



SUMMER 2010

Form & Function

NEWS & INFORMATION FROM HAMILTON FORM



Haunch girder with sloping soffit, at Bexar Concrete Works I in San Antonio, Texas.

PROJECT SPOTLIGHT

Dallas area light rail system requires Texas-sized formwork

The Dallas Area Rapid Transit Authority (DART) operates a 45-mile light rail system in and around the Dallas area. The system is recognized as one of the most successful urban light rail systems in the country. It connects points north, east and south of the city with the downtown area and has continually increased ridership and attracted new development as it has expanded. Thanks in part to funds from the American Recovery and Reinvestment Act (ARRA), DART launched a major expansion that will include rail service to and from the Dallas Fort Worth International Airport. When the expansion is completed in 2013, it will become a 91-mile system with more than 60 stops.

Precast/prestressed products for much of the project are being supplied by Bexar Concrete Works I, LTD. Jorge Hinojosa, P.E., M.S. of Bexar, chose Hamilton Form to design and fabricate the formwork.

“On a complex design/build project of this magnitude,” said Hinojosa, “the forming system plays a critical role in the project’s success. Hamilton Form has the expertise and experience in designing and fabricating complex forms for these types of major infrastructure projects.”

One section of the rail system will travel over a 550-foot precast/prestressed concrete bridge that spans the Trinity River levy, located just northwest of downtown Dallas. The main span of the bridge consists of a 260-foot clear span made up of two 97-foot long by 10 foot 10 inch haunch girders at the piers and a 160-foot middle “drop-in” beam section. The end and center spans of the bridge utilize typical TX82 girders.

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TX82 girders with sideforms removed.



Haunch girder sideforms being placed on casting bed.

Dallas area light rail system requires Texas-sized formwork

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Haunch girder formwork with header.

allow three beams to be set-up at once so that the sideforms could leap-frog down the soffit for additional pours.

The soffit for the beams was unique due to the atypical bottom width of 33 inches. Hamilton Form designed the understructure of the soffit so it could be modified to a more common 32 inch width after this project is completed.

Hamilton Form fabricated 82 inch sideforms for the typical girders with Vibrotrack installed low on one side and high on the other side to provide uniform concrete consolidation. To improve productivity, Bexar was supplied with enough soffit to

For the haunch girders used at the piers, Hamilton Form designed a variable height soffit configured to the profile of the bottom of the beam. The configured soffit allowed the 11 foot 2 inch tall sideforms to be built as a rectangular profile, providing better stability and ease of handling. Sealing of the form against the soffit was accomplished by a thru-tie system located 2 inches below the bottom casting surface. For shipping and handling considerations, the haunch girder was post-tensioned rather than prestressed so that the form required end blocks. Two pour openings were provided to prevent the concrete from dropping the full height of the form during the pour.

“The forms were delivered on time, performed as expected and have helped the project stay ahead of schedule,” notes Jorge Hinojosa of Bexar Concrete Works. “We never have any doubts in Hamilton Form’s ability to deliver.”



BETTER SOLUTIONS require detailed information.

Hamilton Form is a custom form and equipment manufacturer. This benefits our customers because we provide customized solutions that are more efficient and effective than an off the shelf solution. Most of these solutions begin with a request for a quotation. Hamilton Form quotes hundreds of forms each year — from the very simple to the highly complex.

Many variables are associated with the design of each form. Our goal is to prepare an educated — and accurate — proposal based on specific criteria provided by you. Sharing as much detail as possible with us will help us develop the most productive and cost-effective solution. Below are some things you can provide to help us generate an accurate cost estimate:

• Project and product details

Tell us what you want to cast, the number of pieces required and how long you plan to use the form. If you are purchasing formwork as a capital investment for a typical product and plan to keep the form in service for many years, Hamilton Form excels in this area. We build formwork that is rugged and durable. In fact, some

Hamilton Form customers are still using forms that are 20 — or even 30 — years old.

On the other hand, if you need to cast only a limited number of products and plan to retire the form after the project, tell us. We may be able to design the form with a lighter under structure or skin material that will meet your requirements.

• Product drawing

Nothing is more useful than a product drawing. It helps us understand your project and your needs, and gives us a good look at your anticipated final product.

• Bed length or number of products you want to pour at a single time

How many products do you want to produce on the bed? Pay close attention to those that are heavily stressed or labor-intensive at set up — they may prove more cost-effective if cast in multiples.

