

2017 Awards: Field Erected Storage Tanks - ASME PRESSURE VESSEL STORAGE

ENTRY #1, ASME PRESSURE VESSEL STORAGE TANK OF THE YEAR



Submitted by: TARSCO

Link to Product on Web Site: <http://www.tfwarren.com/tarsco/products/asme-storage-spheres>



Product / project title:	Spheres Project - Powder Springs Logistics, LLC
Product / project owner:	Private
Product / project location:	Powder Springs, GA
Date completed:	January 2017
Construction standard (if any):	ASME
Overall height / length (feet, inches):	100' -0"
Column height (feet, inches):	90' -0"
Diameter (feet, inches):	5,712,000
Capacity (US gallons):	1,500
Steel tonnage used (US tons):	1.33"
Steel thickness (inches):	

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Butane is commonly added to gasoline to increase its volume through a process called oxygenation. The region's climate, where butane is stored and oxygenated, determines when this process can best be completed with the least amount of vapor created. Adjusting gasoline vapor pressure for a regional climate can enhance the profitability of a terminal and pipeline operation.

The site owner wanted to construct two large spheres so they could receive and store butane year round and then inject it into gasoline during the winter months when vapors would be at their lowest.

The contractor provided an Engineering, Procurement, Fabrication, and Construction package to the following specifications and scope.

Size: (2) Butane ASME pressure vessels (spheres 90' diameter each – 100 psi)
Specifications: ASME Section VIII Division 2, NFPA 58, and API 2510
Capacity barrels: 68,000 barrels each / 136,000 total
Capacity gallons: 2,856,000 gallons each / 5,712,000 gallons total
Shell thickness: 1.33 inches
Steel tonnage: 750 tons each / 1,500 tons total

Additionally, the scope of work included the sphere foundations and piling, fire protection system (deluge and spray rings), stairs and platforms, ultrasonic or radiograph testing, internal and external coatings and fireproofing of the support columns. The total number of feet welded in this project topped out at 7,500 feet.

This project schedule presented some challenges because the spheres owner needed to begin operations during fall/winter months in order to take advantage of the opportunity to tailor the vapor pressure of gasoline for their cooler climate.

The contractor successfully completed this project without any recordable accidents and over 100 days ahead of schedule.

ENTRY #2, ASME PRESSURE VESSEL STORAGE TANK OF THE YEAR

Submitted by: CB&I - Bryan Holmes & Mark Jordan



Product / project title:	Sinclair Butane Sphere
Product / project owner:	Sinclair Wyoming Refining Company
Product / project location:	Sinclair, WY
Date completed:	August 2017
Construction standard (if any):	ASME Section VIII, Div. 2
Overall height / length (feet, inches):	-
Column height (feet, inches):	-
Diameter (feet, inches):	50' -0"

Capacity (US gallons):	-
Steel tonnage used (US tons):	181.5
Steel thickness (inches):	0.66" to 0.99"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This project included the engineering, procurement, fabrication and erection of one (1) 50' DIA, 65 PSIG Butane Sphere for the Sinclair Refining Company. The scope also included the hydro-pneumatic testing and painting of the sphere.

The erection schedule was completed more than 6 weeks ahead of schedule and allowed for the painting and completion of the sphere ahead of the harsh winter months in Wyoming. This took close coordination with the Customer and their on-site personnel to make this a reality. Some of this coordination included:

- 1) A separate lay down area for sub-assembly work. This allowed for an earlier start.
- 2) The use of the lay down area for the majority of the blasting/priming. This prevented any conflict with operating units and critical areas near the erection site.
- 3) The use of in-house UT/Phased Array capability to reduce the overall duration of the NDE work.

The overall project was a success because of the strong working relationship with our Customer.

ENTRY #3, ASME PRESSURE VESSEL STORAGE TANK OF THE YEAR

Submitted by: **CB&I** - **Jordan Ellis**



Product / project title:	A04 Expansion Sphere
Product / project owner:	Shell
Product / project location:	Geismar, LA
Date completed:	February 2017
Construction standard (if any):	ASME Section VIII, Div. 2
Overall height / length (feet, inches):	54' -0"
Column height (feet, inches):	30' -6"
Diameter (feet, inches):	47' -0"
Capacity (US gallons):	398,160
Steel tonnage used (US tons):	215
Steel thickness (inches):	1.2"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

One (1) field-erected HPC4 sphere constructed to ASME VIII, Div. 1 for Shell in Geismar, LA as part of their Tiger A04 Expansion Project.

ENTRY #4, ASME PRESSURE VESSEL STORAGE TANK OF THE YEAR

Submitted by: **CB&I** - **Darles Scheibe** & **Larry Henkel**



Product / project title:	Hopedale Station
Product / project owner:	Sunoco Pipeline LP
Product / project location:	Hopedale, OH
Date completed:	August 2017
Construction standard (if any):	ASME Section VIII, Div. 2
Overall height / length (feet, inches):	88' -0" and 81' -10"
Column height (feet, inches):	-
Diameter (feet, inches):	88' -0" and 81' -10"
Capacity (US gallons):	4,715,424
Steel tonnage used (US tons):	1,602
Steel thickness (inches):	0.563" to 1.93"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The two (2) pressure spheres were designed and built in accordance with ASME, Section VIII Division 2, 2013 Edition to hold 62,229 barrels (BBLs) of butane and 50,042 BBLs of propane under pressures of 100 psig and 250 psig respectively.

The butane sphere is 88'-0 diameter designed for 100 psig pressure, 9 psig vacuum, 120 degrees F to hold 62,229 BBLs or 2,613,618 gallons of product. All full penetration welds on the sphere were 100% Ultrasonic Tested (UT) for quality prior to being hydrotested at 143 psig. The sphere was externally painted and the columns fireproofed prior to it being placed into service by the owner.

The propane sphere is 81'-10 diameter designed for 250 psig pressure, 14.7 psig (full) vacuum, 120 degrees F to hold 50,043 BBLs or 2,101,806 gallons of product. All full penetration welds on this sphere were also 100% Ultrasonic Tested (UT) for quality prior to being subjected to a full field Post Weld Heat Treatment (PWHT) by insulating and heating the entire sphere to 1,175 degrees F and holding at that temperature for two (2) hours. After the PWHT, the sphere was hydrotested at 358 psig prior to being externally painted, columns fireproofed and put into service.

The Scope of Work for the two spheres included the design and construction of foundations, design, fabrication and installation of the steel support columns including the Pyrocrete 241 fireproofing, multi ring deluge fire protection spray/deluge system, design, fabrication and construction of the two spheres ranging in steel thickness from 1.152 inches thick to 1.93 inches thick, galvanized stairways and field paint of the finalized spheres.

The two spheres used a total of 1,602 tons or 3,204,000 pounds of steel plate and demonstrates the capability and flexibility of steel to store various products at very high pressures and vacuum - making steel the material of choice!

ENTRY #5, ASME PRESSURE VESSEL STORAGE TANK OF THE YEAR

Submitted by: **CB&Services**

Darren Bentley



Product / project title:	76' Diameter x 60 PSIG Skirt Supported Butane Sphere
Product / project owner:	Toledo Refining Company
Product / project location:	Oregon, OH
Date completed:	January 2017
Construction standard (if any):	ASME Section VIII, Div. 2
Overall height / length (feet, inches):	86' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	76' -0"
Capacity (US gallons):	1,534,000
Steel tonnage used (US tons):	445
Steel thickness (inches):	Up to 1.25"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The Client required a new Butane sphere to replace an existing spheroid. The Client wanted to add capacity and increase allowable pressure while maintaining the same footprint of the old spheroid. Storage spheres are

typically supported by columns that extend from the equator to the ground. That was not possible on this project due to the footprint restrictions.

To overcome the footprint restriction, the Contractor designed, fabricated, and erected a skirt supported sphere. Each aspect, from plate layout in the design stage to erection methods in the field, of this sphere was specialized. The plate layout was designed to minimize tonnage while accounting for accessibility during construction. The site layout was adjacent to existing pipelines (both above and below ground), tanks, spheroids, and other process equipment. These created safety hazards that needed to be mitigated and material handling limitations. The Contractor was limited on crane size and the ability to sub assemble plates. Furthermore, the area obstructions changed the way the Contractor was able to temporarily support the sphere during construction. Standard guy lines would not work and the Contractor developed an innovative system to guy plates to previously installed sections of the sphere.

