23 June 2012

SCAFFOLD BRACKET DESIGN
FOR CONSTRUCTING
TEMPORARY WORK PLATFORMS

Many times, riggers need to construct temporary work platforms around vertical vessels, alongside rectangular heaters, etc., or are asked to do so for other crafts, ie, the Carpenters, Pipefitters, Boilermakers, etc.

For example, temporary work platforms are required when a vertical vessel is being fabricated in the air by welding one section on top of another section. See the series of photos below that show a crude column being fabricated in the air in Esfahan, Iran. Note that the 60 ton section is being lifted by two American 9310 crawler cranes, each with a 225 ton capacity. Also note the temporary work platform that is already attached to the top of the section. A much better view of the temporary work platforms can be seen in the 5th photo.

In the photo below, the 60 ton section is being picked behind the cranes from the fabrication foundations.
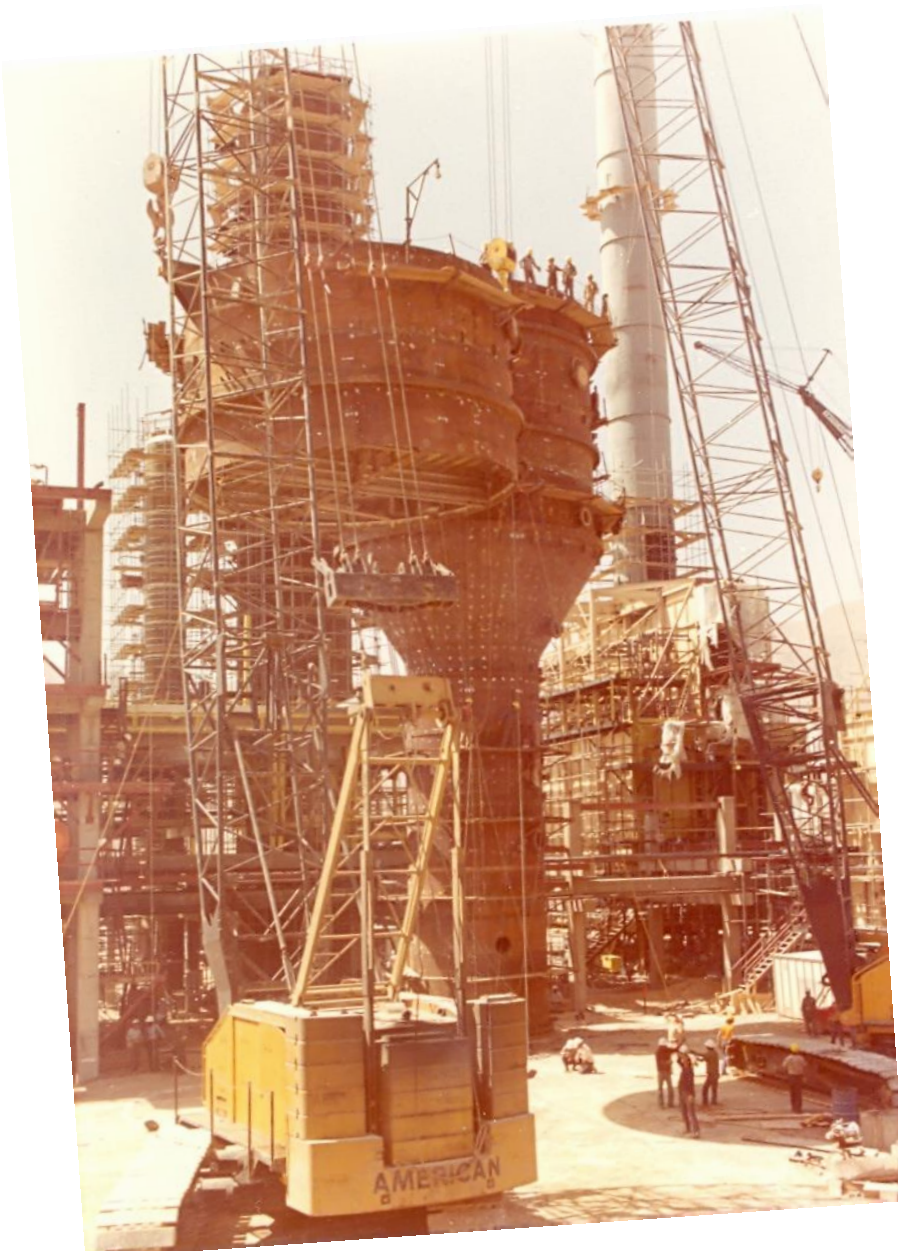
The photo below shows the section being swung between the cranes so it will be in a position in front of the cranes to be walked forward, hoisted and set on the sections that are already set.

The photo below shows the section being lifted in front of the existing sections.

Note the two vertical vessels on the left behind the crude column that have scaffolding from the ground clear to the top. This is because the vessels required about 2" of insulation all around them and it was not installed when the vessels were in the horizontal on the ground. So metal tube scaffolding had to be constructed from the ground to the top of the vertical vessels, a very expensive operation. In fact there were five other vertical vessels that we erected without insulation, but when the Construction Manager say how much time it was taking and how much money it was costing to scaffold these two vessels in the air, he told me to **down end** the other five vessels so the insulation could be put on when the vessels were in the horizontal on the ground. He also decided to install the piping, platforms and ladders. So we down ended them. This meant that we erected these five vessels twice.

