

UTLX X-3 Tank Cars

By Steve Hile

Union Tank Car Company (reporting marks UTLX) was the premier owner/lessor of tank cars in the steam era and beyond. Originally a subsidiary of the Standard Oil monopoly, they became an independent company in 1911 with the breakup of Standard, but they continued to service mostly the pieces of Standard Oil long after. Their plain black tank cars were ubiquitous throughout the US rail system.

While still part of Standard, many of their tank cars were built by the Standard refinery locations since the technology was similar to building refining equipment. Consequently Union Tank Line (as it was known in those days) had its own Master Car Builder and design staff. They participated, actively, in the development of the new tank car specifications that took affect in 1903. John W. Van Dyke produced several innovative designs, including the frameless Class V cars that were patented in 1903 and built for the next decade. When that design was not fully accepted by conventional railroad men, Van Dyke created a second design that was known as the Class X. The Class X cars had a steel underframe made up of two outward facing 15 inch C channels tied together at the top and bottom with steel plates. Cast steel combination bolsters and tank saddles were somewhat similar to the Class V cars, but, instead of those saddles being riveted to the tank bottom, the tank was anchored at its center to the center sill. This concept was patented in 1904 and eventually became the industry standard. Both the X and V cars met the MCB Class II specifications.

10-12 years later, new, improved specifications were discussed and approved for all new cars to be built after May 1, 1917 to be known as Class III. This would evolve to be ARA Class III and then ICC 103, the general purpose tank car. The UTLX design to meet the Class III specification became known as the X-3. As will be seen, it built upon the Class X design and met the Class III spec. UTLX X-3 tank cars were built beginning in 1916 and continued to be built until World War II.

There was evolution of the X-3 design over this 20 plus years of construction. We will discuss this variation. While UTLX built or assembled some X-3 cars, most were built, to UTLX designs, by commercial builders including American Car and Foundry, Standard Steel Car, Pressed Steel Car, General American and Cambria Steel.

Underframes

The X-3 underframe design follows that of the Class X, but with 12 inch C channels as opposed to the 15 inch used on the Class X cars. The coupler draft gear fits inside the formed center sill. In general, for a given tank capacity, throughout X-3 production, the truck center and over buffer dimensions were standardized. One of the big differences between Class II and Class III specifications was that the running boards and end platforms were required to be no more than a fixed height above the rails, similar to that of flat cars. This eliminated the practice of attaching the running boards to the tank (as UTLX Class V and X) as well as designs with high running boards such as those of ACF.

To meet this requirement, UTLX separated the bolsters from the tank saddle castings. They chose to adopt end and stub side sills made of 9 inch C channels facing inward.

I have identified three distinct phases of X-3 underframe design which I have chosen to call: Early, Classic and Late.

Early X-3 Underframe – Used for 2150 6500 gallon and 2000 10000 gallon cars built beginning in 1916 through 1917. This design used cast steel bolsters that were riveted to the center sill. Additional castings were used inside the center sill to back up the channel where the bolster was riveted. At least 1000 of the 6500 gallon cars and all of the 10000 gallon cars used a more tapered cast bolster. My presumption is that the first casting was deemed to be over designed. Both casting designs were somewhat like an “I” beam with openings in the web. These early underframes can be identified externally by a pattern of four rivet heads where the bolster attaches to the stub side sill. In the earliest, the four rivets are more spread out, while the more tapered bolster clusters the four rivets more tightly.

