



**Portal Beam— SUKE Highway
Package CA3
Alam Damai, Malaysia ... p 34**



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Featuring a contractor that has been recognized for outstanding safety practices on the jobsite.

FORM MARKS®

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the people in the business of concrete
construction.



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These quotes can be seen
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jobsite.



The EFCO PLATE GIRDER® form system
is a registered trademark. This product
was designed for use with products
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recommended that it not be commingled
with products of other manufacturers'
forming systems.



INSIDE THIS ISSUE:

This issue of FORM MARKS is full of surprises. Inside you will find all of the things that you have come to expect with each issue like EFCO projects using everything from PLATE GIRDER to HAND-E-FORM and E-Z DECK to POWER SHIELD, EFCO's Safety Award and an incredible cover project featuring the MSG Sphere in Las Vegas. With this issue EFCO is introducing and alternate method to receiving FORM MARKS. EFCO now offers FORM MARKS digitally, in fact some of you may have already received this issue in your "inbox". If you would like to change the way you receive FORM MARKS please use the link below that will take you to EFCO's website and a form to make your choice.

<https://www.efcoforms.com/form-marks-subscription/>

EFCO is also announcing the EFCO Formwork & Shoring Solutions Facebook page. We are excited to connect with our customers in a completely new way. You can look forward to posts of the latest projects and industry information along with insights on how to use EFCO forming and shoring products safely and efficiently. Click on the link below, follow us and stay connected with EFCO.

<https://www.facebook.com/EFCOforms>

Cathy Howell

VP & Director of Advertising

THE Gifts EFCO Has Received

BY SCOTT WALTER,
EFCO President and CEO



This past year has brought a lot of change, and the changes keep coming as we all find our footing in a new era. That goes for EFCO and also for our customers, for all the organizations we're a part of, and for society at large. Shaping the future we desire starts with assessing our situation, the challenges we've overcome and those we still face, the accomplishments and lessons taught by those who came before us, and a reminder of all our gifts and those who we serve. EFCO engages in this mindful reflection collectively as an organization and also as individuals reassessing our place in this new paradigm.

On a personal level, I'm humbled to follow in the footsteps of the four very accomplished CEO's who led EFCO to where we are today: W.A. Jennings, Ralph Jennings, Al Jennings, and Curt Bennethum. Those are some strong examples to learn from—what a gift! Multiplying their contributions, is the sweat of countless EFCO team members and their families over the generations. I am especially proud to follow my two grandfathers who dedicated their entire careers for EFCO. We are all truly standing on the shoulders of giants.

How did we get here? Some of us overcame great adversity. Some of us were lucky enough to receive these wonderful gifts. Often we did not have a choice in either the adversity or the gifts. It's tough to accurately account for it all and compare,

but a couple simple truths are undeniable. First, the ultimate gift is the gift of life which we all share. Second, wherever we're from, one thing is certain which we've been reminded of so often during this pandemic: none of us is alone, we're all in this together.

At EFCO, our gifts include the contributions of current and prior generations of EFCO team members and their families supporting them, the wonderful products, processes, and customer relationships that resulted, our shareholders' desire to continue reinvesting in this endeavor, and our shared mission and values formed over many years. Those gifts are so large and numerous that, as much as our gratitude may compel us to a desire to give something in return, they are a debt we cannot afford to repay. Instead they are a responsibility to pay it forward. So as we assess our situation, which also means looking back on our history, we are ultimately looking forward to the future with no doubt that we will overcome adversity together while creating a gift that the next generation will be proud to receive!

I hope you will enjoy the message that follows from EFCO's Chair Emeritus, Al Jennings, as he shares the gift of his wisdom built on a lifetime in the forming and shoring industry. The EFCO team is humbled by and grateful for all he has given us, and we're devoted to paying it forward. ♦

THE Gifts You Don't Wrap

BY AL JENNINGS,
EFCO Chair Emeritus



EFCO'S HISTORY OF SUCCESSES

I recently sat down with my younger brother Don Jennings and talked about the "old days." Our older brother Ralph has been gone for 32 years now and it would have been wonderful to have had him join us in our reflection of our childhood, our years attending school, those fabulous college years during the 50s and our careers at EFCO. This story is how Don and I remember it.



WA Jennings family, circa 1946

WORK & EDUCATION

We begin with the Stock Market Crash of 1929. Our father, W.A. Jennings, desperately looking for work, moved his wife Lillian and himself from Oklahoma City to his mother's home in Des Moines, Iowa. The Great Depression touched everyone and lasted for what seemed a lifetime. During those years, 1929-1939; work was scarce and if you were fortunate enough to have steady employment, the work was hard with long days and minimal pay. The difference between an unskilled and skilled workforce at that time was \$.15/hr. for the low end and \$.95/hr. for the high end; the obvious difference for W.A. was an education. In W.A.'s eyes education became a way of life, not just formal schooling but with everything he would learn throughout his life and also throughout the lives of his children, the type of education that comes from hard work and adversity. Education is a thread woven into the fabric of success.

► 6



Soup lines were common sight during the Great Depression.



The first all steel 30" x 30" HAND-E-FORM panel.

BEGINNINGS

If you are a regular reader of FORM MARKS then you already know that W.A. started Economy Forms in 1934. You know that W.A. began with a handful of investors eager to go to work. If you know all of this then you also know that EFCO's flagship concrete forming panel was the HAND-E-FORM system still widely used today and throughout the world. Back to the story...



W.A. Jennings, age 36

FATHER, TEACHER, ROLE MODEL

Ralph, Don and I, and our older sister Georgene, were all born in this formative time period and grew up with a tremendous respect for our father. To us, this was a man that beat the odds, could tackle any challenge and emerge unscathed. He was a hero cape and all. W.A. worked hard and

stressed the importance of *"learning how to work and be a contributor."* Throughout our adolescent and teen years all three of us boys spent weekends, and school breaks mowing lawns, working at the meat counter in grocery stores, going door-to-door delivering handbills that advertised anything from new products to scheduled community events.



Donald Jennings, 1955 North High School Graduation.

WORK, WORK, WORK

Us boys learned very early that an education was important and hard work was a way of life. We grew up in the same school district that our father did and graduated from North High in Des Moines just like W.A. had. Our extracurricular activities included the swim team, that in itself was work. In our home, there was no discussion as to

whether college was in our future, it was a given. Following in our mother and father's footsteps, all three of us attended Iowa State College, now known as Iowa State University and just like our father, earned our degrees in Engineering.

SERVING OUR COUNTRY

During our four years at college we worked as waiters in the girl's dormitory; what a great job that was! We also enrolled in the Reserve Officer's Training Corps (ROTC) for two years. This experience helped us to develop leadership skills, deepened our commitment to education and prepared us for our lives after college. In fact, right after college, both Ralph and Don entered two years of active duty serving our country; Ralph in North Africa and Don in Germany. During the summers, we worked at EFCO setting HAND-E-FORM panels on customer jobsites, there was nothing like working hand in hand with

EFCO's customers delivering super service with excellent results. W.A. considered this hands-on experience an absolute requirement in our EFCO education. With all this construction experience, I became a card-carrying carpenter after those three summers in between my college years.

UTILIZING OUR EDUCATION

Don and I were still in college when Ralph returned from North Africa. He went right to work at EFCO using his engineering education and EFCO hands-on education. I started in 1956 and Don, two years later. During the 1960's, Ralph entered sales and set the stage for EFCO's growth with a contract to provide special formwork for 1200 Minuteman Missile Silos that would dot the Midwest and Great Plains. The success of this project would rely on the talents of four EFCO engineers:

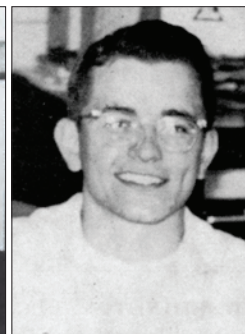
W.A. Jennings (63 Years old)
Manage the Project



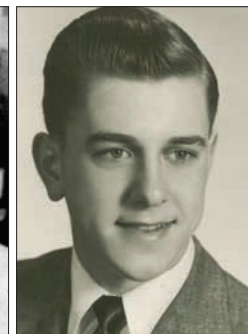
W.A. Jennings



Scott McCracken



Ralph Jennings



Al Jennings

Ralph Jennings (29 Years old)
Sell the Project

Scott McCracken (31 Years old)
Design the Project

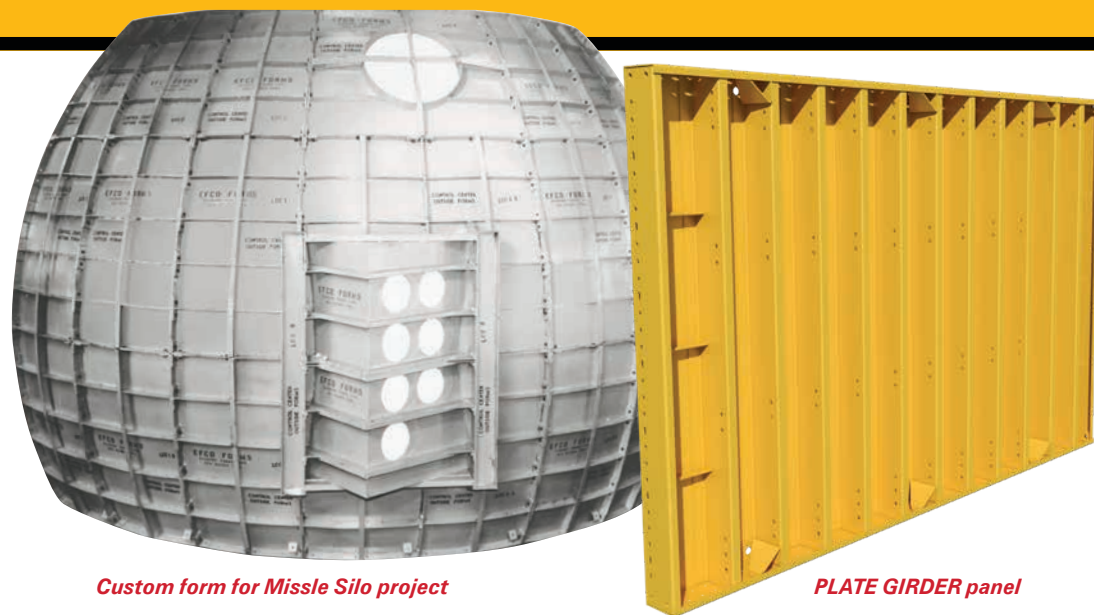
Al Jennings (26 Years old)
Manufacture the Project



Kremasto Hydroelectric Dam in Athens, Greece

After Don finished college and his EFCO training, he cut his teeth in construction working for Peter Kiewit and Sons on one of the Minuteman Missile sites his older brothers sold and manufactured. With this experience, Don went on to selling EFCO formwork in San Francisco with notable





Custom form for Missile Silo project

PLATE GIRDER panel

projects such as the Kremasto Hydroelectric Dam in Athens, Greece and the Sam Mateo Creek Bridge in San Mateo, California. These and others awarded Don a record in sales which stood for eight years. Don's ambition drove him to Canada and a Sales Manager position where the sales volume effectively doubled under his leadership.

ONE THING LEADS TO ANOTHER

The contract for the missile silos was a turning point for EFCO. With Ralph's leadership these special forms evolved into what is widely known as the **EFCO PLATE GIRDER®** which, with its introduction,

introduced the concrete construction industry to heavy-duty formwork solutions that enabled rapid cycling via crane handling. This development sparked yet another opportunity for EFCO and the Jennings boys, the production of EFCO Product Training Videos of which Don was tasked with leading the development. The company was growing and newcomers to EFCO and the concrete forming industry needed to come up to speed with EFCO products, their features and the value they would provide contractors. The success of this educational strategy was exemplified with the tripling of sales volume in only three years. It works and as a result, EFCO



Jennings men in 1972: Ralph, Don, W.A. and Al. All graduated from Iowa State University with engineering degrees.

University was born. EFCO continues to use this strategy in training our engineers and sales teams and have raised the educational bar by offering one-of-a-kind hands-on training at our **EFCO Concrete Construction and Forming Institute** for our customers. When our father would say that *"education is our best tool,"* he was right.

THE EFFORTS OF OTHERS

Afternoon turned into evening and Don and I turned our thoughts towards the families that have made EFCO a successful company beyond our own, the thousands of employees and their families that have contributed of themselves along with their talents throughout 80+ years of EFCO's history and made EFCO what it is today. Generations of families inspired by the

same ideology as W.A. that **hard work, and education are of the utmost importance.** Generations of families that have both been impacted by EFCO and impacted EFCO. We both agreed that it would be interesting to know how their experience at EFCO has impacted their lives and the lives of their families. Feel free to contact us if you would like to share your story.