The skirt supported sphere also meant that piping had to pass through the skirt to reach fittings on the lower head. Additional fire protection was also required inside the skirt because the standard deluge and spray piping on a typical column supported sphere would not reach inside the skirt on this sphere.

2017 Awards: Field Erected Storage Tanks – API 620

ENTRY #1, API 620 LOW PRESSURE LIQUID STORAGE TANK OF THE YEAR



Submitted by: TARSCO

Link to Product on Web Site: <http://www.tfwarren.com/tarsco/projects/1194-four-tanks-provided-at-ammonia-plant-rock-springs-wy>



Product / project title:	NH3 Anhydrous Ammonia Tank - API 620
Product / project owner:	Linde Engineering
Product / project location:	Rock Spring, WY
Date completed:	June 2017
Construction standard (if any):	-
Overall height / length (feet, inches):	112' -6"
Column height (feet, inches):	92' -6"
Diameter (feet, inches):	114' -6"
Capacity (US gallons):	6,328,519
Steel tonnage used (US tons):	845
Steel thickness (inches):	Max 1.13"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The J. R. Simplot Company in Rock Springs, WY wanted to expand its ammonia plant to improve its long-term sustainability in the phosphate marketplace. Ammonia is a key raw material in the production of fertilizer. With this new plant that supplies both the Rock Springs, WY and the Pocatello, ID phosphate fertilizer production locations, output significantly enhances Simplot's ability to be self-sufficient. This new plant was constructed adjacent to its existing phosphate fertilizer complex.

The contractor provided the engineering, procurement, fabrication, and construction of:

- (1) API 620 Annex R Anhydrous Ammonia Tank (114'-6" diameter x 92'-6" high)
Capacity of 150,000 bbl of NH₃ anhydrous ammonia

In addition to the actual construction of the tank, the scope of work included the tank foundation, installation of the heating system, insulation, and coating.

The 6,500-foot elevation, high winds, cold temperatures, and snow presented challenges with the project schedule. The roof's main platform was another challenge because of its size and that it could not be supported on the roof due to contraction concerns by the client.

The contractor met this challenge by constructing a large girder to span across the whole roof and connecting it to the compression bar. The contractor utilized its roof air raising technology by constructing the dome roof near the bottom of the tank and then air raising it to the final position. Experienced personnel then fit and welded the roof connection to the compression bar. By constructing the roof at a low elevation, the contractor limited workers' exposure to dangerous heights.

Personnel safety was always paramount during this procedure the same as it was in all aspects of the project. The contractor utilized services within its company structure to provide a complete single source solution on this project. Despite all of the challenges, the entire project was completed with zero incidents.

ENTRY #2, API 620 LOW PRESSURE LIQUID STORAGE TANK OF THE YEAR



Submitted by: TARSCO

Link to Product on Web Site: <http://www.tfwarren.com/companies/tarsco>



Product / project title:	The Expansion of the Coastal Petroleum Dominicana LPG Import Facility Coastal Petroleum
Product / project owner:	San Pedro de Macoris, Dominican Republic
Product / project location:	July 2017
Date completed:	API 620
Construction standard (if any):	80' -0"
Overall height / length (feet, inches):	-
Column height (feet, inches):	174' -0"
Diameter (feet, inches):	25,200,000
Capacity (US gallons):	2600
Steel tonnage used (US tons):	0.52" to 1.17"
Steel thickness (inches):	

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

United States LPG imports into the Dominican Republic have recently dominated the island's supply. This created the need to expand the Coastal Petroleum Dominicana LPG import facility in San Pedro de Macoris. The project expansion included constructing a new facility just east of the actual terminal to create 600,000 bbls of refrigerated LPG storage capacity and 180,000 bbls of butane storage capacity. This terminal expansion for storage capacity would feed the existing terminal and would also create export capability.

Now completed, this terminal expansion's main benefit is a reduction in frequency of cargo downloads needed to feed the existing terminal. Another benefit is the ability to enable exploration of new markets in the Caribbean Sea region; i.e. selling propane to small marine vessels.

The project included construction of two (2) refrigerated propane tanks and one (1) refrigerated butane tank. The contractor's scope of work was based on providing a turnkey solution which included engineering, procurement, fabrication, construction, and testing on the tanks.

LPG tanks:

Size: (2) LPG tanks, each 174' dia. x 80' high
Roof heights: 34.1'
Specifications: API 620
Capacity barrels: 300,000 bbls each / total 600,000 bbls
Walls: Single walls
Roofs: Dome roofs

Each tank:

Shell thickness: Between 0.52" and 1.17"
Weld length shell: 4,480' each tank
Weld length roof: 6,208' each tank
Roof weight: 656,600 lb. each tank

Butane tank:

Size: (1) Butane tank 136' dia. x 80' high
Roof height: 26'- 8"
Specifications: API 620
Capacity: 180,000 bbls refrigerated butane
Wall: Single wall
Roof: Dome roof
Shell thickness: Between 0.5" and 0.95"
Roof weight: 207,249 lbs.

The contractor also provided the tank foundations, tank insulation, piping, containment dike, refrigeration system, compression system for boil-off gases, fire water system, LPG pumping system, control system, and earthing and lightning protection.

By utilizing its roof air raising technology, the contractor constructed the dome roofs near the bottom of the tanks and then air raised them to the final position. Experienced personnel then fit and welded the roof connections to their final position. Personnel safety was always paramount during this procedure so by constructing the roofs at a low elevation, the contractor limited workers' exposure to dangerous heights.

The contractor utilized services within its company structure to provide a complete single source solution on this project. The entire project was completed with zero incidents.

ENTRY #3, API 620 LOW PRESSURE LIQUID STORAGE TANK OF THE YEAR

Submitted by: **CB&I** - **Scott Paar** 



Product / project title:	Peony Project
Product / project owner:	Yara / BASF
Product / project location:	Freeport, TX
Date completed:	October 2017
Construction standard (if any):	API 620
Overall height / length (feet, inches):	123' -1"
Column height (feet, inches):	-
Diameter (feet, inches):	132' -0"
Capacity (US gallons):	5,287,000
Steel tonnage used (US tons):	1731
Steel thickness (inches):	1.085"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This Ammonia Tank was designed to store liquid anhydrous ammonia at -28 degrees for an Ammonia plant in Texas.

The tank is a 20,000 MT (metric ton) capacity, double steel wall, double containment Ammonia Storage Tank designed to API 620 Annex R and API 625. The liquid anhydrous ammonia is stored in an open topped, cylindrical flat bottomed inner tank, which has a diameter of 124'-8 and is 96'-1 high. The outer steel tank is 132'-0 diameter and 94'-5 high and is a cylindrical flat bottom tank. The tank also contains an internal suspended insulation deck.

The specially designed dome roof was constructed on the ground inside the tank and air raised into place along with the suspended insulation deck that hangs from the inside of the dome roof. This made erection safer and more economical.

To minimize the heat leak and product boil off, an extensive insulation system was designed and installed. The insulation system included Horizontal Foam In Place (HFIP) with an aluminum vapor barrier that was sprayed on to the shell. The spray foam insulation is integrally bonded to both the tank shell and the aluminum vapor barrier making it very resistant to severe weather.

An unique item for this Ammonia Tank project was the performance of 100% Wet Fluorescent Magnetic Particle Testing (WFMT) to the inner tank (verts, girths and bottom plate) in the field in order to better locate flaws that could contribute to potential ammonia stress corrosion cracking (ASCC) formation.

Other unique items for this Ammonia Tank project included the provision of Crack Tip Opening Displacement (CTOD) Test coupons and testing, keyed interlocks on the PSV isolation valves, and a shell mounted spring hanger for the shell nozzle.

2017 Awards: Field Erected Storage Tank - API 650 ATMOSPHERIC OIL STORAGE TANK

ENTRY #1, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Pit 9 and Pit 11 Terminal Expansion, Pasadena Texas
Product / project owner:	Kinder Morgan
Product / project location:	Pasadena, TX
Date completed:	October 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	65' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	140' -0"
Capacity (US gallons):	88,200,000
Steel tonnage used (US tons):	535
Steel thickness (inches):	0.95"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The Pasadena, TX, terminal is the most significant refined product storage terminal in Texas and has pipeline connectivity to all of the major Texas refineries and pipelines. It handles storage of petroleum products, segregated chemicals, and ethanol.