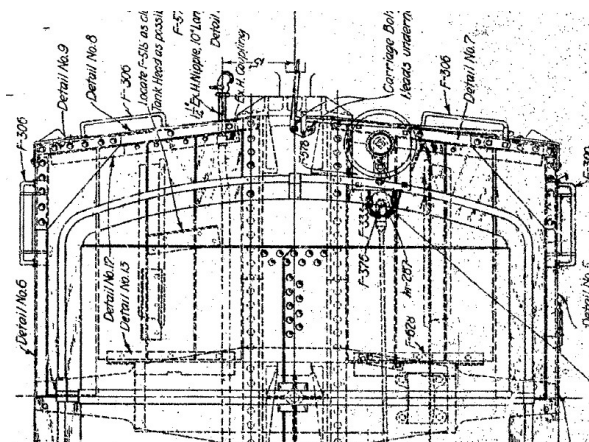


Photo of wider bolster casting on surviving example 6500 gallon car in Lake Superior RR Museum 2016.



Photo of the more tapered, cast bolster on surviving 10000 gallon car UTLX 31589 at Galveston RR Museum. Photo courtesy of Morris Gold. Note the two extra holes under the running board and the tighter cluster of 4 rivets at the side sill.

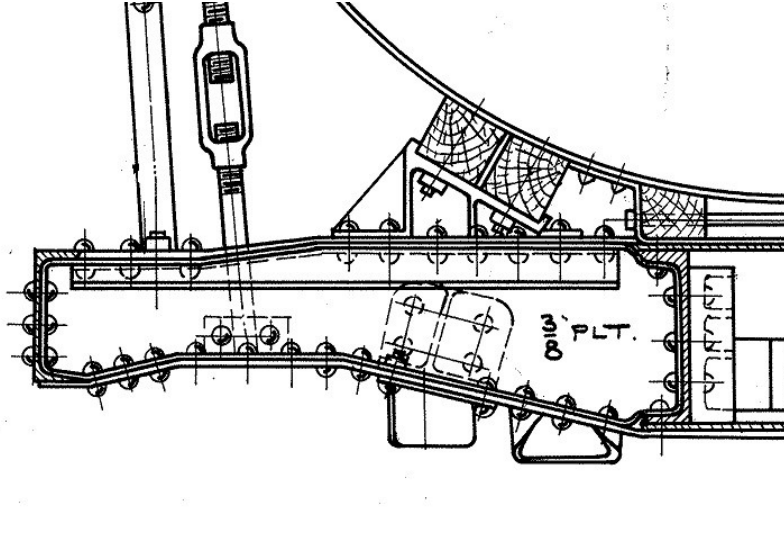
Both versions of the Early underframe treated the end sills in the same way, they were raked slightly back from the draft gear end casting, allowing the end platform to follow the outline of the tank heads, as the running boards had on the earlier X and V designs where they were attached to the tank.



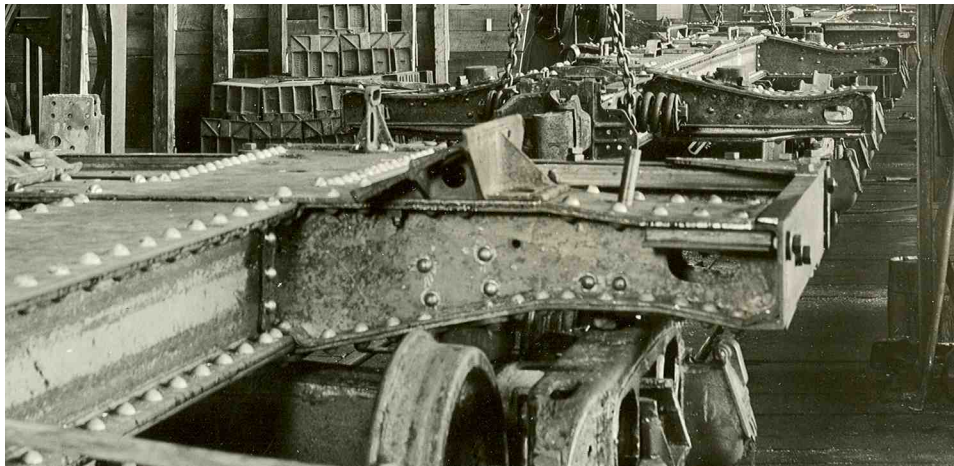
Plan overhead view of the Original X-3 underframe showing the end platform. Boards from the end sill to the bolster fill in the entire end platform under the tank. The end sills are raked backwards from the center sill to the side sills. This mimics the Class X design where the running boards followed the curve of the tank head. There are triangular plate reinforcements at each corner

