



From the beginning of your projects



FORMING & SHORING

# FORMING & SHORING





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Any safety provisions as directed by the appropriate governing agencies must be observed when using our products.

The pictures in this documents are illustrative only. They should not be deemed as definitive.

All the instructions regarding safety and operations contained in this document must be followed along with other preventive measures including local legislation, codes and risk assessment that may be applicable to the project. Any changes or special assembly will require a calculation or special solution.

Our equipment is designed to work with accessories and parts made by our company only. Combining such equipment with other systems is not only dangerous but also voids any or all our warranties.

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# 01.

## BUSINESS



Editorial | Who we are, what we do | Products, services, and solutions | Close to our US customers | Our logistics centers, the best service







# EDITORIAL

AITOR FABIAN

ULMA has over 55 years of experience in the concrete forming and shoring industry, offering quality products, exceptional engineering solutions, sales and logistic support in the concrete industry.



Aitor Fabian  
CEO

Our strong core values of personal development, commitment, flexibility, customer focus, creativity, and innovation help us form enduring relationships with our customers.

Although we live in a globalized world, experience has shown us that each market and each country has its own particular construction methods and work practices. Familiarity with this reality has enable us to offer specific solutions designed to provide our local customers with the greatest efficiency and profit possible.

Regardless of the size and complex nature of the project we deliver safe and efficient solutions. Once engaged, we are committed to the success of the project. Our unique jobsite management philosophy allows us to integrate the customer's voice at every stage, helping ensure satisfaction and a profitable experience.

# WHO WE ARE, WHAT WE DO

We are a leading manufacturer and supplier of **formwork, climbing and shoring solutions** - for sale and rental - in residential and non-residential construction, civil engineering and restoration.

## // GROWING DAY BY DAY, TAILORED SOLUTIONS TO CLIENTS SPREAD ACROSS THE GLOBE



## // ULMA'S OBJECTIVES:

- Excellence in customer service
- Establish long lasting relationships by offering support and value
- Provide our customers with efficient and quality products from our full portfolio
- Provide service second to none with our unprecedented processes for engineering, logistics and administration offering efficiency from proposal to return
- Development of strong, long lasting business relationships by offering support and value

**More than 55 years in business as a global company** have enabled us to accumulate knowledge and experience. ULMA operates on a base of **know-how** that allows us to offer our customers the best service. We deliver high added value to each project with effective cutting-edge solutions and products such as: Wall and Column Formwork, Climbing Formwork, Civil Engineering Systems, Shoring Systems and Safety Systems.







# PRODUCTS, SERVICES, AND SOLUTIONS

The projects may be complex, but the solutions should be simple and efficient. To achieve this goal, we rely on our wide-ranging experience and close collaboration with our customers to design, fabricate, and supply our products.



# CLOSE TO OUR US CUSTOMERS SINCE 1998

Since 1998 ULMA Form Works, Inc. offers innovative concrete forming and shoring products for the US market.



We make the greatest effort to design and develop products and solutions to satisfy any demand. This effort in research provides a **cutting-edge technology with top-quality products and services**. Standardizing solutions and reusing products for different applications speeds project completion in an effective and efficient way:

- Building construction: Multi-family, office and commercial, hotels, cultural and religious...
- High-rise buildings - Skyscrapers
- Industrial and energy construction
- Bridges and tunnels
- Water and sewage treatment plants

The versatility of our products provides maximum safety, quality and cost-effectiveness for our customer's projects.



Over the past half-century, we have worked on thousands of projects throughout the world. Extensive experience and innovative technology allow our US team to offer solutions specially formulated each area of the United States. ULMA's US management team is keenly aware of the needs of the construction industry and how to support its customers in the success of their projects.

We engage all the resources at our disposal, our people, systems, processes, comprehensive solutions, to ensure a successful outcome for our client.

We are dedicated to providing each client with a company-wide commitment to all phases of their project, from the initial conversation through project completion; from the sales force to the engineers and to the on-site field supervisors. ULMA is close to the customer from the beginning.





# OUR LOGISTICS CENTERS ARE FUNDAMENTAL IN PROVIDING THE BEST SERVICE

The range and extent of the comprehensive services that we are able to offer is founded largely on the strength of our material supply capacities.



With large and small projects ULMA shows its response capacity with regard to logistics, available material stock and resourceful, responsive and highly skilled technical assistance. Relying on more than 5 strategically distributed logistics centers in the US, we provide construction solutions and material within the timelines required, wherever needed.

Our experienced logistics team knows exactly what our clients need, and is capable of meeting even the most challenging demands, for turnaround times.

Depending on the requirements of the project, ULMA provides pre-assembled equipment in accordance with ULMA operations planning and execution deadlines. Proven logistics capabilities enable ULMA to respond to any unforeseen circumstances that may arise during project execution. ULMA's logistics service ensures the delivery of properly palletized goods, including user guides for each product.





# 02.

PROJECTS





## HUDSON YARDS, MANHATTAN, NY

Known as "Tower C", the first Hudson Yards tower rises 890 feet and includes 47 floors and 1.7 million square feet of space. There are several different floor configurations at each level and the tower has the visual appearance of leaning toward the city.



### ULMA SOLUTIONS

The first six floors of the building have significant heights between slabs. A temporary supplement to the **ATR self-climbing structure** (pre-assembled in ULMA's New Jersey warehouse), actually to the support structure, enabled the execution of tiers up to 26 feet in height. The arrangement of two anchors in the wall eased the climbing with only two movements of the system.

The **MEGAFORM crane-set formwork**, was easily removed from the MK structure for further use on the typical floors of the building.

The high efficiency of work processes and the structure itself enabled cycles of 5 days per pour of 13.5 feet.

Since the customer required the complete slab to be built together with the core at the same level and outside and inside at once, open spaces without platforms at each hollow were designed to give room for the brackets and the mast to raise after the slab had been built. This required four different and asymmetric structures with the resulting difficulty for a homogeneous load transfer and bracing.

On the structure itself a flat platform for work and material storage was installed. The perimeter in cantilever served as working area while the central area was used for equipment: formwork, steel reinforcement, etc. This setup eased and simplified crane access to this area at all times.

This project has once more proven the successful international positioning of ULMA in the sector of high-rise buildings, as well as setting another example of ULMA's capability to provide the North American market with the most innovative products and solutions.



## PROVOST SQUARE, JERSEY CITY, NJ

The 38 story Building, part of the Provost Square development, was designed to include 417 residences and a 52,500 square feet designated for commercial use, along with a 37-space parking garage.



### ULMA SOLUTIONS

In order to ensure a safe working area, the building perimeter was covered with **self-climbing HWS Protection** with 42.5 feet in height and 11 feet 10 inches wide. The system is made of panels that envelop the floors under construction and three stories below.

The system is equipped with a hydraulic system used for raising the assembly as construction proceeds upward, thereby not requiring precious crane time.

The panels were covered with reinforced netting to prevent material and workers from falling. Also, the system protects the slabs under construction from wind and inclement weather and allows the entry of natural light.

To minimize assembly work on-site, the panels were pre-assembled in the ULMA facility in New Jersey. They were designed so as to be of optimal size for transport while being wide enough to offer an efficient building solution.

The vertical structures, such as the core for stairwells and lift shafts, were built with the **lightweight formwork MEGALITE**, operable without crane assistance.





# ATLANTIC STATION, STAMFORD, CT

Atlantic Station is a mixed-use development which converted the historic U.S. Post Office on Atlantic Street in Stamford, CT into a retail center with two high-rise apartment complexes. The “north tower” comprises 29 floors, and the “south tower” 21 floors, housing a total of 650 residential units and parking for more than 800 cars.



## ULMA SOLUTIONS

The first floor of the 29-story tower, with some irregular layouts, demanded a simple and easy to assemble system adaptable to any special geometry. **ENKOFLEX slab formwork** was the best solution to solve all the customer requirements.

For floors 2 through 29 and for the parking garage, 57,000 square feet of the **FORMADECK Drop Head Shoring system** was used. The 8' X 8' grid pattern and fewer components maximize labor productivity and reduce formwork cycle time.

**ALUPROP aluminum post shores** were used to support the slab formwork and for re-shoring.

Other ULMA systems used on this project include **MEGALITE, a handset panel modular wall and column formwork** system, and **KSP platform** system used for formwork support in elevator and staircase shafts, hollow piers or other types of cavities where formwork support was necessary.



# 61 NINTH AVE., MANHATTAN, NY

61 Ninth Avenue will sit in a growing area for high tech firms adjacent to Apple's Store on Ninth Avenue and West 15th Street and across the street from the Chelsea Market and Google's NY headquarters. The 61 Ninth Avenue building rises 10 stories ranging from 9,000 to 20,000 square feet, with floor heights ranging from 13 to 17 feet.



## ULMA SOLUTIONS

For the slab construction and support, ULMA proposed the use of the **CC-4 panel shoring system**, ideal for large slabs in building construction, with regular geometry and spans between columns. The contractor also chose ULMA's CC-4 for the system's ability to be installed entirely from the ground promoting safety and improved productivity.

Other ULMA systems used on this project included, the **MEGALITE handset forming system** to most efficiently form the shear walls and columns and **ALUPROP aluminum post** to support the CC-4 panel system and for re-shore of the slab.

ULMA worked closely with the contractor to provide all engineering, logistics and field support services required to keep this project on track. CC-4 was a great choice for shoring the slabs as the project had highly restricted construction and equipment storage area and the CC-4 system is installed first as the main grid and the lightweight panels slide into place from the floor below; reducing the amount of material needed onsite.





# MARYLAND CORRECTIONAL INSTITUTION, HAGERSTOWN, MD

Carl Belt was contracted to provide the construction of a major upgrade to the existing wastewater treatment plant at the facility and partnered with ULMA to provide the required formwork materials. Structures included in the upgrade were a RAS Pumping Station, two Secondary Clarifiers, and a new Filtration Building.



## ULMA SOLUTIONS

ULMA provided 3,100 square feet of **MEGALITE handset forming system** to form the complex concrete walls of the RAS Pumping Station. This structure consisted of 16" thick walls that ranged from 19'6" to 21'6" in height and included numerous interior walls.

ULMA designed the formwork to be used in multiple pours in order to ease stripping procedures. This layout also provided greater reuse of the forming materials and reduced rental costs. She-bolts with inner tie rods and neoprene washers were provided to create watertight seals.

The **MEGAFORM gang forming system** was provided to form the new Filtration Building. The Filtration Building contained numerous horizontal construction joints and intersecting walls which in turn created multiple lifts, form heights, and pour sequences. ULMA provided 2,600 square feet of MEGAFORM for the lower walls and an additional 1,700 square feet for the upper walls and "Y"-walls which ranged in height from 4' to 24'. ULMA also provided **MEGAFRAME 20K shoring system** to support the haunches of the "Y"-walls.

The two Secondary Clarifiers were completed with **BIRA circular steel forming system**. Each clarifier measures 40 feet in diameter with walls 16 inches thick and a wall height of 16 feet. 1,800 square feet of formwork was used to build the clarifiers.



ULMA designed the formwork to pour each clarifier as one continuous pour. BIRA was complemented on the clarifiers with MEGAFORM to include the effluent boxes monolithic with the clarifier walls.

# 26 ANN STREET, MANHATTAN, NY

26 Ann Street is located across from the Fulton Center, a short walk from the World Trade Center, and is one of four large residential and commercial development initiatives underway along Fulton Street. 26 Ann Street consists of a 298 room hotel beginning on the 5<sup>th</sup> floor; the lower levels include retail space, a restaurant and all the latest amenities needed for hotel guests. 26 Ann Street will rise 364 feet and contain over 128,000 SQF.



## ULMA SOLUTIONS

The customer, selected ULMA's **CC-4 Drop head panelized shoring system** to erect all elevated concrete slabs.

The CC-4 Panel is the ideal system for construction of flat slabs with regular geometry. CC-4 improves worker productivity and promotes safety on-site, as the entire system can be installed from the ground. Another great feature of the CC-4 panel system is the reduction of plywood required on-site as it is incorporated into the panel, a great feature for construction areas where space is limited.

ULMA's complete solution package included **ALUPROP aluminum post shores** to support four working levels of the CC-4 panel system and concrete deck. ALUPROPs were also used to shore the first 3 levels as they provided the client with a wide range of shoring heights. For the re-shoring of the concrete slabs, EP Props were chosen to shore the four levels below the CC-4 panel system. ULMA's **MEGALITE, lightweight formwork panels** were used to form, columns, walls, pilasters, elevator core and foundation walls.





# EMPIRE OUTLETS, STATEN ISLAND, NY

The first major shopping outlet in New York City, located on Staten Island features nearly 100 stores and a boutique hotel.



## ULMA SOLUTIONS

ULMA proposed the use of **MEGAFRAME a 10,000 pound per leg galvanized steel frame** handset shoring system, designed to work most efficiently on a great variety of construction geometries.

ULMA supplied approximately 100,000 square feet of shoring equipment for the construction of the retail, hotel and parking garage with the MEGAFRAME system. Other ULMA systems used on this project include **MEGALITE, a handset panel modular wall and column formwork**, and **ENKOFLEX, a versatile wood beam formwork** system adaptable to any slab configuration/geometry combined with **ALUPROP, a light, heavy-duty aluminum post shore**.

All material supplied for elevated slabs was used as intended to achieve high productivity and ensure that the project was completed according to the owner and contractor's established project schedule. Ever changing job site conditions required ULMA to modify material requirements which required constant and precise coordination between the contractor and ULMA's engineering and logistics departments.



# MISSION HOSPITAL, ASHEVILLE, NC

The Mission Hospital Health System, based in Asheville, NC is ranked nationally as one of the nation's top 15 Health Systems. The Mission Hospital is North Carolina's sixth largest hospital and the only non-profit hospital located in western North Carolina. The new 12 story, 600,000 square foot building includes the Advanced Medicine Center.



## ULMA SOLUTIONS

Project demands and deadlines were a key issue for the client. To meet the client's demands ULMA project managers and engineers developed a large "flying" table that could be moved and cycled through the job site to reduce labor time while improving productivity for the customer.

The **Mega VR table flying form table** measured 15 feet by 38 feet and is based on ULMA's versatile **MK system**. The Mega VR tables increase job site productivity as tables could be quickly moved into position in preparation for pouring concrete. They are easily stripped in preparation for the next shoring phase of the project thus reducing crane time needed. This was the ideal solution for this project.

The Mega VR tables were assembled on site. Ease of use, increased site productivity, quick cycling of equipment and direct onsite service were the key to this project success.





# TANGRAM PLAZA, QUEENS, NY

Tangram Plaza consists of a 1.2 million square feet of multi-phase, mixed-use development in the heart of Flushing, Queens. The massive project encompasses an underground 1,200 space parking garage, two 220-unit residential towers, a 350,000 square feet tower with Class A office, retail space, and a 240-key hotel. This project also includes 275,000 square feet of retail with shops, a movie theater, food hall, restaurants and family-oriented entertainment options.



## ULMA SOLUTIONS

ULMA is part of this mega-project supplying complete project solutions for concrete forming.

The client chose **MEGALITE, a handset panel system** for wall and column formwork; **MEGAFRAME 10,000 pound per leg frame shoring system** (used to support shoring heights of 30, 40 and 50 feet high) and the CC-4 Drop head panelized shoring system to erect all elevated concrete slabs.

**CC-4 is a panelized drop head shoring system** ideal for large slabs with regular geometry and spans between columns; a perfect match for this mega project.

Over 25,000 square feet of CC-4 panels are being used to form the main towers, underground garage and retail spacing, meeting all the safety and high productivity customer requirements.



# LIGHTHOUSE POINT, STATEN ISLAND, NY

The Lighthouse Point project in Staten Island is a new mixed-use development adjacent to the St. George Ferry Terminal, the New York Wheel and Empire Outlets. The project includes 62,000 square feet of retail, 115 residential units, 175 hotel rooms and a 125,000 square feet sub-grade parking garage. Lighthouse Point offers great views of the New York harbor and lower Manhattan.



## ULMA SOLUTIONS

For the 12 feet and 24 feet high foundation walls, ULMA offered two different wall forming solutions. For the single-sided walls, the **EUC (A-Frames) system** in combination with **MEGAFORM crane-set panels** was used. The EUC system (A-Frames) is a single-sided formwork designed for walls between 12' to 30' high. Single-sided formwork is designed for walls where it is not possible to place the formwork panels face to face and it is only possible to place panels on one side of the wall.

Due to the wall being supported on only one side the panels are reinforced by frames that are designed to withstand the horizontal loads due to concrete pressure.

EUC is based on a simple modular system composed of welded truss frames and is able to support pressures ranging from 600 psf. to 1000 psf. (depending on height and anchor selection).

For other one-sided wall application, the **UCAB mini A-Frames** and **MEGALITE handset forming** combination were used. The UCAB is a single-sided formwork based on steel frames and is used for walls up to 10 feet high. To provide and promote worker's safety around the foundation work, **Perimeter Working Platform** and **Wall Formwork Safety Platforms** were also used. For the garage slab, 18,000 square feet of **ENKOFLEX H20 wood beam shoring system** with aluminum stringer was chosen.





# HARBORSIDE TOWER, JERSEY CITY, NJ

A series of buildings are being constructed along the banks of the Hudson River with spectacular views of Manhattan. The Harborside Tower was designed with 69 stories, 763 residences, at a total height of 702 feet.



## ULMA SOLUTIONS

The Harborside tower perimeter was protected with **HWS “Hydraulic Windscreen System”**, a safety system based on ULMA’s **MK system** composed of straight lightweight panels. Movement on the job site was streamlined and the workers and equipment were protected from falls and against inclement weather.

The panels are made up of **H-20 wood beams** and reinforced netting. This gave the protection system an aesthetic finish with minimal weight and minimal stress on the anchors to the building.

Although the geometry of the building is irregular, with stories staggered every 8 to 10 levels, the protection provided by HWS was completely seamless, preventing the fall of even the smallest of debris or other objects. To achieve this tight seal necessary for this complex project, strips of rubber were used around panel perimeters and between the panels and slabs.

Small windows were left open in the enclosure to take topographical references from points outside the building, such as from the surrounding towers, to aid in construction.



# PARAMOUNT MIAMI WORLDCENTER, MIAMI, FL

The Paramount Miami Worldcenter project is a mixed-use complex with over 30 acres that includes a 58 story mixed-use tower. The Paramount tower consists of 513 luxury residential units rising over 700 feet above the city with over 750,000 square feet of retail space in downtown Miami. Located north of the Central Business District and at the epicenter of Miami’s downtown, Paramount Miami Worldcenter is the second largest urban development in the U.S.



## ULMA SOLUTIONS

Due to the high and variable shoring heights, ULMA proposed **ALUPROP shoring towers** as a solution to support the **ENKOFLEX shoring system**. This solution proved to be ideal for its high-load bearing capacity, and easy height adjustment.

ALUPROP towers provided the means to support the concrete slabs ranging between 19 to 32 feet in height, in combination with the ENKOFLEX H20 wood beam shoring system that provided the decking layer (stringers and H20 beams) for the intricate shoring layout.