Kinder Morgan needed to add over two million barrels of storage to the refined products storage hub that sits on the Houston shipping channel. After completed construction of new tank storage capacity, the terminal now provides refined product producers and traders the ability to send more barrels to the water for international exports or to the network of pipelines for domestic use.

The contractor provided a single source solution which included the engineering, procurement, fabrication, and construction of fifteen (15) new petroleum storage tanks that now provides 2,115,000 barrels of storage. Each tank has a shovel bottom with steel internal floating roofs. The infrastructure was constructed in accordance with the Geot recommendations, steel design, and mechanical layout and met the Kinder Morgan construction standards.

In addition, construction activities were carried out to meet permit requirements and environmental regulations. The scope also included tank foundations, all equipment, hydro-testing, and foam fire protection installation.

Tank specifications:	API 650
Total capacity:	2,115,000 barrels of storage
Total tonnage:	535 tons of steel, maximum of .95" thick
All roofs:	Steel internal floating roofs
Size:	(14) 140'Ø x 65' high cone roof tanks
Capacity barrels:	2,100,000 barrels
Size:	(1) 50'Ø x 56'4" high cone roof tank
Capacity barrels:	15,000 barrels

The project required an expedited schedule and ability to perform services in a busy construction site with many contractors. The contractor on this project had to manage schedules around the historic rains of 2017 with one flood in the spring and one flood in the fall from Hurricane Harvey. The contractor utilized services within its company structure to provide a complete single source solution on this project.

ENTRY #2, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	McCook Nebraska Fertilizer Distribution Plant
Product / project owner:	Next Generation Inc.
Product / project location:	McCook, NE
Date completed:	October 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	32' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	24' -0"
Capacity (US gallons):	1,200,000
Steel tonnage used (US tons):	205
Steel thickness (inches):	3/8 – 3/16"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The project consisted of fabricating and erecting a total of 1,200,000 gallons of storage with 11-100,000 gallon and 2-50,000 gallon chemical tanks in McCook Nebraska for a fertilizer distribution plant. The tanks were flat bottom with self-supported cone roofs. Nearly 500,000 pounds of type 304 stainless steel were fabricated in our manufacturing facility and transported to the customer site, where our field crew erected the tanks over a four month period.

The design of the tanks were per API-650 12th Edition, Addendum 2, Annex S, F and V.

ENTRY #3, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by: **CB&I** - **Jordan Ellis** 



Product / project title:	Tank T-4 (Gasoline/Diesel)
Product / project owner:	CalJet
Product / project location:	Phoenix, AZ
Date completed:	November 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	69' -4"
Column height (feet, inches):	66' -0"
Diameter (feet, inches):	106' -0"
Capacity (US gallons):	4,125,870
Steel tonnage used (US tons):	275
Steel thickness (inches):	0.719"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

One (1) field-erected cone roof tank with internal aluminum floating roof constructed to API 650 for CalJet in Phoenix, AZ as part of their T-4 Replacement Project.

ENTRY #4, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by: CB&I - Jordan Ellis



Product / project title:	Turbine Inlet Cooling (TIC) - Thermal Energy Storage (TES) Tank
Product / project owner:	Dominion Virginia Power Company
Product / project location:	Freeman, VA
Date completed:	May 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	94' -7.875"
Column height (feet, inches):	90' -1.5"
Diameter (feet, inches):	145' -0"
Capacity (US gallons):	10,000,000
Steel tonnage used (US tons):	725
Steel thickness (inches):	.25" to 1.175"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Thermal Energy Storage (TES) Tank - Turbine Inlet Cooling (TIC) System

267,800 Total Ton-Hour Capacity

145' dia. x 90'-1 1/2" Cone Roof Tank

Thermal Energy Storage with Corrosion-Resistant Radial Flow Plate Upper and Lower Diffusers

ENTRY #5, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by: CB&I - Rich Horn & Jim Bohinski



Product / project title:	City Campus Thermal Energy Storage Tank
Product / project owner:	University of Nebraska – Lincoln
Product / project location:	Lincoln, NE
Date completed:	December 2017
Construction standard (if any):	-
Overall height / length (feet, inches):	100' -0"
Column height (feet, inches):	98' -0"
Diameter (feet, inches):	120' -0"
Capacity (US gallons):	8,291,000
Steel tonnage used (US tons):	758
Steel thickness (inches):	1.124" to .3125"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This unique, very large and aesthetically pleasing welded steel tank serves the University of Nebraska at Lincoln as a cost effective Thermal Energy Storage (TES) tank that holds 8,291,000 gallons (120' diameter x 100' shell height) and uses 1,516,000 pounds of steel plate.

The TES tank stores chilled water produced at night when electricity rates are low and uses the chilled water during the heat of the day to economically air condition a number of campus buildings when electricity rates are high. With an estimated annual utility bill savings of up to \$900,000 per year, the tank will ultimately pay for itself!

The tank foundation design was complicated due to the poor soils at the site requiring a thick pile cap supported by (295) 18" auger cast piles drilled to a 60+ foot depth. The internal flow diffusers were specifically designed for this tank based on the temperatures differences and the flow rates of the water coming in and out of the tank that will stratify the water and provide 52,000 Ton-Hours of cooling.

The TES tank was wedged onto a very small site and built between a new mechanical building and an active railroad spur line making construction challenging.

The university's Aesthetics Review Committee wanted this tank to tie in well with the new mechanical building. After rendering numerous color patterns for the tank, they chose a staggered, vertical pattern in a light gray and white finish for the exterior of the aluminum jacketing. The aesthetically pleasing finished product can be seen from certain parts of this large campus.

The welded steel tank met all of the challenges proposed by this site as well as provided additional benefits to the University including:

- A 100% leak tight storage tank to eliminate any risk of any leakage to the adjacent campus buildings.
- Displayed the flexibility of steel design and construction in tight sites with poor soil conditions,
- Displayed the flexibility to meet even the most concerned customer's needs to be aesthetically pleasing.
- Provided not only the low initial capital cost but also the lowest maintenance & life cycle cost.

This tank promotes and demonstrates the flexibility and aesthetics of welded steel tanks to be built in tight sites, pay for themselves in a few years and will continue to save the Owner money for many years to come.

ENTRY #6, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by: CB&I - Bryan Holmes



Product / project title:	P66 Methanol Tanks
Product / project owner:	P66 Gulf Coast Properties LLC
Product / project location:	Nederland, TX
Date completed:	April 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	50' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	250' -0"
Capacity (US gallons):	16,755,312
Steel tonnage used (US tons):	4,915
Steel thickness (inches):	.5" to 1.07"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The P66 Methanol Project included the design, detail engineering, procurement, fabrication, and construction of three (3) 250'-0 Diameter x 50'-0 High Type 5 Internal Floating Roof Storage Tanks. The project scope also included the ringwall foundation design and construction, as well as self-performing the external painting of the tanks.

The schedule was aggressive and required each of the three tanks to be finished with a lag of only one month in between each tank. The project was completed in time for the Customer commissioning and use, despite an excess of 40 days of weather impact to the overall schedule.

There was also special consideration given to the overall environmental impact during the hydro-testing of these

tanks. We planned and were able to reuse the hydro-test water for all three tanks. This limited the total amount of water used to only one tank volume.

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ENTRY #7, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Frontera Storage Expansion Project
Product / project owner:	TransMontaigne
Product / project location:	Brownsville, TX
Date completed:	October 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	60' -8 1/4"
Column height (feet, inches):	58' -10 7/8"
Diameter (feet, inches):	150' -0"
Capacity (US gallons):	7,401,450
Steel tonnage used (US tons):	539
Steel thickness (inches):	Max .92"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Frontera Storage Terminal provides integrated terminalling, storage, transportation and related services for companies engaged in the trading, distribution and marketing of light refined petroleum products, heavy refined petroleum products, crude oil, chemicals, fertilizers and other liquid products. It wanted to expand its refined products

storage capacity, and to do that, it needed to construct a new tank at its terminal in Brownsville, Texas. The tank would store refined petroleum product such as gasoline and diesel fuel.