Classic X-3 Underframe

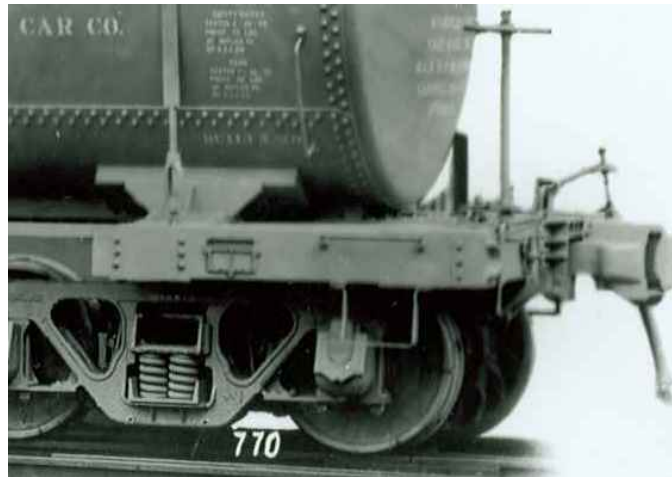
Beginning following WWI and continuing through the next decade, the X-3 design for the underframe had two significant changes. The cast bolsters were replaced by one of riveted, built up, box section construction. It can be assumed that this design change was either cheaper or stronger, or both. At the same time, the stub side sills were lengthened slightly and the end sill became straight across, rather than raked back from the coupler. The entire area between the end sills and the bolster remained covered with a wooden plank platform.



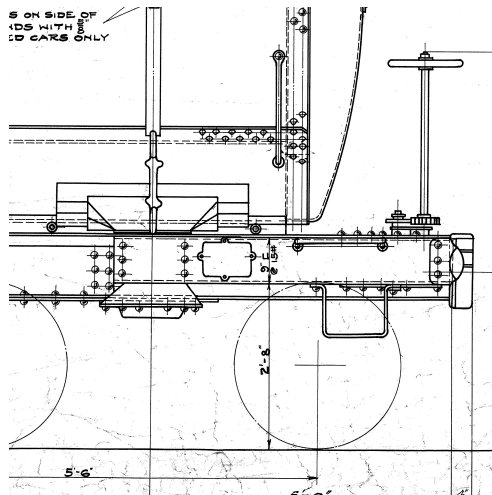
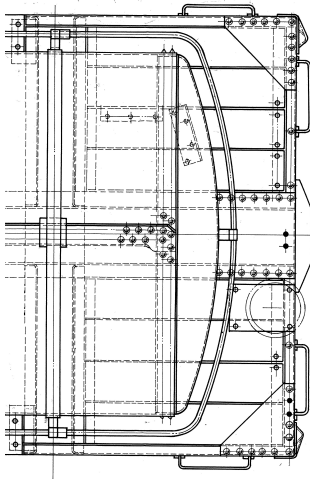
Plan view of the built up bolster, it is attached to the center sill and side sills in exactly the same way at the cast bolsters, except that there are now 6 rivets on the side sill where the bolster attaches. There is an angle to support the end platform boards.