As we wrapped up our conversation Don and I reminded ourselves again of the respect we had and still have for our father **including work and education.** We remarked on the values that he instilled in us and the pride we have for being part of his legacy. With children, grandchildren and even great-grandchildren of our own, we have honored W.A. by passing his gifts of integrity, strength, and the strongest of wills to survive in the darkest of days to them. They in turn will honor the generations before them by weaving these threads into the fabric of their success. Will it be easy for them, only time will tell but Don and I both believe that the thicker the thread, the stronger the fabric.

Let's go for it! ♦



EFCO's International Home Office

EFCO's Concrete Construction & Forming Institute



THE MSG SPHERE TAKES SHAPE

Las Vegas, Nevada

TO HAVE ADVANCED TECHNOLOGY

Expected to be the largest spherical building in the world, MSG Sphere at the Venetian began construction in early 2019. When finished, the structure is expected to top out at 366' (112 m) and will reach 516' (157 m) at its widest point on Level 6. Once the massive concrete structure has been completed, MSG Sphere will be transformed into one of the most technologically advanced buildings in the world.

EFCO FORMING SYSTEMS CHOSEN

After being selected to complete the one-of-a-kind structure, **M.J. Dean Construction** began to analyze the many different elements of the building. Designed with an expanding and contracting footprint and constantly changing floor heights, deciding on the correct formwork suppliers was important to keep up with the aggressive schedule and allow for constant adjustments on fly. EFCO's durable high-strength, all-steel face sheet forming systems quickly became a go-to for vertical concrete as the structure came out of the ground.

MULTI-CELL CORES

Surrounded with four 240' (73 m) multi-cell cores, M.J. Dean decided the use of a self-climbing core form system was necessary to free up crane time and carry the placing boom. The **EFCO POWER TOWER® PT-100** Hydraulic Climbing System, together with **EFCO PLATE GIRDER®** wall forms, proved to be the most efficient option and provided the lowest in-place concrete cost.

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BASEMENT AND SUBGRADE WALLS

With the core system in design, the basement and subgrade work began on-site. Thousands of feet (meters) of 22' (6.7 m) tall basement retaining walls were the first vertical concrete elements to be built. Bolstered with large pilasters, M.J. Dean decided EFCO's **PLATE GIRDER**® and **REDI-RADIUS**® wall form systems would be the most efficient and safest way to handle the walls. In addition to the walls, varying width rectangular and round columns were needed. EFCO **PLATE GIRDER**, **EFCO LITE**® and **Round Column**® forms, many interchangeable with the walls, were again chosen to complete this portion of the vertical concrete.

WORK CONTINUES LEVEL AFTER LEVEL

Once out of the basement, vertical formwork needs only became more complicated. Utilizing the **PLATE GIRDER** wall forms once again, Level 1 walls reaching 40' (12.2 m) in height were able to be formed and placed in a single pour. Column forms were cycled constantly to match the changing size and height as the building progressed. Reaching Level 3, large raker beams presented a new challenge. With anticipated form pressure of 2,000 psf (96 kPa), the decision was made to switch to EFCO **HP 2400** vertical formwork. Utilizing external vibrators, the centerpiece of the stadium seating area was able to be completed safely and with a great concrete finish.

The strength and versatility of EFCO's vertical forming systems have been validated level after level as the MSG Sphere continues its climb. ♦

John ThomasonSuperintendent
 Fred MorganSuperintendent
 William GreenrodSuperintendent
 Brian LongSuperintendent
 Loay HanthelProject Manager
 Bill SalusEFCO Territory Manager
 Matt BruceEFCO Field Supervisor
 Jill ProvostEFCO Engineer
 Jeremy JohnsonEFCO Engineer, PE
 Judd DavidsonEFCO Engineer, PE

*With walls bolstered with large pilasters, it was decided to use EFCO's **PLATE GIRDER**® and **REDI-RADIUS**® wall forming systems.*



Thousands of feet of 22' (6.7 m) tall basement retaining walls were built.



AT THE CORNER OF KEEAUMOKU AND MAKALOA STREETS

HONOLULU, HAWAII

CONDOS AND APARTMENTS WILL BE CLOSE TO BEACHES

Located at the corner of Keeaumoku and Makaloa Streets, Azure Ala Moana is a new 41-story residential tower centered in the Ala Moana and Kapiolani Boulevard area of town. Featured are 330 condominium residences along with 78 affordable rental apartments and 20,000 ft² (1,850 m²) of commercial space, all within walking distance of Ala Moana Shopping Center and numerous restaurants, markets and night life. Azure Ala Moana is one of many parcels in the area being redeveloped, bringing affordable living and convenience within a few miles of downtown and the beaches of Waikiki.

FORMING ELEVATOR CORE

Albert C. Kobayashi, Inc. (ACK) partnered with EFCO to provide the concrete forming solution for the main elevator and stair core located on the mauka side of the project. Utilizing EFCO's **POWER TOWER® PT-100** hydraulic core lifting system, EFCO hung **PLATE GIRDER®** panels from overhead beams to enable deck to deck placement. This operation typically would require the internal lobby slabs to be placed later, but with **POWER TOWER PT-100's** spacious design, the lobby slabs were able to be placed with the poured wet deck.

TOP DECK ALLOWS FOR ADDITIONAL STORAGE

With the **POWER TOWER PT-100's** high capacity, ACK was also able to utilize the top deck as a work and storage platform. Column forms typically dropped to the ground were now being stored closer to the active work deck, creating a safer workspace and saving crane time.

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At EFCO®, our employees are our most valuable assets. We share this ideology with our customers in that they, too, recognize the value of their employees and the direct impact they have on the business.

EFCO demonstrates our commitment to safety with an Awards Program. Each winner receives a personalized plaque (pictured left) and appears in **FORM MARKS®** magazine.



*With the **POWER TOWER® PT-100's** high capacity, Albert C. Kobayashi, Inc. was also able to utilize the top deck as a work and storage platform.*

STRIPPING CORNER SPEEDS CYCLING TIME

The large 24' (7.2 m) wide x 40' x (12.2 m) long double core was raised utilizing only four lifters located inside the main elevator core. The smaller, side stair core's work decks and wall forming panels were hung from beams cantilevered almost 20' (6.1 m) off the end of the lifters, creating an open area for work. Each core was stripped using EFCO's NEW **Hydraulic Stripping Corner**, making for faster cycling with less labor. ♦

Roberta Hsu Project Manager
James Ching General Superintendent
David Frausto Asst. Superintendent
Alex Weldon Asst. Superintendent
Corey Gokan Project Engineer
Garrett Holm EFCO Sr. Territory Manager
Dennis Philpot EFCO Field Supervisor
Andrew Gray EFCO Engineer, PE



EFCO's NEW Hydraulic Stripping Corners made for faster cycling with less labor.

The large 24' (7.2 m) wide x 40' (12.2 m) long double core was raised utilizing only four lifters located inside the main elevator core.



“

EFCO has heightened safety and efficiency with the POWER TOWER® PT-100 system. In comparison with the PT-50, the PT-100 is smoother in climbing and jumping. Another new feature that is highly valued by our field operations, are that the cylinders are jacking and pushing at the same time, so now there's no challenges with the levers in controlling and balancing the cylinders to go up at the same time, making for a smooth and safe operation.

Another advantage is the remote operation, computerized machine and hydraulic stripping of forms. Our employees no longer have to carry the heavy shoes, which reduces the risk of strains, sprains and back injuries.

In addition, EFCO provides invaluable field service with highly experienced field technicians who we have collaborated with on safety pre-planning and safety tool box talks. We were also provided with helpful safety material and the field technician was able to answer any questions we had and suggested ways that we could incorporate safety into production.

Jolene Furumoto, Project Safety Administrator

”



A SYSTEM PROVEN TO SAVE TIME AND MONEY

Manila, Philippines

PROJECT OVERVIEW

Total Safe Development Construction, Inc. (TSD), the contractor for the SCT Building Project, is a category "C" construction company in the Philippines, owned by Engr. Manuel Chua and Arch. Alexander Bornasal.

The SCT Building is a 10-story commercial building with two basements and a roof deck. It is located at Shaw Blvd, Manila, owned by Shamrock Development Corporation, a real estate developer in the Philippines.

FORMING PERIMETER WALLS

Total Safe Development Corporation, Inc. is one of EFCO's valued clients and a repeat customer who has experience using EFCO's **HAND-E-FORM®** system for columns and shear walls. They chose to use EFCO again because of their past positive experience. For the SCT Building Project, TSD chose to use the HAND-E-FORM system for their perimeter wall rather than the conventional concrete hollow blocks (CHB). EFCO's HAND-E-FORM system is proven to save time, money and speed up any operation. Using a four-man crew, 1,450 ft² (136 m²) of RC Wall was completed in 48 hours achieving an average of 30.5 ft² (2.83 m²)/man-hour.

TSD was appreciative of EFCO's super service and plans to use EFCO products and services in the future. ♦

Manuel Chua Owner
Alexander Bornasal Owner
Samantha Abarquez Project Manager
Jollibee Cuid Contract Admin Engineer
Raniel Mar Jinang Formworks Engineer
Jhoggy Klein Dela Torre EFCO Territory Manager
Abunasif Gubat EFCO Field Supervisor
Jeanna Fernandez EFCO Engineer



HAND-E-FORM®
all-steel face sheets
can withstand the
demands of being
used over and over
and over again on
your jobsite.



E-Z DECK BEATS WOOD TO THE PUNCH

Jackson, Mississippi

EFCO HAD A SOLUTION WHEN OTHERS DID NOT

EFCO's territory managers were granted the opportunity to develop a complex forming and shoring solution when Gregory Construction Services' previous supplier didn't have a solution. EFCO's team of sales, engineers and field service went to work, developing a safe and efficient solution. As the solution was coming together, the sales and field service personnel presented Gregory Construction with a hands-on tutorial to demonstrate the workability, features and benefits of EFCO equipment.

ACCOMMODATING THE SLOPE

One of the biggest challenges on this project was a sloping French drain mud slab to be used as the base for EFCO shore towers to set upon. Another challenge was the varying levels of elevated slabs, ranging from 52" (1,320 mm) to 217" (5,512 mm) in height. For the slopping base, EFCO's solution was to attach the EFCO Swivel Head Adapter on the bottom of the E-Z DECK® posts to stabilize the shore towers and support the 12" (300 mm) deck slab. To accommodate the varying shoring heights, EFCO used components of the E-Z DECK, EFCO DECK® and SUPER STUD® systems to meet the pour challenges this project presented.

SERVICE THEY HAD NEVER HAD BEFORE IN SUPPLIER

Throughout the course of the project, the EFCO team remained involved, helpful, supportive and provided service at levels

this contractor had never experienced with their previous supplier. EFCO's teamwork, creativity and knowledge, combined with the versatility and variety of EFCO products, turned a long-time prospect into a valued repeat customer. ♦

Thomas Glenn Project Engineer
Josh Cantor Project Manager
Randy Woods Superintendent
Anderson Kay EFCO Territory Manager
Mark McCarty EFCO Field Supervisor
Nate Witte EFCO Engineer

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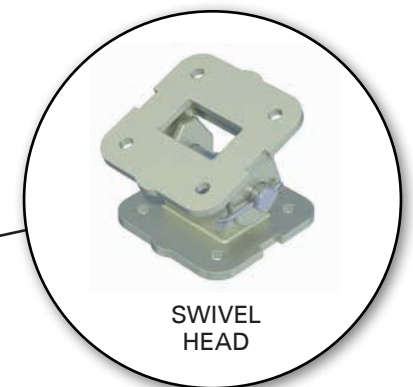
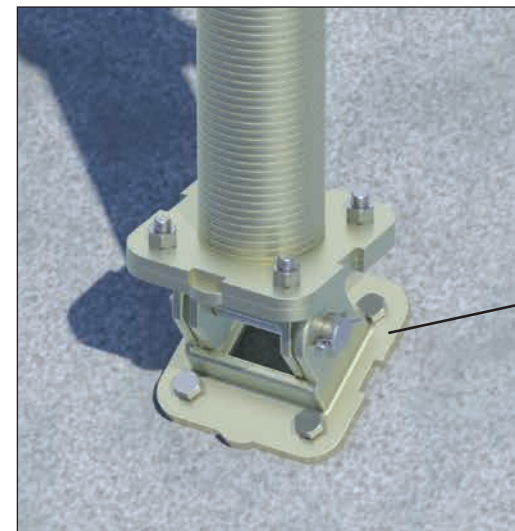
EFCO provided not only a one-of-a-kind solution using a combination of the EFCO DECK and E-Z DECK systems, but also one-of-a-kind service for the life of the project. Their creative solution with the Swivel Head Adapter saved us from countless hours of wood build and material expenses.

