

Best Building Project – Specialty Contractor (\$2 – \$6 Million)

University of Denver

The Daniel Felix Ritchie School of Engineering & Computer Science and The Knoebel Center for the Study of the Aging, 2155 E. Wesley Avenue, Denver, CO 80208

Project Cost: \$5,300,000

Title: Wow Factor

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The project consists of a new five-story engineering and bio-medical research building at the University of Denver. The 115,000SF University of Denver engineering lab building has to be flexible. To provide a student with a flagship learning environment is a must – this spectacular facility provides 60,000SF of state-of-the-art laboratory and research spaces and 5,000SF of high tech classroom space. The students will need a restaurant inside to grab a hot meal to fuel their studies – World of Wings is set to open just in time for midterms. The building must also provide the faculty with 30,000SF of modern office space filled with the latest and greatest Audio-Visual gadgets, not to mention sweeping views of the Front Range. University Regents and Deans must be able to host events with alumni and industry professionals in a space that has wow factor – take one step into the 40’ high domed event space, floor to ceiling windows facing the Denver skyline, illuminated by a cluster of pendant fixtures hanging 20’ down from a sky lit wood slat and stone ceiling and you cannot help but to be impressed. This amazing space has an independent lighting control system, coupled with an incredible surround sound system. This space serves as the jewel on the top of an impressive building.

Just as the University of Denver has a high standard for excellence for their graduating students, such is the same high standard for their buildings and facilities. Photos do more justice than words, but the building is an architectural marvel – sky lit copper dome and trim, exposed “DU crimson” brickwork and tan block, finished concrete pillars and trim, suspended ceiling “clouds”, exposed wood slat ceilings, ceiling soffits, open commons stairwells, all come together to create a unique space for learning.

A significant challenge of this project was integrating the functionality into the form. To perform such a feat (and make it look good), took constant planning and coordination. Ludvik rough-in had to be pre-planned and installed months (and perhaps years) ahead of being utilized. For example the rough-in for the interior dome was completed inside the dome while it was being constructed in the parking lot of the jobsite. The lighting and speaker rough-in conduit and boxes were installed in the pillar concrete columns in May 2015 in order to install wire and devices in August 2016. Constant following of the mason trades as the building was being vertically constructed to rough-in Power, Data, Security, and AV in the numerous exposed brick walls. Precast exterior pole-bases required laying out all site lighting underground. Floor Boxes and Poke-Thrus with Telecom, AV, and Power were installed as the cast-in-place decks were being formed and poured. Vertical raceway for Lightning Protection was embedded in block 6 floors vertically from the basement to the roof. The handrail was drilled and tapped with a custom machine to embed puck lights which were pulled thru the handrail to a stub up in the deck that had been installed one year prior in the exact location of the hand rail post. Every time a piece of scaffolding was erected, Ludvik was on it to rough-in a high ceiling or a block wall. A full ceiling was finished and punch listed 6 months prior to building completion so scaffolding could be removed for construction to complete beneath it; therefore all trim had to be 100% complete and accurate with no chance of returning. A 40’ lift was brought in to hang decorative pendant fixtures and architectural panels in the dome. Over 70 unique Fixture Types compiled a 500 line-item fixture purchase order to install in these varied and complex architectural walls and ceilings. Cove Lighting, Pendant Lighting, Stair Rail Lighting, Casework Lighting, Site Lighting was all coordinated and installed. A snowmelt system was installed on the dome in several stages in coordination with the roofing and finish work. Paver snowmelt was installed underneath the front pavers and stairs on the north side entry-way to keep the students safe in icy conditions. All of

this work demanded high attention to detail and a knowledge of each trade's work and how ours interfaced to become successful.

Along with the massive architectural coordination effort, there were several systems both Ludvik's and others that were brought online into this complex building. Ludvik provided and installed a Lighting Control System, Telecom/Data System, Audio Visual pathways, Access Control and CCTV System, Fire Alarm System, 800MHz First Responder System, and Lightning Protection System.

As with any laboratory building, Ludvik was responsible to hook up and install a multitude of equipment by others including: Casework, Machine Shop Equipment, Vivarium Equipment, Autoclave, Fume Hoods, Overhead Service Carriers, Service Tiles, Fluoroscopy Units, Force Plates, Kitchen Equipment, Cold Room, Procedure Equipment, Cadaver Freezers, and Paint Booth. Coordination with each supplying subcontractor, reviewing their submittals in detail, and planning each "touch point" in detail so we could install rough-in and trim ahead of the equipment being installed kept the project on schedule and all questions answered ahead of time.