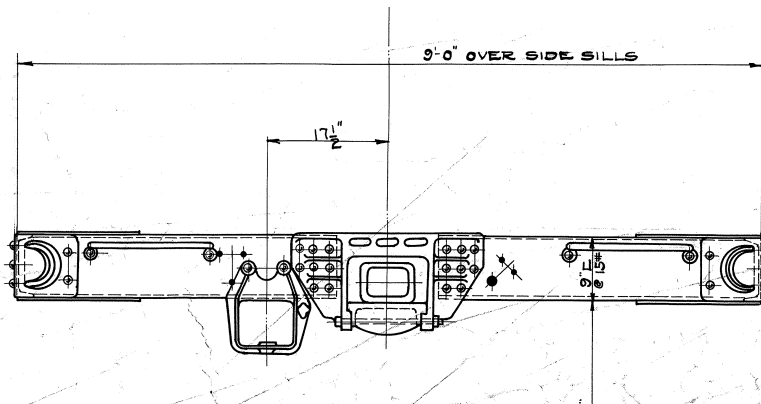
Under construction view of the Classic X-3 underframe (the one in the background is upside down to allow working on that side.) Note that the hole shown under the running board area does not show in the plan and may not have existed for many cars, as it was not really used. The tank saddle casting has lips that help retain the blocks of wood that cushion the tank as it sits on the saddles.



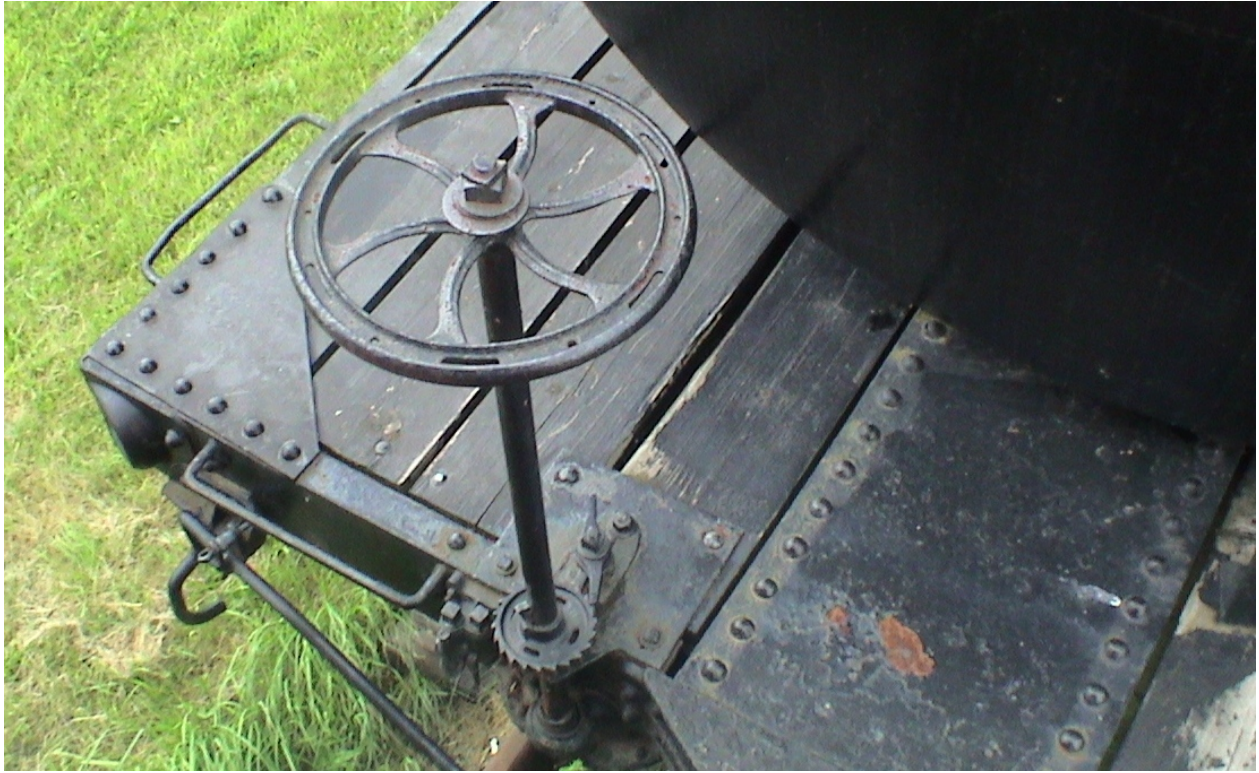
This portion of a builder's photo shows the side sill rivet pattern where the built-up bolster is attached with the common 6 bolt pattern. It also shows the top mounted coupler release.