Thomas Glenn, Project Engineer

”



For the slopping base, EFCO's solution was to attach the EFCO Swivel Head Adapter on the bottom of the E-Z DECK® posts to stabilize the shore towers and support the 12" deck slab.



SWIVEL HEAD



How to Reduce the Amount of Crane Time Needed

Mexico City, Mexico

The Río San Joaquín 498 office building is being built in Polanco, one of the most exclusive areas of Mexico City. This area is home to cultural venues such as museums and galleries. Also, companies, embassies, and leisure businesses such as restaurants, luxury stores, and shopping malls which are characterized by their cultural diversity.

MEETING OR EXCEEDING CODE AND SAFETY REQUIREMENTS

Designed by the global firm HOK, the Río San Joaquín 498 Project has 19 floors of Class A offices with an area of 24,200 ft² (2,248 m²) per floor. Its eight basements are 70,000 ft² (6,500 m²), each equating to 40% of the building's total construction. The Río San Joaquín 498 is being built to the highest architectural, structural, and safety specifications, meeting or exceeding the international building code for mechanical, electrical, and safety requirements. Due to these high standards, **Anáhuac Organización Constructora, S.A. de C.V.** chose EFCO systems to ensure quality, productivity and safety during construction.

PROJECT DETAILS

During the study of the project, the contractor noticed and highlighted the importance of the safety elements the EFCO systems had; such as the scaffolding designed for both the **PLATE GIRDER**® and **HAND-E-FORM**® systems, as well as the ability to safely assemble E-Z DECK shoring towers on the ground. They also appreciated the safety of EFCO's

perimeter protection—the **POWER SHIELD**® system. It provides weather protection for workers while protecting pedestrians from falling debris.

The following EFCO solutions are being used:

- **HAND-E-FORM** system is being used to form the basement and tank perimeter walls.
- The **PLATE GIRDER** system is being used to form the elevator cores and columns due the ability to assemble panels into large gangs on the ground. This advantage, requires less crane time and reduces a requirement of working at difficult heights.
- The **E-Z DECK**® shoring system was chosen because of its load capacity, requiring less equipment per area. This meant less crane movements and labor, increasing performance and maintaining safety standards.
- EFCO's **POWER SHIELD** was used for perimeter protection. Being a project that seeks to meet the highest safety standards during its construction, the **POWER SHIELD** is an absolute requirement. It provides a safer work area and at the same time increases worker productivity. ♦

Sergio Montoya Tijerina.....Project Manager
Sergio Cisneros Castillo.....Superintendent
Cristóbal Morales...EFCO Territory Manager
Rosalio Ramos EFCO Field Supervisor
Jhonatan Pérez EFCO Engineer

“

The main beneficial characteristics found in EFCO systems are the high performance, the quality of the concrete finishes and the safety EFCO products offer during construction.

Sergio Montoya Tijerina, Project Manager

”



EFCO's line of products help reduce or eliminate the need for crane time. **HAND-E-FORM**®—EFCO's handset system—was used to form the basement and tank perimeter walls.



How Can Something This Lightweight Be So Strong?

Cartagena, Bolívar, Colombia

A TOURIST CAPITAL

The Gran Manzana Shopping Center with approximately 755,000 ft² (70,000 m²) of construction is a very important project within the development plan of the southern area of the city of Cartagena. In addition to being located near the city's transport terminal, it is one of the main tourist capitals of Colombia. MOVICON S.A.S., a construction company with more than 38 years of experience developing large projects, was chosen for its construction.

REPEAT SUCCESS

The project required equipment that would enable the aerial beams to be shored to an approximate height of 20 ft (6 m). The shoring needed to have a large bearing capacity because of the weight, heights and variable thickness of the beams. Another characteristic the shoring needed to offer was productivity. Considering the large areas that the project covers, the equipment needed to be set up and cycled quickly. EFCO was chosen as the formwork and shoring partner and served as a strategic partner for MOVICON based on the success achieved in previous projects.

LIGHTWEIGHT ALUMINUM

The EFCO sales and engineering team designed an E-Z DECK® table system that, thanks to its large load capacity of up to 124.5 kN (28 kip) per post, enabled the beams to be shored with less equipment. This increased productivity of the project. Additionally, E-Z DECK tables can be assembled lying on the ground and lifted

into place, reducing the work height and providing greater safety to workers. The tall E-Z DECK® towers had eight E-Z DECK Panels and the short towers only needed four. Each of these panels have built-in hinged jaw Panel Clamps that secure them to the posts with just a hammer blow. With these built-in Panel Clamps, fewer accessories are needed. The HAND-E-FORM® system was chosen to form the beams because of its versatility, variety of panel sizes, simple mechanics and ease of use not to mention the quality finish an all-steel face sheet forming system can provide.

In an effort to maintain an aggressive schedule, the E-Z DECK towers were not only used to shore EFCO's HAND-E-FORM system as the beams were cast, but they also served as a reshore solution for each beam until the desired concrete strength was achieved. ♦

Carlos Segovia..... Project Management
Joaquín Esquivia Project Director
Juan Montero.....Project Engineer
Miguel Arenas.....EFCO Territory Manager
Mario Gallo EFCO Field Supervisor
Erick Smith Delacruz..... EFCO Engineer



“

We found the EFCO team to be easy to work with. Their engineering support, engineering plans, help with assembly and cycling of the different systems and good support during the construction process impressed and helped us the most; thus, achieving higher assembly speed and better finishes.

Joaquín Esquivia, Project Director

”



EVEN IN WICKED WINDS, WORK CONTINUED

San Francisco, California

THE MARKET STREET HUB

San Francisco's Market Street Hub is an area of the city that has often been overlooked by passersby as they make their way to nearby areas like Civic Center, Hayes Valley, Mission District and SOMA. The Hub is now a part of a strategic revitalization effort to bring thousands of much needed residences to the area near the rapidly growing Mid-Market area.

Located in The Hub, the 30 Otis Street project is helping to fulfill part of these must needed residences with the 290' (89 m) tall, 27-story tower accompanied by a 95' (29 m) tall 10-story podium building. The 398,000 ft² (37,000 m²) building will contain 418 rental units, 11,000 ft² (1,022 m²) of amenity space, 4,000 ft² (372 m²) of retail space and provides an expanded space for neighborhood cultural institution.

TOWER CORE FORMWORK

With an aggressive construction schedule, crane time was going to be at a premium. Webcor Builders chose EFCO to provide the **POWER TOWER® PT-100** system to hydraulically lift the formwork for the tower core measuring 31' (9.5 m) wide x 53'-1" (16.2 m) long. The lifter system utilized six lifters to support the suspended **PLATE GIRDER®** wall form panels above the poured deck while the system also extended down into the core to provide a lower platform for installation of elevator components and interior slab access. The exterior panels were efficiently engineered and utilized as double-up panels for two perimeter shear walls.

PODIUM CORE FORMWORK

The podium core, at one-third the height of the tower, did not warrant a lifter system like the **POWER TOWER PT-100**, but did required the muscle of the **PLATE GIRDER** wall form panels to minimize crane handling time and reduce the quantity of wall ties. Measuring 22'-1 1/2" (6.7 m) wide x 27' (8.2 m) long, the podium core interior formwork was picked and set as a full box reducing labor and crane time. With the wide panel modules, ties were kept to a minimum to avoid the congested reinforcement steel of San Francisco.

EXTERIOR PROTECTION

Due to the high afternoon winds this area of The Hub receives, Webcor made the executive decision to replace perimeter flyer tables with EFCO's **POWER SHIELD®** system both for safety and to maintain schedule. Nearby projects were having a tough time controlling schedule due to crane downtime caused by the high winds, so a rail guided system like the **POWER SHIELD** was the right choice to keep the project moving forward. Webcor had the option to either crane handle the gangs when available, or during high winds of up to 60 mph 97 km/h, use the hydraulic power units to jump the screens. EFCO's **POWER SHIELD** provided Webcor with four levels of perimeter platform for slab edge activities to promote better production with a safer work environment.

DELIVERED PREASSEMBLED

With virtually no laydown area for assembling equipment on the 30 Otis site and a very limited truck staging area off the busy intersection of Van Ness and Mission streets, careful delivery coordination of preassembled gear was required. EFCO provided the labor services to construct the assemblies vital to the system such as decks and beams that were built and shipped to site per Webcor's schedule. ♦

Michael Gilmore Construction Manager
Dave Casetta Superintendent
Matthew Miller Assistant Superintendent
Matthew Faith Project Manager
Joel Vasquez Concrete Specialist
Jacob Alonso Concrete Specialist
Brian Barsotti .. EFCO Sr. Territory Manager
Matt Bruce EFCO Field Supervisor
Jeremiah Curley EFCO Engineer
Zach Peacock EFCO Engineer
Judd Davidson. PE EFCO Engineer

*Options are available for the covering used with the **POWER SHIELD** system. They include plywood, thin gauge corrugated steel sheets, or fabric. Webcor Builders chose to use plywood.*





INCREASING SAFETY AT THE EDGE

Los Angeles, California

PROJECT PURPOSE

Le Conte Apartment is just one of eight new structures under UCLA's plans to expand student housing. Besides living spaces, these new structures will include new dining halls, study spaces and sports facilities for students to enjoy.

PROJECT DETAILS

Le Conte Apartment includes two cast-in-place concrete towers. The south building is 10 stories, and the north building is 17 stories. They are connected by an elevator core and have multiple challenging areas where the deck cantilevers out beyond the footprint of the floor plan below.

Largo Concrete is counting on EFCO to provide E-Z DECK® perimeter tables to be used in conjunction with interior handset shoring owned by Largo for this project. A challenge often found with mid- and high-rise buildings are changing deck footprints. EFCO and Largo Concrete worked together to design perimeter tables that could be adjusted and maneuvered to best match the changing floor plans. EFCO was able to pre-build these tables at the Fontana warehouse and deliver them to Largo's busy and congested jobsite in Westwood Village. Using tables at the perimeters of the building enables Largo to avoid dangerous handset work near the edge of the building, which increases worker safety and productivity. The tables are easily cycled with the EFCO C-Caddy from floor to floor.

SOLUTION FOR CANTILEVER SITUATION

In addition to the E-Z DECK perimeter tables, EFCO provided **PLATE GIRDER**® beams extending roughly 9' (2.7 m) from the building footprint below to support the E-Z DECK tables below cantilevered cast-in-place deck pours. These **PLATE GIRDER** assemblies were built on the ground and flown into place, then shored to the deck above, enabling Largo to support the cantilevered deck loads without any deck anchors. ♦

Jorge HernandezGeneral Foreman
Jaime SimentalGeneral Foreman
Art AguilarSuperintendent
Kevin PetersonProject Manager
Stephanie WeldonProject Manager
Cody O'Neil EFCO Sr. Territory Manager
Kris Aguilar EFCO Field Supervisor
Kyle Hamilton EFCO Engineer



The tables are easily cycled with the EFCO C-Caddy from floor to floor.

EFCO provided **PLATE GIRDER**® beams extending roughly 9' (2.7 m) from the building footprint below to support the E-Z DECK® tables below cantilevered cast-in-place deck pours.



AFTER A LONG FLOODING DELAY

Kansas City, Kansas

BRIDGE BETWEEN KANSAS AND MISSOURI

American Bridge was awarded this \$65 million-dollar project to replace the west bound lanes of the Lewis & Clark bridge along I-70 which spans the Kansas River. This section of I-70 was built in 1962. Originally, this replacement project was scheduled to open at the end of 2019. However, record flooding all along the Missouri River kept American Bridge from starting work on the three river piers until November of 2019.

OVER WATER AND LAND

The west bound replacement of the Lewis & Clark Bridge consists of 20 piers; three river piers and 17 piers over land. The east bound lanes for this bridge will be replaced at a later date. The smaller columns and caps over land included 6' x 4' x 21' (1.8 m x 1.2 m x 6.4 m) tall columns with caps measuring 8' (2.4 m) tall x 48' (14.6 m) long x 6' (1.8 m) wide. The bigger river piers and caps all differed in dimensions; the largest measuring 72' (22 m) wide x 110' (33.5 m) tall x 12' (3.6 m) deep. In addition, the piers and caps contained numerous width changes which will add to the architectural integrity of the bridge, including a block form liner located at the mid-section of each pier. American Bridge formed these stepped in areas out of wood and attached the block outs to EFCO's **PLATE GIRDER**®. The bigger piers and caps were made in four to five pours to accommodate engineering along with all the dimensional changes in the concrete. Thanks to the expertise of American Bridge, Andy Kerr, and American Bridge's skilled work force, the Lewis & Clark Bridge will soon be another successful completed project. ♦

Andy Kerr General Superintendent
Charles Bowman Field Engineer
Lanny Miller Project Manager
Joel Jungels-Norris General Foreman
Kevin Kiesling Carpenter Foreman
Gary Nease Carpenter Foreman
Donnie Shewmaker Laborer Foreman
Mike Bowden EFCO Territory Manager
Matt Harrington EFCO Field Supervisor
EFCO Engineer Nate Witte



Cap forming can be even more efficient by completely assembling a cap form on the ground and then placing both the cap form and the reinforcing steel fully assembled into place for pouring.