The crude column did not require insulation, so the temporary work platforms were strictly for welding the sections together.

The photo below shows the section high enough to be walked over the existing sections. Note the riggers on the temporary work platform ready to receive the section. The section is being walked over our heads.

The photo below shows a close up of the section being walked over our heads.

This photo shows the 360° temporary work platform with the individual scaffold brackets, the boards and wire rope hand rails clearer than any of the other photos.

The stainless steel panels with the small holes in them are called trays. A crude column is used to separate crude oil into various products, ie, hot crude oil from the heater on the right side of the photos is pumped to the top of the crude column through a pipe that is connected to a nozzle on the top of the crude column. The oil is injected thru the nozzle on to the top trays. The oil then starts settling out depending on its density and the lighter oil like kerosene is drawn off at that level. The next set of trays down would let gasoline off, and so forth on down thru the crude column. The heavy oil that settles to the bottom of the crude column is then pumped back through the heater where the hot oil is again pumped back up to the top of the crude column and the cycle starts over again.

The photo below shows the section landed on top of the existing sections and is ready to be fitted up. The two sections that must be welded together can always be expected to be out of round with each other, Murphy will

make sure of that, so jigs must be welded at intervals above and below the seam to force the shell of the top section to be directly over the shell of the lower section, so they will at least be in round with each other, with some tolerance, like +/- 1/8". Pulling/pushing 2" thick shell sections into alignment is not an easy thing to do. My hat is off to the Boilermakers who can do this type of heavy fit-up.

SCAFFOLD BRACKET DESIGN:

The following scaffold bracket design has served me well for many years. I first reviewed a Boilermaker Foreman's sketch on a job we were working on and then decided to turn it into a design that could be issued to the field with a good safety factor.

COMMENTS ON THE DRAWING:

1. Note that two brackets provide a temporary work platform that is good for 200 lbs. per square foot (psf).
2. This is based on using 10' or 12' scaffold boards and overlapping them at least 2' on each end.
3. Adding more brackets and boards can complete a full 360 degree temporary work platform around a vertical vessel, similar to the one on the Esfahan crude column.
4. The attachment clip is connected to the shell by a 5/16" weld at the top, using LH70 rod. This weld must be made very carefully as the strength of the bracket depends on it. It is welded to the top side only so that the clip can be removed by inserting a pry bar under the lower edge and breaking the clip off and the weld at the same time. Then the remaining weld can be ground off very easily.
5. The welder must stamp his code by each bracket weld so he can be identified if there is a problem.
6. It is left up to the user to verify the design based on local codes and if necessary make modifications, ie, some codes require hard handrails instead of the use of wire rope.

▼ FLUOR

CALCULATIONS and SKETCHES

DATE 7 JULY 87
CONT. NO. 783500
BY KEGOODMAN CHK'D
SHEET NO. 1 OF 1

SCAFFOLD BRACKET DETAILS

DRAWING No.

8"

¾ V

3/8"×2"×8"
FLAT BAR

¼ V

1/4"×2"×2"
ANGLE

¼
¼

3/4"×2"×2"
FLAT BAR

END VIEW

36"

6"

3/8"

1"
2"

C4×7.25 CHANNEL

∉ 36"∅ HOLE (BOLT) 6" 8"

NOTCH THIS ANGLE FACE

1/4"×2"×2" ANGLE

NOTCH CHANNEL FLANGE

ALL ANGLES 45°

30"

2"

3/4"

42½"

1½"

∉ 3/8"∅×8" ROUND STOCK

SIDE VIEW

¼ V TYP. ALL ANGLE TO ANGLE TO CHANNEL WELDS

SCAFFOLD   BRACKET

5/16 V

C4×7.25 CHANNEL

FRONT VIEW

REACTOR SHELL (REF.)

½"×2" NOTCH (BOTH FLANGES)

2"
6"

SIDE VIEW

∉ ¼"∅ WIRE HOLE

∉ ¼"∅ WIRE HOLE

∉ ¼"∅ BOLT HOLE

∉ 3/8"∅ HOLES 2 HOLES 1"∅ STD BLACK PIPE

20"

44"