The tank contractor on this project provided the engineering, procurement, fabrication, and construction including the foam chambers and foam risers. The tank had to fall under the jurisdiction of 49 CFR Part 195, and all materials, fabrication, and construction had to be in strict accordance with this statute.

Tank specifications:	(1) API 650 aboveground refined petroleum storage tank
Capacity:	7,401,450 gallons
Diameter:	150'Ø
Height:	60' - 8-1/4"
Column:	58' - 10-7/8"
Steel tonnage:	539 tons steel
Steel thickness:	Maximum .92" thick
Weld footage:	9,000'

ENTRY #8, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	UPS Worldport Fuel Farm Expansion Tank 5 & 6
Product / project owner:	UPS
Product / project location:	Louisville, KY
Date completed:	December 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	50' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	90' -0"
Capacity (US gallons):	2,266,600 Per Tank
Steel tonnage used (US tons):	405
Steel thickness (inches):	0.32" Average

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

In May of 2017 we were presented with a challenge. We had to construct two 2,260,000 Gallon Jet Fuel Storage Tanks including the aluminum floating roof and the field applied coatings for UPS at the Worldport Facility at the Louisville International Airport. As these tanks were to supply the increasing Jet Fuel demands of UPS and their most important customer, Amazon, the first tank had to be in service by Black Friday (the most important day of the year for Amazon) and the second tank by mid-December. And unlike many Jet Fuel Storage Tanks at Airports, these were not at the edges of the facility, but in between plane taxi ways and with a Blast Wall within 15' of the tanks to prevent damage to the tanks from the thrust blast of the jets.

The floating roof and the floating suction had to be designed to accommodate the very demanding flow rate of the tank. In order to fuel planes quickly, the process requirements of the tank required it to be capable of being completely drained within 30 minutes. In order to do this the floating suction was required to be 24" in diameter and significant provisions had to be made to the floating roof to withstand the drainage requirements.

Another unique challenge presented by this project was the amount of wind created by jet engines of UPS planes. As taxing planes were in our immediate vicinity and runways were close enough to have gusts created by the planes affect the jobsite, we had to take the following provisions during erection. All lifts had to be coordinated with the taxing and take offs of planes to avoid a situation of gusts causing a hazard during lifting. Additionally, we had to implement Foreign Object Debris procedures to keep the jobsite free of loose small tools, construction waste, and other debris. If items were left on the ground, there was an excellent chance that engine gusts would pick that item up and send it flying thru the air.

Given the engine gusts, painting of the tanks was especially challenging. The interior of the tanks received two coats of epoxy paint with a door sheet provided to allow JLG access as the schedule did not permit the time to install the scaffold. While the interior of each tank was being coated, the exterior was worked at the same time with a separate crew. As the owner was reluctant to use mechanical or power tool cleaning, and there was not time in the schedule to build containment around the tanks, water jet blasting was required. With the engine gusts open air blasting would spread blast media everywhere. Water jet blasting, brush and roller application, and care in the application of it resulted in no damage or overspray in either process.

With a considerable amount of planning, hard work, and overtime we managed to deliver these tanks on schedule and Amazon was able to deliver your packages on time (or at least we weren't to blame).

ENTRY #9, API 650 ATMOSPHERIC OIL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Crude Oil Condensate Tanks
Product / project owner:	Anonymous
Product / project location:	Gulf of Texas, TX
Date completed:	November 2017
Construction standard (if any):	API 650 Anx. H
Overall height / length (feet, inches):	59' -9"
Column height (feet, inches):	-
Diameter (feet, inches):	150' -0"
Capacity (US gallons):	14,400,000
Steel tonnage used (US tons):	1,233
Steel thickness (inches):	0.25" to 0.92"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

These Sweet Crude Condensate Tanks were built to hold 328,000 barrels of storage and are located right on the gulf of Texas. Steel tank construction was critical in the design due to the hazardous nature of their contents and the stresses to which they would be exposed on this coastal marine terminal. The tanks were designed in accordance with API 650 annex H and the customer required the civil site work, foundation, tank, Carbon Steel single pontoon Internal Floating Roof and all appurtenances to be supplied by the general contractor.

Qty: 2

Size: 150'x 59'9"

BBL: 164,00

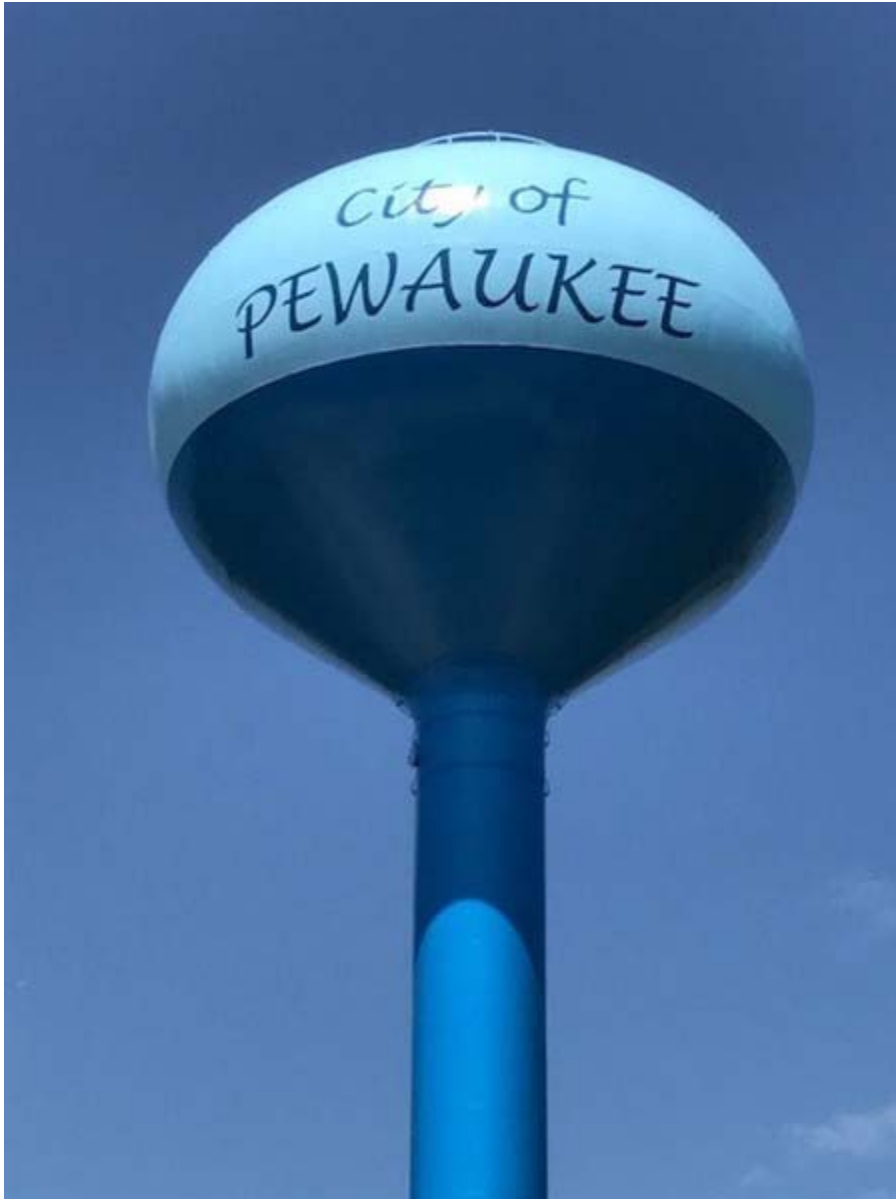
Location: Texas

Roof: Fixed Roof with single pontoon IFR

2017 Awards: Field Erected Storage Tank - ELEVATED STORAGE TANK

ENTRY #1, ELEVATED STORAGE TANK OF THE YEAR

Submitted by: **Phoenix Fabricators & Erectors**



Product / project title:	City Hall Elevated Tank - 750,000 Gallon Single Pedestal
Product / project owner:	City of Pewaukee
Product / project location:	Pewaukee, WI
Date completed:	November 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	166' -0"

Column height (feet, inches):	-
Diameter (feet, inches):	64' -6"
Capacity (US gallons):	750,000
Steel tonnage used (US tons):	230
Steel thickness (inches):	1.5" Max

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This two-tone blue 750,000 gallon single pedestal tank stands 166 feet overlooking the Pewaukee City Hall. Utilizing all steel construction the single pedestal design provides a visually appealing structure showcasing the capabilities of properly fabricated steel plate.