WHERE YOU CAN GET HANDS-ON TRAINING

Haverhill, Massachusetts

The Northeast is a highly competitive forming market with an abundant number of choices for the contractors in the region. To stand out from the rest, the EFCO sales team invited heavy civil contractor, **SPS New England, Inc.** to the Concrete Construction & Forming Institute at EFCO in Des Moines, Iowa. This enabled them to get to know EFCO better and, also get some hands-on experience with EFCO's spanning pier cap forming system. This system would be needed to effectively form and support the pier cap placements for the I-495 Bridge Replacement Project over the Merrimack River in Haverhill, Massachusetts during the upcoming summer. Through this visit, a successful partnership was formed, leading to finalized work contracts from Summer 2019 through completion of the final phase in 2021. ♦

Tyson GagneCarpenter Foreman
 Abderrazak GhallamiCarpenter Foreman
 Chris GreenProject Supervisor
 Steve Kulla.....EFCO Territory Manager
 Lou Szabo EFCO Field Supervisor
 Joel Lindberg EFCO Engineer



The rigid PLATE GIRDER® panels can be bolted together to provide a self-spanning, self-supporting structural form.

A visit to EFCO's Institute gave SPS New England, Inc. guidance and practice in cycling an actual sized pier cap in an indoor setting.



100 PIERS IN 3.3 MILES

Damansara Perdana, Malaysia

ELEVATED EXPRESSWAY

The Sungai Besi-Ulu Kelang Elevated Expressway (SUKE) is a 15.2 mi (24.4 km), three-lane, dual-carriageway running from Sri Petaling to Ulu Kelang. It has 14 interchanges and reaches out to over 60 residential areas and connects to major highways and roads in Kuala Lumpur.

AIMING TO ALLEVIATE CONGESTION

SUKE is being constructed by Projek Lintasan Sungai Besi-Ulu Klang Sdn. Bhd., a wholly owned subsidiary of Projek Lintasan Kota Holdings Sdn. Bhd., also known as PROLINTAS. PROLINTAS is renowned as Malaysia's intra-urban elevated highways developer. SUKE aims to be a viable alternative to Middle Ring Road 2 (MRR2) by minimizing traffic congestion in Cheras, Pandan Indah and Ampang.

Connecting high-density areas closer to everyone will promote economic growth and, most importantly, offer an effective traffic dispersal system. SUKE is expected to reduce traffic congestion by 30% during peak hours on MRR2.

PACKAGE CA3

In 2016, China Communications Construction Company (M) Sdn. Bhd. (CCCC) was awarded Package CA3 located in Alam Damai, southeast of Kuala Lumpur as a sub-contractor. The total length of Package CA3 is approximately 3.3 miles (5.2 km). Its construction involves mainly elevated expressway mainline structures and minor at-grade construction. The structure work of Package CA3 is expected to be completed by the end of 2020, which will now likely be extended well into 2021

due to the delays caused by the COVID-19 pandemic lockdowns.

EFCO Malaysia is involved in forming hundreds of the post-tensioned concrete portal beams 6'-7" and 8'-3" (2.0 and 2.5 m) in width and a maximum of 13'-2" (4 m) in depth. Lengths range from 65'-8" to 164'-1" (20 m to 50 m) with corbels at each side of the beam. The shoring height varies from 19'-9" to 29'-7" (6 m to 9 m). The portal beams were poured in two lifts.

EFCO Malaysia provided a full shoring solution with E-Z DECK® shoring towers and SUPER STUD® shoring towers for the upper layer of the post-tensioned concrete portal beams. A feature of these EFCO shoring systems is the ability to pre-assemble shore towers on the ground, then fly them into position by crane. This significantly enhanced erection efficiency and flexibility at the jobsite and enabled for a safe environment for workers.

The whole Package CA3 involves over 100 piers, each with a minimum of two layers of portal beams. The modular and standardized shoring towers EFCO provided also benefited CCCC in terms of saving the time it took to cycle equipment from pier to pier, largely due to fact that

EFCO's E-Z DECK shore towers can be easily moved fully assembled and modified to accommodate any height variance.

CCCC is very pleased with EFCO's super service, the solutions they have provided, and the expertise of EFCO's Field Service Supervisors at the jobsite, which greatly assisted in safe and efficient construction. ♦

Yang Jian.....Project Manager
He Zheng Xiang.....Contract Manager
Wang Hai Shan.....Project Superintendent
Wang Ye Qiang.....Project Superintendent
Chen Hong Ze.....EFCO Territory Manager
Lee Chee Kheung.....EFCO Field Supervisor
Kevin Khor.....EFCO Engineer



EFCO Malaysia provided a full shoring solution with SUPER STUD® shoring towers for the upper layer of the post-tensioned concrete portal beams.



AFTER STORM DESMOND

Pooley Bridge, England

OUTSTANDING BEAUTY

In the heart of the Lake District, an area of outstanding natural beauty in the North East of England, lies the small village of Pooley Bridge on the southern end of Ullswater. It takes its name from the bridge over the River Eamont. Until the arrival of Storm Desmond in December 2015, the village was served by this historic bridge originally built in 1764. When the water from the storm subsided, the bridge was lost and the process to design and build a suitable replacement had begun.

BRIDGE DESIGN AND CONSTRUCTION

The winning design was a prefabricated 495 ton (450 Tonne) architectural stainless steel and concrete, two-lane road bridge with a 132' (40 m) clear span that would form the US\$ 6.2m (£ 5m) cornerstone of the local council's program to recover from the storms.

EFCO UK was approached by **Betts Construction** to provide solutions for the cast-in-place abutments, support

► 38



EFCO E-Z DECK® shore towers support the arched bridged during erection.





The abutments were formed within cofferdams using the EFCO HAND-E-FORM system.



The all-steel face sheets leave a single line.

“

Having decided to move away from the original contract of forming and casting the deck whilst suspended over the river, and once Betts became involved, we put forward the forming of the lower arch deck by precasting in the adjacent existing car park area. We pushed our proposals forward with the confidence that EFCO's equipment and level of design support would overcome any obstacles, as we moved forward into the detailed support and formwork design requirements.

Indeed, such was the proactive and technical level of support that was required to react and resolve the numerous eccentric loadings that needed to be catered to for this unusual stainless steel box section framework, that Betts' and EFCO's expertise was extended to cover the support and stability of the frame in addition to the original concrete requirements for the deck structure, as well as the abutments, which were formed within cofferdams using EFCO HAND-E-FORM system.

The Lower Arch Deck was erected within a shortened time period and has now been stripped satisfactorily. It is ready for the main contractor to lift and crane the deck into place over the river.

The level of EFCO's support, equipment service and technical support was never in doubt, throughout our company, with major wall formwork and deck support systems continuing smoothly for some time now on our Caernarfon and Warrington bypass schemes.

Trevor Betts, Owner Betts Construction

”

to the steel structure during erection, and falsework support to the complex lower concrete arch prior to the completed structure being lifted into its final position. Using a combination of HAND-E-FORM®, SUPER STUD®, PLATE GIRDER® and E-Z DECK® systems, EFCO UK was able to respond to the challenge of this unique project.

The UK team is very proud to have been involved in this landmark structure and hope it is enjoyed by hikers and holidaymakers for another 250 years, or more. ♦

Trevor Betts Owner Betts Construction
 Ian Scully Contract Manager
 Gerry Brown EFCO Territory Manager
 Colin Walker EFCO Field Supervisor
 James Wood EFCO Engineer



E-Z DECK SUPPORTS ENTIRE SPAN OF BRIDGE

Macro Southern Region, Peru

GORGE MADE TRAVEL DIFFICULT IN PAST

EFCO has participated in many major road projects in the Macro Southern Region of Peru and this project is no exception.

Bridge Huarangal Consortium was awarded the first stage of the construction of the Huarangal Bridge, which consists of an arc spanning 211' (64.31 m) long and 67'-4" (20.50 m) high from the natural terrain to the crown. An embankment was built to improve the terrain, which reduced the height toward the crown, creating 51'-7" (15.70 m) in shoring height. Seen from above, the widths of the ends of the bridge are 67'-8" (20.60 m) and 83' (25.00 m), and the center of the bridge is 25'-8" (7.80 m) wide.

The Torrentera Huarangal Gorge serves as natural drainage for rain and severe storm events which can make travel difficult for the community of 7,838. The new Huarangal Bridge will provide pedestrians and vehicle traffic with suitable conditions all year long.

SOLUTION

Once the terrain was leveled into an embankment, the first step was to support the endpoints at the footings of the arc. This was quickly resolved by using EFCO **SUPER STUDS®**, which are ideal at withstanding diagonal loads because of their high compression capacity.

Next, shoring was needed to support the entire span of the bridge. The main requirements for this were: a light and practical system to minimize the volume of equipment to be moved because of the terrain and equipment that required the

least amount of labor. Thus, EFCO's **E-Z DECK®** system was chosen. Because its high-load capacity post enables greater spacing and higher productivity, it was the best solution. ♦

Mario Ruiz..... Consortium Manager
Anibal Chumbe Resident Engineer
Eduardo Aza..... Production
Karin Concha..... EFCO Territory Manager
Freddy Vite..... EFCO Field Supervisor
Daniel Fernández EFCO Engineer



“

The technical, logistical, training and jobsite support provided by EFCO allowed for us to successfully complete the project. We will surely work together again in the future.

Anibal Chumbe
Resident Engineer

”

*Once the terrain was leveled into an embankment, the first step was to support the endpoints at the footings of the arc. This was done by using EFCO **SUPER STUDS®**.*

E-Z DECK® Posts are made of aluminum providing a reduction in weight while having a load rating up to 28 kip (124.5 kN) per leg capacity.



THE MOST EXPENSIVE INTERCHANGE EVER AWARDED IN OKLAHOMA

Oklahoma City, Oklahoma

PROJECT SCOPE

Allen Contracting, Inc. was awarded the I-235 I-44 Interchange in Oklahoma City in December 2018. The \$110 million interchange is the most expensive interchange the Oklahoma Department of Transportation has ever awarded. The interchange has multi-stem and hammerhead pier caps with extensive form liner and detail. The large hammerhead pier caps are over 13' (4 m) tall. In addition to the large pier caps, over 3,000' (915 m) of overhang was needing to be formed.

MODIFICATIONS MADE ON THE FLY

The large hammerhead pier caps were a unique challenge to form out of a traditional beam and wood form. EFCO approached Allen Contracting with a **PLATE GIRDER**® solution. This would enable forming the pier caps quickly and efficiently reducing labor costs. Each pier cap had a different super elevation, so the EFCO engineering team designed a system that would enable for modification on the fly.

The multi-stem pier caps combined with large form liner detail, made EFCO's **PLATE GIRDER**® a great choice. EFCO self-spanning **PLATE GIRDER** allowed Allen Contracting to cycle the forms in two picks, which protected the finished detail without slowing down productivity.