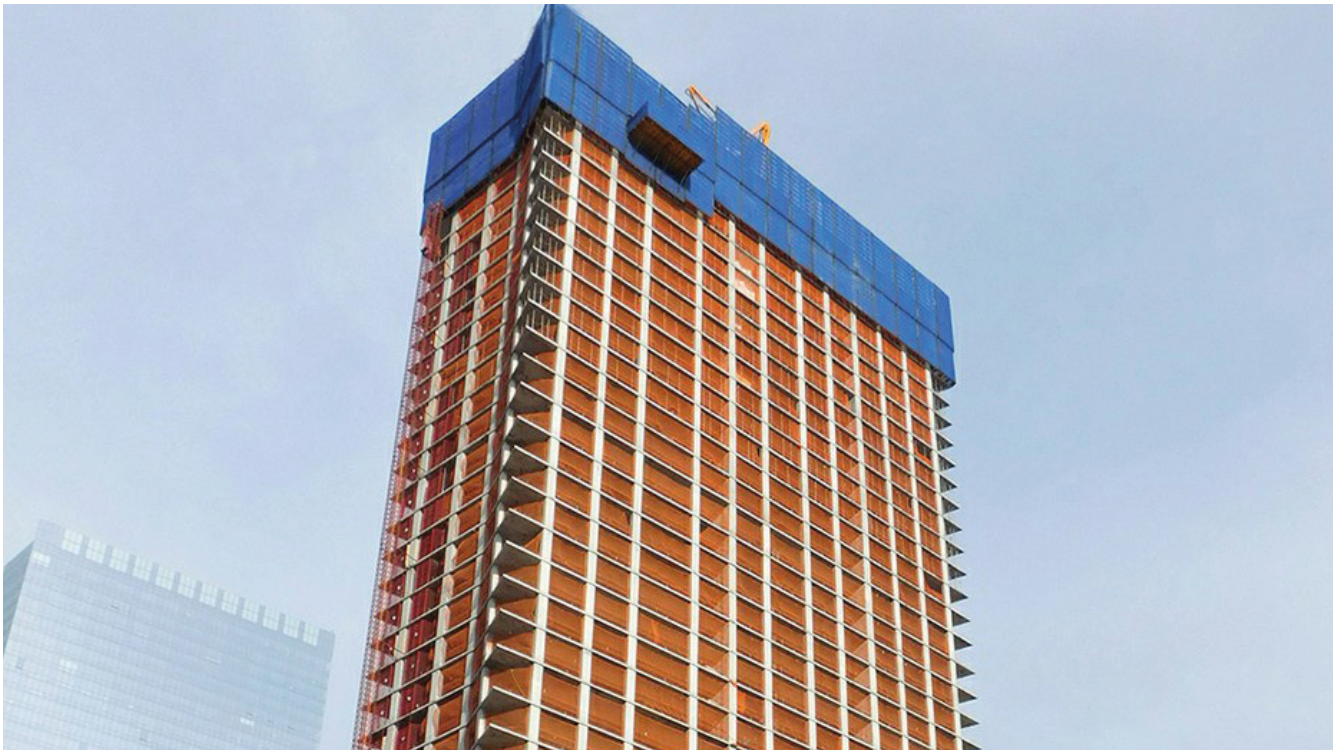
A few simple components permitted the contractor to quickly assemble ALUPROP towers on the ground and were easily lifted into position by crane.





# THE MODERN II, FORT LEE, NJ

As the centerpiece of the enhanced downtown district in Fort Lee, The Modern is comprised of two identical 47 stories 498 foot glass clad towers (The Modern and The Modern II), each containing 450 luxury rental residences and offering breathtaking views of the George Washington Bridge, Manhattan and the Hudson River.



## ULMA SOLUTIONS

The construction of mid and high-rise buildings require great focus on perimeter safety and protection for both, the workers and public.

ULMA proposed the use of the **HWS Perimeter Screens**; a safety system for the perimeter of mid-rise and high-rise buildings. It covers the floor under construction and the floors immediately below preventing workers, material, and equipment from falling off working areas as well as providing some protection from adverse weather conditions.

Another ULMA system used on this project included **MEGAFRAME**, a **10,000 pound per leg galvanized steel frame handset shoring system** used for the 20 foot high lobby level.



# SOUTH BEACH PSYCHIATRIC CENTER, STATEN ISLAND, NY

The new 232,000 square foot five story building will replace the South Beach Psychiatric Center's 47 year old building that was flooded during superstorm Sandy in 2012.



## ULMA SOLUTIONS

The building is a steel frame structure, apart from the building's foundation and cores which are being poured with concrete using **MEGAFORM forming system**.

The building consists of two types of cores, a standard rectangle and a 5 sided polygon. The walls of the cores are 12" thick. The **BMK climbing system**, in conjunction with the **KSP flipper platform** in the center of the core are being used for added walkway safety and easy form stripping.

The irregular and different sized cores created the need for multiple KSP platforms. Due to KSP's versatility, using MK walers, the KSP flipper platforms could be modified on the jobsite to fit into multiple core shapes and sizes quickly and efficiently.





## ASCENT MIDTOWN, ATLANTA, GA

Atlanta's Midtown landscape is being transformed by several new mixed-use developments and the Ascent Midtown is Atlanta's Midtown major mixed-use development with 453,000 square feet of building.

The Ascent Midtown project is located between West Peachtree and Spring Street at 18th street. The mixed-use development includes a 22 story residential tower with 328 residential units, a 12 story 176-room hotel and a 7 story parking garage with 532 parking spaces.



### ULMA SOLUTIONS

To maximize labor productivity and reduce formwork cycle time for the garage and on the typical floors, 42,000 square feet of **FORMADECK Drop-head Shoring System** was used.

FORMADECK's few components simplify the assembly procedure while the drop head mechanism reduces formwork cycle time due to the early retrieval of its main components (girders and joists) which can be moved to the next shoring location for faster cycle times.

The drop head feature, also minimizes the hazard of falling plywood during the stripping. **ALUPROP Aluminum posts** were used in conjunction with FORMADECK to shore and re-shore the concrete slabs.

Other ULMA systems used on this project included the modular "flying" **VR Table shoring system** that was used to erect the cantilevered slab along the perimeter safely and efficiently. VR-Tables were fully assembled on the ground with form face and handrails.

38,000 square feet of ULMA's **MEGAFRAME**, 10,000 pound per

**leg frame shoring system** was used to erect and support irregularly shaped areas, high-heights and multiple shoring height applications for both towers, where the grid shoring systems were not practical.



## ONE BRYANT PARK, MANHATTAN, NY

One Bryant Park is 985 feet high and has a total of 2.15 million square feet of space. This glass tower is the headquarters of The Bank of America. The building displays defined vertical lines that with the movement of the sun and the moon, modify the perception of the building.



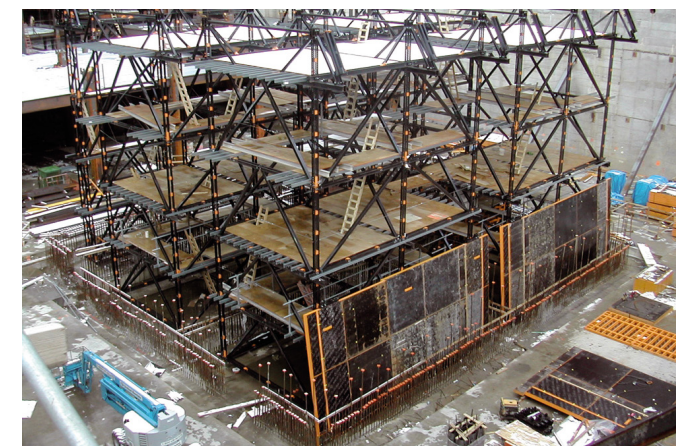
### ULMA SOLUTIONS

In this construction project, the **ATR Self-climbing System** was used from the structure's underground levels to the last floor to form the core. The ATR self-climbing system lifts itself without the need of a crane, thanks to the incorporated hydraulic system.

In a building with these characteristics and with a multitude of materials used, the tasks of the various workers needed to overlap. The use of the ATR system increased productivity, reducing work times since it made it possible to complete different tasks simultaneously. Unlike conventional systems, the ATR greatly reduces crane time, as well as providing simple and fast methods for climbing.

Additionally, this system permits the assembly and preparation of the lifting mechanisms and platforms before the formwork set up. It operates as a lifting tower, anchoring into the walls that have already been built. This self-climbing technique is based on a hydraulic system that enables the gang to be automatically lifted through the successive movements of the formwork and the masts. With this system, along with the **MEGAFORM Modular Formwork**, the

process of the forming of the walls of this building was completed efficiently.





# LARKIN PLAZA, YONKERS, NY

Larkin Plaza is a large complex encompassing two residential towers, retail space and a parking garage. The first tower rises 249 feet and has 280 apartment units and the second tower rises 164 feet and includes 159 apartments.

Two stories of retail space includes restaurants and a diverse shopping totalling 35,000 ft². The adjacent three-story parking garage will have a 539 vehicle capacity.



## ULMA SOLUTIONS

**FORMADECK drop head shoring system** was the perfect choice for this type of project as the structures have regular column spacing and limited amount of drop beams. FORMADECK also incorporates a safe and secure corner condition solution promoting safety and efficiency.

The project also included **ALUPROPS, lightweight aluminum post shores** used to shore and re-shore the 8"-12" thick concrete slabs ranging from 20,000 square feet to 32,000 square feet. ALUPROPS provide the contractor with a wide range of shoring heights; ranging from 15'3" for the first two levels and 9'2" for the subsequent 24 typical floors.



# AGUAS SANTAS TUNNEL, PORTO, PORTUGAL

This project includes the construction of a new 1,200 foot long tunnel. The new tunnel, located just north of the original tunnel, will have four separate lanes for traffic traveling from Amarante to Oporto.



## ULMA SOLUTIONS

ULMA designed a variety of solutions for the bored tunnel measuring 62 feet in width, as well as a cut-and-cover tunnel, with flexibility as the foremost consideration.

One of the complications posed by the project was its location in an urban center with significant geotechnical risks, characterized by thin soil cover and areas of extremely weathered granite.

ULMA's technical team developed three separate structures in partnership with the client, in order to make work as efficient as possible. First, a **BRIO-MK scaffolding carriage** was used to waterproof the entire tunnel. A similar carriage was used to install the rebar. In both cases, ULMA's most versatile systems were combined to create carriages adjusted and optimized to meet the demands of the project without any need for requiring additional room. Next, the **MK formwork carriage** was used to pour the tunnel structure itself. With a single carriage it is possible to create all of the dimensional variety needed for the tunnel, a facet that proved ideal for this tube design with four different sections. As an additional benefit, the carriage allowed for the passage of vehicles during construction, which is a necessity with such projects.

The carriage features hydraulic equipment to facilitate formwork installation and stripping, as well as lowering, leveling, and advancing the entire assembly.

Using a single MK formwork carriage 40 feet long, 33 feet tall, and 62 feet wide, the tunnel was completed in three months. Work cycles were approximately a day and a half, with 10 to 11 hours of pouring and 3 hours for advancing and adjustments. Thus four cycles were completed on a weekly basis.





# HIGH SPEED RAIL NETWORK, SPAIN

With a total of more than 1600 miles of railway lines, Spain has become the leader in Europe and second worldwide only to China in the size of its high-speed rail network.

The routes set for high-speed trains are extremely rigid, given the restrictions set by maximum slopes and curve radii. Many viaducts and tunnels were therefore necessary to traverse the mountainous terrain of the various territories through which the railway passes.



## ULMA SOLUTIONS

In order to build the slabs and decks of the various viaducts, **ENKOFORM formwork**, a versatile system composed of standard material which is easily adapted to many diverse geometries, was chosen.

The decks were shored with high load-bearing capacity shoring towers, such as the T-500, as part of a gantry falsework system or a full shoring system when the terrain permitted.

The piers were built with the beam formwork ENKOFORM V-100, climbed on brackets to reach the required heights.

The cut-and-cover tunnels were built with **MK carriages**, lightweight and versatile systems that offer high efficiency for such projects.



# RIYADH METRO, SAUDI ARABIA

The underground rail network was designed with six lines stretching a total of 109 miles, intended to upgrade the mass transit system of the city.



## ULMA SOLUTIONS

Retaining walls were built in three different phases using single-sided formwork systems made of standard material.

An exterior shoring system was designed for the construction of the foundation and first phase of the inclined walls. Pre-built assemblies were built specifically so that they could be lifted and transported by crane, thus greatly reducing the time necessary for project completion.

The second phase employed a formwork system built from the ground up, composed of single-sided **EUC Trusses** and 16 foot panels.

For the tunnel 20 foot walls were built using **MEGAFORM formwork**. Assembly and disassembly were extremely efficient thanks to large panel sizes with fewer clamps and other accessories required.





# ELECTRIC TRAIN, LIMA, PERU

This emblematic project of the City of Lima includes the construction of a 7.75 miles long elevated viaduct and 8 train stations. The train is going to solve traffic problems suffered by more than 300,000 passengers every day.



## ULMA SOLUTIONS

Faced with different structures and short lead times, ULMA decided in favor of the **MK system** as primary solution for all configurations. A qualified team and powerful logistics ensured the material supply within the agreed deadlines.

**ENKOFORM VMK** was used as vertical formwork for the more than 400 piers of the viaduct.

The formwork exceeding 23 feet height and of octagonal sections had to withstand the high concrete pressure. For the bottom and sides of the pier caps, **ENKOFORM HMK formwork** shored by **ALUPROP towers** was used. The same systems combined with NEVI and COMAIN formwork were applied to the bottom of slab and beam.

For the curved sections where no pre-stressed beams were required, MK as well as ALUPROP towers were used to sustain 108 tons in each case (27 tons per support point).

The versatility of the MK system eased the installation of a pedestrian bridge and a structure for vehicle traffic. This way, the high demands of the customer have been fulfilled.



# BRIDGE OVER WISLOK RIVER, RZESZOW, POLAND

This cable-stayed bridge is the largest structure of its kind in the Podkarpacie region, with a length of 1,575 feet and the singular feature of a reinforced concrete pylon 358 feet tall.

The pylon was constructed in 26 phases: in the first 14, the pylon arms: then in the following 3, the pier cap: and finally the last 9, the cable-stayed portion was completed.



## ULMA SOLUTIONS

In the first phase of the project, the tower legs' foundations were poured using **ENKOFORM VMK formwork**. The structures, measuring 14.5 m in height with a T-shaped cross-section, were later used as a base to install the self-climbing systems. In order to ensure worker safety, the formwork system was equipped with four complete working platform levels with vertical access between them.

The tower legs are 18.75 feet x 15.5 feet box girders, with wall thickness varying between 4.25 feet and 2.75 feet. ULMA supplied two separate sets of formwork designed specifically for the **ATR-B self-climbing system**, which permitted the entire structure to be elevated simultaneously. The two sets of ENKOFORM panels, respectively measuring 15.75 feet and 14.75 feet tall, had a cycle time of only 6 hours.

The exterior formwork, weighing more than 30 tons, was supported by only four ATR brackets. The carriages installed on the brackets allowed the formwork structure to roll back up to 31.5 inches, providing easy access when installing the steel reinforcement and cycling the formwork. The interior part of the self-climbing system, weighing 4 tons, only required two ATR brackets. Cycle times were thus reduced from 7 to 3 days.





# 03.

## PRODUCTS



Wall and Column Formwork | Climbing Formwork | Slab Formwork | Props and Shoring Towers | Civil Engineering Systems | Timber Beams | Safety Systems





# MEGAFORM

STRONG AND VERSATILE PANEL FORMWORK IN IMPERIAL SIZES



Modular formwork in **imperial measurements**. Ideal for the construction of **walls and columns** in **building construction or civil engineering projects**.

## KEY APPLICATIONS

- Ideal for forming walls, columns, and pilasters that require large and long gangs to cycle around the job site.



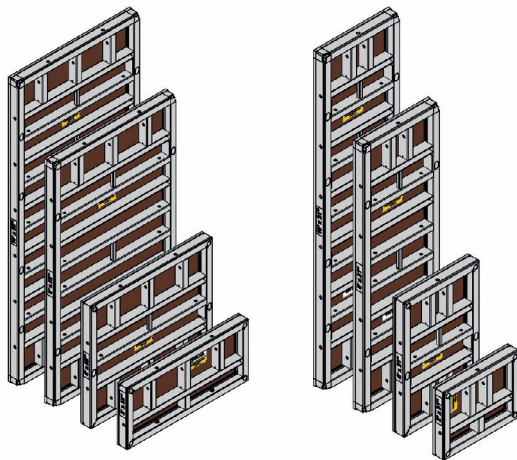
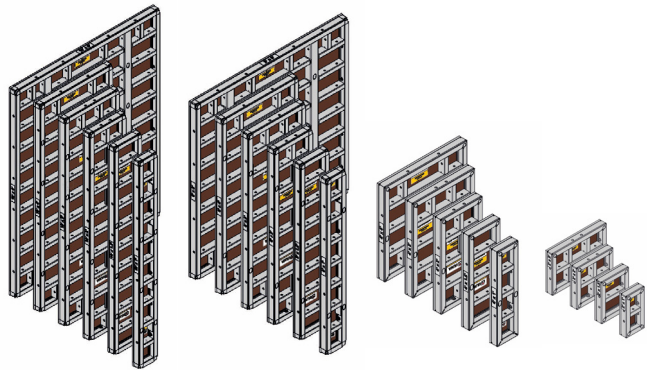
## FEATURES

- Form face, phenolic or composite board, riveted to the **metal frame**.
- Panels are in **imperial measurements**.
- **Flexible:** panels can be fitted with lumber or steel fillers up to 4" between panels.
- Exclusive panel design allows for a **quick and safe connection between panels**.
- **Durable:** Reinforced corners absorb impacts.
- Can support **Single Sided Walls up to 30' high**.
- **Permissible concrete pressure:**
  - Standard panels: **1650 psf**.
  - Universal panels: **1850 psf**.

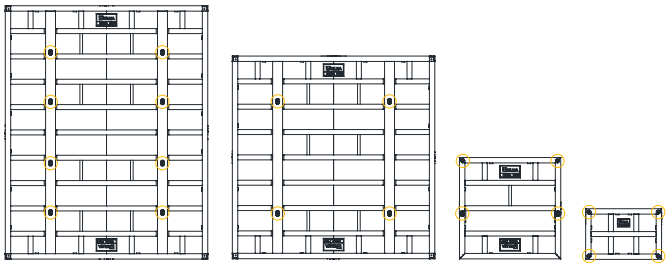


- **Dimensions:**
  - **Height range:** Standard panels: 10', 8', 4' and 2'
  - **Width range:** Standard panels: 8', 4', 3', 2', 1.5' and 1'

- **Height range:** Universal panels: 10', 8', 4' and 2'
- **Width range:** Universal panels: 55" and 31"



- Anchoring:
  - Large panel 10' x 8'** with 4 rows of tie holes in height:
    - $h_{pouring} \leq 10'$ , with 2 rows in height.
    - $h_{pouring} > 10'$ , with 3 rows in height.





