

# Cal Contractor

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## MAGAZINE

**Dunkle Bros. and Trench Shoring Company  
Do Their Part To Safely Deliver The Space Shuttle  
Endeavour From LAX to The California Science Center**





# Dunkel Bros. and Trench Shoring Company

Do Their Part To Safely Deliver The Space Shuttle  
Endeavour From LAX to The California Science Center



© Bill Ingles/NASA



*Space Shuttle Endeavour crossing over Lincoln Blvd. just outside LAX. It was necessary to remove the center divider and then build a 50' wide ramp at less than 5% grade and then cover that ramp with 1" steel plates provided by Trench Shoring Company.*

NASA began their manned launched vehicle Space Shuttle program back in 1981 and continued on until 2011. Four to seven astronauts were launched vertically in a winged aircraft built specifically for orbital space flights. Columbia was the first official Orbiter to launch into space as a Space Shuttle, followed by the Challenger, Discovery and Atlantis. Tragically, in 1986, the Challenger and its entire crew were lost shortly after launch and the Endeavour was built as its replacement. Endeavour's maiden flight was in 1992 and it completed its final journey on June 1, 2011.

The Orbiter was named after the British 'HMS Endeavour', which is the ship that Captain James Cook sailed on his first discovery voyage back in 1768. With an estimated price tag of around \$2.2 billion, the Endeavour was launched 25 times, orbited the earth nearly 4,700 times and flew 122,853,151 miles at speeds up to 19,000 miles per hour, spending a total of 299 days in space. It is also credited for capturing and redeploying the stranded INTELSAT VI communications satellite on its very first voyage, and proudly carried the first African-

American woman astronaut, Mae Jemison in September of 1992. In 1993, the Endeavour made its first mission to the Hubble Space Telescope, and in 1998, it delivered the Unity Module to the Zarya module at the International Space Station. The Endeavour flew its final mission in May of 2011 and was then formally decommissioned.

Soon after decommission, in excess of twenty different organizations submitted proposals requesting the rights from NASA to display the Orbiter. After careful consideration, NASA announced that Endeavour would go to





built back in the 1920's and 30's. Moving the Endeavour required a specialized carrier typically used to haul massive loads like, bridges, oil rigs and heavy equipment. An operator walked along the side of the carrier and operated it remotely, moving its 160 wheels in any direction. It was determined that it would be necessary to utilize steel plates for stability and weight distribution purposes at all of the above mentioned areas in question. Encon Construction Services subcontracted a large portion of this work to Dunkel Bros. Machinery Moving. Peter Dunkel, President of Dunkel Bros. further explains, "The route passed through the city of Inglewood and past the South Figueroa Corridor in the city of Los Angeles, ending just south of the University of Southern California campus at the museum. In addition, the route included some major thoroughfares including: Manchester, Crenshaw, Martin Luther King Jr. Blvd. and a bridge crossing over the 405 freeway. Along the way the Endeavour faced a few obstacles like telephone poles, trees and building structures. Power had to be turned off in some areas, while telephone poles were taken down and some trees had to be removed."

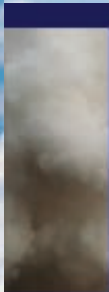
This was not the first time that Dunkel Bros. has been involved with a Space Shuttle project. As a matter of fact they recently

**Dunkel Bros. begins laying down steel plates for stability and proper weight distribution along Space Shuttle Endeavour's route from LAX to the California Science Center.**

the California Science Center in Los Angeles. It was then delivered in its final landing to the Los Angeles International Airport (LAX) on September 21, 2012, and plans went into full gear to carefully transport the Endeavour to the California Science Center. Several ideas were submitted and considered that included everything from moving with a helicopter to dismantling and moving in pieces. In order to protect the delicate heat tiles and other components, the decision was made to transport the Orbiter through the streets of Los Angeles and Inglewood at a cost of just over \$10 million paid for by the California Science Center and private donations.