SOLUTION FOR THE OVERHANG

With several thousand linear feet of overhang, Allen Contracting turned to EFCO's **Heavy Duty Bridge Overhang Bracket**® designed to cycle large 20' (6 m) gangs on 5' (1,500 mm) centers; thus,

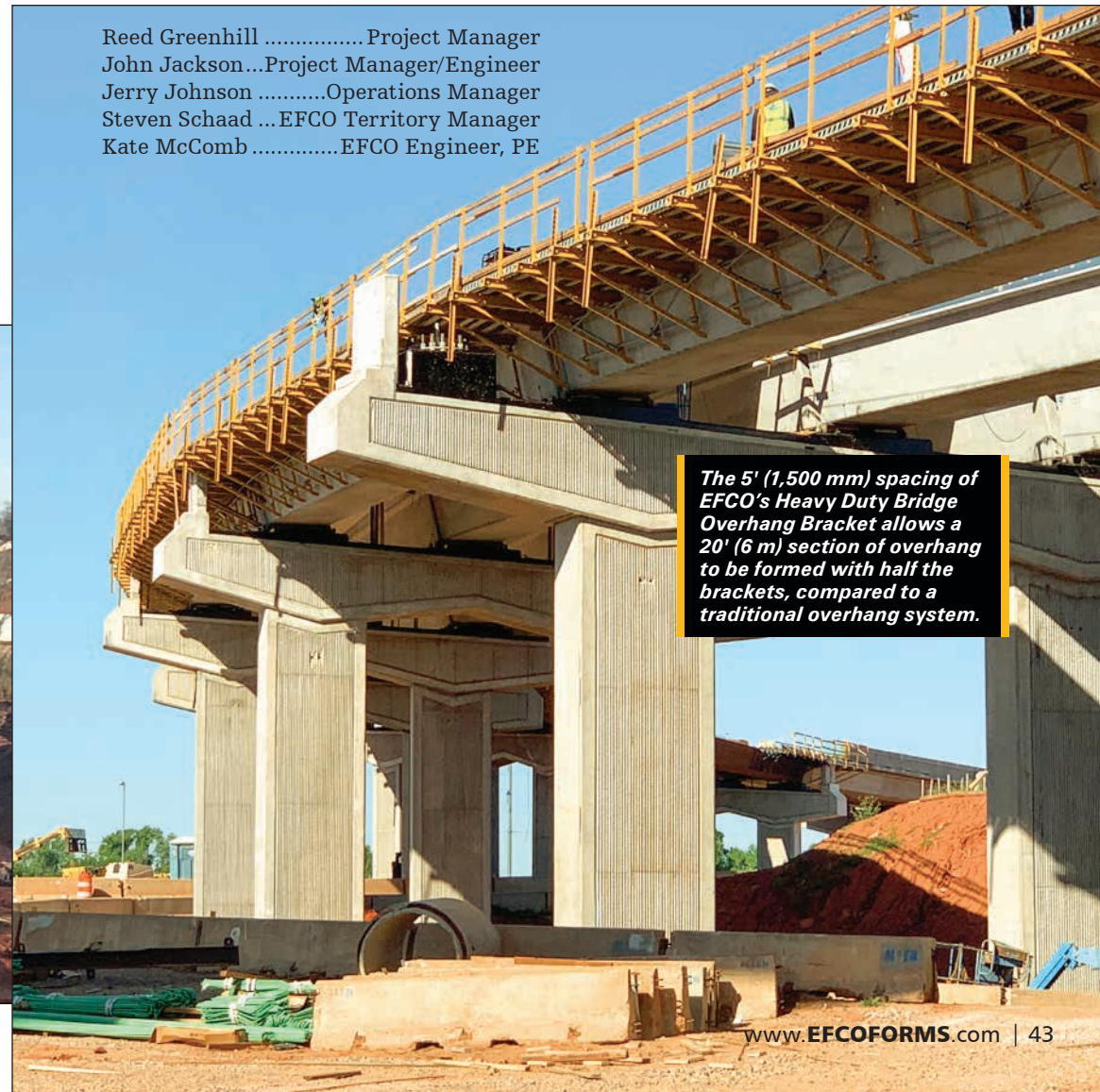
reducing labor cost and cycle times. The 5' (1,500 mm) spacing allows a 20' (6 m) section of overhang to be formed with half the brackets, compared to a traditional overhang system. EFCO's engineers designed the sleeve locations and angles for precasting an anchor into the beams.

EFCO and Allen Contracting, through several meetings and hours of discussions, were able to collaborate on a great solution for Oklahoma's most expensive bridge project ever. ♦

Reed Greenhill Project Manager
John Jackson...Project Manager/Engineer
Jerry JohnsonOperations Manager
Steven Schaad ...EFCO Territory Manager
Kate McCombEFCO Engineer, PE



Each pier cap had a different super elevation, so the EFCO engineering team designed a system that would enable for modification on the fly.



The 5' (1,500 mm) spacing of EFCO's Heavy Duty Bridge Overhang Bracket allows a 20' (6 m) section of overhang to be formed with half the brackets, compared to a traditional overhang system.



A GREEN SPACE IS ON ITS WAY

Pittsburgh, Pennsylvania

PITTSBURGH TO BENEFIT

On June 24, 2019, Joseph B Fay Company was given the notice to proceed on the I-579 Cap Urban Connector. The project consists of the construction of a new cap park structure that will span over part of the I-579 Crosstown Boulevard. The surface of the cap will be transformed into three acres of public green space to be easily accessed by pedestrian pathways and bicycle paths. The area will provide recreational, performance and educational spaces, as well as rain gardens. Construction is expected to be completed in November of 2021.

THE BRIDGE

The project consists of four multi-stem piers that will support the three-acre (1.2 hectare) park. EFCO provided an optimal amount of standard Ø36" (Ø900 mm) Round Column forms for the stems and a single-cap form consisting of EFCO's **PLATE GIRDER**® system. The pier caps were poured in phases and each one had a different length. The largest pier cap measures 110' (33.5 m) long and was poured in three phases. It has twelve columns supporting it. The EFCO systems enabled Joseph B Fay Co. to cycle the equipment with minimal rework in a very compact Mid-town Pittsburgh jobsite.

COMPLICATED SOLUTION

The piers for the I-579 Urban Open Project were very easy to form due to EFCO's design. Once again, EFCO has taken a project that could have been difficult and drawn out over time and provided a common sense solution so Joseph B Fay Co. could cycle a minimal amount of equipment very quickly to maintain a tight schedule on a very challenging jobsite. ♦

Chuck Grabner Project Manager
Randy Morrow Superintendent
Dave Matelan Project Engineer
Mark Dulacy EFCO Territory Manager
Rick Lynch EFCO Field Supervisor
John Lust EFCO Engineer



PLATE GIRDER® forms are designed and built for flying and placing in large sections. Using EFCO's Quick Bolt and Quick Pin, **PLATE GIRDER** panels can be assembled into gangs as large as your crane capacity.



REDUCING SEWER OVERFLOWS INTO D.C. RIVERS

Washington D.C.

PROJECT TO ALSO REDUCE FLOODING

Clean Rivers Project is a \$2.7 billion program initiated by D.C. Water to help reduce combined sewer overflows into the Anacostia and Potomac Rivers and Rock Creek. In 2017, they awarded the \$583 million design-build Northeast Boundary Tunnel Project (NEBT) to **Salini-Impregilo-Healy JV**. The NEBT is the largest component of the Clean Rivers project and will result in a 98% reduction in overflow to the Anacostia River and reduce the chance of flooding in local neighborhoods.

FORMING CONCRETE SHAFTS

The 27,000' (8,230 m) of tunnel is being dug and constructed by a tunnel boring machine (TBM) named Chris. Along the tunnel line are seven drop shafts which are being constructed using cast-in-place concrete. Salini-Impregilo-Healy JV partnered with EFCO to provide the formwork for these concrete shafts. EFCO is providing the **REDI-RADIUS®** system to form these shafts. When REDI-RADIUS forms are connected in a continuous ring, they act as a compression ring and eliminate the need for ties.

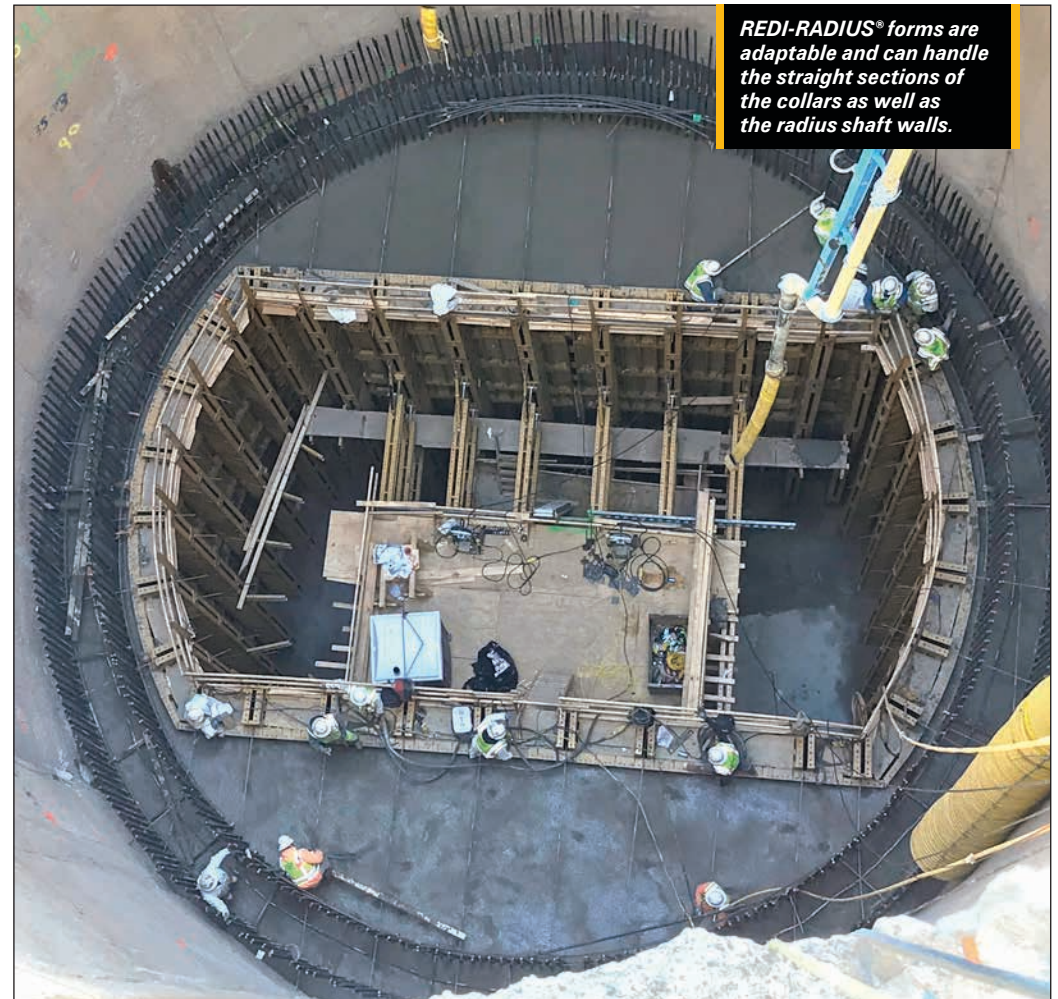
need for ties. The first few lifts of the shaft liner required a collar to be constructed to reinforce the areas "Chris" will break into the shafts. The **REDI-RADIUS®** forms are adaptable and can handle the straight sections of the collars as well as the radius shaft walls. ♦

Filippo Azzara.....Technical Coordinator
Andy Wolterman.....Superintendent
Giuseppe Benevento.....Field Engineer
Andrea Sesenna.....Construction Manager Sites
Emily Chavez.....Engineer
Ryan Chew.....Purchasing Manager
Kevin Pyle.....EFCO Territory Manager
Rick Lynch.....EFCO Field Supervisor
David Thibau.....EFCO Engineer

When REDI-RADIUS forms are connected in a continuous ring, they act as a compression ring and eliminate the need for ties.



REDI-RADIUS® forms are adaptable and can handle the straight sections of the collars as well as the radius shaft walls.





A SPECIAL MODULAR FORM DESIGN TO ENABLE A UNIQUE TIE SPACING

Township of Langley, BC, Canada

JERICO RESERVOIR PROJECT

North America Construction (1993) LTD., after being awarded the contract to build the new Jericho Reservoir in the Township of Langley, approached EFCO to discuss some formwork concepts for this uniquely designed reservoir.

Phase 1 of the project involves the construction of a dual cell, 5.4 MGal (20.6ML) reinforced concrete potable water reservoir, and a main valve control chamber. The reservoir is an above ground structure which will have a community park on the roof to allow the residents of the nearby communities to enjoy the space. This is quite unique; however, the real challenge is to form the 30' (9 m) tall exterior walls which tilt 5 degrees inward. Further complexity was added by installing 9'-7 3/16" (2.9 m) wide form liners to almost the full wall height that do not allow for tie penetrations.

EFCO'S ANSWER TO CHALLENGE

In comes EFCO's all-steel **PLATE GIRDER**® system to the rescue. By using EFCO's **PLATE GIRDER** with varying heights, as well as a specially designed tie panel, the contractor was able to span across the form liners and transfer the 9'-7 3/16" (2.9 m) wide x 30' (9 m) tall load to ties installed on the sides of the liner. This site-specific modular design kept the tie spacing to a very specific location that complemented the architectural finish requirement. Straight walls were poured without intersecting integrated walls which meant a shoring solution also had to be provided to support the freshly poured tilted walls.



EFCO is very proud to work with contractors such as North America Construction on unique and challenging projects like the Jericho Reservoir. Dream it, build it, form it! ♦

Tom Ryan Civil Operations Manager
Rob Mayberry Civil Trade Superintendent
David Carr Project Superintendent
Jassen Wutzke Foreman
Jorge Vanegas EFCO Territory Manager
Rob Cottam EFCO Field Supervisor
Christopher Manson EFCO Engineer





CONSTRUCTING WATERTIGHT TANKS

Laja, Biobío Region, Chile

HIGHLIGHTS

CMPC Pulp S.A. is modernizing its Pulp Plant in Laja, located some 317 miles (510 km) south of Santiago, at the confluence of the Biobío and Laja rivers, in the Biobío Region, Chile.