MEGAFORM - STRONG AND VERSATILE PANEL FORMWORK IN IMPERIAL SIZES

BENEFITS

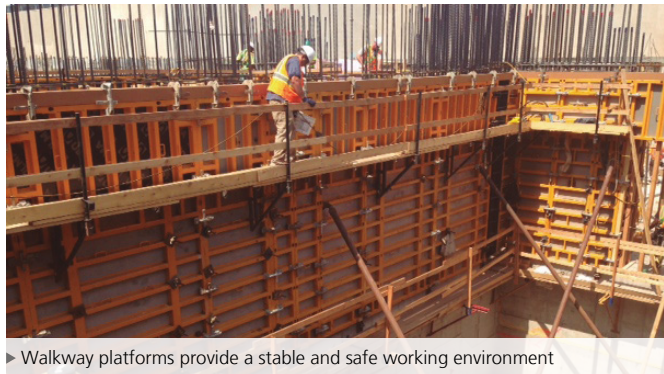
- **Panels with multiple tie holes** can be combined with universal panels to offer **various forming solutions to form numerous geometries**.
- Holes in ribs to tie accessories.
- High-quality phenolic plywood or composite board provide excellent concrete finishes.
- Integrated safety brackets for work at multiple heights.
- **Easy and Simple** connection between panels with the MEGAFORM clamp.
- Only 2 Mega Lifting hooks are required to lift large size gangs with a maximum total weight up to 16,000 pounds.



► Indentations in the panel to ease stripping and assist with panel placement



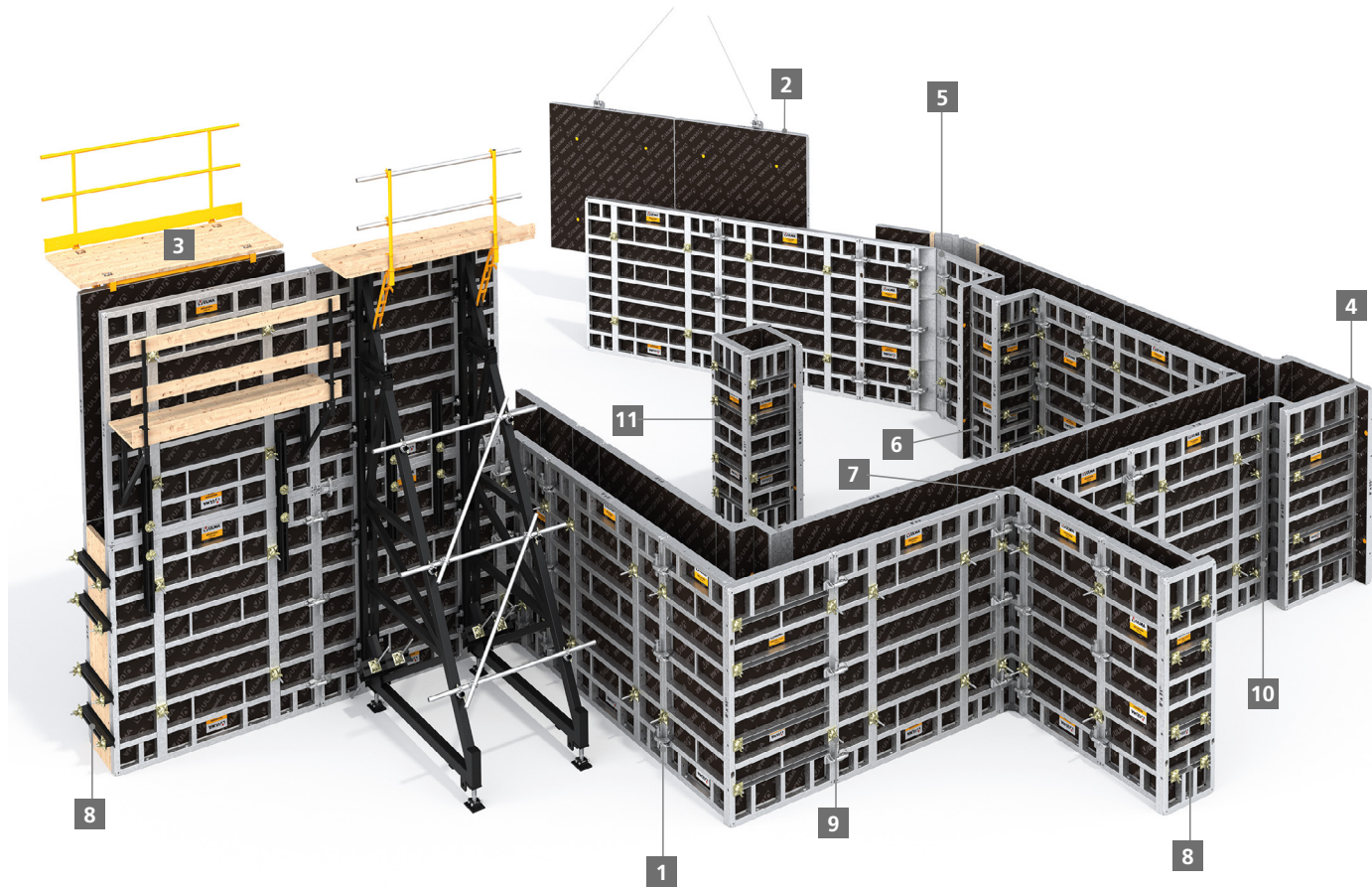
► The MEGAFORM Clamp can easily attach panels by tapping the clamp wedge with a hammer



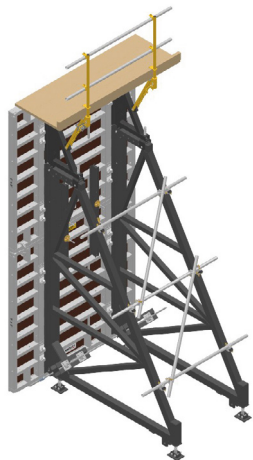
► Walkway platforms provide a stable and safe working environment

SOLUTIONS

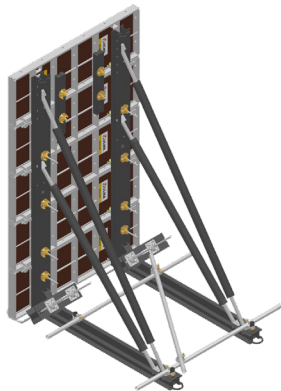
- |                                  |                      |                 |
|----------------------------------|----------------------|-----------------|
| 1 Panel connection: clamps       | 5 Hinged corners     | 9 Formwork ties |
| 2 Gang lifting                   | 6 Pilasters          | 10 Fillers      |
| 3 Walkway platforms / Guardrails | 7 Wall intersections | 11 Columns      |
| 4 90° corners                    | 8 Bulkheads          |                 |



One-sided forming using EUC (A-frames)



One-sided forming using UCAB (Mini A-frame)







## MEGAFORM - STRONG AND VERSATILE PANEL FORMWORK IN IMPERIAL SIZES

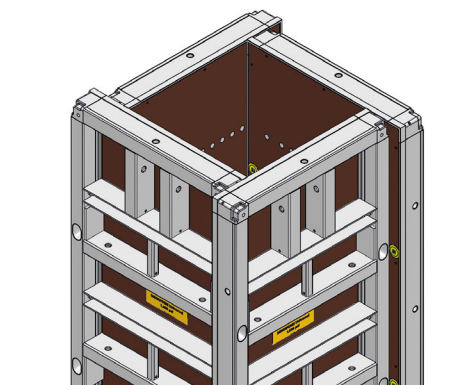
### SOLUTIONS

#### MEGAFORM Columns

Column forming using MEGAFORM is simple & easy and does not require any ties thru the forms. The columns are created using a windmill pattern and can range from 12" to 48".



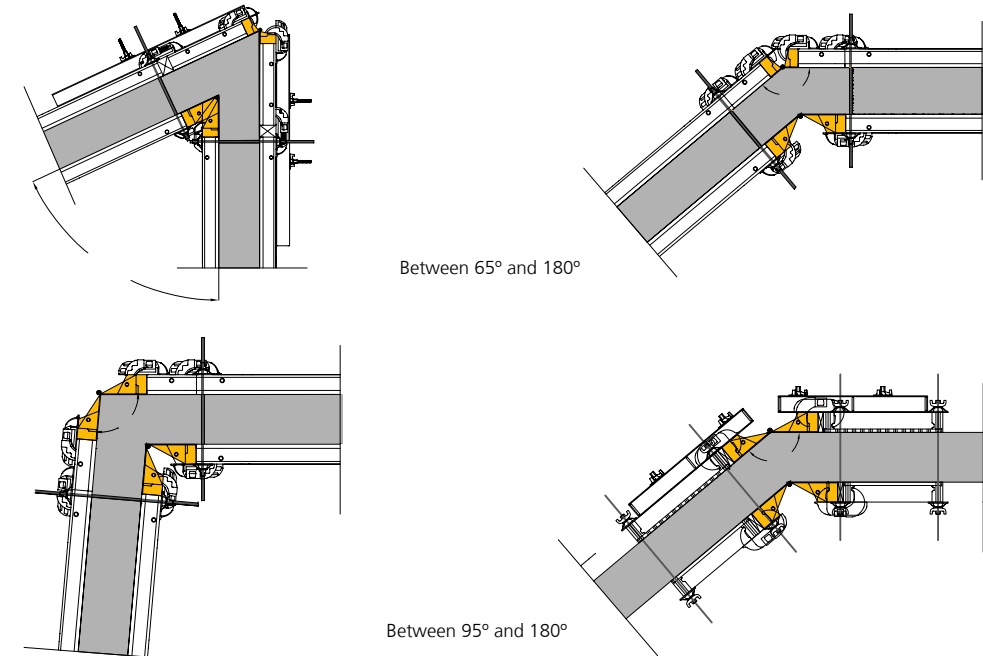
- Maximum Concrete Pressure: 1850 psf.
- Panels in imperial measurements.
- Columns can be formed with universal panels assembled in a windmill style.
- Adjustable width in 1" increments.
- Universal panel 31": for column widths up to 24".
- Universal panel 55": for column widths ranging from 23" up to 48".



### SOLUTIONS

#### Hinged corners

Walls with angles between 65 to 180 degrees can be formed using MEGAFORM hinge corners.



#### Other solutions:

- Inside of shafts
- Inclined walls
- Overhanging walls
- Single-sided walls
- Polygonal walls
- Foundations
- Climbing solutions
- Hinged universal corner solution for pilasters



► Safe and wide platform for climbing formwork



# MEGALITE

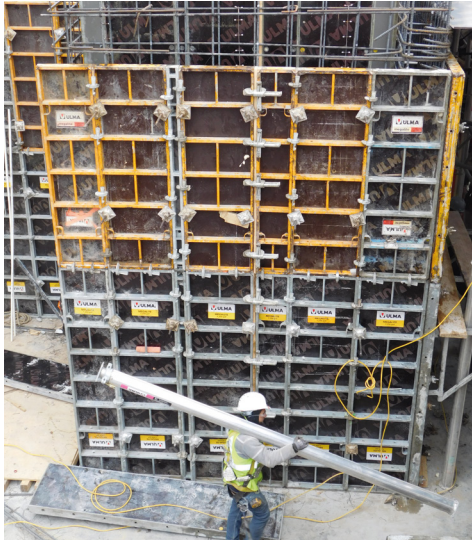
LIGHT WEIGHT, MEDIUM DUTY, HANDSET FORMING SYSTEM IN IMPERIAL SIZES



Modular wall and column formwork in **imperial measurements**. Ideal for the construction of **walls, columns, and pilasters** in building construction and civil engineering projects.

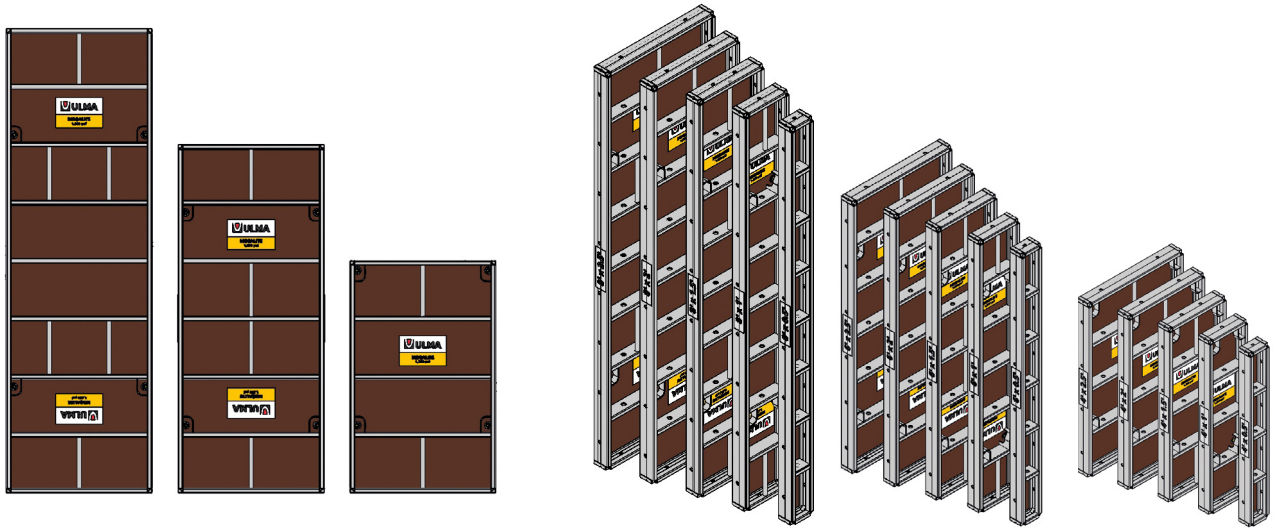
## KEY APPLICATIONS

- Handset Forming system used to form walls, columns and pilasters.
- Can be ganged to form large wall sections that need to be cycled around the job site.



## FEATURES

- Handset system with light weight panels: 7 lbs/sqft.
- **Versatility** by combining universal panels with standard panels to solve multiple building geometries.
- Form face, phenolic or composite board, riveted to the metal frame.
- **Flexible:** panels can be fitted with lumber or steel fillers up to 4" between panels.
- **Height range:** 8', 6' and 4'.
- **Maximum concrete pressure: 1250 psf.**
- 2 rows of tie rods in height up to 8'.
- Gangs can be laid out every 6" by combining different panel lengths.
- **Width range:** 30", 24", 18", 12", 6", 4" and 2".



## BENEFITS

- **Light weight panels** for easy handling and assembly.
- **Versatile.** Varied wall geometries can be formed by either hand setting or by ganging the panels.
- **High strength panels** with only two ties.
- **Durable.** Steel frames with reinforced corners.
- **Excellent surface finishes.** High-quality phenolic plywood or composite board provide excellent concrete finishes.
- **Quick and easy panel connection** using the MEGALITE Clamp.



► Attachable safety brackets for work at multiple heights



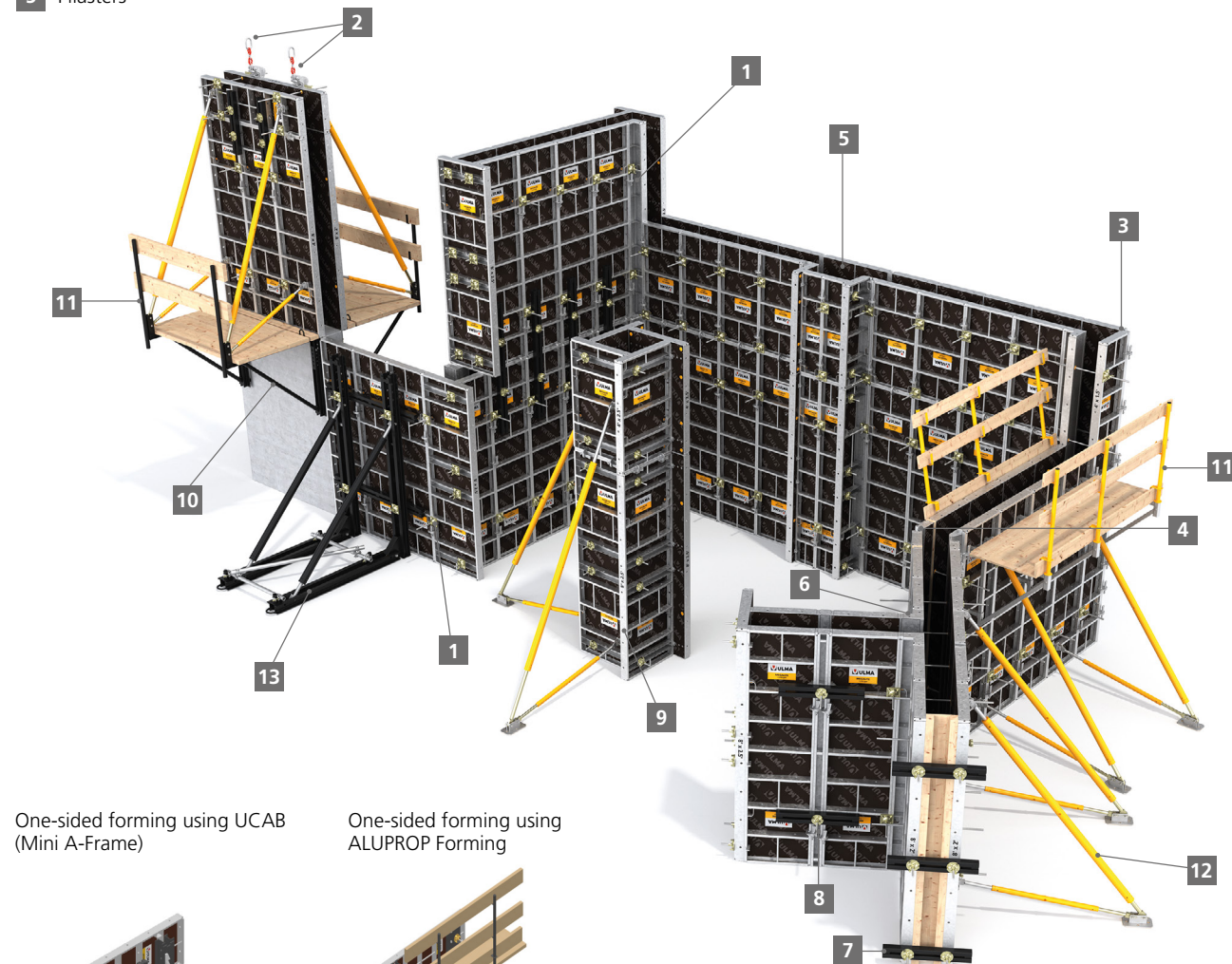
► Strong steel frames



## MEGALITE - LIGHT WEIGHT, MEDIUM DUTY, HANDSET FORMING SYSTEM IN IMPERIAL SIZES

### SOLUTIONS

- |                            |                          |                                      |
|----------------------------|--------------------------|--------------------------------------|
| 1 Panel connection: Clamps | 6 90° wall intersections | 10 Climbing support brackets         |
| 2 Lifting hooks            | 7 Bulkheads              | 11 Walkway platforms / Guardrails    |
| 3 90° Corners              | 8 Fillers                | 12 Pipe brace support                |
| 4 Hinged corners           | 9 Columns                | 13 One sided forming up to 16' high. |
| 5 Pilasters                |                          |                                      |

