Project Apothecary (Client Confidential)

Category 7: Best Building Project – Specialty Contractor (Over $10M)
Sturgeon Electric Company, Inc.

The story of the $180 million-dollar Project Apothecary is much more than a tale about how concrete, steel and lighting came together. It's a testament to the power of non-traditional collaboration and transparency. It's a story about the human heart and the effect of trust among those working together under tremendous pressure. It's a proof-positive account of how a high-risk, uniquely challenging project can be successful when a team of multiple disciplines commits to collective success.

A significant milestone in Frederick, Colorado's history, Project Apothecary was a rejuvenating shot in the arm for the local community. Most importantly, it promises a global impact in the fight to save people suffering from cancer and other severe conditions. This new 138,000 SF state-of-the-art facility allows the Facility Ownership to double their production of Oligonucleotides, a critical and innovative ingredient with the potential to treat cancer, rare and infectious diseases, cardiovascular indications, and many other disorders. New structures include hazardous classified production and storage warehouse buildings, central utility space, a bulk tank farm, and an office administration/lab building. It is equipped with a single production train, with enough space and utilities for a future second train.

1) Solutions of Special Projects, and **2) Excellence in Project Execution and Management/Team Approach:**

There were two major hurdles to overcome:

First, hundreds of instrumentation units and process controls had to marry with the electrical systems. This challenge became gargantuan because this particular system had never been designed before, so construction began with a still-evolving design. Therefore, placing conduits and infrastructure to feed unknown equipment was at high-risk for re-work, threatening ballooning costs for the owner, especially for underground infrastructure. To get the underground and core and shell rolling without negative schedule/budget impacts, Sturgeon Electric

collaborated heavily with GE Johnson Construction Company (GEJCC), special systems teams and equipment manufacturers to develop creative solutions to bridge design gaps:

- **Leveraged use of concrete slab voids:** Where equipment skids had unknown or incomplete designs, the team agreed to leave out concrete temporarily. Underground and overhead infrastructure was installed to the edge of these points, so conduit and systems could be easily routed to final destinations upon design completion, eliminating re-work.
- **Resolved constructability conflicts by strategically leaving out structural steel, walls and ceiling sections:** Several massive equipment had long-lead delivery times, making installation difficult because of conflicts with the timing of wall/structure erection and equipment delivery. Heavy coordination between all team players resulted in a headache-free equipment placement process, despite conflicts between lagging equipment delivery and the construction timeline.
- **Oversized electrical infrastructure:** Since power requirements weren't established, Sturgeon Electric installed oversized conduit as a fail-safe to meet sizing requirements upon design completion. A small added cost with a big return on investment, the owner could rest assured that re-work would not be a factor due to surprise changes with equipment power.
- **Improved design to allow for flexibility during construction and beyond:** For overhead systems, Sturgeon Electric suggested changing from traditional pipe and wire to a three-tier cable tray system. This covered design gaps, eliminating lagging overhead installations and change orders, and added flexibility for the facility and future production train.

The second major hurdle was a new Food and Drug Administration (FDA) requirement which further inflamed an already hot schedule. The FDA would not allow production without laboratory validation, so the Facility Ownership was required to commission the project's laboratory component **nearly a year ahead** of the project's end date. This resulted in a cascading series of issues. First, Facility Ownership's IT team required a fully functional redundant power supply for the lab's computers and equipment. This meant the permanent UPS and Emergency Generator had to be installed, commissioned and in service. Second, prior to occupying the lab,

the permanent, fully functional portion of the fire alarm and life-safety systems had to be in place and able to expand to the remaining build-out.

To resolve this, collaboration again reigned supreme. Working with GEJCC, Facility Ownership and other trade partners, a comprehensive plan was developed that pushed all lab-required systems, construction activities, and equipment deliveries forward a year in advance. This was a huge challenge, and without an extremely committed team working in an environment of trust and camaraderie, this would not have been possible.

Delivering a pharmaceutical project of this size typically flows in this order: design-construction-commissioning-validation-manufacturing. However, we achieved product manufacturing much earlier, because high collaboration fostered the ability for construction, design and validation to run simultaneously.

