



Case Study: EXTREN®, FIBREBOLT®, & DURAGRATE®

Golf Resort is all "FORE" FRP for its Bascule Bridge

A prestigious golf resort in the Cayman Islands needed a dual-purpose bridge at their facility to support golf cart traffic and allow watercraft to pass below.

To do so, it reached out to Autoquip, a leading lift equipment solutions manufacturer to design a single-leaf retractable bascule bridge. The bridge had to fit accordingly with the resort's strict design standards, yet be robust enough to withstand the environmental conditions of the Cayman Islands for decades of maintenance free service.

Measuring 38' in length, the 10' wide bridge is able to raise almost 90 degrees to accommodate most water vessels either via remote or keypad stanchions. When serving as a bridge, the structure is capable of supporting up to 5,000 lbs.

One of the design challenges of this particular project was finding the right balance between industrial structural design and aesthetic appearance. To do so, fabrication played a key role in this process.

Strongwell's design team was able to work with Autoquip to fully utilize EXTREN® Series 625 square tubes and wide flanges to construct the pedestrian handrails and pickets. The supporting structure of this bridge took advantage of FIBREBOLT® to mechanically fasten EXTREN® angles, tubes, I-beams, and wide flanges together.

For flooring, DURAGRATE® molded grating was chosen because it could be outfitted with a grit system surface proving maximum traction while still remaining a non-marking walking surface, even in wet conditions.

...continued inside...



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...continued from front...

All of the components were painted beige with the exception of the walking surface to resonate with the resort's color theme. As a follow-up to the installation, the parties involved throughout the project were impressed with properties of the materials, fabrication processes, shipping, scheduling, and delivery experience. ●



above & right: fabrication; below: installation



Spotlight on Strongwell Talent



Brandon Crook
Corporate Sales Account
Manager

Brandon Crook has been hired for the position of Corporate Sales Account Manager, reporting to the Customer Relations Manager. He will take over the position long held by Bruce Patterson, who recently retired. Brandon will work closely with Corporate Sales Director Ray Reuning to serve the customers in the North Atlantic Region. Brandon holds a Bachelor of Science in Business-Marketing from King University and brings many years of Inside Sales and Customer Service experience to this role. Most recently, Brandon worked in Inside Sales for a cabinet and countertop fabricator. Prior to that, he spent several years in the residential and industrial lighting industry.



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NEWS & APPLICATIONS



How Strongwell FRP Contributes to Total Job Cost Savings

Staying on Schedule and on Budget

Each construction project has unique challenges, but two that seem to plague every project is staying on schedule and staying on budget. Choosing the right materials and calculating installed cost vs. just material cost are seemingly simple choices – but ones that can result in huge savings in time, manpower, and total project costs.

Strongwell's pultruded fiber-reinforced polymer (FRP) composite structural materials have a proven track record of saving customers time and money – often realizing those savings before the project is even complete. Once you factor in the long-term maintenance savings and longer life span of FRP vs. most traditional materials, structures built using FRP are a clear winner.

How Much?

October 2021 Email

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Case Study: EXTREN®

FRP Design Offers Seismic Adaptability



A data center equipment yard in Santa Clara, California required an extensive cable bus support structure and a multi-story maintenance access platform to service and maintain key equipment integral to the operation of the zero-downtime essential facility. Steel was originally planned for this massive, intricate, structure; however, the design would have required sourcing almost half a million pounds of structural steel to transport, fabricate and erect with an aggressive construction schedule, scarce supply of skilled labor and challenging site access restraints given the weight of key steel members.

Outfitted with these severe time, labor, and space constraints, the owners of the data center looked to Frost Engineering & Consulting to design an efficient, fast-erecting, non-steel structure capable of withstanding high seismic conditions within a densely populated area. Weighing in at 120,000 lbs. of FRP (versus 400,000 lbs. of the original steel structure), this 7,000 square foot dual-purpose exterior structure offers a 3,400 square foot cable bus support over one floor level and serves as a 3,600 square foot 2-story generator access platform.

Here are four of the more unique design challenges faced by the design team:

1. PROJECT SCHEDULE:

Difficulties in sourcing raw materials, supply chain disruptions and the need for post-fabrication weatherproofing (galvanization) prohibited steel from being an effective solution for this project. The value-engineered FRP solution was designed, fabricated and fully erected prior to the anticipated delivery date of the first steel shipment. One of the key benefits noted by the installer was the reduced weight of the main structural components (averaging 60%-70% reduction in weight). This weight savings provided much more maneuverability, eliminated the need for heavy equipment and greatly accelerated the erection timeline.

2. HIGH SEISMICITY:

This FRP structure represents the third heaviest free-standing FRP structure created to date and the largest all-FRP structure built in a high seismic region. The Owner also requested the structure be categorized as an essential facility (risk category IV) mandating the design team to accommodate a 1-in-2,500 year seismic

event, including all seismic overstrength factors and elevated importance factors. State of the art ACMA seismic design standards were implemented in conjunction to finite element analysis (FEA) modeling to the acceptance of owner and regulatory bodies.

3. PRYING ACTION:

Given the large magnitude of lateral demands and lack of diaphragm system, the majority of FRP beams were subject to varying degrees of axial loading. The prevalence of beam-axial demands required the Design Team address the implications of prying action on FRP connection elements. Taking inspiration from the AISC Steel Construction Manual equations (and other white papers on the subject) Frost Engineering & Consulting developed a closed-form FRP specific prying capacity equation to characterize the performance of typical beam end connections.

4. ELEVATED TEMPERATURES:

Key coordination and design considerations were able to address the concerns of the generators' dynamic range of exhaust temperature output, at times approaching 800 degrees Fahrenheit.

All parties involved were pleased with the project from start to finish such that the owner has chosen FRP as the preferred material solution during future phases of the project. It is also noteworthy to mention that this project was awarded the 2021 Award for Composites Excellence for Most Creative Application of Composites. ●

For more information about this Case Study
and to read the full Technical Release:
bit.ly/3C4onn0 or scan this QR Code:



FRP WT-Shape connection



FRP Gusset plate connection



FRP Double clip angle connection

Literature Updates:

- Availability List (Imperial & Metric)
- Design Manual Section 2 (Imperial + Metric)

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What's in this Issue:



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Spotlight on Strongwell Talent



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FRP Design Offers Seismic Adaptability



Literature Updates



Grating Provides Containment System Trench Support



Case Study: DURAGRID®

Grating Provides Containment System Trench Support

For years, Strongwell has offered secondary containment systems to prevent, control, or mitigate the discharge of hazardous substances into local ecosystems in the event of critical component failures.

Although there are multiple approaches towards spill containment and management, a major utility provider in Indiana built concrete trenches around their individual substation transformers to mitigate any transformer oil leakage in the event of an equipment failure. In addition to using concrete, the electric utility placed DURAGRID® T-3300 grating panels over the trench to provide a safe and durable access-way for transformer maintenance.

In the event of a spill, the 1/2" of open space between grating bars allows residual oil to quickly drain into the containment area. The discharged oil could also be removed by lifting sections of the lightweight panels (3.9 lbs. per sq ft) without the introduction of heavy-duty lifting machinery into the fenced-in complex.

The nonconductive nature of the pultruded grating and its bright yellow color chosen for this application also serve as added safety features around the electrical substation.

This is the third installation of DURAGRID®

pultruded grating with this energy provider. The end user has been pleased with the service and overall performance of the material and

will continue to install DURAGRID® pultruded grating on both new and retrofits of old substation containment systems. ●