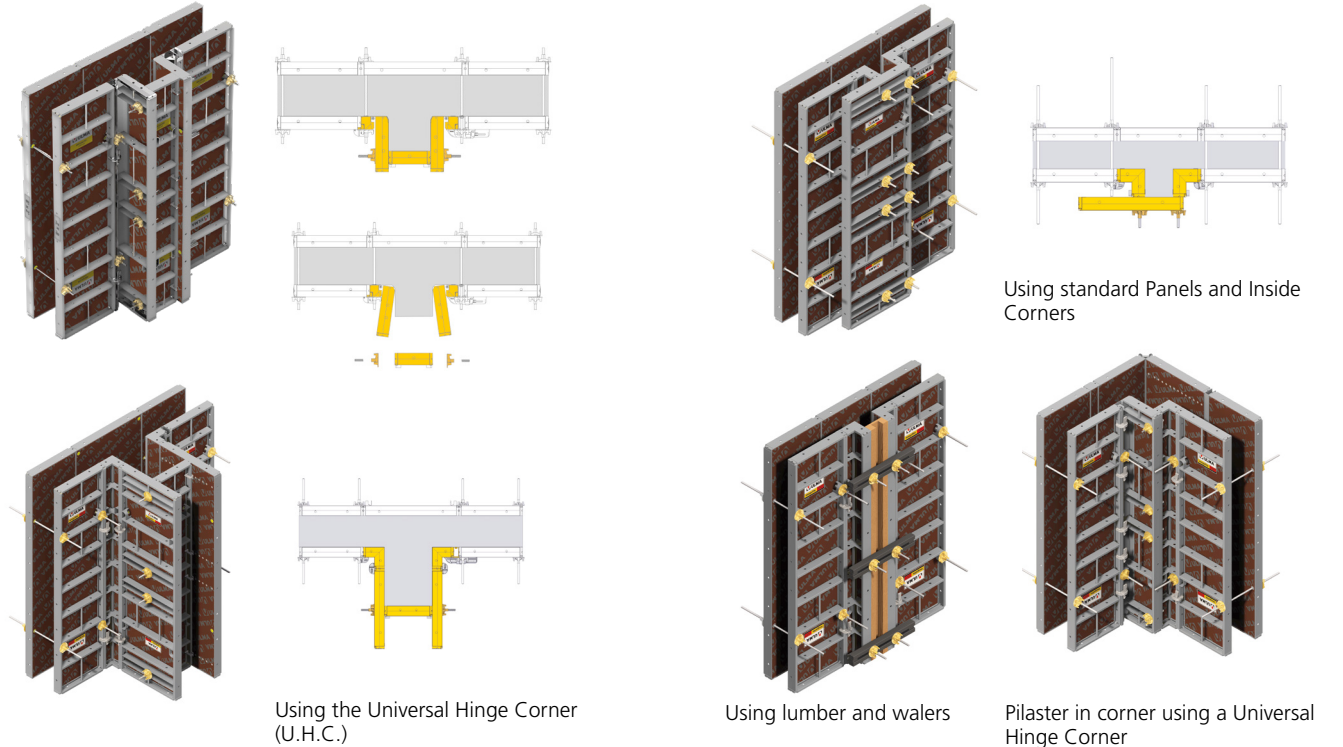


One-sided forming using UCAB (Mini A-Frame)

One-sided forming using ALUPROP Forming

### SOLUTIONS

#### Pilasters



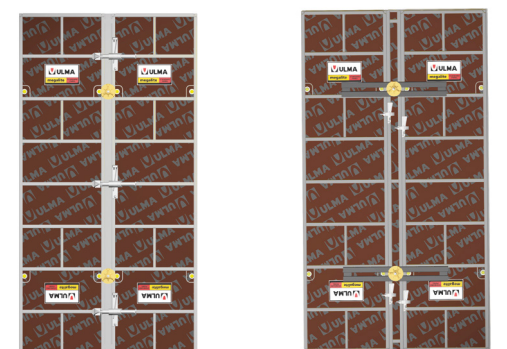
#### Corners



90 degree corners using the Universal Panel

90 degree corner using the standard Inside and Outside Corners

#### Fillers



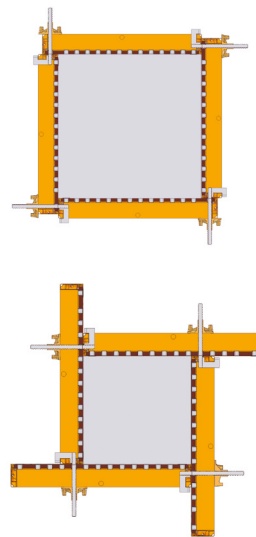
Using MEGALITE 2" or 4" fillers Using job built fillers up to 4"



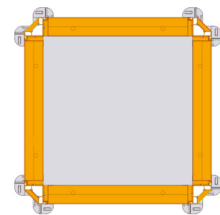


## MEGALITE - LIGHT WEIGHT, MEDIUM DUTY, HANDSET FORMING SYSTEM IN IMPERIAL SIZES

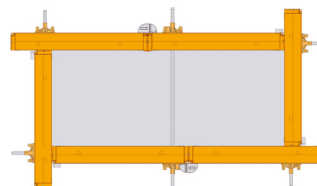
### SOLUTIONS



Columns from  
6" x 6" to 27" x 27"  
adjustable in 1" increments



Maximum column of  
30" x 30", using universal panels  
with outside corners tied  
with fixed clamps



Large columns up to 57"



### Columns

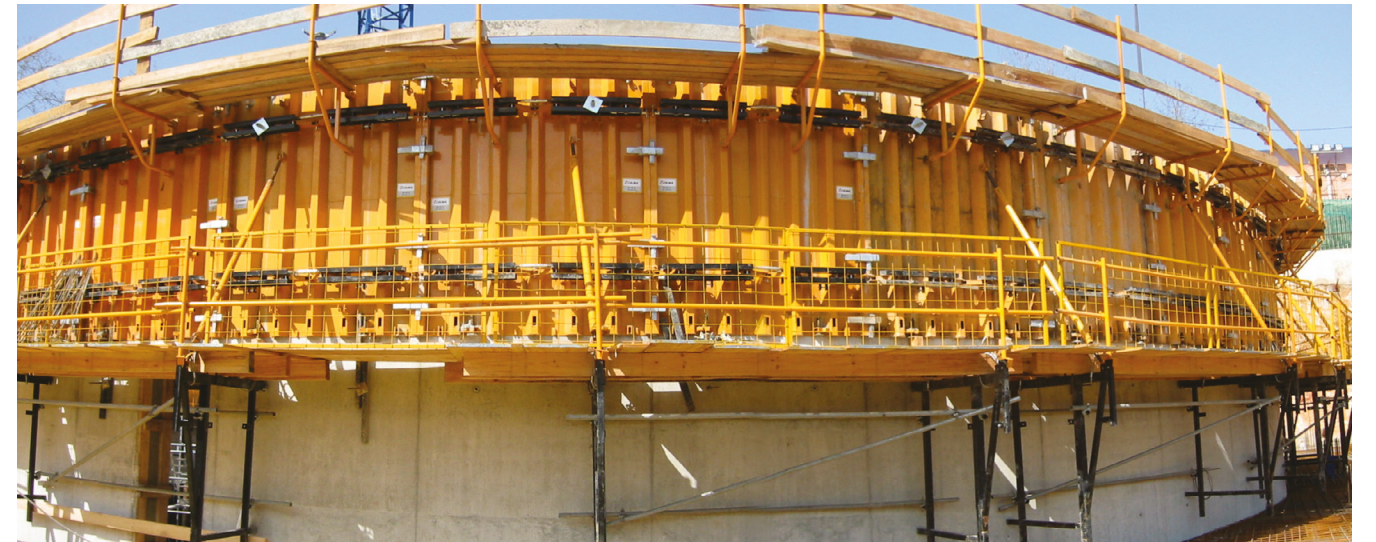
#### • Columns with universal panel

- Using a single panel, columns can range in width from 6" to 27" and can be adjusted in 1" increments.

- Columns up to 57" can be formed by combining standard panels to universal panels.

## BIRA

### ADJUSTABLE CIRCULAR FORMWORK



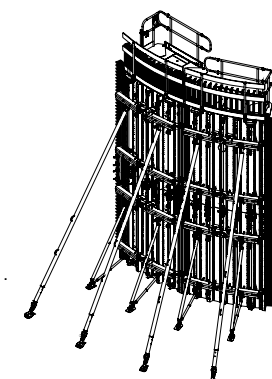
Adjustable vertical formwork for the construction of **circular or curved walls**.

### KEY APPLICATIONS

- Circular formwork used to form tanks, circular, and curved walls.
- Adjustable curved panels can be ganged and used to form large structures.

### FEATURES

- Maximum concrete pressure: 1650 psf.
- Minimum curve radius: 7' - 2.5".
- Panel height range: 4', 6', 8', 10'.
- Panel width:
  - Inner Panel: 7' - 4.5".
  - Outer Panel: 7' - 2.6".
- Varied compensations (Steel Fillers):  
13/16", 1 - 3/16", 1 - 9/16", 13 - 15/16".



BIRA with walkway platforms forming a round tank

### BENEFITS

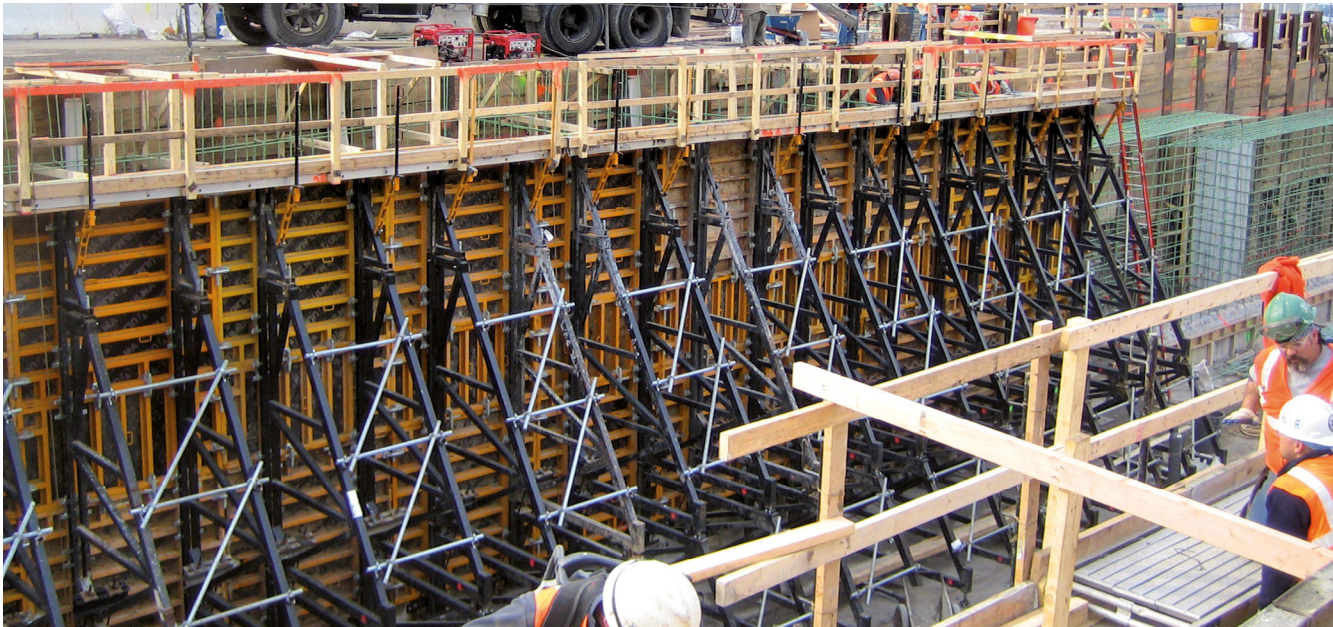
- **Safe**, walkway platforms provide a stable and safe working environment.
- **Durable**, robust panels made of steel.
- **Steel forming face** provides a **smooth finish** and is **easy to maintain and repair**.
- **Built in leveling jacks** - The panels have built in screw jacks mounted on each form for side to side leveling.
- **Built in swing lock** - to secure panel joints.
- **Adjustable:**
  - An easy curving system with only 4 adjustment points.
  - Simple placement of compensation plates between panels for added radius movement.
- **Efficient:**
  - All panels require only 2 ties in height.
  - A wide range of panels for most circumferences and heights.
  - Compatible with ULMA's MEGAFORM formwork and accessories.





# UCAB-EUC FRAMES

## SINGLE-SIDED WALL FORMWORK



Frames designed to withstand concrete pressure without using any tying elements through the walls.

### KEY APPLICATIONS

- Ideal for single-sided wall applications ranging from 8' to 30'.

### FEATURES

There are two systems available depending on the wall height: **UCAB Frames and EUC Frames.**

- **UCAB Frames:**
  - For wall heights ranging from 8' to 10'.
  - Has the ability to be handset or ganged depending on site conditions.
- **EUC Frames:**
  - For wall heights ranging from 12' to 30'.
  - Can be ganged and easily cycled through the job site.



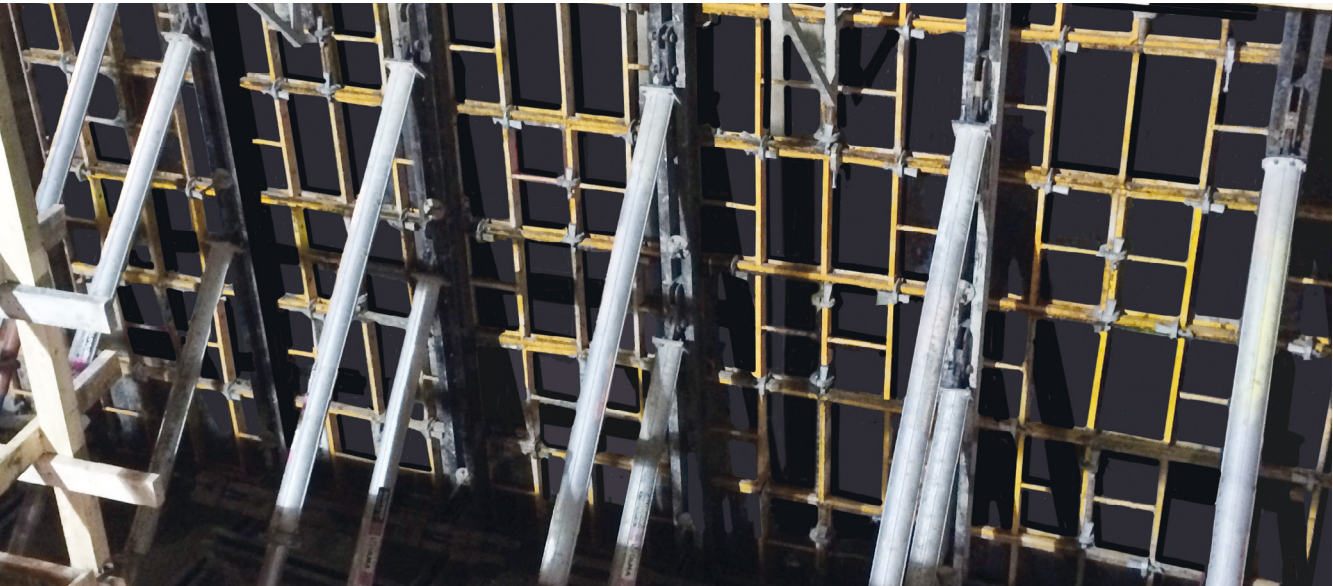
► UCAB frames with MEGAFORM modular formwork

### BENEFITS

- **Compatible with all ULMA wall formwork systems.**
- **Quick and easy connection to panels.**
- Utilizes anchors at the bottom of the frames to support loading due to concrete pressure.
- The frames are moved **in conjunction with the formwork panels to subsequent pouring stages.**
- Attachable walkway platforms: **For safe handling at height.**

# ALUPROP FORMING

## SINGLE-SIDED WALL FORMWORK



Support of single sided walls without using ties for heights ranging from 8' to 16' high.

### KEY APPLICATIONS

- Ideal for shafts, tunnels or other constricted project conditions where **crane access is unavailable.**

### FEATURES

- Wall formwork in **Imperial measurements.**
- Permissible **Concrete Pressure up to 1,250 psf** depending on height.
- Combines easily with ULMA's MEGALITE lightweight forming system.



► ALUPROP connection to panel formwork

### BENEFITS

- **Easy to connect** components for quick and easy use.
- **Light** weight components and panels.
- Can be placed in areas with **limited space or accessibility.**
- Can form one sided **walls without the need of a crane.**
- High-quality phenolic plywood or composite board provide **excellent concrete finishes.**
- Attachable safety brackets for work at multiple heights.



► Components can easily be adjusted and shifted to fit project requirements





# ATR

## SELF-CLIMBING SYSTEMS



The ATR self climbing system is a conventional climbing system for the construction of walls and other vertical structures, where **hydraulic components** are added in order to **lift the formwork instead of a crane**.



► Construction of a building core with ATR Self-Climbing system



► ATR lifting mechanism

### KEY APPLICATIONS

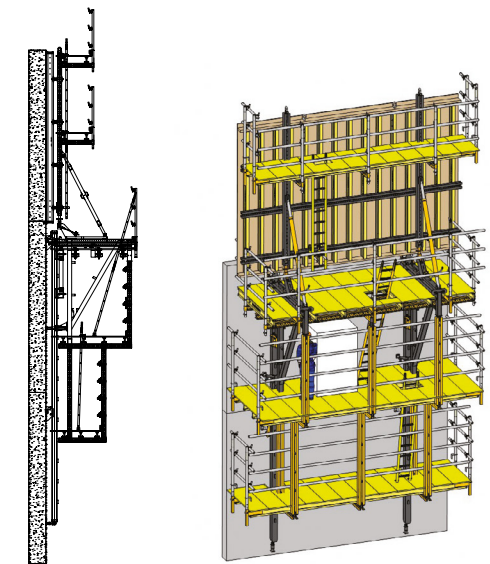
- Ideal for **buildings or bridges** that need large sections of the structure to be **poured monolithically** such as piers, walls, cores, or shafts.

### FEATURES

- Moves hydraulically and does **not require the use of a crane**.
- The **climbing platforms** are **lifted as one unit** rather than independently.
- Includes components to **position and plumb the formwork both horizontally and vertically**.
- Equipped with two platforms: **a main working platform (8' wide)** and a platform for hydraulic system operation. Up to **3 optional platforms for pouring, material recovery**, and other applications can be supplied.

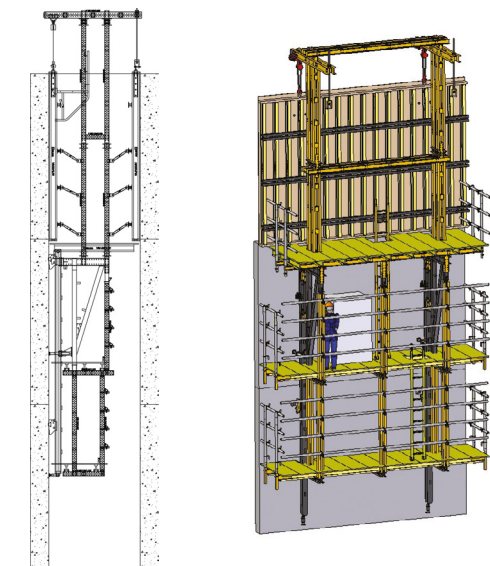
#### ATR-B self-climbing bracket

- Standard configuration used in applications that do not restrict platform components or size.
- Self-Climbing bracket configuration where the offset (27 inches) is done with a roll-back carriage attached to the bracket.