A concrete spread footer bearing 9' below grade supports this steel structure. 1.5" thick base plates are anchored to the foundation and receive five base cone courses topped by a 1.5" thick transition. Approximately 82' of 11'-9" diameter vertical stem transitions smoothly through heavy reducing cones to the 64'-6" container responsible for containing over 6.25 million pounds of water.

The design allowed for a climate-controlled room to be built in the base of the structure to house critical base piping, electrical, telemetry equipment, and tank mixer control panel. A 24' diameter steel handrail crowns the structure providing safe access to the tank vent and ingress/egress hatches.

The tank received a dark blue finish from the bottom up to just below the equator of the container before transitioning to a light blue. The owner elected to showcase their City name on one side of the tank in the darker blue which stands out well against the lighter shade. All finish coating was completed in a high quality polyurethane with UV absorbers for enhanced color and gloss retention which should continue to highlight the appearance of the structure for many years.

ENTRY #2, ELEVATED STORAGE TANK OF THE YEAR

Submitted by: Phoenix Fabricators & Erectors



Product / project title:	SRWD Spiritwood Area Water Tower - 600,000 gallon Single Pedestal Stutsman Rural Water District
Product / project owner:	Jamestown, ND
Product / project location:	December 2017
Date completed:	AWWA D100
Construction standard (if any):	190' -0"
Overall height / length (feet, inches):	-
Column height (feet, inches):	59' -0"
Diameter (feet, inches):	600,000
Capacity (US gallons):	201
Steel tonnage used (US tons):	1.375" Max
Steel thickness (inches):	

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Located just southeast of Jamestown, this 600,000 gallon single pedestal towers 190 feet over the North Dakota countryside. Utilizing all steel construction the single pedestal design provides a visually appealing structure

showcasing the capabilities of properly fabricated steel plate. From the top of the structure, the 59' diameter container transitions smoothly through thick reducing cones into over 109' of 11'-9" diameter vertical stem. Five base cone courses and another transition receive the stem before sitting on its reinforced concrete spread footer which found bearing 8' below grade.

The design allowed for a climate-controlled room to be built in the base of the structure to house critical base piping, electrical, and telemetry equipment. A 20' diameter steel handrail sits atop the structure providing safe access to the tank vent and ingress/egress hatches.

The owner elected to showcase their logo on two sides of the tank in black, blue, yellow and green which stand out well against the overall white background of the tank. All finish coating was completed in a high quality, long-lasting fluoropolymer which should continue to enhance the appearance of the structure for many years.

ENTRY #3, ELEVATED STORAGE TANK OF THE YEAR

Submitted by: Don Nason



Product / project title:	Four (4) Million Gallon Elevated Tank/ Ocala Drive Storage Tank
Product / project owner:	Nashville Metro Water Utilities
Product / project location:	Nashville, TN
Date completed:	February 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	91' -3"
Column height (feet, inches):	26' -0"
Diameter (feet, inches):	135' -0"
Capacity (US gallons):	4,000,000
Steel tonnage used (US tons):	885
Steel thickness (inches):	1/4" to 0.5"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

!!! Massive !!!

This tank is one of only three "all steel" elevated tanks that have ever been designed and built this big! They are the largest elevated tanks in the world and are a true testament to the versatility and strength of steel. They are fabricated and erected as "all steel" structures. Each holds four (4) million gallons of water that weighs over 33,445,000 pounds.

There are 1,770,000 pounds of fabricated steel in this structure and over 600 gallons of high-strength and long

lasting interior and exterior coating systems on the tank.

Due to severe leakage problems, Nashville-Metro lost a 10,000,000 gallon pre-stressed concrete tank on this very site. They had to demolish that tank and elected to come back with an AWWA D100 "all steel" elevated tank that is not allowed to leak. The tank has now been in service for over a year with no leaks and will last a lifetime with minimum planned inspection and maintenance.

A true testament to the versatility, durability and strength of "all steel" fabricated and welded structures.

ENTRY #4, ELEVATED STORAGE TANK OF THE YEAR

Submitted by: Dan Knight



Product / project title:	1 MMG Waterspheroid / 1st Street Elevated Water Storage Tank
Product / project owner:	City of Ocean City, MD
Product / project location:	Ocean City, MD
Date completed:	February 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	118' -0"
Column height (feet, inches):	15' -0"
Diameter (feet, inches):	74' -8"
Capacity (US gallons):	1,000,000
Steel tonnage used (US tons):	307
Steel thickness (inches):	1.2" Max

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Striving to create an iconic landmark for their Summer beach visitors, the town of Ocean City, Maryland prepared its specifications to give its newest water tower a "Beach Ball" appearance. The colorful paint scheme now welcomes the throngs of sand and water fun loving tourists as they arrive onto the southern end of the island. Standing at nearly 120' tall, it creates many a smile for those seeing it for the first time.

While the "Beach Ball" nickname is certainly appropriate, the builders gave it a second moniker - "The Cell Tower That Holds Water". This is because the tank had to be designed to accommodate the (52) incoming cellular and municipal antenna cable systems (which were being relocated from two older multi-leg tanks slated for demolition)! In order to meet this need, the tank's bell includes a massive shop fabricated insert plate to hold the four dozen six inch diameter penetrations. Inside the tank, there is also a complex system of conduit routing and support systems, topped by a custom access tube extension on the roof. This extra wide tube allows the operators to actually exit onto the tank dome via a steel door (vs std roof hatch). It also provides adequate turning space for the thick cables, as they are directed towards the three heavy duty antenna support railing systems.

Another special feature of this tank relates to its support structure. With the tank's location being situated on soft barrier island sands, a deep pile foundation was an obvious necessity. However, this area of the island also routinely floods during nor'easters, and so the engineer smartly designed the site's layout, such that the elevation of the final grade would be four feet above the surrounding properties. Thus, the tank's ringwall was extended and the entire site backfilled with four feet of compacted fill upon the tank's completion. This ensures that if (hmmm, when) the neighborhood floods, that the City's control systems within the tank's base remain dry. All in all, this colorful tower gives new meaning to the local sign, "High Water"!

ENTRY #5, ELEVATED STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Penn State University Water System Upgrade/750M Gallon Elevated Tank
Product / project owner:	Penn State University
Product / project location:	State College, PA
Date completed:	July 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	135' -7"
Column height (feet, inches):	100' -0"
Diameter (feet, inches):	70' -0"

Capacity (US gallons):	750,000
Steel tonnage used (US tons):	350
Steel thickness (inches):	1 1/32" to 1 3/4"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This unique structure sits directly beside the School of Architecture and Landscape Architecture on the campus of The Pennsylvania State University, in State College, PA. When the University decided on a major water system upgrade, it was quickly determined that the existing 750,000 gallon elevated water tank located at the center of Penn State's campus needed to be demolished, replaced, and painted to complete the university's water improvement project. Because the existing tank was surrounded by university buildings, this rehabilitation project was especially difficult to execute and contain. The utilitarian usage of the new water tank needed to be complimentary to the design of the surrounding buildings and also be perched as the roof for a working amphitheater! The tank was designed and constructed without an exterior balcony, and the bottom bay of brace rods were eliminated, to allow pedestrian access to the amphitheater.

Crews first demolished the existing tank, prepared and staged the area, and placed a new 12-inch water line. Forty-two micropiles were placed, along with concrete parallelogram supports, for the tank's legs. For the amphitheater, one row of seats doubles as a retaining wall, with two other bluestone walls to create additional seating. Student space was also created with a combination of undulating canopy and security climbing baffles on the tower legs. These climbing baffles also house the theatrical lighting for the amphitheater. At night, the space beneath the water tower becomes illuminated with vibrant colors of purple, pink and blue, as lights are cast onto the seating area. A removable fencing on one side of the tank also allows for event control.