Top and side plan views of the Classic X-3 underframe showing the end sill straight across. The triangular corner braces are now right triangles.



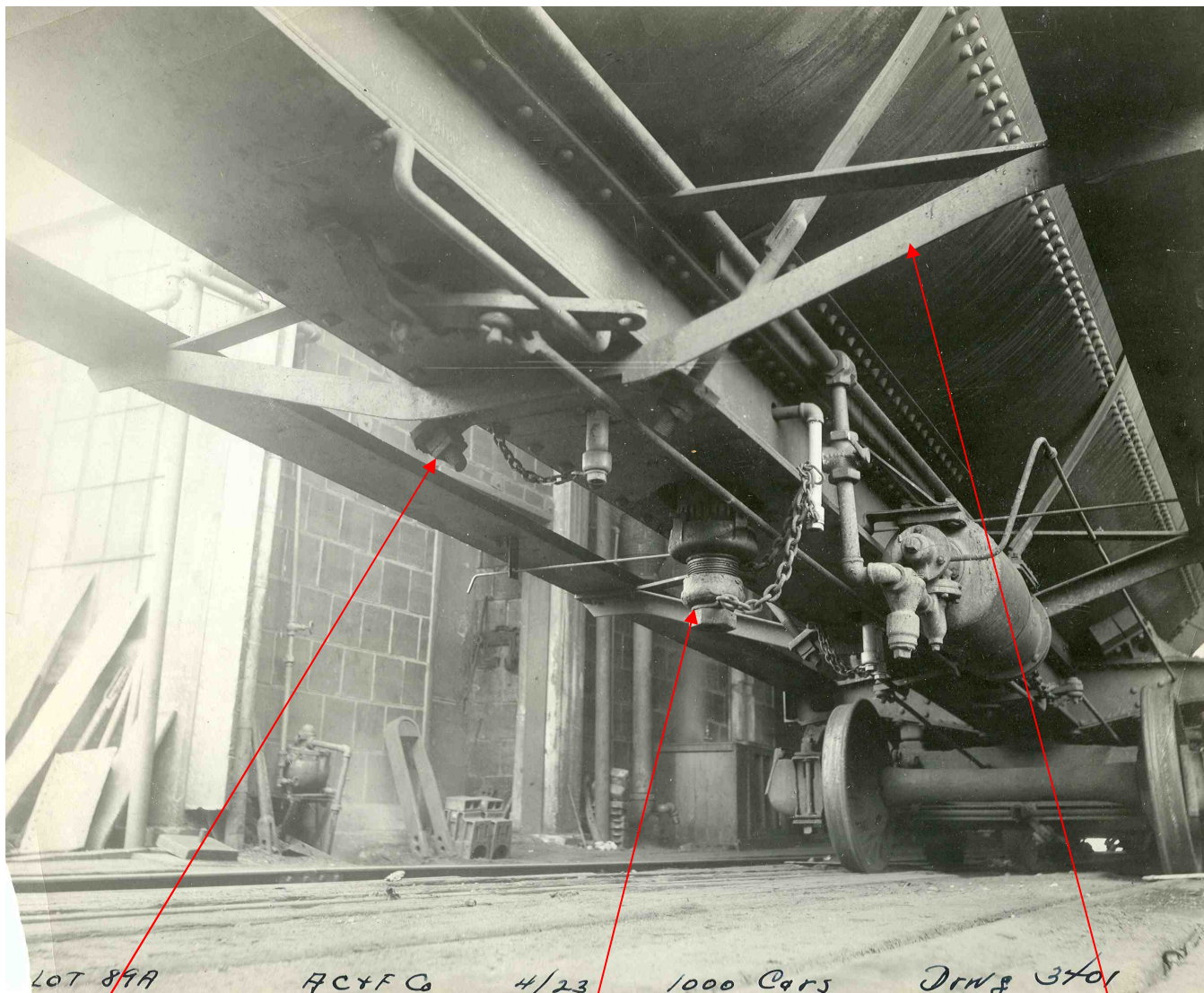
End plan view of the end sill. The draft gear cover casting has been widened slightly from the early underframe. The poling pockets are part of a stamping that wraps the corner where the channels of the side and end sills meet.