#### ATR-N narrow self-climbing bracket

- Configuration of the self-climbing bracket **used in between walls, narrow shafts, or cores between 5' - 8" and 8' - 2" wide**.



- Formwork is hung from a structure above to facilitate formwork positioning and stripping.



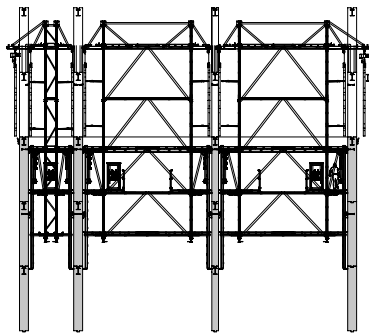


## ATR -SELF-CLIMBING SYSTEMS

### FEATURES

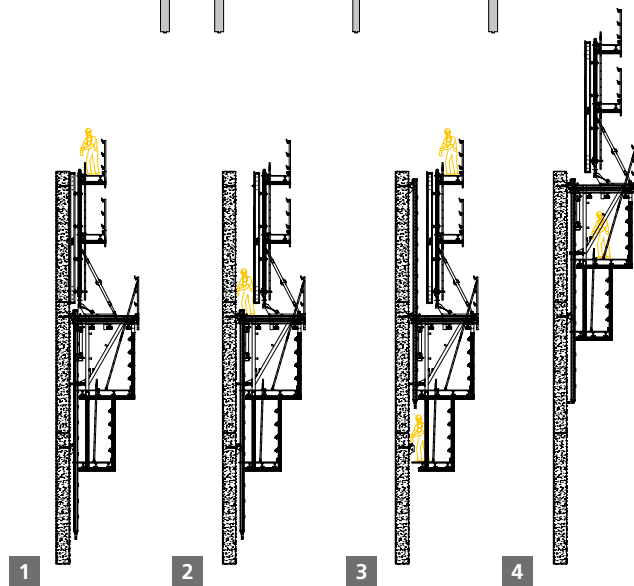
#### ATR-P self-climbing platform

- **Platform configuration** used in shafts for situations where the ATR-B and ATR-N can not be used due to shaft dimensions, loading or building geometries.
- Can adjust to **different geometries and be fitted with different formwork** stripping systems (carriages or outrigger structures).
- Structures for the **support of auxiliary elements**, such as **concrete placing booms and small cranes**, can be assembled to this system.



#### ATR self-climbing system lifting sequence

- 1 Pouring the concrete
- 2 Stripping
- 3 Anchor placement
  - Lifting the mast
  - Recovery of lower anchors
- 4 Lifting the structure



### BENEFITS

- **Versatile** system able to be adapted to most job requirements when **building large and tall concrete structures**.
- The system is independent from the crane. It is designed to **simultaneously lift the formwork, walkway platforms, and placing booms**.
- **Hydraulically driven**, the self climbing system can lift larger formwork sets, compared with a crane. Even several units can be raised simultaneously, therefore achieving **very high performance rates**.
- Safe to lift and handle at height.
- Can be adapted to complex wall geometries.
- Wide and protected **walkway platforms with safe access**.
- **Hydraulic system fully configurable** to construction requirements.
  - Hydraulic power unit operates up to 12 cylinders simultaneously.
  - The working load of each cylinder can be controlled separately.
- **High load-bearing capacity**: supports large concrete structures and forms.
- **Roll-back system that sets back 27"** from the form surface allowing **work to be performed between formwork panels**.
- Compatible with all ULMA formwork and MK systems.

### SOLUTIONS

#### Complex geometries



► Lifting auxiliary elements such as concrete placing booms or small cranes



► Building irregularly shaped cores

#### High capacity self-climbing structures for interior shafts



► Adaptable to construction methods for slabs and walls

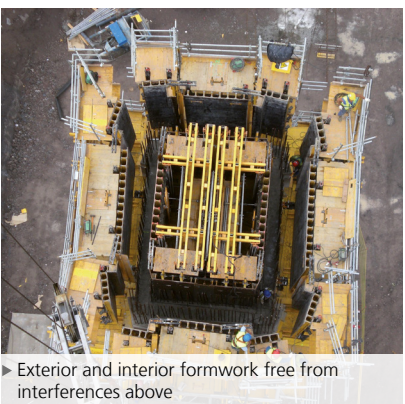


► Exterior formwork and platforms hung from the MK structure above

#### ATR System used in pier construction



► ATR used in inclined pylon construction



► Exterior and interior formwork free from interferences above



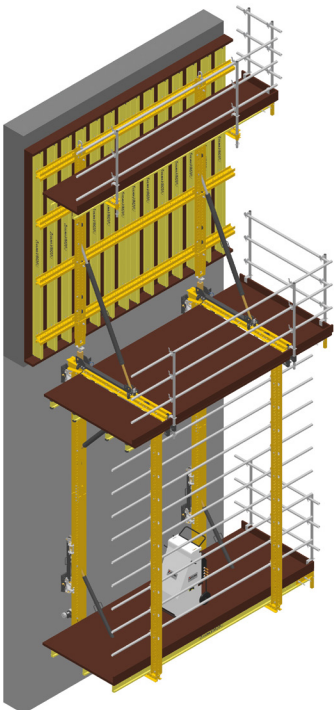
► Safety on all walkway levels





# RKS

## RAIL CLIMBING SYSTEM



Uses rails and anchors to quickly and efficiently climb and form building walls.

### KEY APPLICATIONS

- **Rail climbing system** for the forming of cores, shear walls, and perimeter walls using **hydraulic lifting mechanisms**.
- Climbing platforms are **lifted independently** rather than as one unit.

### FEATURES

- Adjustable to different **pouring heights**, with a standard range from **8' - 10" to 16' - 4"**.
- Formwork **roll-back distance: 28"**.
- **Attachable platforms** for anchor recovery.
- Lifting of all platforms with a **single hydraulic power** unit and two cylinders.
- Hydraulic cylinder lifting capacity: **11,240 lbs.**

### BENEFITS

- Enables climbing of the **form panel without separating** the structure from the wall.
- **Utilizes rails for quick and efficient movement.**
- **Safe climbing at height** ensured by rails attached to walls.
- **Versatile and adaptable** to form complex building geometries.
- **Large and secure platforms**, with customizable configurations.
- **Lifting without crane assistance.**

### SOLUTIONS



► Auxiliary platforms and trailing platforms can be added as necessary



► Hydraulic movement allows for quick and easy forming



► Roll-back or tilt-back systems to climb and form building cores and walls





# BMK

## CONFIGURABLE CLIMBING BRACKETS



Crane assisted climbing brackets with available platforms for added safety and cone recovery.

### KEY APPLICATIONS

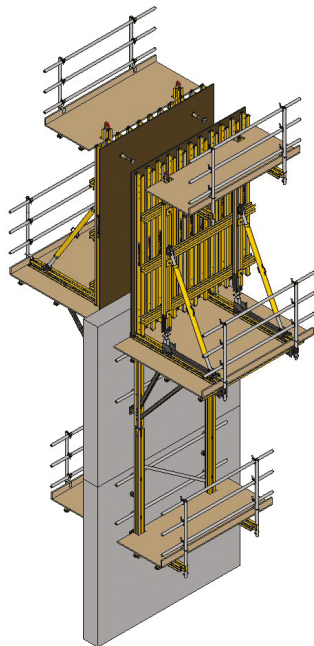
- Tilt-back and roll-back climbing system for forming cores, shear walls, and perimeter walls **with the use of a crane.**

### FEATURES

Several standard configurations to suit job site needs.

#### Climbing bracket BMK-240

- For building construction and civil work.
- **Platform width: 7' - 10".**
- Formwork support:
  - Can support an area up to 376 Ft<sup>2</sup> on a set of two brackets.
  - Can support formwork up to 16' - 4" high.
- Wall anchors: DW15 (5/8") and DW20 (7/8").
- Formwork stripping distance: **2' - 7" with roll-back carriage, or 2" to 6" with tilt-back system.**
- **Adaptable to inclined walls.**



### FEATURES

#### Climbing bracket BMK-170

- For building construction and civil work.
- **Platform width: 5' - 6".**
- Formwork support:
  - Can support an area up to 376 Ft<sup>2</sup> on a set of two brackets.
  - Can support formwork up to 16' - 4" high.
- Wall anchors: DW15 (5/8") and DW20 (7/8").
- Formwork stripping distance: **2" to 6" with tilt-back system.**
- **Adaptable to inclined walls.**

#### Climbing bracket SBMK-180

- **Support for One-Sided forming applications.**
- For civil work such as dams and pylons.
- **Platform width: 5' - 10".**
- Formwork support:
  - Can support an area up to 376 Ft<sup>2</sup> on a set of two brackets.
  - Can support formwork up to 16' - 4" high.
- Wall anchors: DW20 (7/8").
- Formwork stripping distance: **2" to 6" with tilt-back system.**
- **Adaptable to inclined walls.**



Pylon construction using the BMK Climbing Bracket

### BENEFITS

- Configures to **straight, inclined, or circular walls.**
- Brackets can be fitted with **trailing platforms for cone recovery.**
- **Easy to use:** Few components simplify the assembly and dismantling procedure, and also **reduce the number of trucks required for transport.**





# BMK - CONFIGURABLE CLIMBING BRACKETS

## SOLUTIONS



► Tilt-back system for forming and support



► Casting of cores ahead of slabs



► Trailing and recovery platforms can be added as necessary



► Support of bridge piers and pylons



► Adaptable to varying structures



► Forming of circular structures

# KSP SHAFT PLATFORM



Platforms sit on a concrete box outs or anchors to provide form or walkway support.

## KEY APPLICATIONS

- Used in **shafts, elevator openings, hollow piers, or other types of open spaces** where it is necessary to support formwork panels and have added **platform support**.
- Can be **combined with conventional climbing brackets** on the walls' external face.

## FEATURES

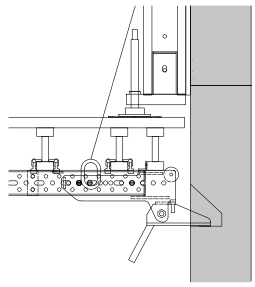
- Two different solutions depending on the project requirements:
  - **Gravity pawl bracket with concrete box out:** The bracket rests on the bottom side of the cavity created from the previous pour.
  - **Adjustable folding bracket and anchor:** No holes are required in the wall. The adjustable bracket rests on the folding bracket, attached to the wall with DW15 (5/8") cone.

## BENEFITS

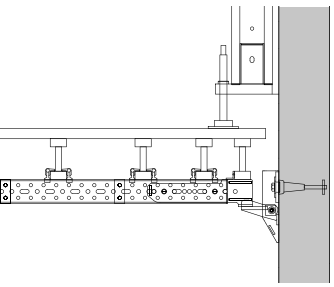
- Covers **large openings** and can be modified to **varying dimensions**.
- **Versatile** gravity pawl bracket adaptable to all MK waler types and lengths.
- **Easy adjustment** with multiple types of formwork.
- **Trailing platforms** can be added as necessary.



► KSP on folding brackets



► Gravity pawl bracket with concrete box out



► Adjustable folding bracket and anchor





# ENKOFLEX

## H2O WOOD BEAM SLAB FORMWORK SYSTEM



ENKOFLEX is a wood beam slab formwork **system adaptable** to most any type of slab and height configuration. Independent beams provide **great versatility**.

### KEY APPLICATIONS

- **Ideal for irregular geometries**, complex shoring layouts and compatible with other shoring systems with a minimum of infilling required.



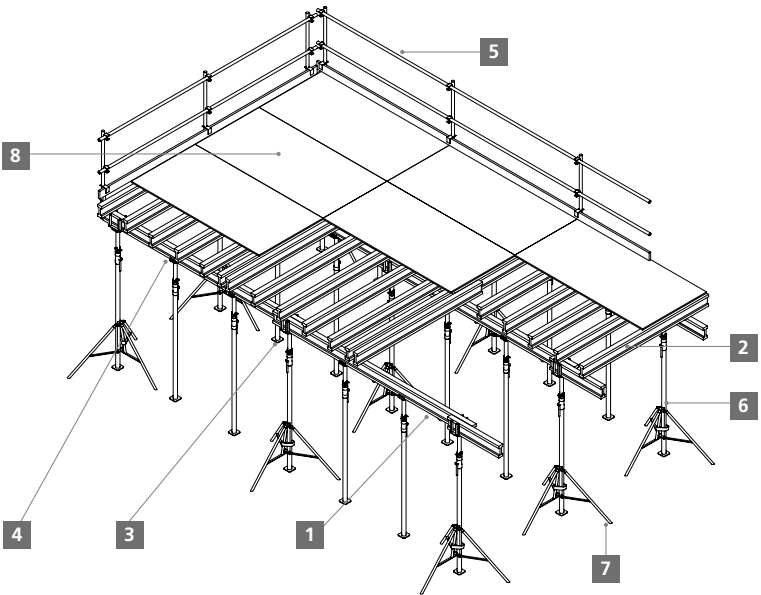
► Ideal for complex shoring layouts



► Adaptable to all types of geometries

### COMPONENTS

- 1 Main: H20 wood beams or aluminum stringers
- 2 Secondary H20 wood beams
- 3 Universal stringer head: Two Way U-head
- 4 Single head VR
- 5 Safety handrail
- 6 Prop (EP Prop or ALUPROP)
- 7 Tripod
- 8 Plywood



### BENEFITS

- **Simple and easy to assemble.**
- **Few system components:** H20 wood beams or aluminum stringers, heads, props and plywood.
- Achieves **highest concrete finishing requirements** as any type of plywood can be used based on job requirements.
- **Great versatility for different slab geometries, thickness and heights** based on beam grid layout and shoring used.
- ENKOFLEX can be supported with props or frame shoring, depending on height requirements.
- **Durability:** H20 wood beams are fitted with plastic end caps that protect them against impact and moisture.



► Aluminum stringer supported by Universal Stringer Head and Stringer clip



► H20 beams forming two layers, main and secondary beams, supported by Two-Way U-Heads





## ENKOFLEX - H2O WOOD BEAM SLAB FORMWORK SYSTEM

### SOLUTIONS



► High capacity load bearing shoring with ALUPROP towers



► ENKOFLEX with Aluminum stringers and H2O wood beams as joists



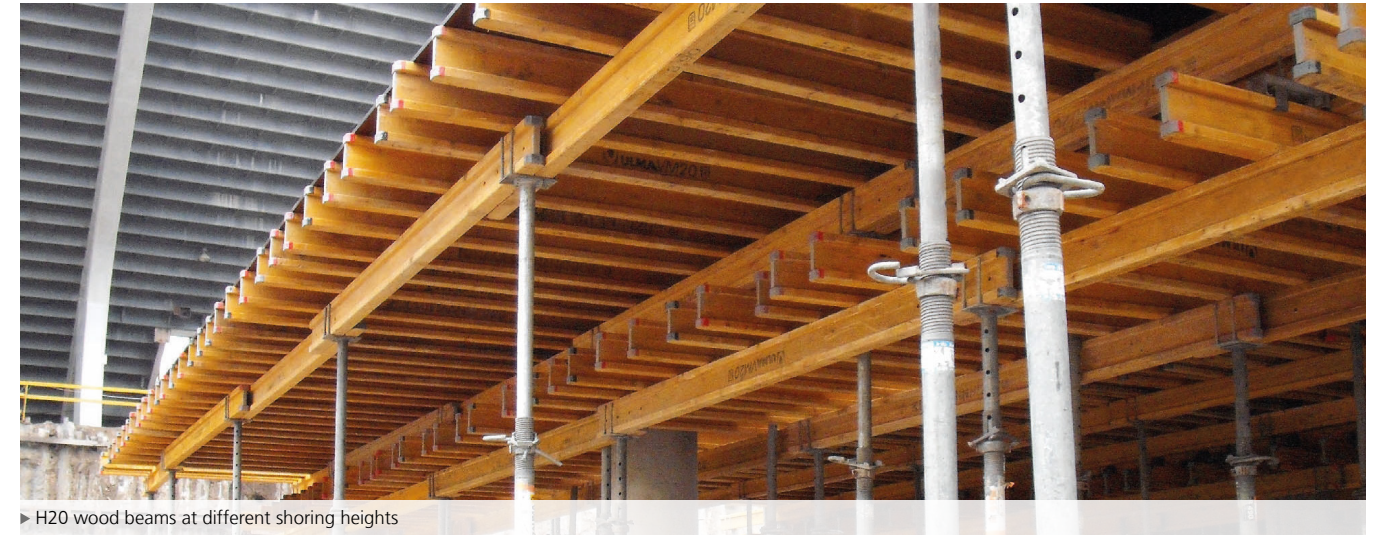
► ENKOFLEX shoring with EP Props



► H2O wood beams supported by frame shoring (MEGAFRAME)

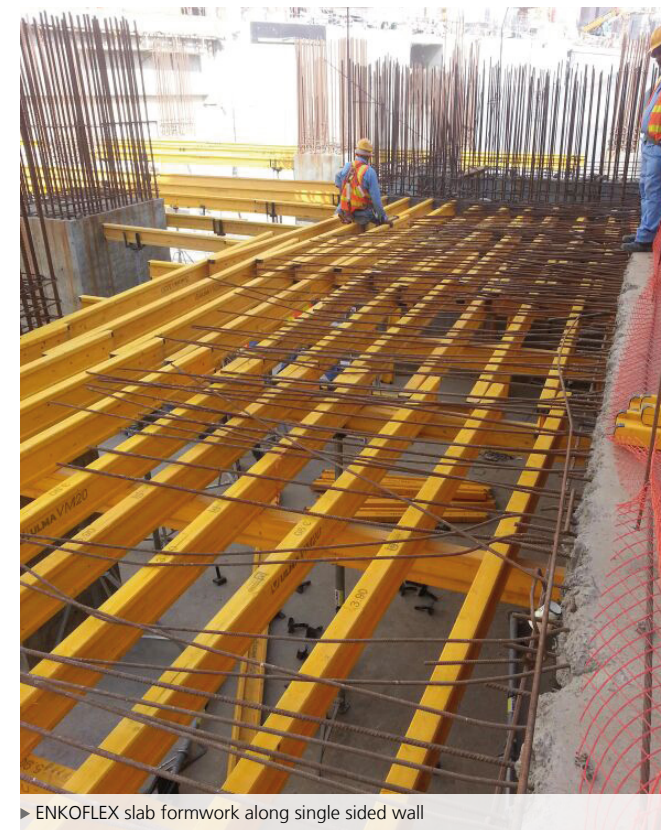
### SOLUTIONS

#### Drop beam



► H2O wood beams at different shoring heights

#### Infilling along walls



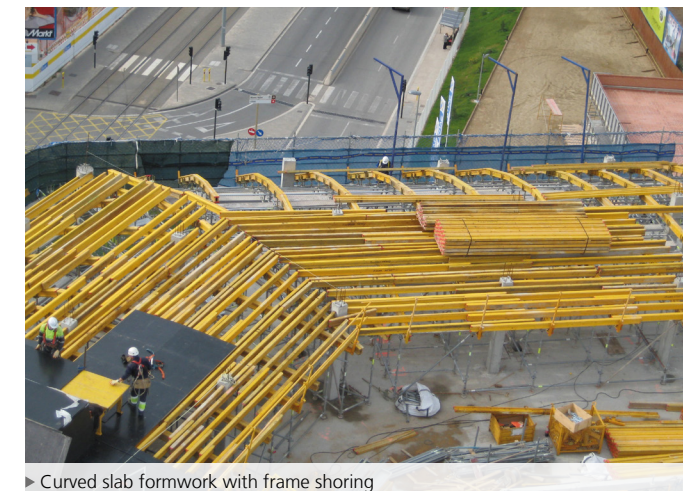
► ENKOFLEX slab formwork along single sided wall

#### Infilling around columns



► Plywood support for infills around columns

#### Curved slabs



► Curved slab formwork with frame shoring





# FORMADECK

## DROP HEAD SHORING SYSTEM



FORMADECK is a handset shoring system designed to **maximize labor productivity and reduce formwork cycle time**. The primary components include hi-capacity post shores with drop heads, girders, grid and LVL joists.