• The stressing capacity of the form and the strand pattern

How many strand will your product require? What strand pattern has been specified?

The strand location, pattern and size of strand greatly influence the design of the formwork. Taking time to provide us with at least a preliminary pattern can save time and duplicate estimates.

• Flexibility

Are you hoping to cast multiple products by modifying the form? We can help you maximize your investment, without compromising functionality by adding block outs, risers, magnetic side rails and other features to build-in flexibility.

• Equipment needs

What production equipment do you plan to use? It’s good for us to know before we get started so that our final design complements your operation. Remember, Hamilton Form is more than just a formwork supplier. We also build custom equipment to help mechanize production and improve efficiencies.

In our business — and yours — the devil is in the details. The more we know, the better able we are to design the custom formwork, custom equipment and practical solutions you need to achieve the best results.

Handling sideforms

In recent years the bulb tee and haunch girder sections have become more prominent in bridge design. Due to their configuration handling these sideforms can be challenging. To strip, the sideforms need to be pulled straight back. This can easily be accomplished with a roller system. Another option is to pull back and lift the sideforms with a crane. When handling sideforms with a crane, Hamilton Form has developed different styles of vertical lifting apparatuses that we refer to as a “VLA.”

Two common types of VLAs are the plate style and the tube-in-tube. The plate style is C-shaped with holes that fit into a socket built into the sideform. The bottom section of the plate is inserted into the socket and locked in with a pin. The top hole is used for attachment to the crane. The tube-in-tube style has a structural steel tube welded onto the shelf angle of the form. A smaller tube locks into it and has an attachment point for the crane.



The picking points for the VLA are placed directly above the center of gravity so that sideforms hang vertically, optimizing handling of large, cumbersome sideforms. Some customers opt for a few sets of VLAs and use them on multiple sideforms. Others connect a VLA to each section of sideform and leave them in place, eliminating the need to store the VLAs and eliminating the attachment step from their set-up and stripping process.

Sideforms at Bexar Concrete Works I in San Antonio are easily handled with Hamilton Form VLAs.

Anchoring and clipping forms

Proper anchoring is critical to the performance of your formwork. Formwork can be permanently damaged, product quality affected and safety compromised if your forms are not properly anchored and clipped. Anchoring becomes even more critical on long-line, heavily stressed beds.

Forms must be fixed at the centerline to prevent longitudinal movement of the form at the center. Formwork shortens when it is stressed and lengthens when de-tensioned. Steel forms also move by expansion and contraction with temperature changes. This is especially significant if you are heating your beds. Anchoring or fixing the form at centerline distributes the longitudinal movement toward each end, splitting the

movement in half. A long-line form (120 feet or more) should be permanently anchored at the center 5 or 10 feet of the form. The remainder of the form MUST be clipped down to provide resistance to uplift forces while allowing the form to move longitudinally.

After the center of the form is fixed, clip it down every 5 feet on both sides of the length of the bed. Self-stressing forms should be clipped every 30 inches on the end 10 to 15 feet of the bed for added resistance to uplift at this critical area.

A properly anchored form is easier to strip, produces better product and protects your investment in formwork.



St. Louis Prestress recently installed a 320-foot Box Beam bed. This photo is a good example of how a self-stressing form should be clipped down, with welds on the side of the shims as well as the toe to constrain the form laterally, while permitting longitudinal shortening when the bed is stressed.

Dick Oliphant: CFO

Dick Oliphant has managed the credit, finance and accounting for Hamilton Form since 1972. He also serves as the company's IT Director. Dick is a native Texan; born, raised and educated in the Lone Star State. Dick graduated from SMU (Southern Methodist University) in Dallas. Although his degree is in accounting, Dick always did well in math and science and almost went into engineering. Ironically, his first position was with a consulting engineering group. A few years later, Dick came to Hamilton Form and again, found himself working with a staff of engineers.

The engineer in Dick led him to build his own radio equipment and become a HAM radio operator while still in high school. As a testament to the influence of the media on our lives, Dick was a big fan of the TV series *Sea Hunt*; that led him to become a diver. Always the adventurer, he has made diving trips to Micronesia, Palau, Venezuela, Bonaire, Honduras, Costa Rica and Mexico. To this day, Dick remains a fan of the sea and enjoys water sports. In addition to his under sea adventures, Dick also loves to fly and earned his private pilot's license in 1978.