3) Construction Innovations/State-of-the-Art Advancement:

Delivered under a Lean Integrated Project Delivery (LIPD) approach, all stakeholders worked tirelessly together, leveraging multiple Lean Construction tools, including:

- **Target Value Design –** The owner had an idea of what they wanted but was constrained by a limited budget. Early collaboration allowed the owner to leverage the expertise of the builders, fostering a set of specifications that were negotiated with buy-in from the entire team. In turn, RFI's were significantly reduced and the owner could make the best design choices within the targeted price.
- **Pull-Planning and The Last Planner System –** A method of planning with the end in mind, builders worked together to develop a schedule which everyone could meet, and as Planned Percent Completes (PPC) were reviewed weekly, the schedule was continually fine-tuned. This was instrumental to establishing high trust between project teams; in turn, this eliminated the bickering, change-order wars and needless hold-ups common to traditional construction projects.
- **Shared work space environment/"big rooms"** – In a refreshing change from typical project construction where teams operate independently or in isolation, all project teams operated under a single roof. This promoted rapid issue resolution between the owner, designers and builders, and fostered common ground amongst all parties. In the big room,

all team players had a voice in the design, constructability and delivery of services to promote a successful project.

- **Just-In-Time Delivery -** The traditional method of storing materials on-site is immensely wasteful; material occupies space, creates safety hazards, and inevitably gets moved multiple times or becomes damaged. We eliminated nearly all these wasteful practices by coordinating with vendors, utilizing offsite warehouses for storage. Thus, equipment and materials were coordinated for delivery exactly at the correct time for installation.

The LIPD approach presented a rare opportunity for builders' pre-construction teams to heavily engage the client and design team at the earliest stages of project design. As a result, Sturgeon Electric helped owners and designers make informed decisions that would impact the facility and employees in the long-term, rather than simply focusing on getting the project built.

For example, there were nearly 60 Variable Frequency Drives (VFDs) slated to control process equipment, with the first design draft showing them displaced throughout the facility. Sturgeon Electric proposed an alternate solution to centralize and condense them onto a single pre-fabricated rack. This approach significantly improved conditions for Ownership's facilities and maintenance teams long-term, simply making it easier for people to do their jobs.

Sturgeon Electric also pushed new boundaries with Building Information Modeling (BIM). Using Assemble Software fostered unprecedented capabilities in terms of coordinating the 3D model with estimators, schedulers, and the builders. The BIM team developed drawings rapidly for the prefabrication team, who were able to build 95% of all major underground infrastructure off-site. This included a massive conduit rack with 55 four-inch conduits and 90-degree sweeps.

4) Environmental/Safety:

An excellent, unified safety culture was demonstrated between GEJCC, Sturgeon Electric and other trades throughout all project phases. For example, when different systems started to come on-line, the complexity made for a fragmented schedule. Teams worked to establish protocols and develop a detailed lockout/tagout plan, resulting in over 1,000 instruments and equipment powered up without a single near-miss or negative event. Sturgeon Electric worked nearly 118,000 hours with up to 65 personnel, without a single recordable injury.