### KEY APPLICATIONS

- Projects where a **regular grid system will increase productivity** due to flat plate with long runs and limited number of drop beams.
- Large areas where geometry of the slab and column separation is regular.
- Projects where **shoring heights are under 20 ft. and can be shored using a grid system**.
- Projects where **fast shoring cycle time is required**. Drop head system allows fast system assembly and stripping, saving time and minimizing on-site material requirements.



► Main grid assembly

### FEATURES

- FORMADECK's drop head provides a **safe and faster early-retrieval system** than "rotary" style stripping mechanisms.
- A single, unimpeded, square **hammer blow can disengage the loaded wedge**, dropping the girders and joists 4 inches for fast and easy removal.



► FORMADECK's Drop head



► A hammer is the only tool needed to install and strip system

- System accommodates soffit heights from **7' - 6" to 14' - 1"** with EP Props and from **6' - 6" to 20' - 8"** with ALUPROPS.
- Can support a **10" thick concrete slab on a 8' x 8' grid** and a **14" thick slab on a 6' x 8' grid** throughout the entire post range and up to 36" thick throughout post range with standard equipment.

### BENEFITS

#### Productivity

- Provides a **high level of productivity** through the use of 8' x 8' and 8' x 6' grid patterns.
- **Reduces labor needed** to erect and disassemble system. Two workers can erect up to 588 ft<sup>2</sup> per hour (8' x 8').
- **Drop head design allows majority of the system to be cycled for next pour** reducing on site equipment needs (Joist, girder and grid joist). Drop head mechanism allows props to remain in place as re-shores.



► Top view of the system



► ALUPROPS as re-shores





# FORMADECK - DROP HEAD SHORING SYSTEM

## BENEFITS

### Easy to use

- **Fewer components** simplifying erection/assembly procedure.
- The drop head allows for changing direction of girders and joists by 90°. This characteristic makes the system **versatile and simplifies infillings**.
- **Easy jobsite handling of materials** with provided carts.
- **Easy to handle** light weight aluminum components.



► Provided carts



► Wide open bays

### Safety

- Drop head mechanism **minimizes hazard of falling plywood during stripping**.
- Light weight system components provide overall ease of use and results in **reduced worker fatigue and down time**.
- System is **erected and dismantled from beneath the slab to be poured**.
- The assembly is **secured with a hold down bracket in order to avoid cantilever girder overturning**.



► Safe installed from below deck



► Hold down brackets for cantilever conditions

## SOLUTIONS

### 90° Assembly

- The drop head allows for the changing direction of girders and joists by 90°. This means that **the direction of the formwork can be changed wherever necessary**.



► 90° assembly

### Perimeter detail

- The post socket at the end of the cantilever girders permits the **installation of the required handrail system for perimeter conditions**.



► Perimeter detail

### Infilling around columns

- Column clip is being used **to form around a column**.



► Infilling around columns

### Slopes

- The system allows for sloping conditions, **up to 10% slopes in each direction**.



► Slopes





# CC-4

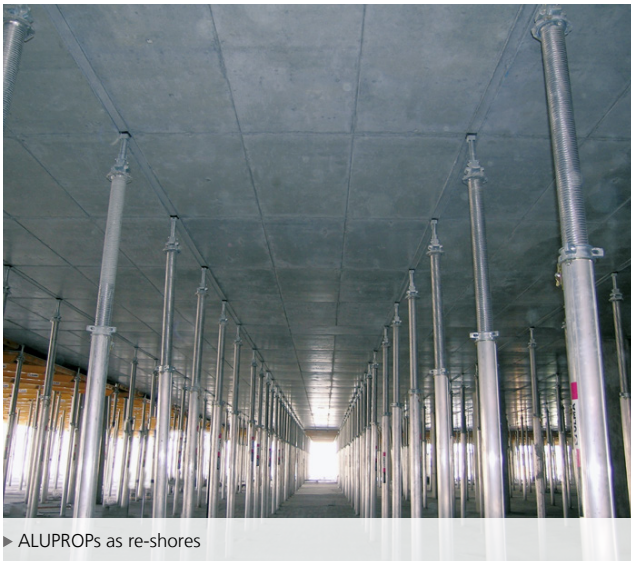
## PANELIZED ALUMINUM SHORING SYSTEM



Light, safe **panelized drop head shoring system** with **high productivity** and excellent concrete finish.

### KEY APPLICATIONS

- Ideal for **large slabs with regular geometry** and spans between columns, and for **high quality finish** requirements.



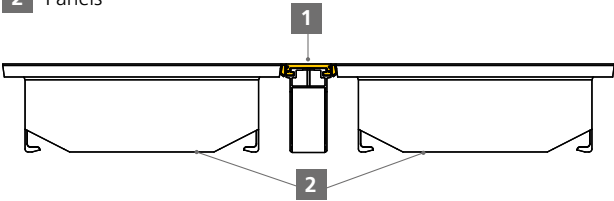
► ALUPROPS as re-shores



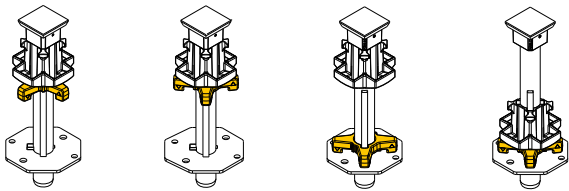
► Recoverable structure

### FEATURES

- 1 Transversal CC TE
- 2 Panels



- **High Efficiency:** minimizing on-site equipment needs. Drop head design allows majority of the system to be cycled for next pour.
- Significantly **reduces amount of plywood needed.**
- Drop head mechanism provides safe and fast stripping; lowering panels, beams and transversals 6 inches for easy equipment retrieval.



- A **prop rate of 37 ft<sup>2</sup>/prop** can be achieved with main grid: 7' - 7" by 4' - 11" .
- **Watertight joints between panels** to prevent concrete leakage.

### BENEFITS

- **High level of productivity** due to **lightweight components**, providing overall ease of use, resulting in reduced worker fatigue and down time.
- The phenolic formface provides **superior concrete finishing.**
- Secure stripping and **material retrieval without falling to the ground;** greater worker protection.
- **Safety: system can be erected and dismantled from beneath the slab to be poured.**
- Drop head mechanism allows props to remain in place as re-shores after slab formwork has been retrieved.
- **Stability:** Main grid, consisting of beams and transversals can be assembled prior to panel placement.
- Easy and safe handling of equipment with provided racks and pallets.
- **Great flexibility:** it allows a **change in beam direction of 90°** whenever necessary. This characteristic makes the system versatile and simplifies infills.
- **Efficient solutions for infillings** at column and wall, perimeter protection and safety.
- Can **support slabs up to 35 inches thick**, depending on selected grid size.



► Safe assembly and dismantling from below





## CC-4 - PANELIZED ALUMINUM SHORING SYSTEM

### SOLUTIONS



► Main grid assembly



► Several teams for the assembly of grids and panels can work simultaneously improving productivity



► The post socket at the end of the cantilever beams allows installation of required handrail system for all perimeter conditions



► Column Infills - CC-4 offers many possibilities for the support of plywood in infill areas

### SOLUTIONS



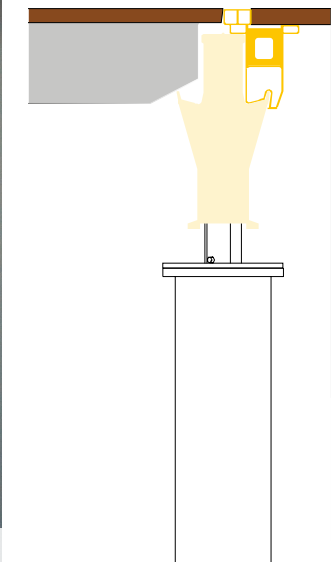
► Change of formwork direction optimizes its layout and reduces infillings



► CC-4 panel system supported by ALUPROP towers



► Infills at walls with edge beam as infill plywood support



► Starting from a wall with panel at the edge





# VR TABLE

## MODULAR SHORING SYSTEM



This system consists of steel beams and secondary wood beams, decked with plywood and supported by props or shoring towers. The steel main beam eases the design of special perimeter tables and solutions for drop beams and high load capacity tables for thick slabs.

### KEY APPLICATIONS

- Perfect for projects with **high demand for safety, efficiency, and quality finishing.**
- **Adapts to most any slab geometry.**
- Horizontal slab formwork especially suitable for projects with:
  - High number of repetitions.
  - Large slab areas.
  - Where slab and columns layout is the same on successive floors.
  - Accessible (open) façade.
  - **High productivity requirements, especially in high labor cost markets.**



► Optional metal main beam with a folding and locking system for props

### BENEFITS

- Can be moved **from one location to another without stripping**, using trolleys or by crane. Reduces time and risks during assembly and stripping.

#### High efficiency:

- Tables available with pre-defined dimensions or fitted for special solutions, depending on requirements.
- **Quick formwork erection, stripping** and equipment transport requiring less time and labor.
- Easily compatible with ULMA's complete shoring portfolio.

#### Versatile system:

- **Available with fixed or swivel heads.** If prop folding is required to overcome slab perimeter beams or parapets when moving tables, a swivel head VR is available.
- Easily configures around drop beams, column heads, drop panels and other slab geometries.

- Easy and safe cantilever solutions, due to specific prop arrangement.
- Easy infills (plywood rests on beams projecting from tables).
- Table **support with EP props, ALUPROPS** or frame shoring.

#### Safety:

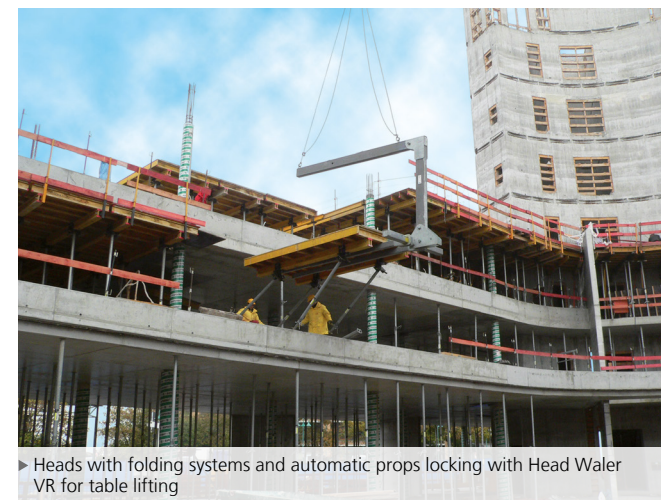
- **Complete formwork assembly** including plywood and guardrails for perimeter tables **on ground level**, except for infills during the progress of the project.



► Lifting and installation of tables with attached handrails



► Safe solution for perimeter formwork



► Heads with folding systems and automatic props locking with Head Waler VR for table lifting



## VR TABLE - MODULAR SHORING SYSTEM

### SOLUTIONS

#### VR Table configuration with MK



#### Different supports



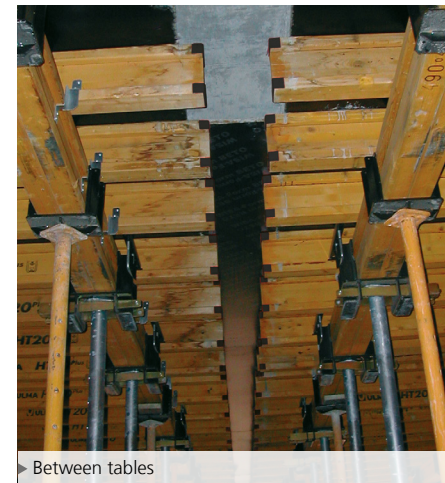
► With EP Props



► With ALUPROPS

### SOLUTIONS

#### Infilling



► Between tables



► Along walls



► Around columns

#### Perimeter solutions



#### Drop beams







# ALUPROP

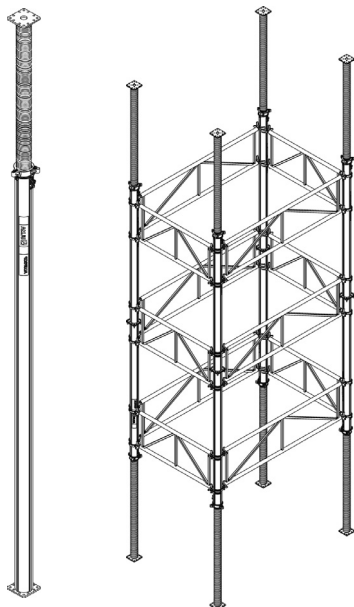
HIGH LOAD CAPACITY ALUMINUM PROP



ALUPROP props have **high load-bearing capacity** are **light in weight** and provide a wide range of shoring solutions. ALUPROPs are designed to **shore horizontal formwork** and to meet other shoring requirements, including re-shoring.



► ALUPROP props and towers



## KEY APPLICATIONS

- Designed for shoring and reshoring of slab formwork systems. Bracing frames are available to erect shoring towers.

## FEATURES

- **Maximum height** with single prop: 19' - 8" (22' - 11" with a 3' - 3" in ALUPROP extension).
- **Maximum load** (at 3 to 1 safety factor)
  - At minimum extension with 1.65 prop 20,700 lbs.
  - At maximum extension with 4.5 prop (without ALUPROP extension) 7,100 lbs.
- **ALUPROP Towers**
  - Shoring towers can be made by joining the ALUPROP props and the bracing frames. Greater stability is achieved allowing the building of tall shoring towers and increasing working loads.
  - **Maximum height** permitted for ALUPROP towers: 39 ft.
  - Tower components: Bracing frames, ALUPROP posts and ALUPROP clamps and Joined props.

## BENEFITS

- Lightweight aluminum prop.
- **High load-bearing capacity.**
- Inner tube captured by outer tube.
- **Easy and quick** length adjustment.
- Dual height adjustment (top and bottom), possible with the use of ALUPROP spindle.
- **Self-cleaning thread design** facilitates the concrete that adheres to the thread.
- The props have a clip which prevents any accidental movement of the inner tube.
- **Versatile:**
  - Props can be braced with bracing frames or bracing hooks and tubes.
  - **Props can be combined to form shoring towers for building high slab formwork.** Bracing frames are easily attached to the outer tube of the prop with bracing hooks and wedges already built in to the bracing frame.
  - Shoring towers can be assembled in horizontal position on the ground. Subsequent lifting and placement is performed by crane, creating ergonomic and safe working conditions.



► Fastening clip



► ALUPROPs props with ALUPROP extensions



► ALUPROP tower lifting





## ALUPROP - ALUMINUM PROP

### BENEFITS



► Safe and easy ground-level assembly



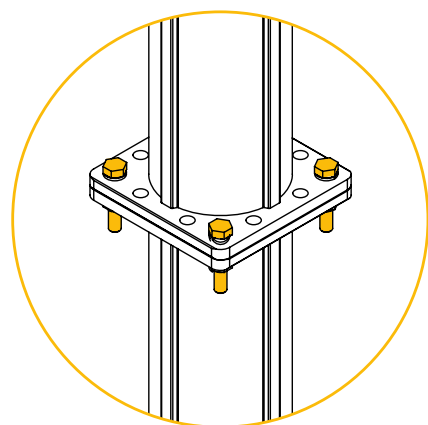
► Bracing between ALUPROP props and towers using tube and clamps and/or with bracing frames

### SOLUTIONS

#### Configurations

##### • Joining Props:

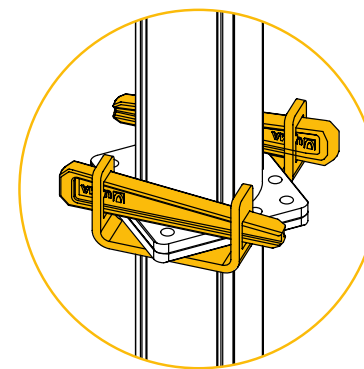
- Joints between: two ALUPROP Props (Maximum height: 39 ft).
- ALUPROP and an ALUPROP 39 inches (1 m) extension.
- ALUPROP and an ALUPROP spindle.



► With bolts

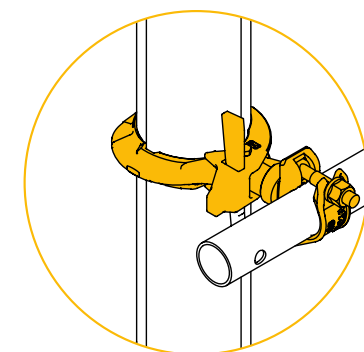


### SOLUTIONS

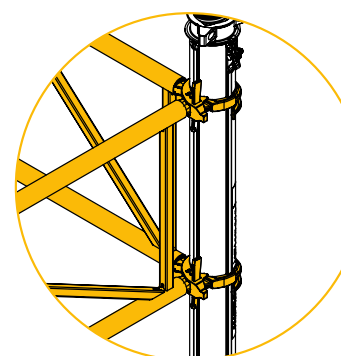


► With ALUPROP clamp

#### • Bracing between ALUPROP props and towers



► With bracing hook and tube



► With bracing frames







## ALUPROP - ALUMINUM PROP

### SOLUTIONS

#### Slab formwork with ALUPROP

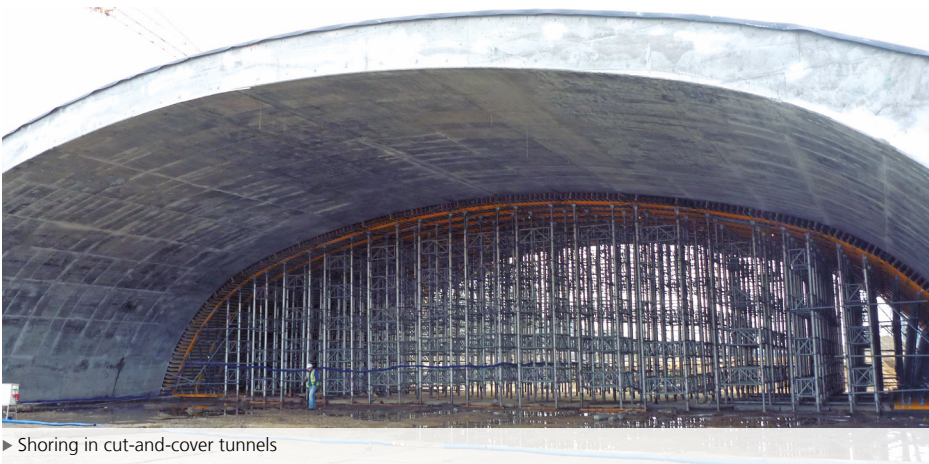


► VR Table pre-assembled slab formwork with MK waler



► VR Table pre-assembled slab formwork with H20 wood beam

#### Other uses of ALUPROP in shoring



► Shoring in cut-and-cover tunnels



► Shoring in bridges



► Shoring in single-sided wall formwork



► Shoring in inclined walls

## EP STEEL PROP



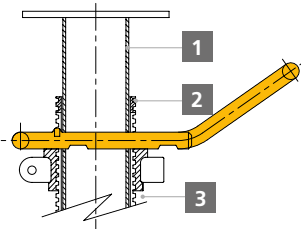
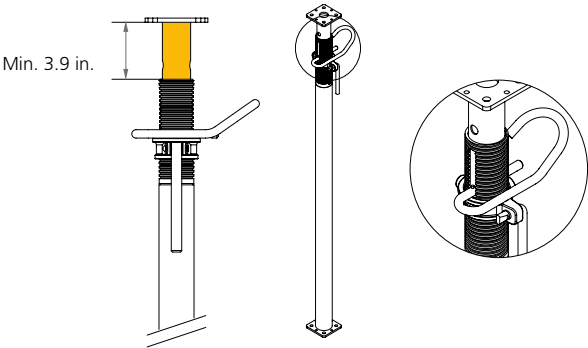
Adjustable telescopic galvanized **steel prop**.