This modernization seeks to improve the environmental management of water treatment and greenhouse gases. The current capacity is 360,000 AD (397,000 ADton) per year and will increase to 500,000 AD (551,150 ADton) per year by completing a series of sub-projects that will be implemented within the "Modernization of Laja Plant, Phase 2." **Echeverría Izquierdo Montajes Industriales** was awarded the project and began with the Effluent Treatment Plant Improvement phase, which will improve the quality of effluents from the Laja Plant with a capacity of 1,440 yd³ (1,100 m³) per day.

EFCO de Chile accepted this challenge and together with Echeverría Izquierdo Montajes Industriales designed and provided the formwork for the following two structures:

SECONDARY CLARIFIER

The Secondary Clarifier is an 263' (80 m) diameter tank measuring 18' (5.4 m) high and includes an inspection trough at the top. To boost productivity, the contractor chose to utilize enough formwork to place the concrete for the entire tank in one pour. EFCO engineered a solution using the **REDI-RADIUS**® system assembled in 10.8 m long gangs. The trough wall was completed with a second pour.

AERATION TANK

The Aeration Tank consists of two concentric tanks with one common core. The exterior tank has a 202' (61.6 m) diameter and 32'-2" (9.8 m) high walls and the interior tank diameter is 100'-5" (30.6 m) with 32'-2" (9.8 m) high walls. In both cases, Echeverría Izquierdo used the same 35'-6" (10.8 m) long EFCO **REDI-RADIUS** gangs used for the Clarifier. This enabled the crew to move and cycle more than 375 ft² (35 m²) of formwork in each cycle. In addition, the interior gangs used **REDI-RADIUS** pour windows easing the pour process by having the ability to monitor the pour rate. Both tanks were connected through a diametrical straight wall that was designed using EFCO's **PLATE GIRDER**® system.

In both structures, the contractor used Rubber Hole Plugs N°6 to waterproof the concrete. Thanks to EFCO's Rugged Tie, the hole plug provides the necessary water tightness required by this kind of hydraulic work. ♦

Gabriel Cea Project Administrator
Cristian Sepúlveda Technical Office
Edisson Jara Job Chief
Ariel Arias Supervisor of Civil Works
Claudio Sánchez EFCO Territory Manager
Cristian Santibáñez .. EFCO Field Supervisor
Conrado Llanza EFCO Engineer



EFCO's REDI-RADIUS® system was assembled and placed in 35'-6" (10.8 m) long gangs.



The Aeration Tank consists of two concentric tanks with one common core.

PHOTO: ECHEVERRÍA IZQUIERDO MONTAJES INDUSTRIALES



TWO ELEVATIONS, TWO SYSTEMS WORKING TOGETHER

Milwaukee, Wisconsin

IN NEED OF SHORING SOLUTION

Zenith Tech, Inc. of Waukesha, Wisconsin is no stranger to EFCO. As a longtime owner of **PLATE GIRDER**® forms and accessories, Zenith Tech relies on EFCO's equipment on civil projects around the Midwest. Typically, **SUPER STUD**®, **E-BEAM**®, **PLATE GIRDER** and support accessories form and support the placement of bridge abutments, pier stems, and caps, but recently the need for shoring had them looking for a new solution. The Kilbourn Avenue exit from Interstate 43 North in downtown Milwaukee included a tunnel in need of repairs. The Wisconsin DOT awarded the project to Zenith Tech and they turned to EFCO to provide the shoring to support the replacement of the tunnel roof.

REMOVAL AND REPLACEMENT OF TUNNEL

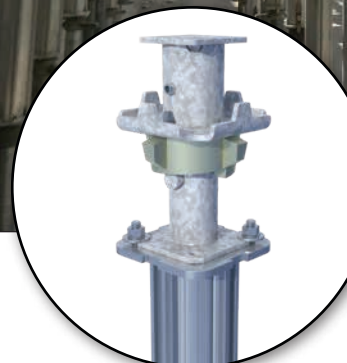
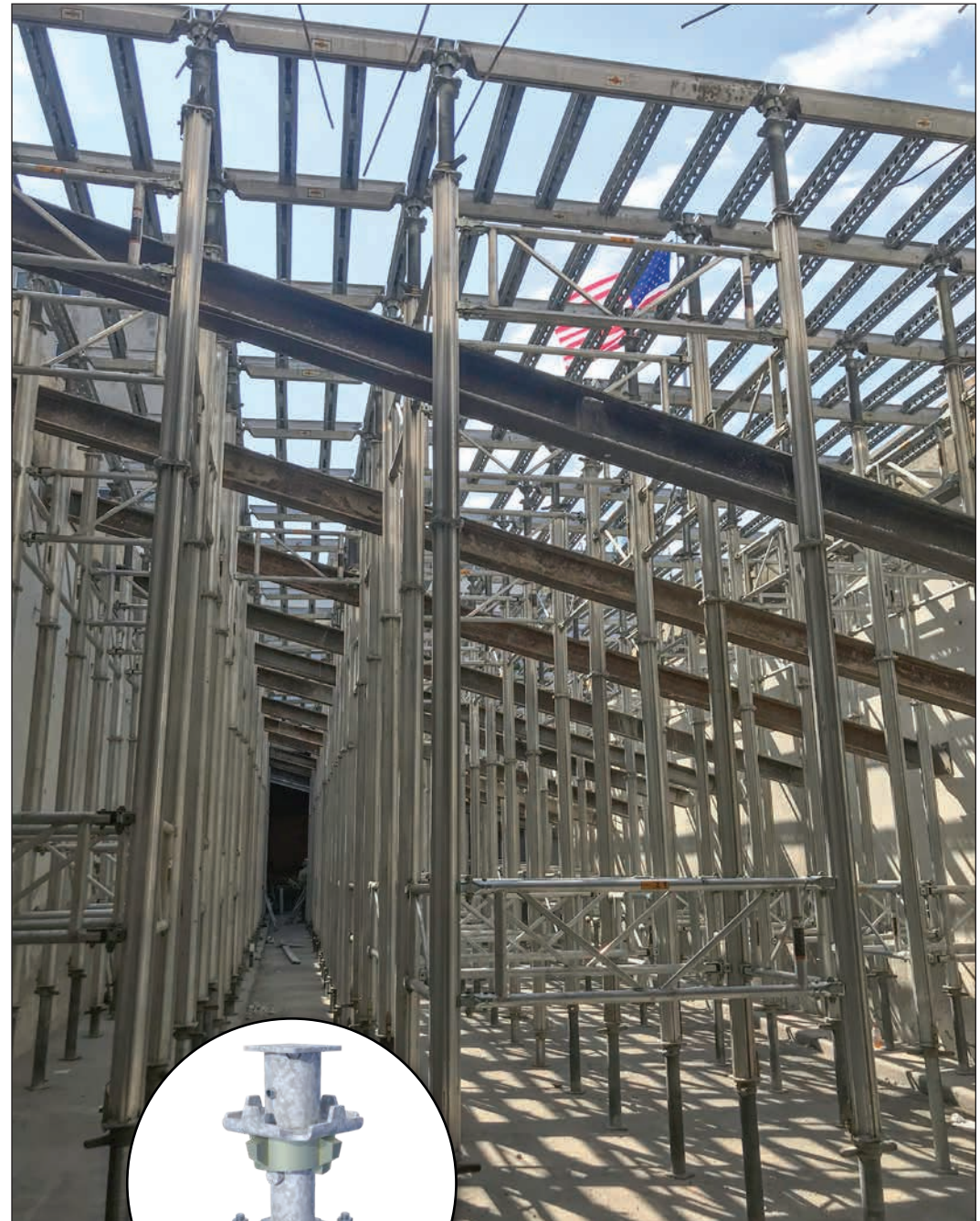
The repair consisted of the removal and replacement of 7,000 ft² (650 m²) of tunnel roof, 16" (400 mm) thick. The slab to be replaced was set 10' (3 m) above the grade below in one area and 20' (6 m) above the roadway in the other. By incorporating **E-Z DECK**® posts, the **EFCO DECK**® Primary and Secondary Beams were the perfect solution for both elevations. EFCO DECK's ability to be efficiently cycled from floor to floor in a highrise application made it the perfect fit for a single slab pour that would be set up, poured and removed around temporary bracing. E-Z DECK posts were added for the 20' (6 m) tall areas with EFCO DECK Dropheads to allow the same, quick-to-install, handset Primary

(stringer) and Secondary (joist) beams to be used everywhere.

QUICK INSTALL

The E-Z DECK bracing panels match the EFCO DECK standard beam sizes; 4', 6', and 8' (1220 mm, 1830 mm, and 2440 mm) long which means E-Z DECK towers can be built matching the required post spacing, enabling EFCO DECK beam layouts to be used when shore heights reach beyond the EFCO DECK post capabilities. This can allow the same horizontal shoring equipment to be used in commercial applications for atypical tall floors 20' to 30' (6 m to 9 m) often seen near the ground level. On this project, the temporary wall braces prevented large E-Z DECK towers from being flown in which meant the shoring would need to be built and disassembled in place. Designed to be handset, EFCO DECK's Primary and Secondary beams reduced labor and equipment needed to install the shoring. A five-man crew easily set up the 7,000 ft² (650 m²) area in a few days. EFCO engineers coordinated with the project team to provide layouts designed to fit between the temporary braces to maximize efficiency. Those familiar with EFCO's super service know they can rely on our solutions to provide the lowest in-place concrete costs! ♦

Mike Gallitz.....Sr. Construction Asset Manager
Alex Genc.....Project Manager
Jeff Steinman.....Construction Manager
Matt Gehrman.....Lead Foreman
Nick OlsonEFCO Territory Manager
Paul HuisingaEFCO Field Supervisor
Zach ScholtenEFCO Engineer



E-Z DECK® posts were added for the 20' (6 m) tall areas with EFCO DECK Dropheads to allow the same, quick-to-install, handset Primary (stringer) and Secondary (joist) beams to be used everywhere.



FORMING PHASE II OF PAULSBORO MARINE TERMINAL

Paulsboro, New Jersey

FEATURES OF TERMINAL

Phase II of the Paulsboro Marine Terminal Project involves the addition of a 550' (168 m) barge berth along with two additional wharf extensions consisting of over 1500' (460 m) of wharf, train rail and vehicle trestles.

EFCO SUPPLIES DECKING AND FORMWORK

EFCO's equipment started to ship to the jobsite in April of 2019. EFCO supplied not only the support decking, but also the **PLATE GIRDER**® side forms for this ongoing project. Due to the Atlantic Sturgeon fish moratorium period on the Delaware River, **Commerce Construction Corp.** had a strict window to drive and fill over 1,500 steel piles before EFCO's equipment could be utilized.

PLATE GIRDER formwork along with **SUPER STUD**® and **E-BEAM**® accessories were provided. The ease of assembly, along with the contractor's experience with EFCO equipment, made for a fluid start and good progression on the project. **PLATE GIRDER** was used to form over fifty-six beams approximately 125' (38 m) in length, including support decking throughout.