ENTRY #6, ELEVATED STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Design/Build Water Tower Structure, Sagamore Spirit
Product / project owner:	Sagamore Spirit Distillery
Product / project location:	Baltimore, MD
Date completed:	April 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	120' -0"
Column height (feet, inches):	96' -0"
Diameter (feet, inches):	24' -0"
Capacity (US gallons):	50,000
Steel tonnage used (US tons):	50
Steel thickness (inches):	1/4" to 1 1/4"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

When the Under Armour founder's whiskey company, Sagamore Spirit, decided to build a showcase distillery in downtown Baltimore – part of an enormous development that also includes condos, shopping, trails, and a new

Under Armour headquarters campus – they knew just what to do, build a showpiece water tower! This water tower structure stands right next to the new Sagamore Spirit distillery building in a courtyard with processing, tasting, and restaurant buildings nearby. To complicate the construction of this water tower, the distillery building was already in place prior to the tank being erected and painted. The tower stands prominently as a showpiece for Sagamore Spirit, Under Armour, and for the City of Baltimore.

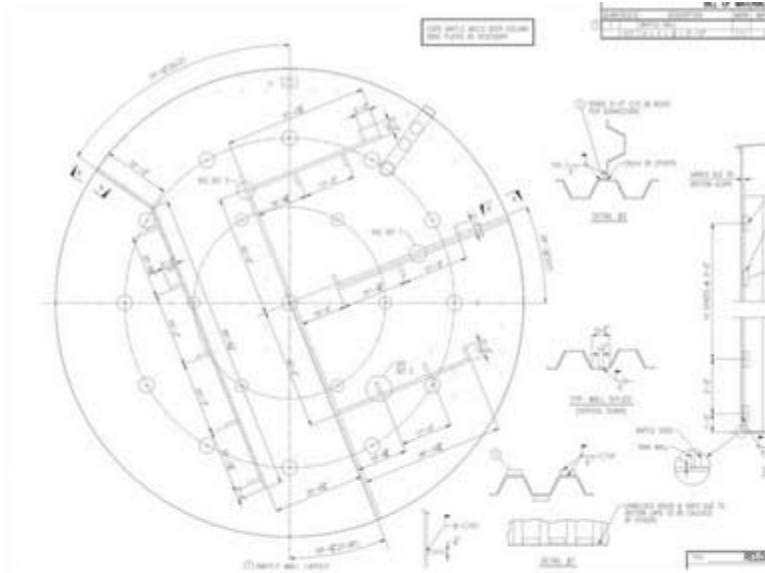
The water tower was designed to have the “retro” look with a cone roof and floor, a narrow tank diameter, and an extended vertical shell. The carbon steel tank stands on (4) outer 20” diameter tubular columns and has a 3’ wide balcony. At 120’ tall, it can be seen from Interstate 95. The tank is used to store water for the whiskey’s proofing process and is spring-fed from a natural limestone spring at Sagamore Farm, 22 miles from the distillery.

Though coordination challenges associated with fabrication, field construction, and safety was already extraordinary, the Owner presented the design build tank company with another huge challenge in the middle of an extremely aggressive schedule. The Owner had three bells, weighing several tons, which had been cast in a foundry nearly 150 years ago, that they wanted to hang off the side of the tank and access from an added walkway! It definitely took a great deal of ingenuity to design, fabricate, and construct this amazing project.

2017 Awards: Field Erected Storage Tank - RESERVOIR STORAGE TANK

ENTRY #1, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Moore's Bridges WWTP Subgrade Tank Replacement
Product / project owner:	City of Norfolk
Product / project location:	Norfolk, VA
Date completed:	2017
Construction standard (if any):	AWWA D100 Section 14
Overall height / length (feet, inches):	42' -4"
Column height (feet, inches):	40" -0" (Shell Height)
Diameter (feet, inches):	154' -0"

Capacity (US gallons):	5,573,000
Steel tonnage used (US tons):	616
Steel thickness (inches):	0.25" to 0.75"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

5,573,000 Gallon MCCR Water Storage Tank
154'0" D x 40'0" H w/ Seal Welded Cone Roof

The tank contractor provided engineering, fabrication and construction of one 154' x 42'4" welded steel tank with the foundation below grade and inside an existing ring wall. The contractor's scope included shop painting and field painting for the tank, all the required nozzles and accessories, and the installation of baffle walls inside the tank. The tank contractor also provided the detailed foundation design, with piles, to be built by a subcontractor.

The new tank needed to be constructed within the footprint of an existing tank in a wastewater treatment facility. The old tank was cut off at grade; the annular ring was left behind to add stability to the new tank. The foundation for the new tank had to be 6' below grade in order to ensure connections to the existing below-grade piping. The old tank had extensive interior baffle walls that were removed prior to demolition. The plan for the new tank needed to include re-installation of approximately 450 linear feet of 35' tall corrugated baffle walls. In addition to these engineering and construction challenges, the poor soil conditions and changes in the site's elevation presented challenges.

The tank contractor designed the new below grade foundation with 329 auger-cast pile to ensure proper support for the new tank and to protect the integrity of the existing piping. Due to the slope of the site, the new tank was constructed from the inside, with a double door sheet and ramp to permit access during construction. The tank contractor worked in the 3' wide x 6' deep interstitial space to perform welding work on the tanks below grade exterior. Once the tank shell was complete, the baffle walls, which were ground down on the edges and painted, were reinstalled. The tank contractor used a crane to lift the baffles and reinstall them in the new tank.

ENTRY #2, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Little Cove Road Water Storage Tank
Product / project owner:	Huntsville Utilities
Product / project location:	Huntsville, AL
Date completed:	February 2017
Construction standard (if any):	AWWA D100 Section 14
Overall height / length (feet, inches):	45' -0"
Column height (feet, inches):	31" -0" (Shell Height)
Diameter (feet, inches):	88' - 0"
Capacity (US gallons):	1,501,300

Steel tonnage used (US tons): 160
Steel thickness (inches): 5/16" to 3/8"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

88' x 31' Stiffened Umbrella Roof Water Storage Tank

This water utility project presented some unique challenges. The land for the tank was donated by the developer of the surrounding property, with the stipulation that the tank could be no taller than 45'. The tank needed to provide 1.5 million gallons of water storage. Additionally, the site for the tank is on a hillside with a significant slope and was difficult to access with construction equipment.

The tank contractor provided engineering, fabrication and construction of one 1,500,000 Gallon Water Storage Tank (88'0" D x 33'0" H SURT w/ Knuckle Umbrella Roof). The contractor also provided a unique foundation design that met the support requirements for the 15 MG tank and permitted level construction and a maximum overall height of 45'. The tank foundation, field painting and electric control valve house were subcontracted.

The tank contractor worked closely with the foundation contractor to execute the challenging foundation design. On the high side of the foundation, the foundation contractor excavated 9' of grade. The high side foundation is 2' tall and sits below the frost level. On the low side, the foundation is 11'2" tall and sits on bedrock; the foundation is stair-stepped from the highest point to the lowest point.

In order to meet the capacity requirements and the overall height limitation, the tank contractor designed a knuckle umbrella roof with only 11' of rise. The design included 24' roof vents placed lower on the roof slope instead of at the top. The tank was designed and constructed per AWWA D-100 Section 14 with 573-70 plate material. There are four shell rings; the first ring is 3/8" carbon steel, and rings 2, 3 and 4 are 5/16" A36 Mod steel.

ENTRY #3, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	New 4-H Tank
Product / project owner:	City of New Martinsville
Product / project location:	New Martinsville, WV
Date completed:	July 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	24' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	88' - 0"
Capacity (US gallons):	1,040,000
Steel tonnage used (US tons):	88
Steel thickness (inches):	0.33" Average

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

We were contracted to provide a new Reservoir for the City of New Martinsville, WV. This was inclusive of the Reservoir, the foundation for the Reservoir, the Coatings, the Mixing System, and the Geodesic Dome Roof. The most challenging aspect of this Reservoir is that it sat at top of hill 300' above the access point from the county road.

There was no road to the top of the hill and the top of the hill was not at the time of award large enough to hold the tank itself.

To access the site the existing dirt path had to be widened and gravel added to aid in traversing it. Numerous trees had to be removed. As the grade and turns were still too steep for tractor trailers we had to use a bull dozers to pull material and cranes up the access road.