Plumb Engineering, a fully-integrated architecture and engineering firm, and Encon

Construction Services, a consulting construction and design-build firm were hired to provide design, engineering and logistics management for the transport of the Space Shuttle Endeavor. These two firms in turn worked with Sarens, Caltrans, Southern California Edison and local police departments to ensure the protection of roadways, sewer and storm drain systems and underground utilities. With a 78 ft. wingspan and standing a full five stories high, the Endeavour would be extremely difficult to move through the streets of Los Angeles. The combined weight of the Space Shuttle at approximately 175,000 pounds and the transport vehicle at another 325,000 pounds was just too much for the cities infrastructure, which was initially







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**The Space Shuttle Endeavour weighs more than 175,000 lbs. and the 160 wheel transport vehicle that carried it weighed around 325,000 lbs. The 8'x10' and 8'x20' steel plates help to properly distribute this weight around sensitive areas like manholes, sewer lines and other worrisome subterrain.**

finished dismantling one of the previous shuttles just a few months ago. They were also involved in the transport of the original wood Space Shuttle mockup that was manufactured in Downey, California. Peter Dunkel continues, "Once the Endeavour left LAX, we were contracted to lay plates over the center divider at Lincoln Blvd., which is considered a state highway. In order to accomplish this, Encon Construction Services had to first remove the center divider (k-walls) and then we proceeded to construct a 50' wide ramp at less than a 5% grade to bridge the 9" difference between the two

sides of the road. We built the ramp out of strips of stacked plywood with 1" steel plate laid on top. From this point on, our job consisted of continuing to install predominantly 8'x10', 1" steel plates along the route wherever manholes, sewer lines or any other worrisome subterrain existed. We put down approximately 1,000 steel plates, however our installation trucks could only carry 12 plates at a time. So if you do the math, that comes out to 83 individual loads each way by jobs end. We had to leap frog as many as 200 plates at a time in some areas and we did the plate moving at night to avoid any additional traffic

issues. It was also necessary that we make all of the plates non-slip and we were also required to have safety lights and striping on each plate. We are extremely thankful to Trench Shoring Company, who supplied us with all of our steel plates for this job. They did a terrific job and their professionalism and experience was a welcome relief and helped to alleviate much of the pressure."

Trench Shoring Company has been providing the construction industry with the finest in steel plates, trench plates and shoring equipment since 1973. Mike Hayet is the Operations Manager for Trench Shoring Company







of the plates and other material prepped and ready for delivery. To make things even more logistically challenging, it was necessary for Dunkel Bros. to place the plates as they were being delivered; due to the fact that leaving stacks of steel plates overnight was strictly prohibited. In all there was around 110 truckloads of plates and other material to deliver and the same amount to pickup later. Dropping off the material took us around eight days, while the pickup was accomplished in half that time. We fulfilled the entire order with our existing inventory by coordinating with all of our eight Southern California locations, as well as our branch in Las Vegas. We delivered to several predetermined locations, which required lane closures from 6:30 am to 2:00 pm. The plates were available in various sizes, from 8'x10' to 8'x20' and anywhere from 3,200 lbs to 6,500 lbs. each. This was a great team effort by everyone involved and we would like to thank everyone for his or her professionalism and hard work."

The Space Shuttle Endeavour will continue to inspire people of all ages for many years to come. It's historical final journey began in the early morning hours of October 12th and reached its final destination at the Science Center on October 14th. The exhibit is now open to the public at the temporary Samuel Oschin Space Shuttle Endeavour Display Pavilion and will eventually be housed in a brand new addition currently under construction. **CC**



*Crowds look on as the Space Shuttle Endeavour turns one of many corners on its way to the California Science Center in Los Angeles, California.*

and comments, "We were of course very pleased that Dunkel Bros. chose Trench Shoring for their trench plate needs on this high profile project. We have worked with Dunkel Bros. before delivering machinery and they have used our plates in the past for weight dispersal purposes on other jobs. We worked together very well on this project, with Trench Shoring providing and

delivering all of the plates and Dunkel Bros. concentrating on the placement. We provided more than 1,000 steel plates, which is the equivalent of 95,000 square feet or around two acres of surface area. That is a tall order and represents our single largest steel plate job to date if you consider the amount of time this was accomplished in. The real challenge was getting all