A portion of the end sill and platform of preserved UTLX 36025 at the New Brunswick RR Museum in Hillsborough, NB Canada. Photo courtesy of Steve Boyko. It shows the riveted top of the center sill, the board platform from the end sill to the bolster, the right triangle brace and the poling pocket at the corner as well as the brake wheel. The retainer valve is just to the left of the brake shaft, on the end sill. This view shows the common later modification to move the brake wheel shaft outside of the end sills. The cars were not built this way, but photo evidence suggests that many/most were so modified, possibly at the time of conversion to AB brakes in the late 40's to early 50's.

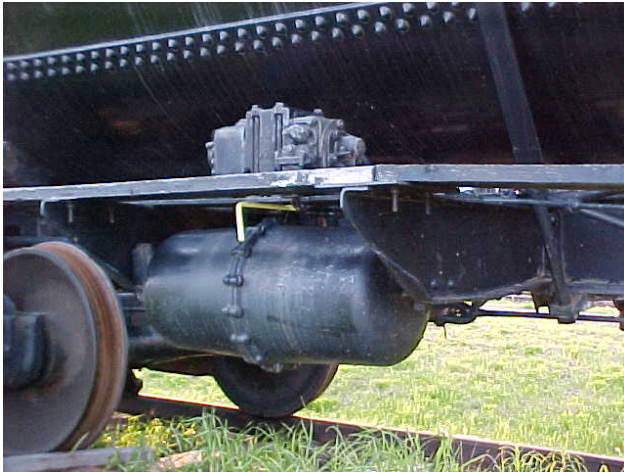


Another view of the brake wheel shaft outside the end sill on a late X-3 multi-compartment tank car at the National Museum of Transport in St. Louis, MO,



Here is an unusual view of the underside of an X-3 tank car, purportedly one of the 1000 cars built by ACF in 1923. Things to note include the bracket attached to the bottom of the center sill that anchors the inboard tank bands and the braces that support the running boards with an angle below the center sill and a strap above it. The bottom outlet has a screw cover, but the control valve is inside the tank. This protruding part is designed to break off in case of a derailment without causing a leak. What is less clear is the meaning of the other two capped pipes. Typically those would be for circulating steam through heater coils inside the tank to warm the cargo. Perhaps those were installed in anticipation of a later addition of the heater coils. They do not appear on a full car builder's photo, nor does the extra pipe exiting the side of the center sill near the line to the air brake cylinder, and may represent a one-of situation.

As is shown in the builder's photo, the characteristic UTLX safety placard holders were clustered on the left end of each side of the car. In later service, the side facing safety placard was moved toward the center of the car and placed on the running board support to the right of the car center.



The conversion to AB brakes was accomplished by leaving the brake cylinder in exactly the same position as the KC system, which then retained all the original geometry. The reservoir was hung from two large stampings that replaced the left hand running board support. The triple valve sits on a plate above the reservoir with all the piping behind the pair. This was a common installation on many tank car builds and upgrades. Photos courtesy of Steve Boyko and the New Brunswick RR Museum.

Tanks

More than 10,000 ten thousand gallon capacity X-3 tank cars were built with the Classic underframes. All but about 700 of which had identical truck center spacing of 26' 9" and a length over buffers of 37' 5". But there were variations in expansion dome size and spacing of safety valves. All were delivered with the bolted safety manway covers. (Dates shown are authorization dates which precede actual construction.)