At the top of the hill, the site had to be levelled to make room for the Reservoir. We then had to increase the area around the tank for crane ways and then add in another flat area for the Geodesic Dome Roof to be built outside of the Reservoir.

The Interior of the Reservoir received a prime coat of Zinc with 2 full field coats of Epoxy applied after touching up this coat. The exterior received a prime coat of Zinc, an intermediate coat of Epoxy, and then a finish coat of Polyurethane.

ENTRY #4, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Tank 2A - 06 Replacement
Product / project owner:	Lake Havasu City
Product / project location:	Lake Havasu City, AZ
Date completed:	October 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	86' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	26' - 0"
Capacity (US gallons):	1,000,000
Steel tonnage used (US tons):	244
Steel thickness (inches):	0.375" to 0.625"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

City of Lake Havasu

Qty: 1

Design: AWWA D-100 (basic)

Size: 86'x26x CRWT

Roof: Geodesic Dome w/ none skid coating

ENTRY #5, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Reservoir 4606-1 Construction (Mission Hills Pressure Zone)
Product / project owner:	Coachella Valley Water District
Product / project location:	Coachella Valley, CA
Date completed:	November 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	40' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	186' - 0"
Capacity (US gallons):	6,800,000
Steel tonnage used (US tons):	619
Steel thickness (inches):	0.3125" to 0.9788"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

This tank was under consideration to be built via concrete or welded but the design team performed a Life cycle cost analysis and overall bid the job as a welded steel tank. It was designed to meet the new demands of an ever growing city as well as supplement future demand of additional housing tracks. This asset will be a critical part of their system for decades/ centuries to come.

The tank was designed in accordance with AWWA D-100 section 14 in order to be as cost effective as possible; but due to high seismic load's and the tank being located just feet away from the San Andres Fault line there were many precautions taken in the design/supply of the reservoir. The tank as a whole weighed more than 1.2 million pounds and was constructed during the Santa Ana winds. The effects of the high winds were amplified by the fact that it's located on a mountain range which regularly sees winds in excess of 60 mph on any given day. Although there were many days which the crew had to work split shifts or submit a weather delay, we were still able to complete the job on time with a satisfied customer and a safe crew. This was due to the construction sequencing of a welded steel tank and the ability to start / stop as needed in order for the crew to safely follow all applicable safety regulations.

ENTRY #6, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	NEW 3.0 MG Welded Steel Tank
Product / project owner:	California Water Service
Product / project location:	East Los Angeles, CA
Date completed:	May 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	155' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	24' – 0"
Capacity (US gallons):	3,200,000
Steel tonnage used (US tons):	302
Steel thickness (inches):	0.25" to 0.5"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

At the start of the project the footprint for this new 3.2 MG KRWT was being occupied by a deteriorating concrete tank which was actually a hazard to the homes surrounding the area. The owner examined the cost comparison of trying to rehabilitate their existing concrete tank and determined that both initial cost and life cycle costs of a welded steel tank made the decision an easy choice. The basis of their study was not on conceptual theory but instead on

the tanks which are currently operating in their systems. The scope of this project included erection of a sound wall, establishing onsite field office trailers with utilities, demolition of existing facilities (including concrete reservoir), import and export of site materials, installation of a concrete ring wall, tank erection, tank shrouding, tank coatings, site yard piping, connections to existing mains, finish grading, asphalt, curb / gutter, CMU wall and new fencing to secure the facility.

The location of the project was East L.A. so access to and from the site was a new challenge everyday due to the close proximity of surrounding homes and neighbors parking on both sides of the 18' wide street which required traffic control measures to be 24/7 during specific project phases . Once access was gained to the site, you were surrounded by low hanging power lines which made every move critical to negotiate while working on the outside boundaries of the project. The customer allowed for the use of AWWA D-100 section 14 which helped reduce the cost of the overall project by a substantial amount, keeping the weight / steel thickness down which saved on material, labor and trucking. Since the customer selected steel as their material of choice this job exemplifies its superior longevity and cost effectiveness because they have both styles of reservoirs operating in their system but only one was superior enough to replace the other.

ENTRY #7, RESERVOIR STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Paradise Meadows 5.0 MG Tank
Product / project owner:	Eastern Municipal Water District
Product / project location:	Menifee, CA
Date completed:	October 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	40' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	157' – 0"
Capacity (US gallons):	5,400,000
Steel tonnage used (US tons):	545
Steel thickness (inches):	0.25" to 0.78"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The work comprises construction of a 5.0 MG Potable Water Storage Tank and appurtenances including but not limited to the following: furnishing, delivery and erecting a 5.0 MG welded steel tank and appurtenances; all precise grading and construction of the tank pad, detention basin and access road; including 18-inch dia. Detention basin drain pipe and riser; furnishing, delivery and installation of 24-inch dia. welded steel (CML/C) water pipeline and appurtenances; including all welded joints, valves, blowoffs, and air valves; connections to existing water mains with valves and associated removals as needed; trench sheeting, shoring and bracing per California Labor Code;

pavement and PCC curb and gutter; valve enclosure; electrical panel and SCE service panels/conduits; all electrical and SCADA equipment; implementation of the mitigation measures identified from the Mitigation Monitoring and Reporting Program; comply with SCAQMD Rule 403 to actively prevent, reduce or mitigate fugitive dust emissions; chain link fencing and gates; painting and coating; all system shutdowns and piping tie-ins; hydrotesting, miscellaneous testing, chlorination/disinfection and field start-up and testing.

This 5.4 million gallon tank was built at 157' diameter by 40' tall, with a knuckle roof, and overlooks the new housing development of Audie Murphy, but can be seen from surrounding communities to the west. One of the unique things about this tank is that, when you're looking for it from the east end of town, it is painted to blend in with the hillside that it was built into, so you really have to scan to find it. In order to make room for this site footprint, and to set the tank at the proper elevation, over 25,000 cubic yards of dirt /rock had to be blasted and removed. As a customer preference the reservoir was designed with a modified structure to support the large roof platform as the additional weight required rafters, poles and a girder to be increased in thickness. Along with their preferred platform design, this customer is extremely particular about operator safety, so they design all of their tanks to have 360 degree handrail, roof tie off cables, and fall resistant grading shields, located on all roof access hatches. As you can see in the picture, the tank is fitted with 5 custom aluminum roof vents, which really stand out against the dark color of the tank and hillside.

2017 Awards: Field Erected Storage Tank - SPECIAL STORAGE TANK

ENTRY #1, SPECIAL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	1,000,000 Gallon Elevated Tank Raise
Product / project owner:	Pennsylvania State University
Product / project location:	State College, PA
Date completed:	January 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	193' -10.5"
Column height (feet, inches):	16' -0"
Diameter (feet, inches):	15' -0"
Capacity (US gallons):	1,000,000
Steel tonnage used (US tons):	43.5
Steel thickness (inches):	1" to 3/16"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Penn State University has continued to grow and expand with many additions and improvements to its aging infrastructure. A key component to this growth is the availability of usable (effective) storage of finished water to service the many facilities on and around campus. Their previous system lacked the volume of effective storage to meet their current and future needs. Options to solve this problem included de-commissioning their existing water towers and replacing with taller structures, or modifying their existing resources to increase the volume of effective storage.

After careful review and consultation, they elected to raise two of their elevated tanks 16'-0" to increase their

effective storage and boost their pressure by almost 7 psi. This method would reduce both cost and construction time. The first tank, a 1,500,000-gallon multi-column tank, was successfully raised with hydraulic cranes, freshly painted, and placed into service in 2016. The second tank, a 1,000,000-gallon single pedestal tank was completed and placed into service in January of 2017.

Due to site constraints, hydraulic cranes could not be mobilized in to lift the single pedestal tank. The only option for modifying the tank on the minimal site was to employ a hydraulic jacking system which operated from a heavy post installed structural steel girder within the stem of the tank. This system was designed to handle the weight of the tank and incorporated a series of hydraulic cylinders to lift the tank and upper stem off the girder.

The lift was completed in two phases as the tank was elevated allowing two 15'-0' diameter by 8'0" tall rings of 1-3/16" thick formed steel stem sections stacked in succession. While the tank was out of service for this modification, additional accessories were added and many components were replaced totaling 43 ½ tons of new steel incorporated into the now taller structure. The tank was re-coated and returned to service in early 2017, proudly overlooking Beaver Stadium just north east of the campus.