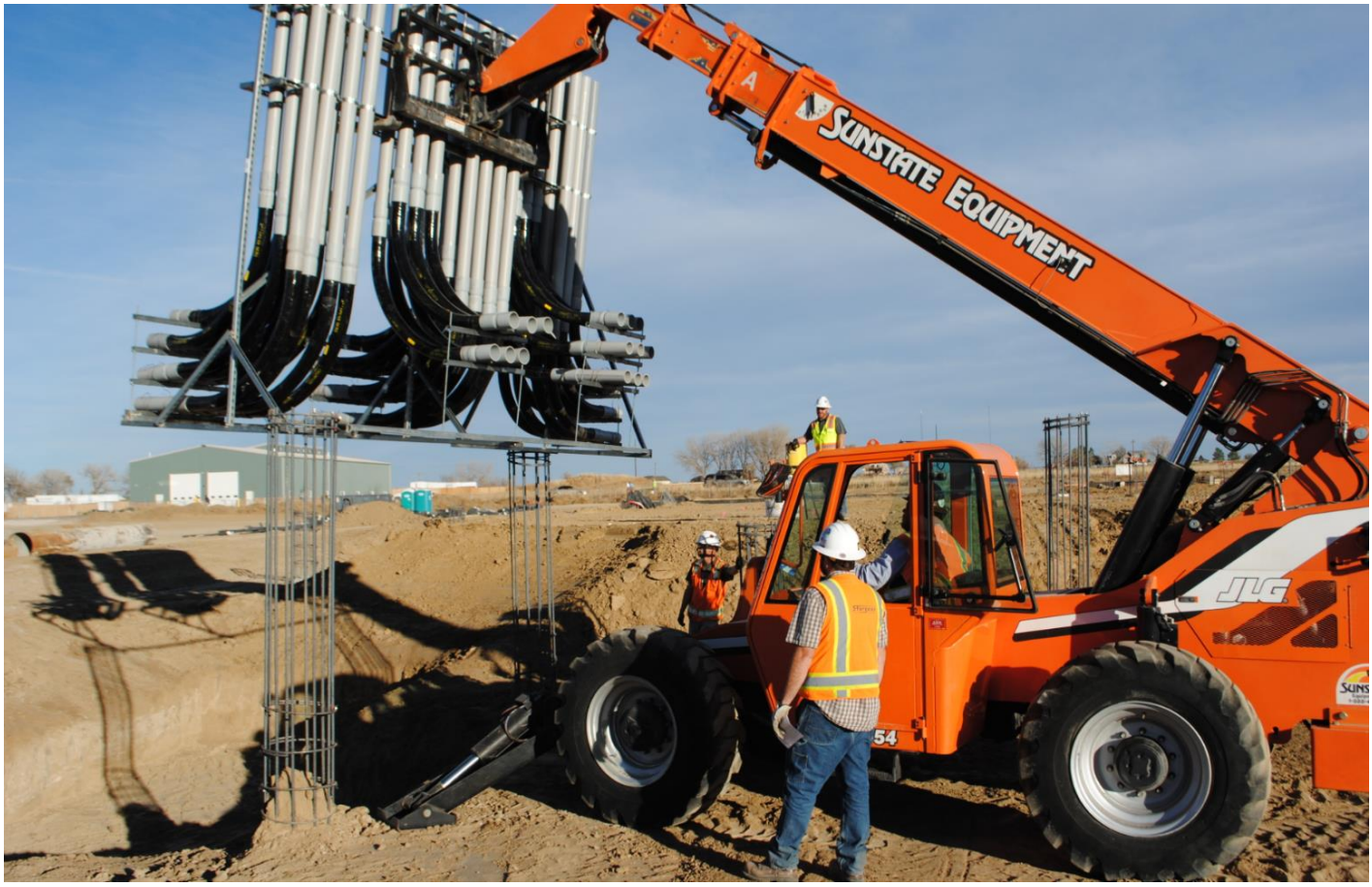
Secondly, crews had to abide by construction processes outlined by Good Manufacturing Practices (GMP) required by the FDA. This demanded extra documentation and steps by the builders to ensure environmental controls were established in sync with the FDA guidelines.

5) Excellence in Client Service and /or Contribution to the Community:

Project Apothecary created more than 200 high-paying jobs for skilled workers, attracted new investment and improvements to the local economy in Northern Colorado, and promises to impact the world in terms of fighting cancer and other disease.

Dee Davis, primary liaison to the owner, said of Sturgeon Electric's performance, "*..it is very noticeable to me when a contractor shows the appropriate level of conscientiousness on a project… the Sturgeon team conducted themselves with integrity and professionalism throughout the project… completing the facility with a high degree of quality… and was instrumental in helping us achieve occupancy of the facility*."