### KEY APPLICATIONS

- Designed for shoring and reshoring of slab formwork systems.

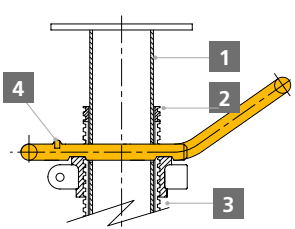
### BENEFITS

- The prop is **hot-dip galvanized** to provide excellent corrosion protection and long service life.
- Inner tube, pin and nut protected against accidental disengagement.
- A **fast-striking system** incorporated into the pin.
- The collar nut has a thread designed to remove dirt and concrete remains.
- Clearance length of at least 3.9 inches, between the highest part of the outer tube and the bottom of the endplate to prevent workers from having hands trapped.
- **Quick and accurate height adjustment.**



#### Pin in working position

- 1 Inner tube
- 2 Threaded part
- 3 Nut



#### Pin in striking position

- 1 Inner tube
- 2 Threaded part
- 3 Nut
- 4 Pin stop





# MEGAFRAME

## 10,000 POUND PER LEG FRAME SHORING SYSTEM



MEGAFRAME is a 10,000 pound per leg (20,000 pound per frame) galvanized steel frame handset **shoring system designed to work most efficiently on a great variety of construction projects.** There are just a few components in this system which makes it easy to identify parts and increase efficiency.

### KEY APPLICATIONS

- **High-floor or high-shoring height applications** such as in building lobbies, mechanical floors, and water storage tanks.
- Multiple shoring heights **where there are drop beams and column capitals.**
- **Irregular-shaped areas** where grid shoring systems would not be practical.



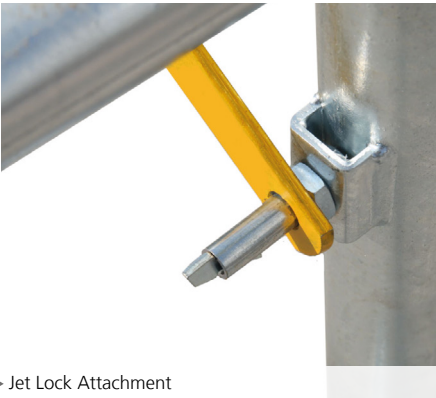
### FEATURES

- **10,000 pound capacity per frame leg** (3 tiers high with a combined total screw leg extension of 24-inches top and bottom using a 2.5 to 1 safety factor).
- **Three sizes of braces that separate the frames** in 4, 6 and 8 foot lengths to make shoring towers.



- **Screw legs have 20 inches of adjustment.**

- **Galvanized** frames and components.



► Jet Lock Attachment



► Color-coded Braces



► Tie-Off Plate





# MEGAFRAME - 10,000 POUND PER LEG FRAME SHORING SYSTEM

## BENEFITS

### Productivity

- **4', 5' & 6' high frames** accommodate most all shoring heights.



► Frames available in 2 and 4 feet widths

### Easy to use

- **Fewer components required** simplifying the assembly process.



► Two Tie-off plates are located on each frame

### Safety

- **Tube and clamp components available for lacing and bracing** when additional stability is required.



► System easily accommodates sloping conditions

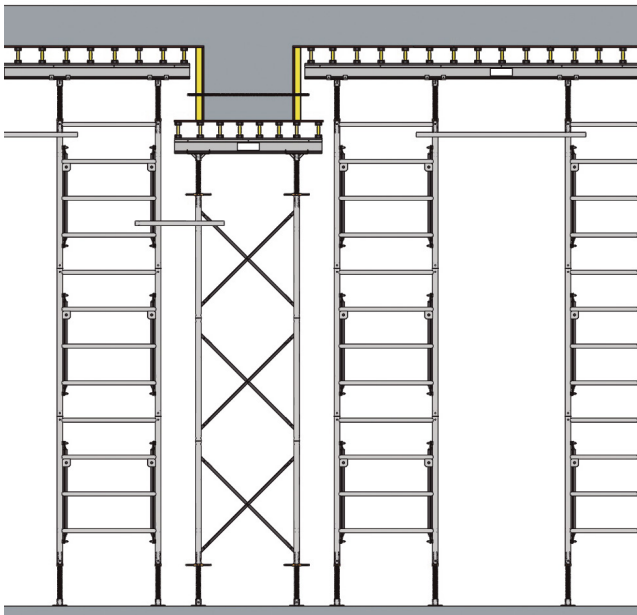


► Easy infills around columns

## SOLUTIONS

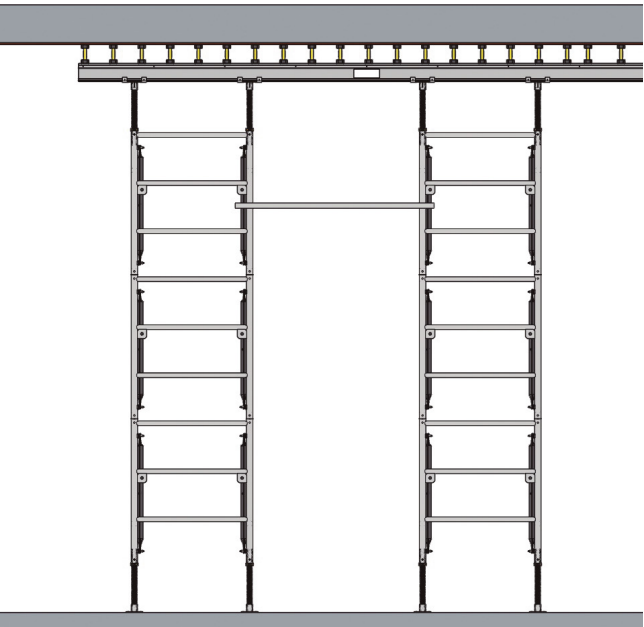
### Drop beams

- **Beam shoring must be braced for stability.** Beam forming must be designed and restrained from lateral movement with respect to the shoring. The contractor shall provide sufficient lateral support as necessary.



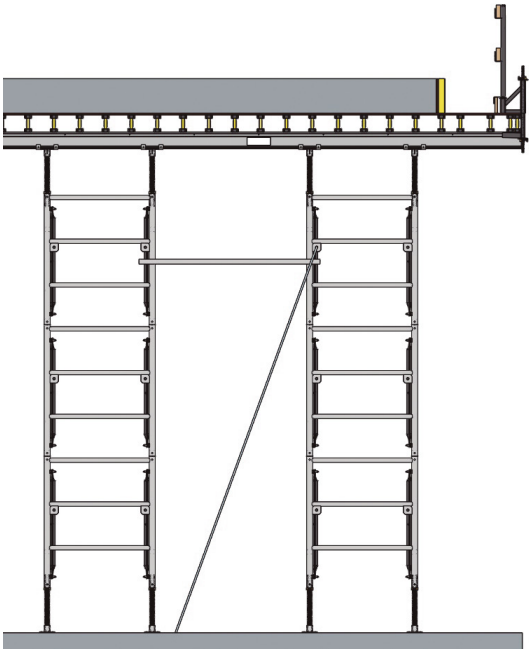
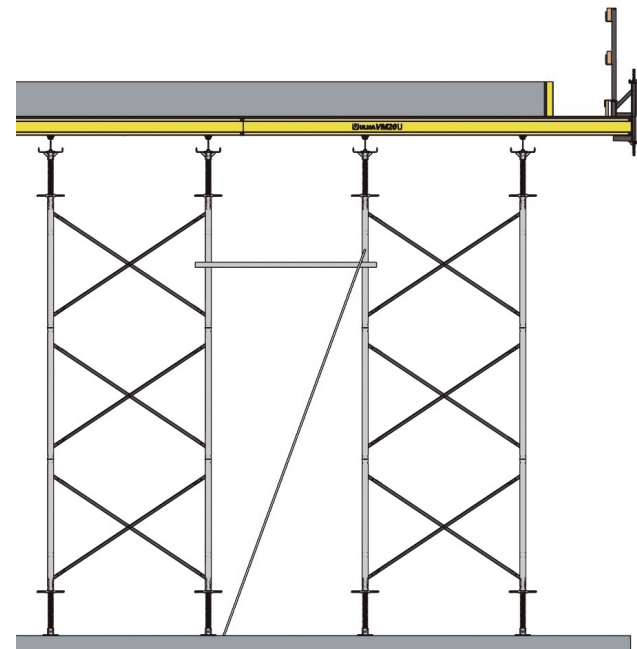
### Inter tower bracing

- **The shoring towers must be braced for stability at a height of more than or equal to four times the base dimension.**



### Perimeter

- **Perimeter shoring towers must be braced for stability.** Shoring is not designed to resist lateral forces. Contractor shall stabilize the shoring structure with adequate bracing against all such forces.







## HEAVY-DUTY SHORING SYSTEMS

# MK Shoring Systems



Heavy duty, high load bearing shoring towers.

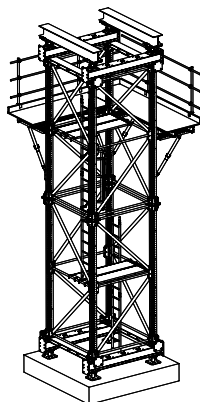
## KEY APPLICATIONS

- Shoring towers capable of supporting **high loads ranging from 15,000 lbs to 31,000 lbs** depending on height.
- Ideal for conditions that require high shoring towers.

## FEATURES

- Tower widths available: 2' - 4", 3' - 3", 4' - 10", 8' - 2", and 9' - 9".
- Tower combinations are achieved by selecting the above widths.

### MK-360 Shoring Towers



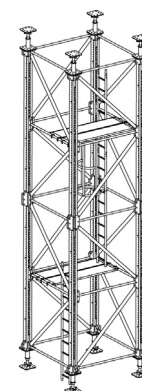
► Gantry shoring



► Shoring system for irregular slabs

## FEATURES

### MK-150 Shoring Towers

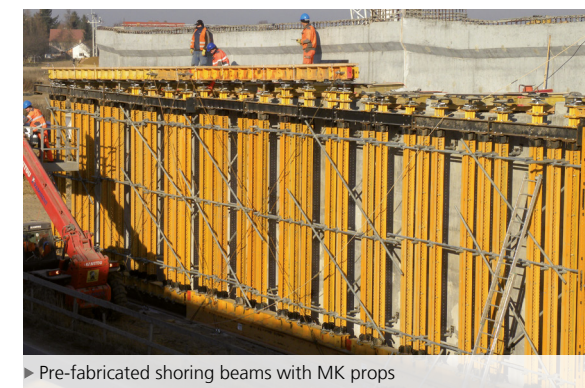


► Overpass shoring



► MK-150 shoring braces

### MK Prop Shoring



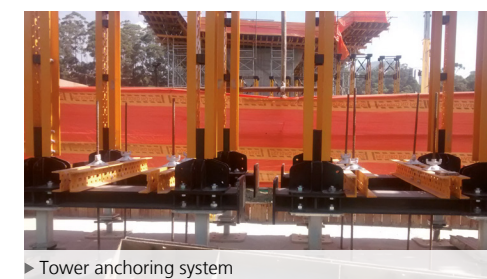
► Pre-fabricated shoring beams with MK props

## BENEFITS

- Quick and safe on-site assembly.**
- Can be configure as **independent or interconnected towers**.
- Few components** can create **a wide variety of tower configurations**.
- The use of independent jacks to achieve required high elevations.
- Tower base can be anchored to the ground** for increased load-bearing capacity.
- Different stripping options** at either the base or head:
  - Stripping with hydraulic jack at base and head.
  - Stripping with wedge at base and head.
  - Stripping with jacks at head.
- Optional cable-stayed system** connects towers and optimizes the assembly.
- Safety:** walkway platforms and guardrails can be installed anywhere on the towers with access ladders between towers.



► Walkway platforms



► Tower anchoring system



► Structural joints





## BRIDGE FORMWORK

# MK TRUSS

## CONFIGURABLE HEAVY DUTY TRUSS



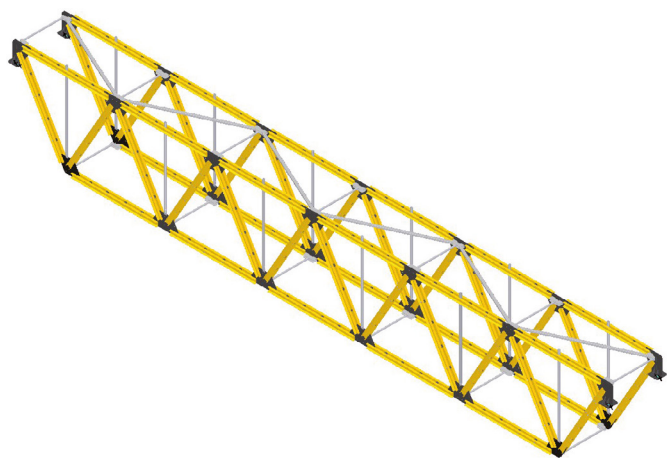
Adjustable to bridge shapes allowing for high elevations and gradients.

## KEY APPLICATIONS

- Truss structure designed to **bear heavy loads** with large spans between supports.
- Used to support horizontal formwork.

## BENEFITS

- **Easy to adapt to project requirements.**
- **Easy transport, handling, and assembly.**
- **Walers can be handled without a crane.**
- **Modular structure** of interconnected walers capable of adjusting to most project requirements.
- **Versatile:** can be modified to fit most bridge dimensions.
- Can be combined with ULMA's high load bearing shoring products (MK-360 and MK-150).
- **Safety:** attachable walkway platforms and safeguards.
- **Flexible and multifunctional:** can be used as a beam with dual supports, a continuous beam with multiple supports, or as a cantilever beam.



► MK Waler and accessories

## SOLUTIONS



► MK Truss used for gantry falsework



► MK Arch Truss



► Pier Cap truss



► Pier segment console



► Hanging console



► Reinforced trusses for large span between supports



► Large inclined slabs



► Pedestrian bridge made with MK Truss





## BRIDGE FORMWORK

# ENKOFORM HMK

## BRIDGE DECK FORMWORK



Bridge deck formwork adaptable to various geometries.

## KEY APPLICATIONS

- Advanced design to suit the different sections of bridge decks, overpasses and underpasses, and other horizontal structures of reinforced concrete.

## BENEFITS

- **Built to fit** and shape to different bridge configurations:
  - Bridges of constant and variable cross sections both solid and hollow.
  - Bridges of **variable deck depths**.
  - Bridges with **high elevations**.
  - Underpasses and overpasses.
  - **Incremental bridge construction**.
  - **Thick slabs**.
- **Fast stripping** of formwork units.



► Configurable ENKOFORM HMK

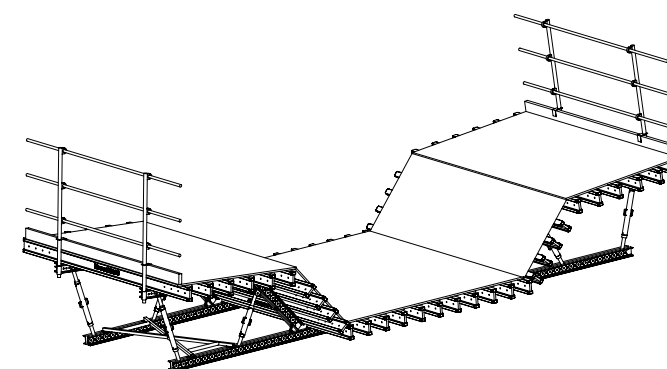
## SOLUTIONS



► Viaduct deck of variable depth



► Bridge deck on profiles



► ENKOFORM HMK as gantry falsework



► Incremental bridge construction using ENKOFORM HMK





BRIDGE FORMWORK

# CVS

## CANTILEVER FORMWORK CARRIAGE



Mobile cantilever formwork carriage for bridge construction.

KEY APPLICATIONS

- Mobile metal structure designed for building bridge segments.
- Construction of large span bridge decks and bridge arches where ground shoring is complex or not practical.

FEATURES

- Carriages with different load-bearing capacities in US tons.

Maximum Segment Possible (t)	Segment Length				
Carriage Type	16 ft	14'-9"	13 ft	11'-6"	9'-9"
CVS 165/4.5		200.2 t	220 t	244.2 t	275 t
CVS 200/4.5		242 t	266.2 t	299.2 t	337.7 t
CVS 165/5	200.2 t	217.8 t	242 t	266.2 t	300.3 t
CVS 200/5	242 t	264 t	290.4 t	323.4 t	363 t

BENEFITS

- Appropriate for spanning distances between piers up to 650 ft.
- Ideal for easily spanning riverbeds, road intersections, and sites where railways and motorways converge, etc.
- Bridge construction with a cantilever carriage is carried out in two phases: **pouring the concrete, then advancing the unit.**
- **Allows for varied span distances.**
- **Allows for varied deck thickness.**
- The formwork carriage is propelled by **hydraulic cylinders: movement is regular and repetitive.**



BRIDGE FORMWORK

# DECK FLANGE FORM CARRIAGE



KEY APPLICATIONS

- Efficient system for the construction of deck flanges on metal bridges and partially prefabricated structures.

BENEFITS

- **Heavy duty** structure with **high load bearing capacities.**
- **Quick work cycles.** Easy use and repetitive movements.
- Movement with auxiliary push or pull systems.