3D Model to Shop Drawings to Overhead Prefab, Ludvik and all trades completed 6 months of coordination to create a clash-free 3D model. Ludvik then created installation shop drawings from there and then developed schedules and systems to go straight from the engineered shop drawings to pre-fab and then to the field. We prefabricated all conduit hanger racks and feeder conduit bends. All the engineered drawings were labeled with part numbers which our prefab shop labeled for our field crew to install. This made for very fast and efficient installation to save time on the schedule. Ludvik also used Trimble to do sleeve and insert installation on the decks, as well as underground conduit installation for the site work. Trimble points were imported directly from the 3D model into the Trimble Unit onsite allowing for fast installation of over 1,000 points.

Ludvik recognized that there was some repeatability in the Audio-Visual typical details, and that prefab could be used to save time and reduce hours spent in the field. Over 100 back-box and device-box assemblies were created and labeled at our prefab shop. The prefab sheets were then

taped to the studs for easy identification and installation by the field crews. A similar system was also used for the standard power and data rough-in where boxes and branch conduit was prefabricated and labeled. Stickers were placed on the studs at the correct locations, and the material was staged by floor accordingly and the installation was completed efficiently. Ludvik's use of technology and innovation kept the project moving forward and the electrical durations to a minimum to help the schedule.

Ludvik Electric's commitment to safety resulted in zero lost time injuries for the entire two years of construction. All work was planned safely daily with Pre Task Plans where no one is ever asked to put production over safety. Where possible, Hazards were engineered around to remove the hazard, rather than worked on with PPE. With this top-down commitment to planning and equipping abundantly and safely, we were able to accomplish our safety goals.

With an emphasis on education and the need to ensure that opportunities exist for future generations to obtain the studies necessary to become successful young adults, this school was part of a vision to "turn DU into the Stanford of Denver" according to entrepreneur J.B. Holston. Engineering will be one of the fastest growing job markets over the next decade. This department focuses on fields such as cyber security, software engineering, sustainable energy distribution and mechatronics. Ludvik Electric was excited for the opportunity to build the school for the future engineers with whom we will work with for generations to come.

This facility will serve students and the greater community for many years. DU constructs their buildings for a 500-year life cycle, so many generations will benefit with DU's plan to become the Stanford of the Rockies coming to fruition. With our success on this project and proving that we are high performers, Ludvik has now partnered with this client on another design assist project breaking ground this year. Relationships with the Owner have been positive as well; working on many smaller projects throughout campus and we will be ready for the next large one to come.

We were able to take potentially challenging building circumstances to our advantage and create a building with truly "Wow Factor" for years to come.