RAPID MOVEMENT OF STEEL TO BE EXPECTED

The Paulsboro Marine Terminal was the first major port to be constructed on the Delaware River in more than 50 years. Since Phase I opened in 2017, over four million tons of imported steel slabs have been processed through the terminal. The completion of Phase II is slated for 2021. ♦

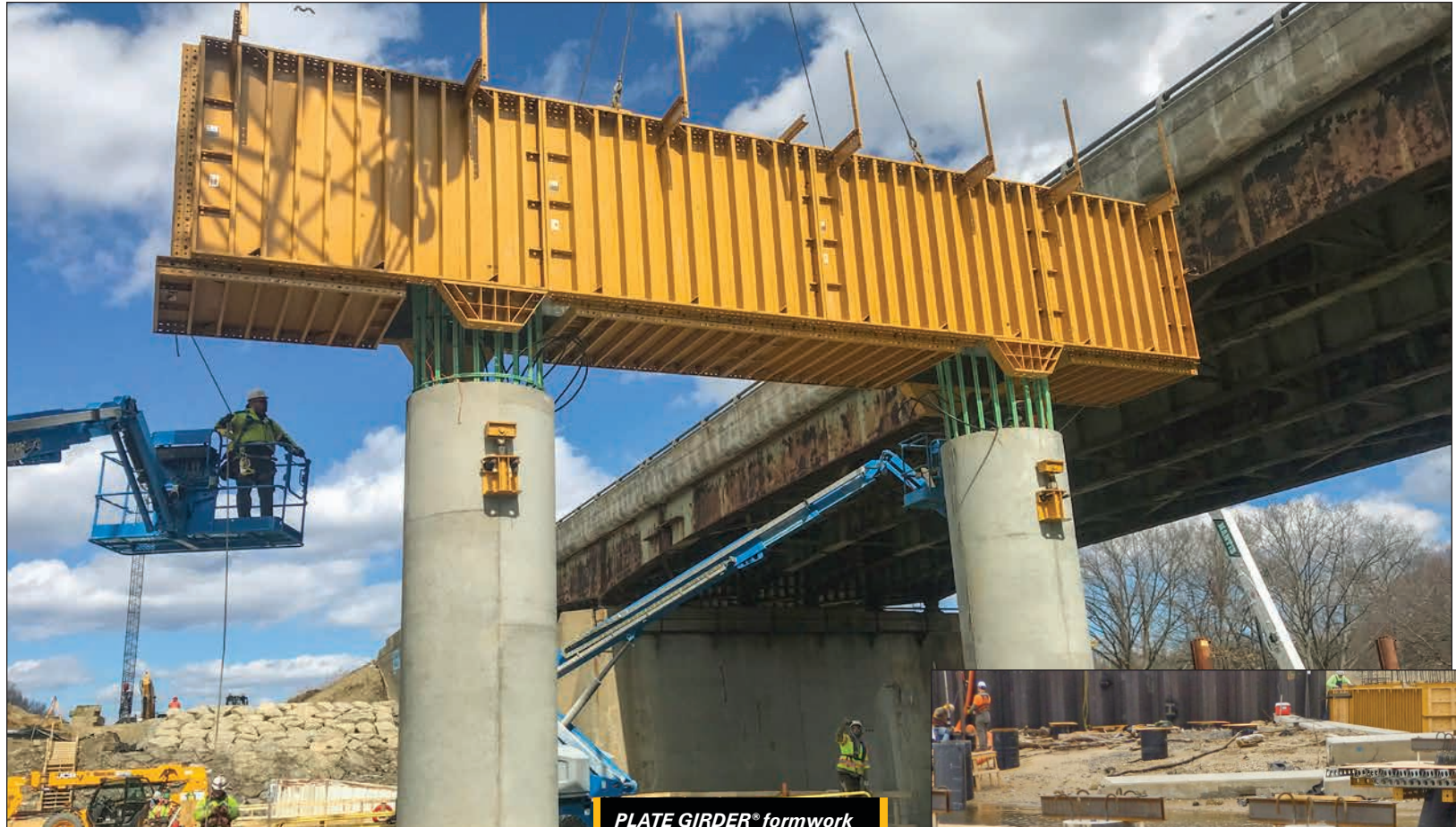


PLATE GIRDER® formwork along with EFCO Support Brackets, **SUPER STUD**® and **E-BEAM**® accessories were used.

Dan Zmijewski.....Project Manager
Scott Zettle.....Project Manager
Mike Iulucci.....Superintendent
Todd Zettle.....Superintendent
Jeff Shannon.....Superintendent
Ruben De Los Santos.....EFCO Territory Manager
Lou Szabo.....EFCO Senior Field Supervisor
Evan Hammer.....EFCO Engineer





FILLING THE NEED FOR MORE SPACE

Luján de Cuyo, Mendoza, Argentina

COMPLEX TO HAVE NEW TYPOLOGY

In 2018, the government of Mendoza City awarded the construction of the prison complex, Almafuerite II, to the companies Jose Cartellone CC and Obras Andinas as a temporary union. This new complex will meet the need to add new prison spaces to the already built Almafuerite I complex, and at the same time, introduce a new typology within the prison architecture in Argentina. The complex will include modules in which the prisoners are separated into more limited groups.

The project has 330,500 ft² (30,700 m²) of covered area with five modules (two low security, two medium security and one high security) distributed in four wings; each wing has 16 cells inside. These five modules have the capacity to house 1,046 prisoners. It also has two multipurpose rooms, a building for educational activities and administrative sectors. The construction schedule was estimated at 24 months with an investment of approximately US\$ 17.6 million (1,240 million Argentine pesos).

RETURN CUSTOMERS

For the construction of Almafuerite II, Jose Cartellone CC—Obras Andinas UT once again chose EFCO as its formwork supplier reaffirming the quality of EFCO products and services.

For this project the contractor used the **HAND-E-FORM**® system. Because of its ease of handling, durability, low

maintenance, and the quality finish it produces, the **HAND-E-FORM** system met the contractor's needs.

For the sections that required greater pour heights, the **HAND-E-FORM** system was used in combination with **SUPER STUDS**® which enabled for large gangs to be assembled at ground level.

The versatility of the **HAND-E-FORM** system was essential when it came to resolving the joints of partitions with different angles and the brackets posed by the project's architecture. ♦

Miguel Medina Superintendent
Enzo Pantano.....Production Manager
Rodrigo Garcia... EFCO Territory Manager
Agustin Saraceno... EFCO Field Supervisor
Gaston CampagnolleEFCO Engineer



*The fast and efficient one-piece EFCO Plate Clamp is used to hold the **HAND-E-FORM**® panels together. It has a dowel pin that goes through the flange hole to align the panels and the jaw rotates down to lock them together.*



THE BEST SOLUTION FOR RADIAL WALLS

Hamilton, Ontario, Canada

PROJECT

The Woodward Avenue Wastewater Treatment Plant Upgrade Project is the largest single capital investment in the history of Hamilton, Ontario. The new pumping station at the plant, upon completion, will have a wet weather capacity of 450 megagallons (1,700 megaliters) per day. The larger, deeper, wet well will provide increased system storage, mitigate flooding, and reduce solids building during dry weather flows.

Known for their quality, efficiency and schedule adherence, **Reimar Forming and Construction** was selected as the forming subcontractor by Maple Ball JV to construct the new pumping station and bypass chamber. Reimar was founded by Mike Martins and Carlos Reis in 2003 and have been a mainstay in key projects throughout the Hamilton and Niagara regions.

REDI-RADIUS IS IDEAL

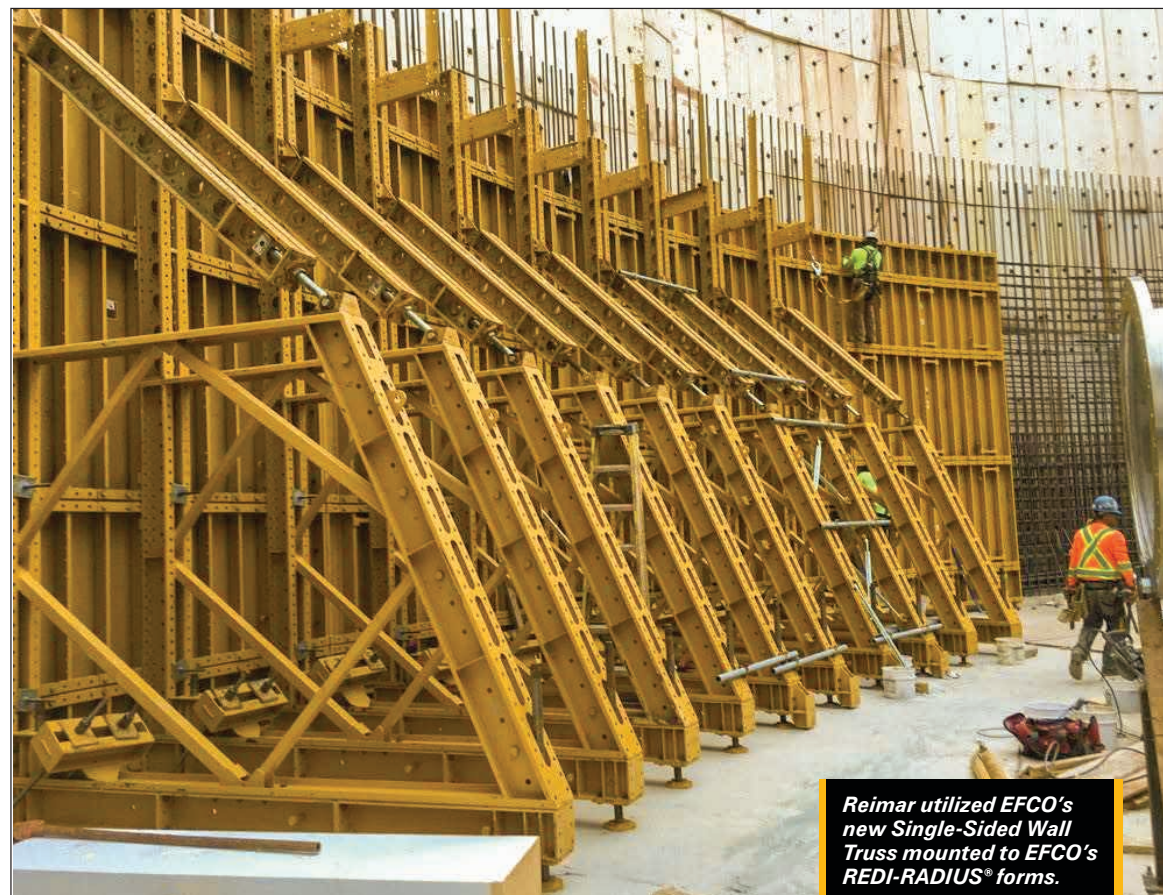
The dry well and wet well in the main pumping station are completely radial and presented many unique forming and access challenges that Reimar teamed with EFCO to solve. As with any major project, the key focus was on how to save on time and labor.

Construction of the dry well consisted of more than 24 radial single-sided wall pours across four lifts. Each lift was formed and poured to a height of 20' (6 m). Reimar utilized EFCO's new **Single-Sided Wall (SSW) Truss** mounted to EFCO's **REDI-RADIUS®** forms. The truss and REDI-RADIUS forms were ganged together to cycle completely assembled in 12' (3.6 m) wide by 20' (6 m) tall sections. Complete pours were stripped and cycled in five picks, keeping crane time to a minimum.

The upper lifts of the dry well also required access for multiple trades. Using EFCO's **E-Z DECK®** shoring system, Reimar was able to provide access for rebar installers and water proofers, as well as structural support for the aerial single-sided wall pours. Once completely erected, these towers stood 60' (18 m) tall and lined almost the entire perimeter of the pump station. To install new lifts, Reimar utilized the top down building method when stacking shoring towers.

WRAP UP

With now four completed projects over the past three years, the EFCO and Reimar partnership continues to be a success in developing formwork solutions. ♦



Reimar utilized EFCO's new Single-Sided Wall Truss mounted to EFCO's REDI-RADIUS® forms.

Mike Martins.....President
Ralph FiliceProject Superintendent
Joanna Couch..... Project Manager
Matthew Turner... EFCO Territory Manager
Richard Wilder EFCO Field Supervisor
Judd Davidson EFCO Engineer



The Woodward Avenue Wastewater Treatment Plant Upgrade Project is the largest single capital investment in the history of Hamilton, Ontario.



FULL POWER AHEAD

Chachoengsao, Thailand

Bang Pakong Power Plant Units 1 and 2, decommissioned in 2018, will be replaced with a more efficient plant to support the growth of the communities it serves.

Bang Pakong Power Plant Replacement Units 1 and 2 are single-shaft combined-cycle plants with a total capacity of 1,350 MW. Comprised of two gas turbines, each has a generating capacity of 442 MW and two steam turbines with the generating capacity of 233 MW each. Natural gas is used as the primary fuel and diesel oil as the secondary. This project is under Power Development Plan 2010: 3rd Revision (PDP 2010) which requires EGAT to construct new combined cycle power plants using natural gas as fuel, in order to cope with the increasing power demand and ensure the stability and reliability of the power generation system.

HAND-E-FORM SYSTEM FOR ROUND TANK

The reservoir is a round tank structure with an interior diameter of 164' (50 m), a height of 29'-3" (8.9 m) and 2'-4" (700 mm) thick walls. The contractor—**Italian-Thai Development, PLC (ITD)**, one of the largest in Thailand, has started to use EFCO's **HAND-E-FORM**® system. The reservoir round tank is located 29'-3" (8.9 m) below the existing ground level and created a few challenges, mainly temporary subgrade bracing and crane access. The **HAND-E-FORM**—a handset system, was accepted as the best solution. The

lightweight panels are easily maneuvered and assembled by one person. Above all, it includes the efficient spreader tie which goes through the concrete. The spreader ties, used along with EFCO's water stop and plastic cone combination, produced watertight walls which was a crucial requirement in this project. Initially, the contractor had concerns regarding the curvature of the wall and the flat panels of **HAND-E-FORM**. Nevertheless, EFCO's engineered solution includes placing flex forms between the flat panels to produce a curved wall. Immediately following the removal of the formwork after the first pour, both the contractor and consultants were fully satisfied with the result.