► Deck flange form carriage for bridge with steel core



► Lower deck flange form carriage





## BRIDGE FORMWORK

# PARAPET FORM CARRIAGE



► Carriage walkway



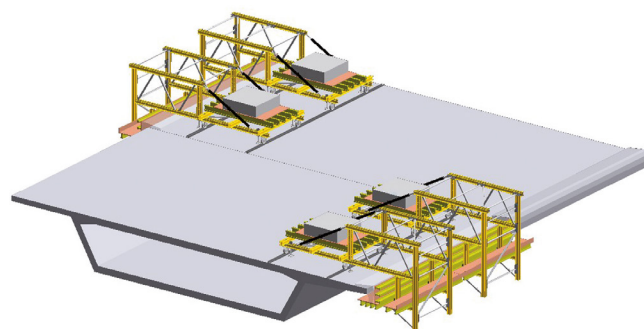
► Parapet forming and support

## KEY APPLICATIONS

- Designed for the construction of protection parapets for bridges or structures with low load-bearing requirements.

## BENEFITS

- Quick work cycles.** Easy use and **repetitive movements**.
- Manual movement possible.** Requires a permanent solid support foundation for the guide rail.
- Movement by auxiliary **push or pull systems**.



► Form carrier for the construction of bridge parapets



► Form carrier support and counterweight on bridge deck



► Parapet form carrier for use on deck edges and between two decks



## TUNNEL FORMWORK

# MK CARRIAGE FOR SUBTERRANEAN TUNNELS



The system supports high concrete pressures and can be moved manually as well as hydraulically.

## KEY APPLICATIONS

- Mobile carriage** combining shoring and forming in one structure, facilitating successive pouring in subterranean tunnels.

## BENEFITS

- Efficient and productive.** Composed primarily of standard reusable components.
- The formwork surface, made of **metal sheeting**, can **withstand high concrete pressures**.
- Concrete is poured around the MK carriage and vibrated externally.
- Fully configurable.** Sections adaptable to different shapes, pressures, and loads.
- Fast pace of construction** due to ease of use and repetitive movements.
- Manual or hydraulic advancement.**
- Available walkway platforms and safeguards.**



► Subway stations



► Road or train tunnels



► Mine shafts





## TUNNEL FORMWORK

## MK CARRIAGE FOR CUT-AND-COVER TUNNELS



Mobile MK carriage for tunnel projects.

## KEY APPLICATIONS

- Mobile structure for tunnel construction that combines shoring and forming to shape tunnel vaults.

## BENEFITS

- **Efficient and productive.** Composed mainly of fully-reusable standard components.
- Based on the MK system, which uses a variety of multipurpose elements to create an extremely **versatile structure with high load-bearing capacity.**
- **Fast paced construction due to ease of use and repetitive movements.**
- **Quick work cycles.** Easy use and repetitive movements.
- **Manual or hydraulic advancement.**
- **Available walkway platforms and safeguards.**



► Cut-and-cover tunnel



► Box section and underpass



► Transition tunnels



► Formwork carriage for walls



## H20 WOOD BEAMS



The design and the material used provides a light and durable product. Excellent as structural element for formwork and shoring purposes.

## KEY APPLICATIONS

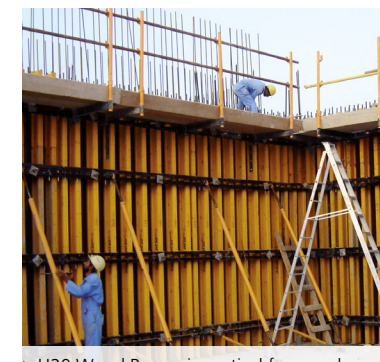
- **Applications: horizontal and vertical formwork,** bridge and tunnel formwork, working platforms.
- Used by many of ULMA's products such as: MEGAFRAME, ENKOFLEX, ENKOFORM V-100, KSP, HWS, VR-Tables, etc.

## FEATURES

- The complete beam is waterproofed using a water-repellent color glaze.
- The beams are in the shape of "I": 7.87 inches in height by 3.15 inches wide.

## BENEFITS

- H20 Wood Beams are **available in different lengths**, so that the most appropriate length can be chosen.
- Each beam is marked with the date of manufacture and length for traceability and identification.
- The double T-section with a height of 1.5 inches and a width of 3.14 inches resists strong impacts.
- Both beam ends are fitted with plastic end caps to protect them against impact and moisture.
- **H20 Wood Beams can be used as main and secondary beams.**



► H20 Wood Beams in vertical formwork







# HWS

## PERIMETER SAFETY SCREEN



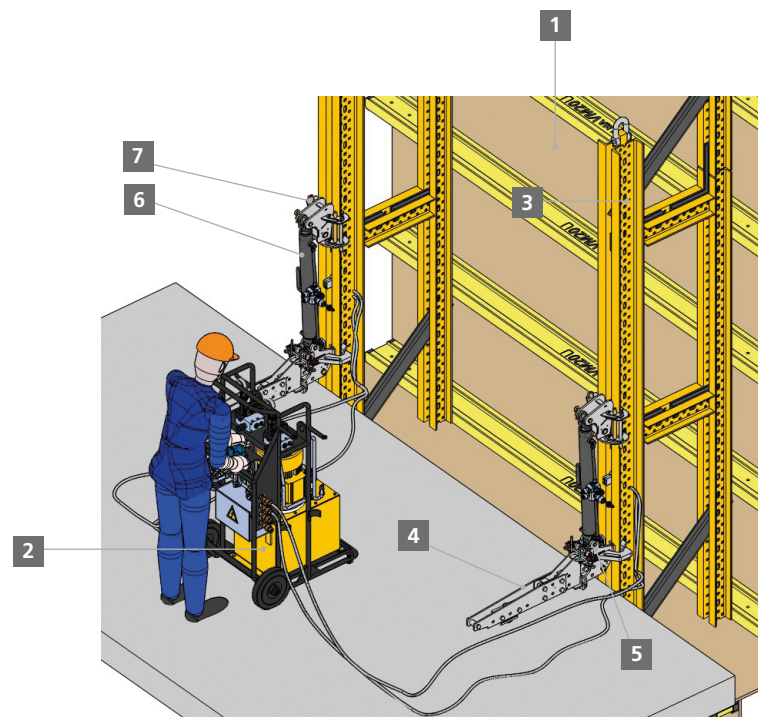
**HWS covers the perimeter of the level under construction as well as the two levels below.** As the building rises, the HWS is lifted by crane or by a hydraulic power unit. The HWS is adaptable to different geometries and configurations depending on project requirements.

### KEY APPLICATIONS

- Multiple configurations of perimeter protection

### Main System Components

- 1 Protection screen with different enclosures
- 2 Hydraulic power unit
- 3 Mast
- 4 Slab bracket LT HWS
- 5 Head LT HWS
- 6 Cylinder HWS
- 7 Climbing Head HWS



### FEATURES

- The HWS (Hydraulic Windshield System) is another solution based on the MK system (standard walers with simple connecting elements); which focuses on perimeter safety for high rise buildings.

### BENEFITS

- **Prevents falls** from the slab edge.
- Excellent **protection against inclement weather.**
- Reduces the visual height effect.
- **Versatility** of the MK system.
- **Adjustable cross-section:** working platform levels, dimensions, material unloading platforms and different types of protective sheathing.
- **Mesh protective sheathing.**
- Allows for the use of **exterior material lifting platforms.**
- Available working **platform for work** on slab perimeter.
- **Hydraulic self-climbing system** operates without crane assistance.
- **Can be anchored to slab or wall.**
- **Adapts well to the geometry of irregular slabs.**
- Completely encloses the entire perimeter.
- Provides large surfaces at height for **promotional messages.**
- Accessories shared with other MK systems.

### Anchorage of HWS to slab or wall:

- Slab anchor system
- Slab edge anchor system
- Wall anchor system



► HWS slab anchors



► Multiple configurations of perimeter protection



► Installation of HWS windscreen with working platform





**HWS - PERIMETER SAFETY SCREEN**

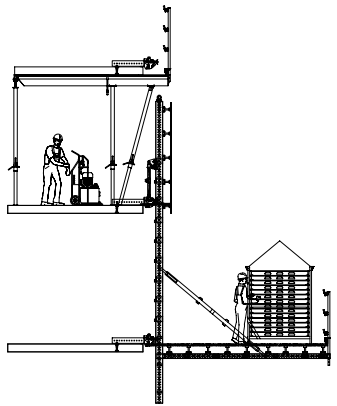
**BENEFITS**



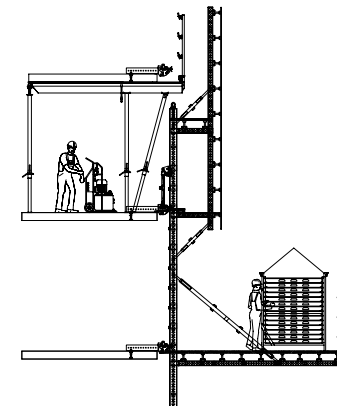
**SOLUTIONS**



HWS with **working platforms** for **material storage** and at different levels



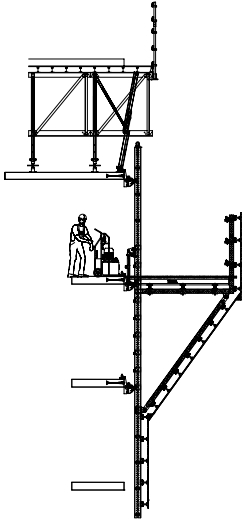
**Basic cross-section with platform** for material unloading



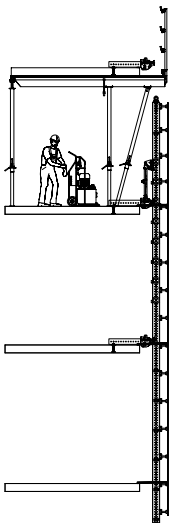
**SOLUTIONS**



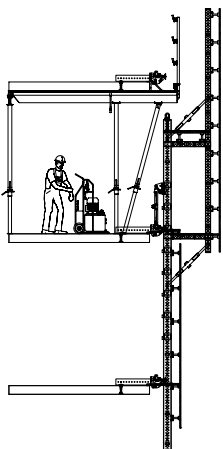
**Debris section:** slab extension for use as perimeter working platform and material storage area. Prevents debris from falling during formwork table removal and provides a large advertising area directed toward the street below.



Straight cross-section



HWS with **working platform**







# PERIMETER WORKING PLATFORMS

Perimeter working platforms are used on the perimeter of the building. **They are moved from one floor to the next as the building grows in height.** They act as formwork **support** for subsequent tasks such as closing walls or repair works on walls. **Formwork lifting** is separate from platform lifting.

## Single climbing bracket

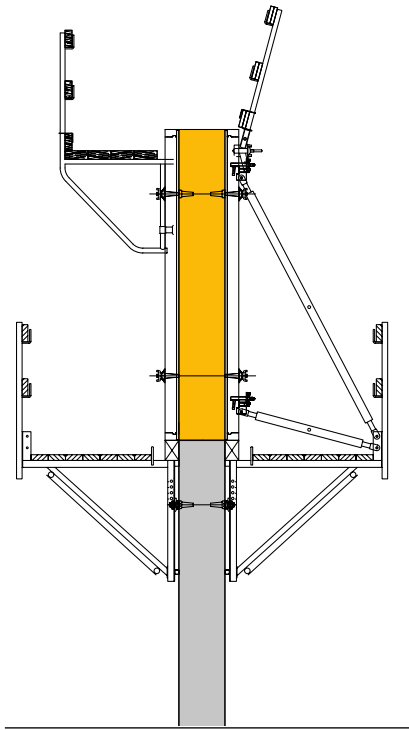


## KEY APPLICATIONS

- Used as **working platforms for pouring concrete** when building walls.
- **Ideal for straight geometries**, without corners, pilasters, etc.

## FEATURES

- For building construction.
- Platform **width: 4.26 ft.**
- Maximum formwork height: 12.7 ft.
- Load capacity class 2 (1.5 kN/m<sup>2</sup>) according to standard EN-12811.
- Anchorage to wall with AWF or DW15 cones.



# UNIVERSAL COLUMN PLATFORM

## COLUMN FORMWORK SAFETY PLATFORM

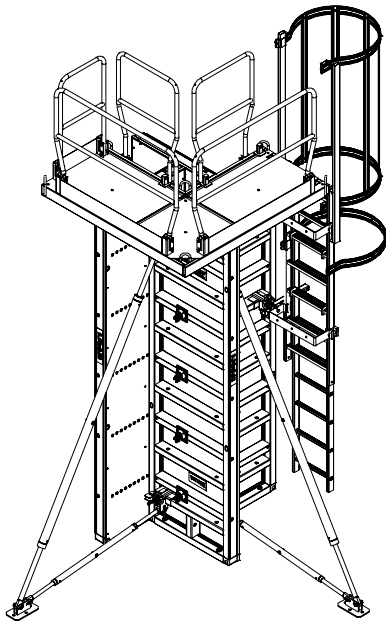
The Universal Column Platform is an auxiliary system designed to safely perform concrete pouring in column formwork.

## FEATURES

- Dimensions: 5.41 ft. x 2.46 ft.
- Maximum load: 1.5 kN/m<sup>2</sup>, class 2, according to standard EN-12811.
- Platform (main structure and outside handrails).
- Inside handrails.
- Ladder with cage protection.

## BENEFITS

- **Compatible with different ULMA column formwork systems:** ORMA, LGR, NEVI, LGW, **MEGAFORM, MEGALITE**, F-4 MAX and CLR.
- **Promotes safety** for the pouring of columns.
- **Simple and easy to erect and dismantle** on the ground as formwork panels.
- **One platform per column** for complete safety.
- **Adaptable** to any column size.
- **Direct attachment** to formwork panels (without lower support structure).
- **Entire platform perimeter protected** with inside handrails.
- Fixing brackets for different **access ladders**.
- **Folding** outside handrails (minimum volume of transport).
- **Built-in lifting elements.**







## WALL FORMWORK SAFETY PLATFORMS

### WORKING PLATFORM BRACKET

Supports walkway platforms and handrails.

#### BENEFITS

- **Easy installation** on vertical and horizontal ribs.
- **Plastic anchor** for nailing wooden planks.
- Compatible with other ULMA formwork systems.
- Width of walkway platform is approximately 3.28 ft. The height of the complete protection handrail is 3.5 ft.



## GUARDRAILS

### EDGE PROTECTION SYSTEMS

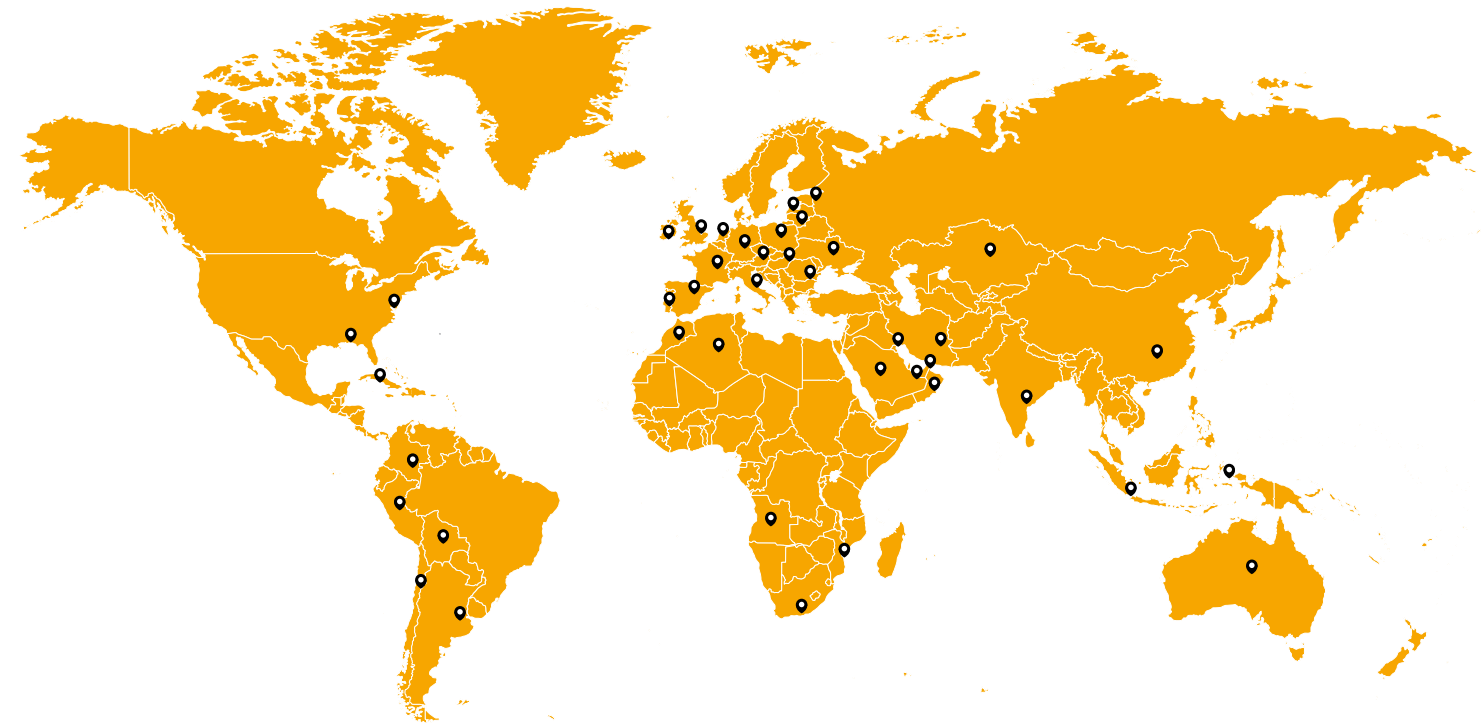
Provisional fall **prevention system for slab edges** suitable for both personnel and material.

#### BENEFITS

- Appropriate for **horizontal or inclined surfaces**.
- **Various heights available**, from 3.28 ft. to 4.92 ft., depending on needs.
- Different **attachments** such as clamps, hooks set in the formwork, or plastic anchors set in the slab.
- Handrails made with metal tubes.
- **Certified** for use with ULMA Slab Formwork Systems.



## ULMA CONSTRUCTION AROUND THE WORLD



#### HEAD OFFICE IN US:

16-00 Route 208 Suite LL4,  
Fair Lawn, NJ 07410  
Phone: +1 (201) 882-1122

#### NEW JERSEY WAREHOUSES:

58 Fifth Avenue,  
Hawthorne, NJ 07506  
Phone: +1 (201) 882-1122

172 E 7TH St,  
Paterson, NJ 07524  
Phone: +1 (201) 882-1122

295 Vreeland Ave.  
Paterson, NJ 07512  
Phone: +1 (201) 882-1122

#### MARYLAND BRANCH:

3600 O'Donnell Street, Suite 150,  
Baltimore, MD 21224  
Phone: +1 (443) 296-9852

#### MARYLAND WAREHOUSE:

2301 Grays Rd,  
Dundalk, MD 21222  
Phone: +1 (443) 296-9852

#### GEORGIA BRANCH:

1500 Winder Highway  
Dacula, GA 30019  
Phone: +1 (770) 910-7510

#### GEORGIA WAREHOUSE:

1500 Winder Highway  
Dacula, GA 30019  
Phone: +1 (770) 910-7510