Overview Exterior



Dome - Before



Handrail Light



Dome - During



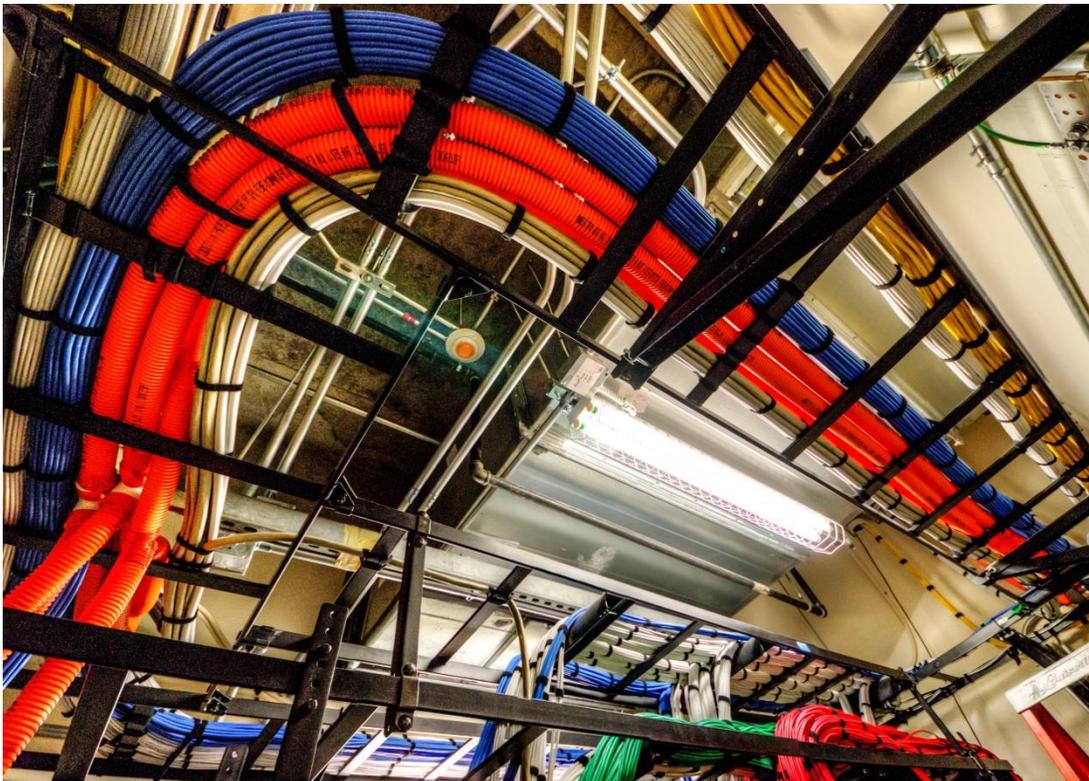
L2 Pendants – Before



Branch Prefab



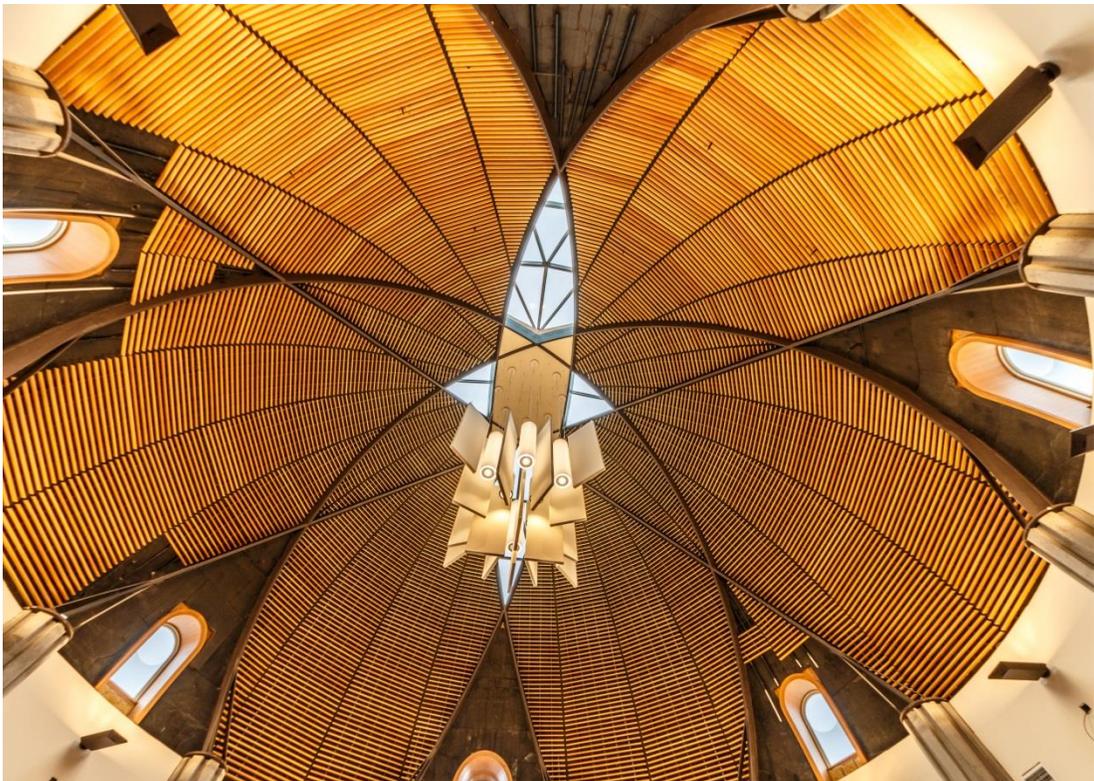
In-Wall Prefab



Telecom Room



Labs



Dome After