6"
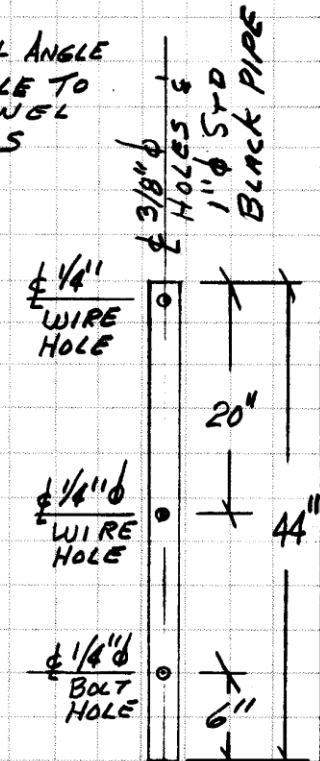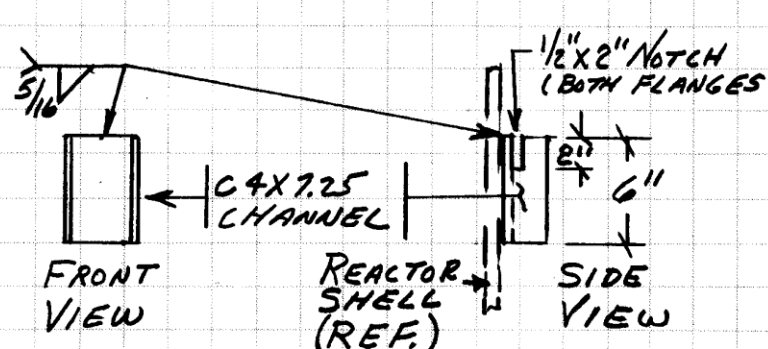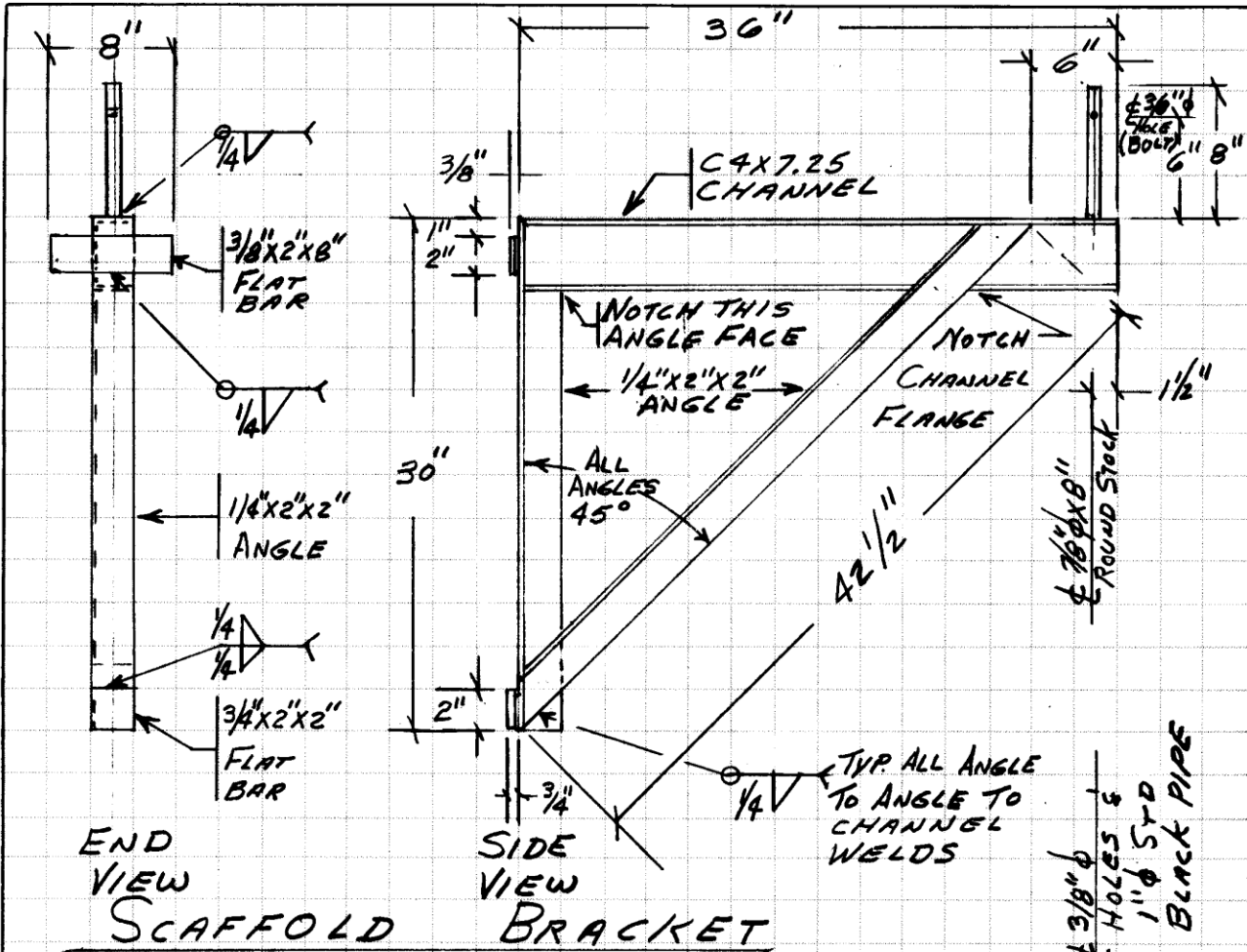
HAND RAIL

ATTACHMENT CLIP

NOTES:
1. LEAVE 3/4"×2"×2" FLAT BAR OFF TO LEVEL
   BRACKET, IF NECESSARY.
2. SWL = 200 lb/SQ.FT.