54 inch diameter dome with closely spaced safety valves

- | | | | | |
|---------------|-----------|---------------------------|------|--------------------|
| • 32000-35499 | 3500 cars | Standard Steel Car | 1919 | |
| • 35500-36249 | 750 cars | Cambria Steel Company | 1919 | |
| • 36250-36499 | 250 cars | Pressed Steel Car Company | 1919 | |
| • 37000-37399 | 400 cars | UTLX | 1919 | |
| • 50000-50249 | 250 cars | Pressed Steel Car Company | 1919 | Internal Heaters |
| • 37400-39244 | 1845 cars | General American | 1920 | |
| • 23845-23999 | 155 cars | General American | 1920 | Insulated X-4 cars |

60 inch diameter dome with more wide spread (45 degree from car center line) safety valves

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|---------------|-----------|--------------------------|------|------------------------------------------|
| • 27825-29324 | 1500 cars | American Car and Foundry | 1923 | |
| • 29325-29999 | 675 cars | Standard Steel Car | 1923 | |
| • 36500-36999 | 500 cars | Cambria Steel Company | 1923 | |
| • 23520-23844 | 325 cars | Standard Steel Car | 1923 | Immediately upgraded to X-4 cars by UTLX |

60 inch diameter dome with more wide spread (45 degrees from car center line) safety valves. Elongated frame (28' truck centers and 38' 8" over buffers.)

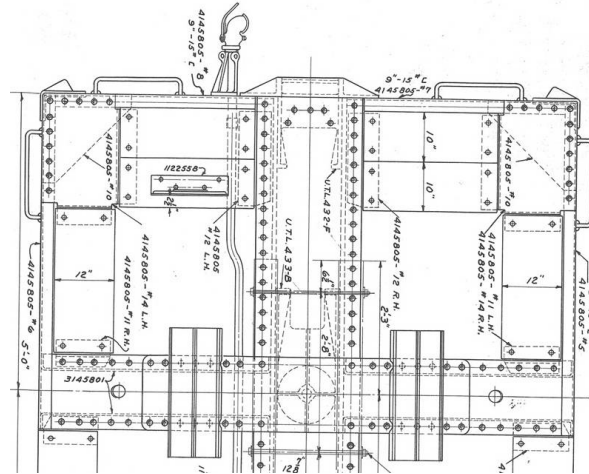
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|---------------|----------|--------------------------|------|
| • 27146-27324 | 179 cars | UTLX | 1930 |
| • 27325-27824 | 500 cars | American Car and Foundry | 1930 |

(This group of cars matches the drawings in Mainline Modeler and the Overland Models brass import.)

In addition to the above 10000 gallon cars, the classic form of the X-3 underframe was used (with identical dimensions) for 875 8000 gallon tanks built in 1927 and 1929. There were also 671 12000 gallon X-3 cars, probably with a slightly longer underframe, built in 1930.

Late X-3 Underframe

After a depression era pause in new construction of tank cars, UTLX resumed new car purchases in the mid-1930's. There was an adjustment in the design of the underframe. The plank platform from end sill to bolster gave way to more traditional running boards along the side and end sills. Instead of triangle braces at the corners, there was a rectangular riveted plate on the upper surface. AB brakes became standard equipment. Dome platforms and ladders were employed on both sides of the car.



Plan view of the bolster to end sill area of the Late X-3 underframe.

This late version of the X-3 underframe was not used on any 10000 gallon tank cars, but was used on a batch of 2000 6500 gallon cars (the first new cars of this capacity in 20 years) as well as 800 8000 gallon cars built on the same underframe, requiring a larger diameter tank, thus the "short" 8000 gallon cars. This underframe was also used, in slightly variable lengths for 675 multi-compartment tank cars, as well as small numbers of low capacity cars. All cars with the late X-3 underframe were built by American Car and Foundry.