Sturgeon Electric Company, Inc. is proud to have been part of delivering the $16.5 million-dollar electrical systems package on this meaningful and uniquely challenging project, along with GE Johnson Construction Company, the ownership of Project Apothecary, and over a dozen other project partners investing fully into the spirit of collaboration.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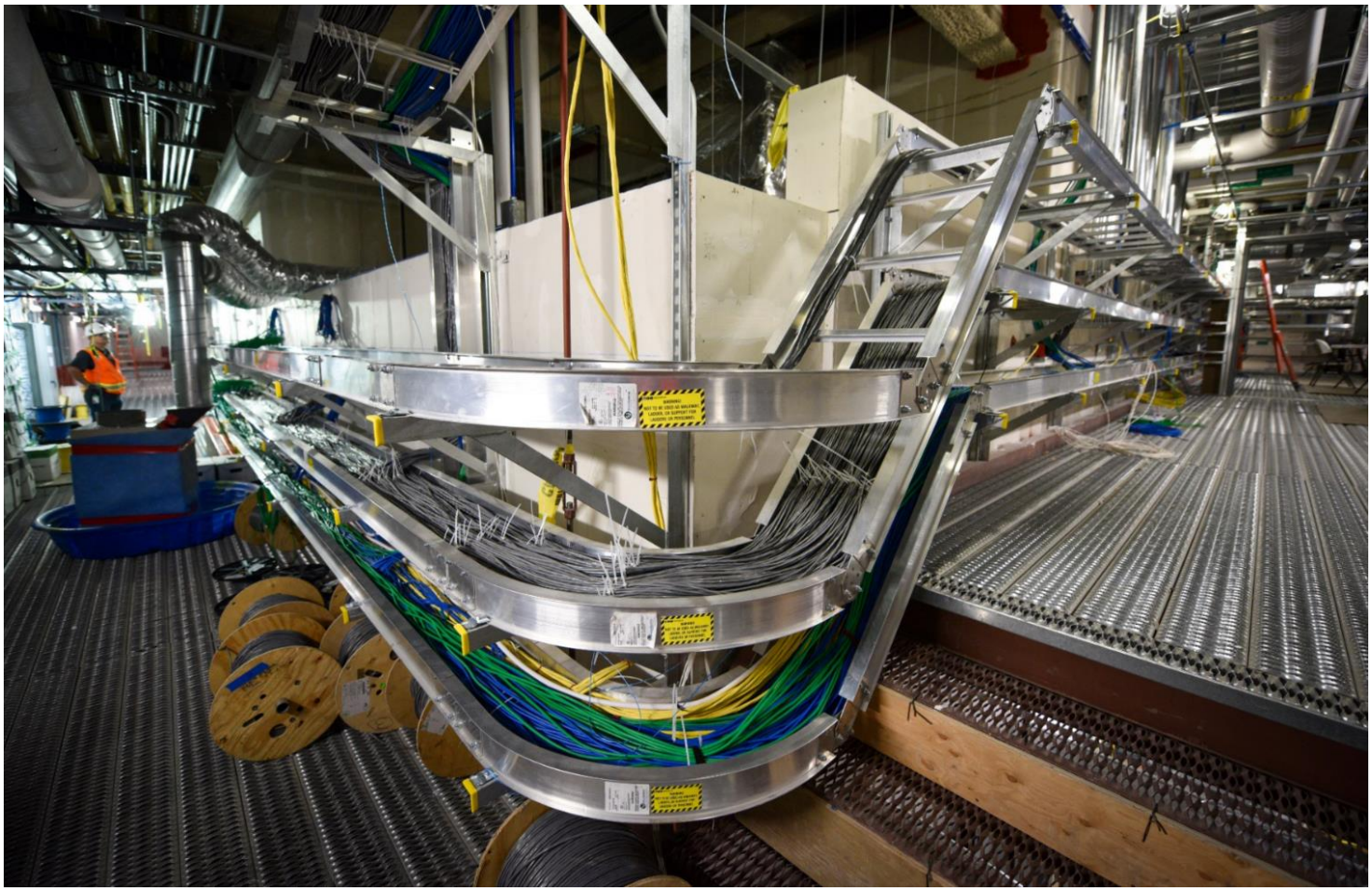


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