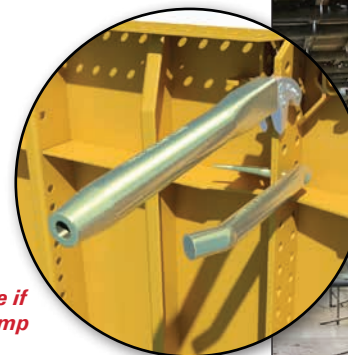
E-Z DECK SHORING SYSTEM

Once EFCO won the confidence of ITD with our capabilities and product—a result of the round tank success, they ordered **E-Z DECK**® shoring to continue with the 47" (1,200 mm) thick INTAKE Slab. EFCO and ITD faced a new set of challenges with narrow areas of shoring space, along with many horizontal steel beams of excavation bracing. However, EFCO overcame these difficulties with various sizes of **E-Z DECK** panels and **E-Z DECK** Posts. Each post leg has the maximum load capacity of 28 kip (124.5 kN), significantly reducing the number of post legs needed when compared to traditional shoring solutions. Additionally, a significant vertical distance between **E-Z DECK** panels and its adjustable position enable it to avoid steel bracing at the jobsite.

► 62



The lightweight HAND-E-FORM panels are easily maneuvered and assembled by one person.



When slipped over the handle of a Plate Clamp, the Pin and Plate Clamp tool can provide more leverage if needed to quickly clamp panels together.

The EFCO Drift Pin is designed for easy alignment of EFCO HAND-E-FORM panels. After the holes in the panels have been aligned, the EFCO Plate Clamp, with its tapered pin and clamping jaws, can be inserted into the appropriate flange hole location and clamped together for a tight fit.





HANDSET E-Z DECK HIGH SHORING, HOW?

Crane access was still a challenge in some areas for assembling the E-Z DECK® shoring. The solution was assembling it in place using the handset method. Since EFCO's E-Z Post and E-Z Panel are lightweight, and the panels easily clamp to the posts with the tap of a hammer, the crew was able to carry equipment piece by piece to assemble from the bottom level. The crew then continued to connect E-Z Posts and E-Z Panels together for each additional layer until they reached the required shoring height. And finally, the **Z-BEAM®** and **E-BEAM®** were placed from the ground level.

A COMBINATION OF PRODUCTS

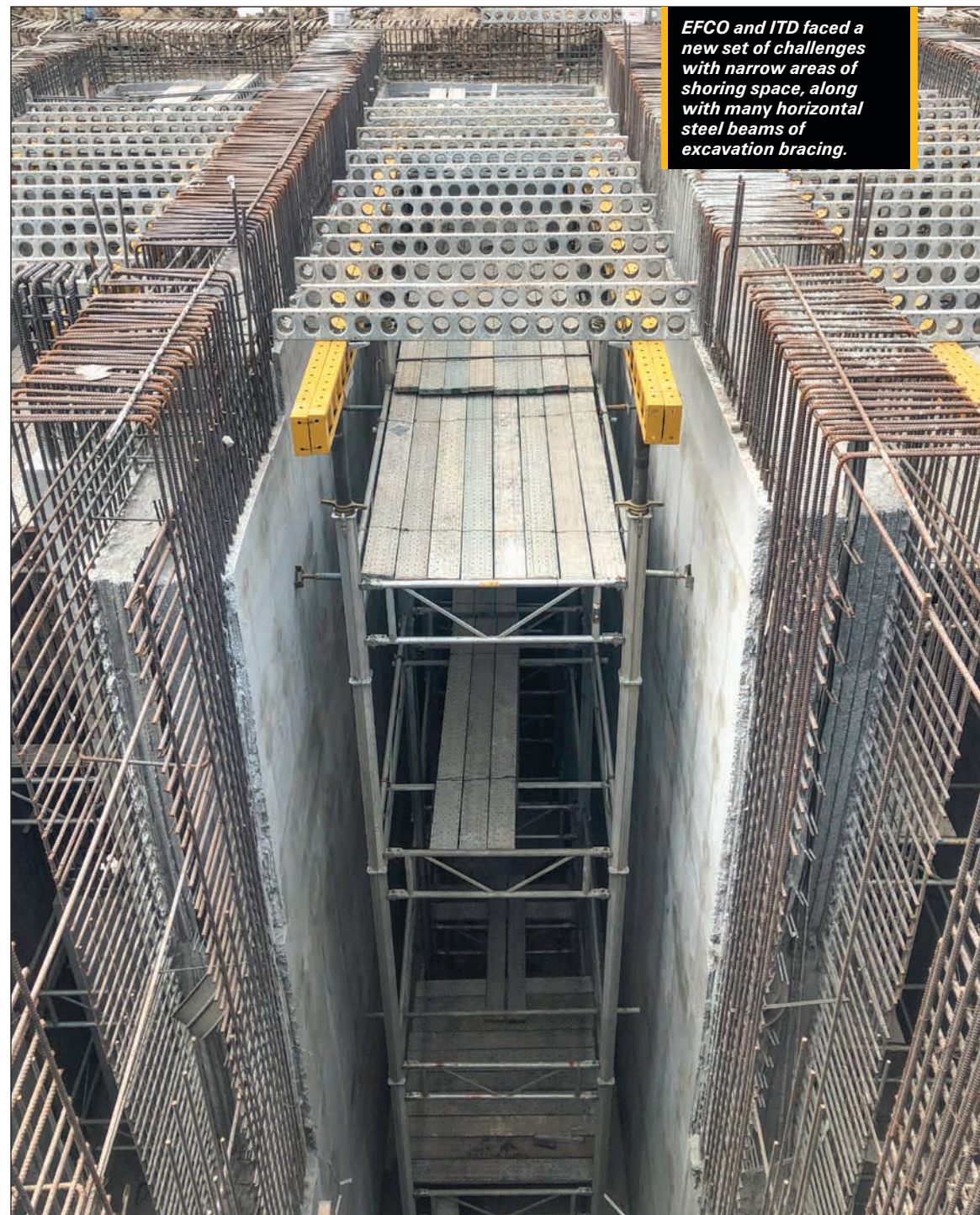
A combination of EFCO forming and shoring products provided versatility to meet every requirement. Because of the significant cost savings from not having to purchase plywood, ITD decided to continue using EFCO's HAND-E-FORM® system. The EFCO engineered design included putting HAND-E-FORM on top of E-Z DECK shoring. The success of EFCO forming and shoring equipment during this phase of the project earned EFCO additional contracts for the remaining structures required for the project. A summarization of the project is as follows:

- Reservoir round tank: 16'-4" (Dia) x 29'-3" (H) x 2'-4" (Thick) [50.0 m (Dia) x 8.9 m (H) x 700 mm (Thick)], Combination HAND-E-FORM & E-Z DECK
- Approach Wall: 118'-2" (L) x 20'-9" (H) x 2' (Thick) [36.0 m (L) x 6.3 m (H) x 600 mm. (Thick)], Combination HAND-E-FORM & E-Z DECK
- Bund wall: 836'-8" (L) x 10' (H) x 1' (Thick) [255 m (L) x 3.0 m (H) x 300 mm (Thick)], HAND-E-FORM
- Intake Wall: 249'-5" (L) x 32'-8" (H) x 2'-8" (Thick) [76 m (L) x 9.95 m (H) x 800 mm (Thick)], Combination HAND-E-FORM & E-Z DECK

- Internal Wall: 269'-5" (L) x 32'-8" (H) x 2'-8" (Thick) [82.1 m (L) x 9.95 m (H) x 800 mm (Thick)], Combination HAND-E-FORM & E-Z DECK
- Cooling tower slab: Shoring height 22'-8" (6.9 m) and slab thickness 3'-3" (1.0 m), E-Z DECK shoring system

This project was completed in 50-60 days using 15-20 workers per structure, which translated into a savings of 25% of their budget, which was a clear winner for ITD. ◇

Akrapong VasuvantagaPresident
Alongkot Kotchasarn Project Manager
Thawatchai Ruma.....Formwork Engineer
Veerayut PonsetmatargulEFCO Territory
Manager
Rakchat Nimpila EFCO Field Supervisor
Paphakorn Tawatpeerachai.. EFCO Engineer



EFCO and ITD faced a new set of challenges with narrow areas of shoring space, along with many horizontal steel beams of excavation bracing.



BIGGER SHIPS, BETTER ACCESS NEEDED

Fort Lauderdale, Florida

CRITICAL IN FLORIDA

Ships are getting bigger, as they need to carry more cargo in less time. This is critical in Florida, where so many people (consumers) are now living in what is to become the third highest populated state in the United States. To meet these demands, port infrastructure improvements are aimed to expand accessibility and parking facilities. The improvements include new parking garages with ingress and egress flyover ramps. Hitting deadlines on the project schedule is essential, as cruises still regularly take place during this time.

ENGINEERED SOLUTION

Interstate Construction, LLC was awarded the two flyover ramps in 2019. The construction of these two ramps include a total of 15 foundations, columns and caps of varying sizes. All substructure elements will be sequentially cast in place and both ramps worked on simultaneously. Interstate Construction decided to partner with EFCO for their technical expertise, equipment and product solutions utilizing the EFCO **PLATE GIRDER**.[®] EFCO has provided its engineering services by analyzing the project schedule, along with the varying types of structures required for both ramps to facilitate formwork assembly, setting, stripping and cycling. This played an important role as cap forms were designed to handle changing slopes and sizes. EFCO formwork has provided safe and versatile solutions needed to

promptly complete the construction of these ramps. The self-spanning EFCO **PLATE GIRDER** system was chosen as the best solution to handle all project forming requirements and specifications. ♦



The EFCO systems enabled Interstate Construction to cycle the equipment with minimal rework.



Because every customer and project is special at EFCO[®], we engineer the best forming solution for you.

“

Interstate Construction, LLC. has undertaken this venture in an unfamiliar setting thanks to the quality of the products and services provided by EFCO.

*Ervin Margolles
Project Manager*

”

Gustavo Graupera.....General Manager
Ervin Margolles..... Project Manager
Bacilio Holguin General Superintendent
Johannes Rodriguez Superintendent
Jay Yi.....Project Engineer
Omar Abreu.....EFCO Territory Manager
Frank Bonventre EFCO Field Supervisor
Aaron Tang..... EFCO Engineer



GETTING THE LOWEST IN-PLACE CONCRETE COST

Atlanta, Georgia

NEW PARKING GARAGE

The Centers for Disease Control and Prevention (CDC) has been the focus of many news reports since the COVID-19 pandemic has recently captured the world's attention.

Even prior to this, the CDC has experienced sustained growth at its main complex in Atlanta, Georgia. As a result, an additional parking garage was required on the campus. This eight-story garage with a solar panel array on the roof is being built by **Fly and Form Structures** using the EFCO **Cunningham Parking Garage system**.

BENEFITS REALIZED

The EFCO Cunningham Parking Garage system had been used by Fly and Form with great success on previous projects and was again discussed as the most viable solution for this project. Benefits to using the system:

- The reduced labor requirement to build up the beams and deck panels was a plus in the tight labor market found in Atlanta.
- The all-steel, three-piece beams with welded in-place chamfer are easily assembled to accommodate a variety of depths and widths. With all-steel formwork, very little wood is needed, reducing the amount that will need to be disposed.
- Beams up to 60' (18.3 m) long can be cycled by crane or rolled up the ramp as required.
- EFCO's steel faced formwork provides a high-quality concrete surface from start to finish, whereas wood faced forms exhibit wear after several cycles. Finishing costs are also greatly reduced when all-steel formwork is used.

The project site was tightly bound by existing building and roadways, allowing no room for assembly of beams and panels on site. To accommodate the needs of Fly and Form and the site conditions, EFCO arranged to have Fly and Form crews pre-build the deck panels and the beam tubs at the EFCO Atlanta warehouse site. An area was reserved alongside the building for staging the equipment. From there it was delivered to the site on trucks supplied by Fly and Form on a scheduled, as-needed basis.

The unusually heavy rains in Atlanta caused changes and delays in how the site preparation could progress which affected the construction schedule and cycle. The ability to make quick adjustments to the Cunningham Parking Garage system enabled for such changes to easily happen.

Fly and Form and EFCO will continue to partner on projects, providing the best value and lowest in-place concrete cost. ♦



The all-steel, three-piece beams with welded in-place chamfer are easily assembled to accommodate a variety of depths and widths.

Mark Hicks..... Project Manager
Mikey Edwards Asst. Project Manager
Matt Seabury EFCO Territory Manager
Jim Ostrander..... EFCO Field Supervisor
Eric Maciaszek..... EFCO Engineer



The reduced labor requirement to build up the beams and deck panels was a plus in the tight labor market found in Atlanta.

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