Music is an important aspect of Dick's life. He began his musical career at age 8 when he took up the trumpet and the French horn. Later, he played guitar, banjo and the mandolin. This year, he is learning the piano. (His wife is hoping he skips the drums.) Dick is also an a cappella singer. In 2005 he joined a group of friends to form a barbershop quartet named *Killin' Time*. They are members of the Barbershop Harmony Society and have competed and placed in many competitive events and shows. The group frequently performs, especially during the Christmas Holidays and Valentine's Day, as well as at birthday parties, anniversaries and weddings. Stop by Hamilton Form's offices on a Tuesday evening and you may catch one of their rehearsals.

On weekends you will find Dick and his wife, Linda, at their second home on the water in Galveston. The home was heavily damaged during Hurricane Ike in 2008 and is keeping Dick busy rebuilding and remodeling. When Dick is not at the coast, and not at Hamilton Form, he can be found on 12 acres in Cleburne, Texas. Over the years he has raised cattle, kept horses, dogs, cats and other assorted barnyard animals. He also raised three daughters and has three grandchildren and two great-grandchildren.



Eighth Air Force Museum Mall of Memories

Hamilton Form is involved in building forms for a variety of different projects. One simple and yet unusual, is a brick form for the 8th Air Force Museum. To fund the museum, engraved bricks that line the perimeter of the airfield at the museum can be purchased. Bricks are engraved to honor those who have served or are serving our nation and to recognize organizations that support our men and women in the military. The form to cast the bricks was donated by Hamilton Form and delivered to a precaster near the museum who uses leftover concrete to pour the bricks. The bricks are delivered to the museum where they are sold, engraved and installed on the Memorial Walkway.

To find out more about the Mall of Memories Brick Program; visit the 8th Air Force Museum website: <http://www.8afmuseum.com>





Artist rendering of the Woodall-Rogers Park being built over a major freeway that will run under the park in Downtown Dallas.

Precast planters contribute to urban landscape.

“Light rail systems, bike ways, pedestrian paths, greenspace...” these are the buzzwords of today’s urban planners striving to revitalize urban areas by creating gathering places for relaxation and entertainment in the heart of the city.

One such project is the Woodall–Rogers Park in downtown Dallas. The park is a 5.2 acre site that is being built over a major freeway. When completed in 2012, the freeway will run through a tunnel under the park. The park will feature a performance pavilion, bike and jogging trail, playground, dog park, restaurant, water sculptures and an area for games.

Construction of the park is funded through a public/private partnership, along with an infusion of stimulus funds that helped jump start the project.

The Texas Department of Transportation selected Archer Western as the contractor for construction of the deck plaza. Trees, bushes and other greenery in the park will be contained in precast concrete planter boxes. Speed-Fab Crete a Dallas/Fort Worth area precaster is supplying the planter boxes, cast with forms fabricated by Hamilton Form.

The formwork includes three identical trench forms that each cast four 8’-10” by 10’-4.5” planters, or 12 total vessels, daily. The trench forms consist of a 10 foot by 50 foot casting table with drafted, fixed domes and bolt on side rails for each product set-up. Chamfer is welded to the bottom of the table to maintain consistent product dimensions. Keyed headers bolt in place. The product is cast upside down.

To strip, sideforms and alternating headers are pulled back so that the product can be lifted from the form.

A fourth form was fabricated to produce four 4’-10” by 10’-4.5” products. This form includes an additional internal, sliding header that can be positioned over the domes for small, low quantity sizes. Finally, a separate casting table was built with removable domes and headers. By attaching the separate domes and headers to the form, Speed Fab-Crete has the flexibility to cast several odd sizes required for the project.

Finished products are set between two beams, forming planter boxes for this world-class park that will serve as a gathering spot in the heart of the city.



Trench forms with domes built for Speed-Fab Crete.



Each 50'x10' table casts 4 products daily.



Products are fitted together to form planter boxes.



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Name that form



An Inside Look at a Hamilton Form

Here's an atypical view of a Hamilton Form that we wrote about in this newsletter. If you can name that form, you'll be entered in a drawing for a \$50 gift card from American Express. Send an e-mail with your answer before July 10th to: newsletter@hamiltonform.com

Five winners will be chosen from the correct answers.

NEWS

Join Us in Our Nation's Capitol

Washington DC is the place to be this Memorial Day weekend as The PCI Annual Convention & Bridge Conference joins The Third International **fib** Congress and Exhibition. Stop by and see us in Booth 424.

