing in the region for more than 20 years. His sons, Dan and Tom III, inherited his passion for finding affordable living solutions and were some of the first to utilize these new tax incentives to finance developments. Since then, Costello Companies have developed more than 75 LIHTC properties across South Dakota, Iowa, Nebraska and Wyoming.

What makes Costello special isn't just their dedication to affordable housing. It's that they create quality homes. Costello properties aren't designed to be basic, no frills, "cheap" housing. They're held to a much higher standard that results in attractive, energy-efficient, quality buildings in our communities.

West Plains has been fortunate to provide the mechanical and electrical engineering for several Costello projects in recent years. Each design challenges us to find new and creative ways of keeping quality and efficiency up...and costs down. And of course, engineers love a challenge!





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### PROJECT PROFILE NEW CONSTRUCTION

Hieronymus Square Iowa City, IA

Team Neumann Monson Architects



David Clark, P.E. is a Mechanical Engineer in our Cedar Rapids office. David joined our team in 2011 and has nearly 20 different multi-family and senior housing projects in his portfolio. *david.clark@westplainsengineering.com* 



#### **MIXED-USE MODERN**

As people define less separation between their work, home and leisure time, the way we design buildings has changed to keep pace. Mixed-use projects allow one structure to serve multiple activities, and has become increasingly popular in commercial construction.

Since 2017, our team has worked with Neumann Monson Architects on a mixed-use development called Hieronymus Square, a 7-story development in Downtown Iowa City. The two-tower property features a modern, eco-focused hotel on one side; and high-end condos, offices and retail businesses on the other. In between is a shared outdoor terrace. Mechanically, the condos and common areas of the hotel are served with electric fan coil units. Vertical Terminal Air Conditioners, or VTACs are used to condition the hotel rooms. The hotel and condos have a full sprinkler system with fire pumps. The hotel includes dedicated outside air energy recovery units mounted on the roof.

Electrically, the condo utilizes photovoltaic panels for electrical power generation to serve the house unit loads. The hotel side has an emergency generator serving the facility, life safety and egress elevator.

Rendering courtesy Neumann Monson Architects