ENTRY #2, SPECIAL STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Raising of Existing 500,000 Gallon Elevated Tank
Product / project owner:	City of Leesburg, GA
Product / project location:	Leesburg, GA
Date completed:	June 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	133' -0"
Column height (feet, inches):	40' -0"
Diameter (feet, inches):	10' -0"
Capacity (US gallons):	500,000
Steel tonnage used (US tons):	20
Steel thickness (inches):	3/4"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The City of Leesburg, GA found themselves in a situation of having two tanks in the same system operating off of two separate hydraulic grade lines. This created pressure differential issues across the City often resulting in poor water pressure. After looking at replacement options, they elected to pursue raising the shorter tank in order to save time and money while increasing water pressure and putting their full capacity at the same operating level.

After completing a full engineering analysis to determine if both the structure and the foundation were suitable to handle the additional loads of adding 40 feet of additional height, a plan was engineered to raise the tank. An additional 12 anchor bolts were added into the foundation to handle the additional wind loading. Because the tank had enough open area around it, two large hydraulic cranes were brought in to lift the 200,000 pound container off of the stem. As the container was raised and swung to the side, a third crane was utilized to hoist the new 40 foot

stem section into place to be welded to the existing stem. Once the extension was secured, the tank was lowered back down to sit atop the new extension. In a matter of only 6 hours, the tank was raised and securely welded back in to place. All of the internal piping and ladders were extended and matched to their existing counterparts.

Upon completion of all welding activities, the tank received a fresh coat of paint including city logos. The tank proudly sits 40' higher and 20 tons heavier while overlooking the high school football field. This option was completed at a fraction of the cost and construction time of building a new tank, and allowed the City to continue the life of their existing tank.

ENTRY #3, SPECIAL STORAGE TANK OF THE YEAR

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Submitted by:?.....



Product / project title:	(3) Contanda Olive Oil Storage Tanks
Product / project owner:	Contanda Terminals
Product / project location:	Baltimore, MD
Date completed:	2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	44' -2"
Column height (feet, inches):	40' -0" Shell Height
Diameter (feet, inches):	30' -3"
Capacity (US gallons):	645,000 Total / 215,000 Each

Steel tonnage used (US tons): 89 Total / 29.8 Each
Steel thickness (inches): 0.1875" to 0.25"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Tanks: (3) 304 Stainless Steel 30'3" x 40' Olive Oil Storage Tanks

For this turnkey API 650 tank project, the tank contractor provided engineering, fabrication and construction of three tanks, along with associated foundations, piping, steam piping and equipment. The contractor successfully met the customer's specific design, project site, safety and schedule requirements.

The stainless steel tanks were custom fabricated per the customer's specified designs and in accordance with API 650 standards. The tanks were constructed on ringwall foundations designed by the client and furnished by the tank company's subcontractor. The civil scope, the piping and equipment, and the insulation were in the tank contractor's scope and were executed by subcontractors.

The primary challenge of the project was planning for and executing construction of three 30'3" x 40' storage tanks in a tight space in an existing, fully operational bulk liquid storage terminal facility. To meet the demands of the customer's tight schedule and make the best use of the available space for the project, the tank contractor developed a construction plan that included building the three tanks in consecutive order. The contractor received and unloaded all tank materials next to each tank's foundation. Each tank was construction directly on its foundation. The tank roofs were constructed inside the tanks and lifted into place with a large crane. Following the completion of construction and hydrostatic testing, the insulation was installed on each tank. Much of the work on the project was executed simultaneously, which required the tank contractor's careful coordination of the foundation, tank erection, piping and insulation crews.

2017 Awards: Field Erected Storage Tank - STANDPIPE

ENTRY #1, STANDPIPE STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	GMP 7 - Thermal Energy Storage Tank
Product / project owner:	Lockheed Martin
Product / project location:	Fort Worth, TX
Date completed:	December 2017
Construction standard (if any):	API 650
Overall height / length (feet, inches):	105' -0"
Column height (feet, inches):	-
Diameter (feet, inches):	45' -5"
Capacity (US gallons):	1,260,200
Steel tonnage used (US tons):	180
Steel thickness (inches):	0.3" Average

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

Given that this standpipe was to be built in an existing and operating Lockheed Martin plant, the space taken up by the standpipe had to be absolutely minimized. Therefore, we had to size the standpipe to have the smallest diameter possible, while still meeting the ton-hour of storage required for the standpipe. We were able to provide 16,000 Ton Hours of Thermal Energy Storage in a 45' diameter by 105' tall Chilled Water Standpipe.

Included in the scope of supply was the foundation, which consisted a 3' pile cap and (37) 3' diameter drilled piers over 25' deep.

This standpipe and the diffuser within it, had to be built, painted, and insulated in an urban, plant environment with many other existing, occupied buildings and in use parking lots, immediately adjacent to the standpipe. In any urban environment, paint application is difficult, and this project presented an especially challenging work site. The parking lot on the west side of the standpipe was within 15', and on the east side of the standpipe was an existing standpipe within 5'. To the south of the standpipe was a production building, within 40', and to the north, was a production building, within 100'. Deliveries and major lifts involved significant communications with Lockheed Martin so as to not impede plant operations.

Most importantly, the building 40' to the south of the standpipe was where Lockheed Martin paints their fighter jets. Because of this, numerous steps to ensure cleanliness had to be taken. This included hourly checks for Foreign Object Debris (FOD), where all construction waste had to be immediately placed in a sealed receptacle. All sparks produced during welding had to be contained. This especially is challenging for a hundred foot tall standpipe.

The interior of the standpipe received two coats of epoxy, and the exterior received one coat of epoxy. This was touched up in the field with the welds, and damaged areas being power tool cleaned, to minimize the dust, and then the coatings were applied with brush and roller for the exterior surfaces, to eliminate overspray issues.

Despite the challenges, we were able to provide this Thermal Energy Standpipe to Lockheed Martin ahead of schedule and with a storage capacity exceeding that of the performance guarantee.

ENTRY #2, STANDPIPE STORAGE TANK OF THE YEAR

Submitted by:?.....



Product / project title:	Palo Alto Medical Center
Product / project owner:	VA Medical Center
Product / project location:	Palo Alto, CA
Date completed:	February 2017
Construction standard (if any):	AWWA D100
Overall height / length (feet, inches):	57' -9"
Column height (feet, inches):	-
Diameter (feet, inches):	41' -0"

Capacity (US gallons):	507,000
Steel tonnage used (US tons):	75
Steel thickness (inches):	1/4" to 7/16"

PRODUCT/PROJECT DESCRIPTION AND SPECIAL FEATURES:

The VA Paso Alto Healthcare System project was an essential upgrade to the facility, it consisted of providing all tools, materials and labor for site preparation, selective demolition, grading, sewer, landscaping, site lighting, finish grading, fire suppression systems, utilities, mechanical, electrical, telecommunication, elevators, radiation shielding, abatement of hazardous material, cogeneration plant and construction of a thermal energy storage tank.

The Palo Alto VA TES tank is a 5,000 ton-hour cold water storage standpipe wedged between existing buildings and backing up to a precipice that drops off into a creek on the VA medical campus. With the tank being adjacent to the creek, and with allowable soil bearing pressures below that of the water column within the tank, the foundation had to be designed as an oversized slab, nearly 19ft larger in diameter than the tank itself, and measuring 4'-2" thick at the toe of the foundation. The oversized slab was required to spread the bearing pressure in the soft soil induced by seismic overturning of the standpipe. With nearly 220 degrees of the tank blocked by the surrounding buildings and creek, the construction and engineering teams created a detailed assembly sequence while factoring in crane position, pick weight, and available reach. The center column was designed to be inserted through the door sheet of the tank horizontally, and to be lifted vertically inside the tank, in order to avoid potential overhead restrictions. One of the most noteworthy features of the TES tank is the diffuser design. The radial plate diffusers are designed out of modular elements that are small enough to fit through the bottom manway door and can easily be installed or removed without cutting or welding. The diffuser design also allows for the diffusers to be expanded/extended easily in the future if the VA ever decides to increase the inlet/outlet flow rates through the tank.