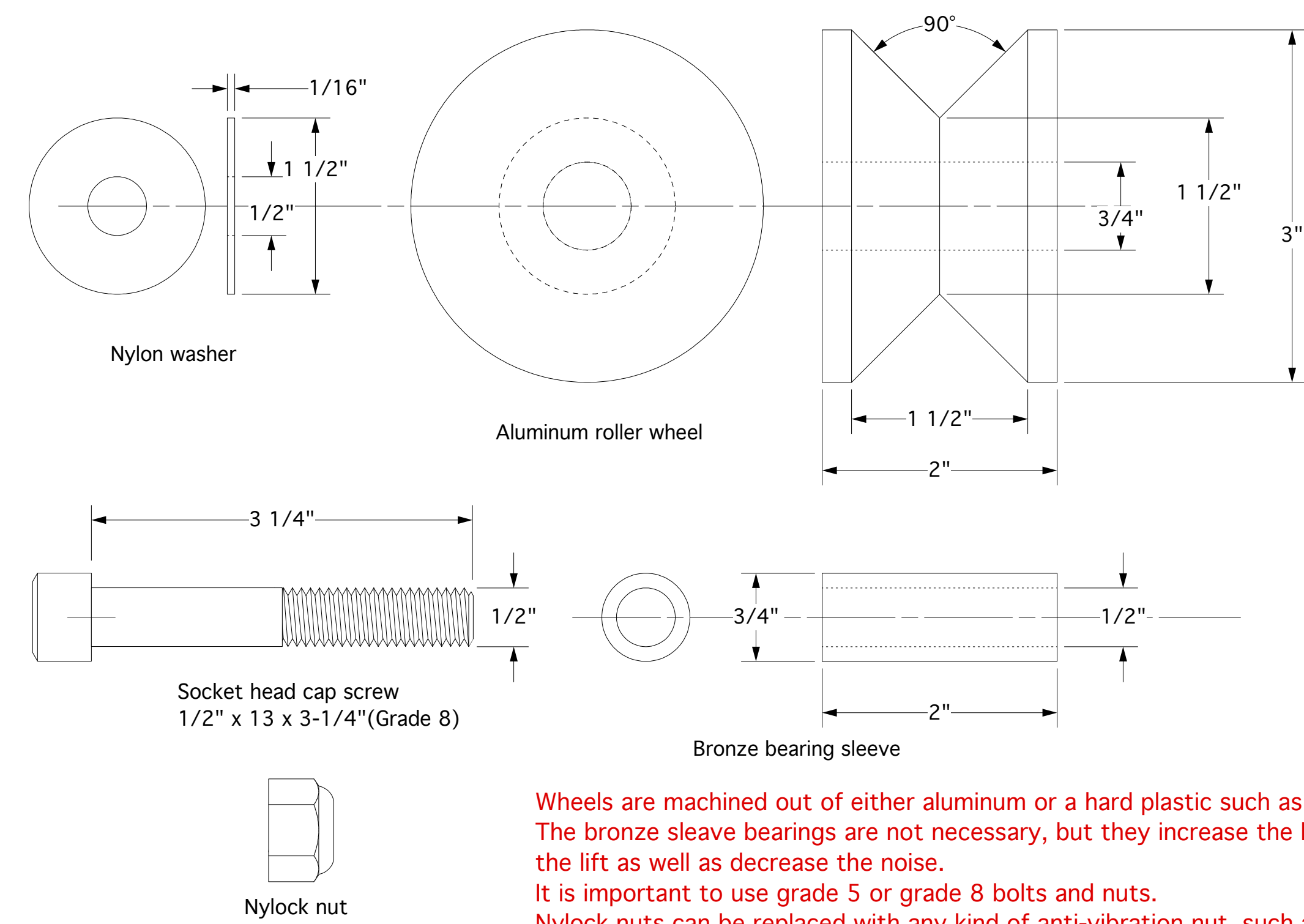
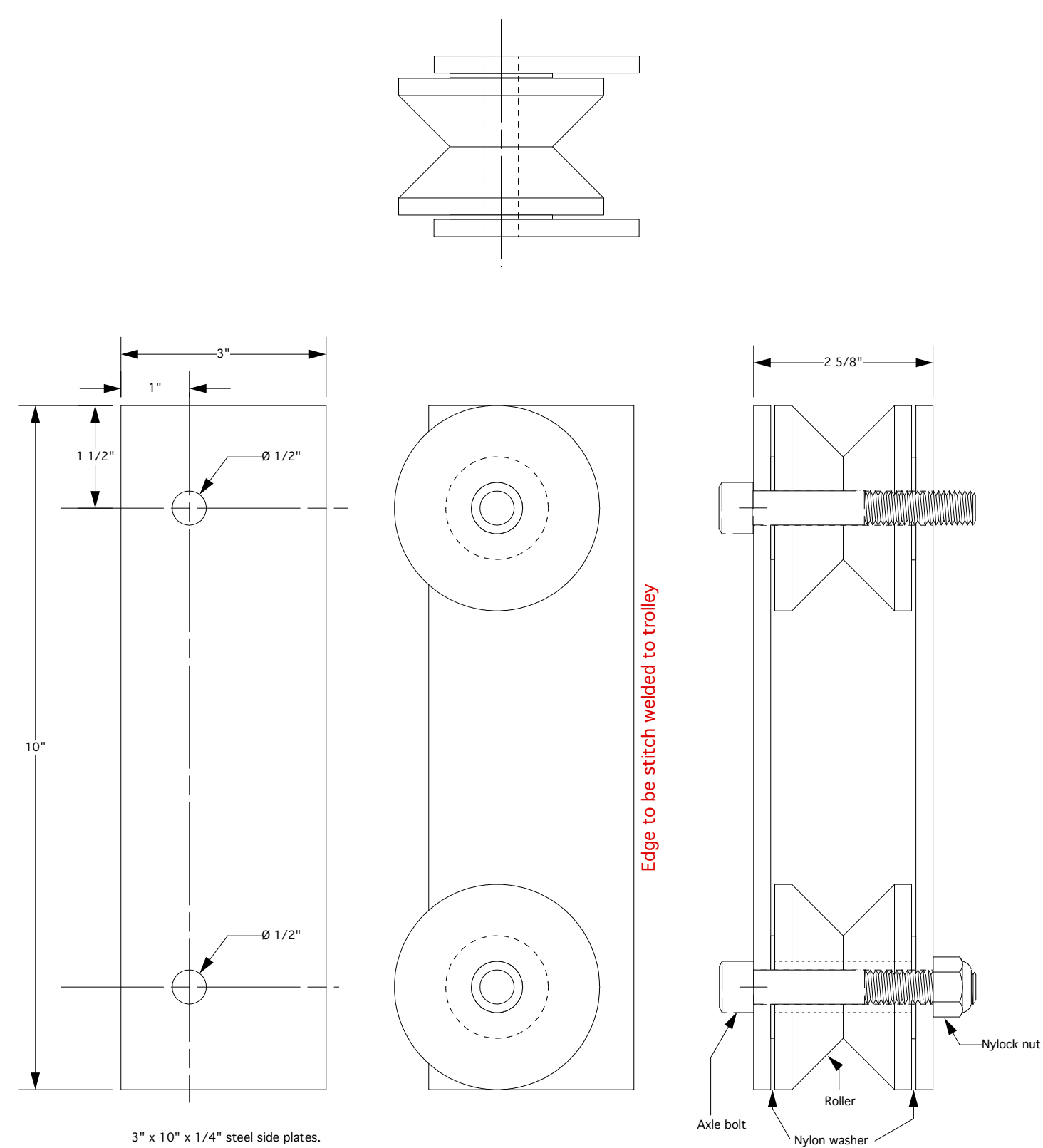


Trapdoor Elevator V-Rollers



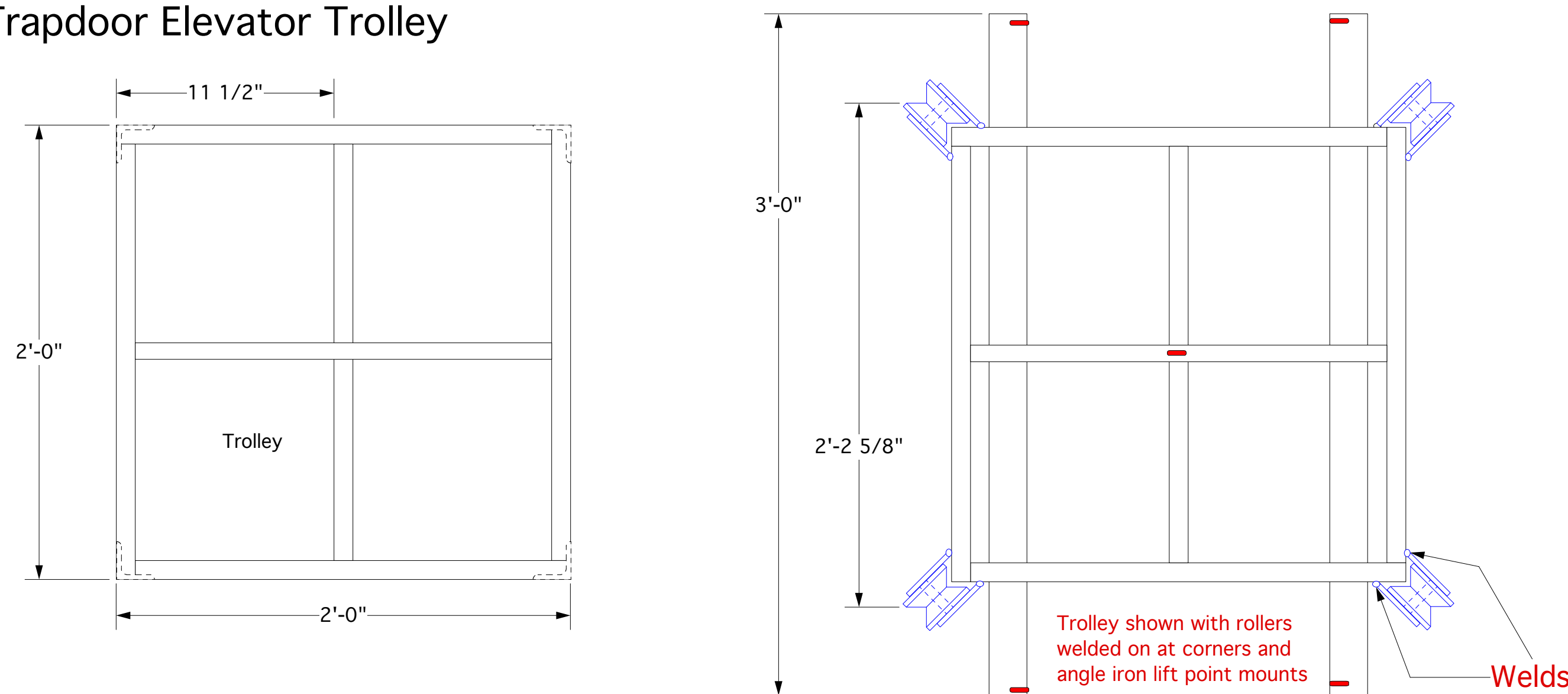
Wheels are machined out of either aluminum or a hard plastic such as UHMW. The bronze sleeve bearings are not necessary, but they increase the life of the lift as well as decrease the noise. It is important to use grade 5 or grade 8 bolts and nuts. Nylock nuts can be replaced with any kind of anti-vibration nut, such as jam nuts, castle nuts, or torque nuts. You will need 8 of these wheels, but it would be wise to have 10 made.

Trapdoor Elevator Roller Sets

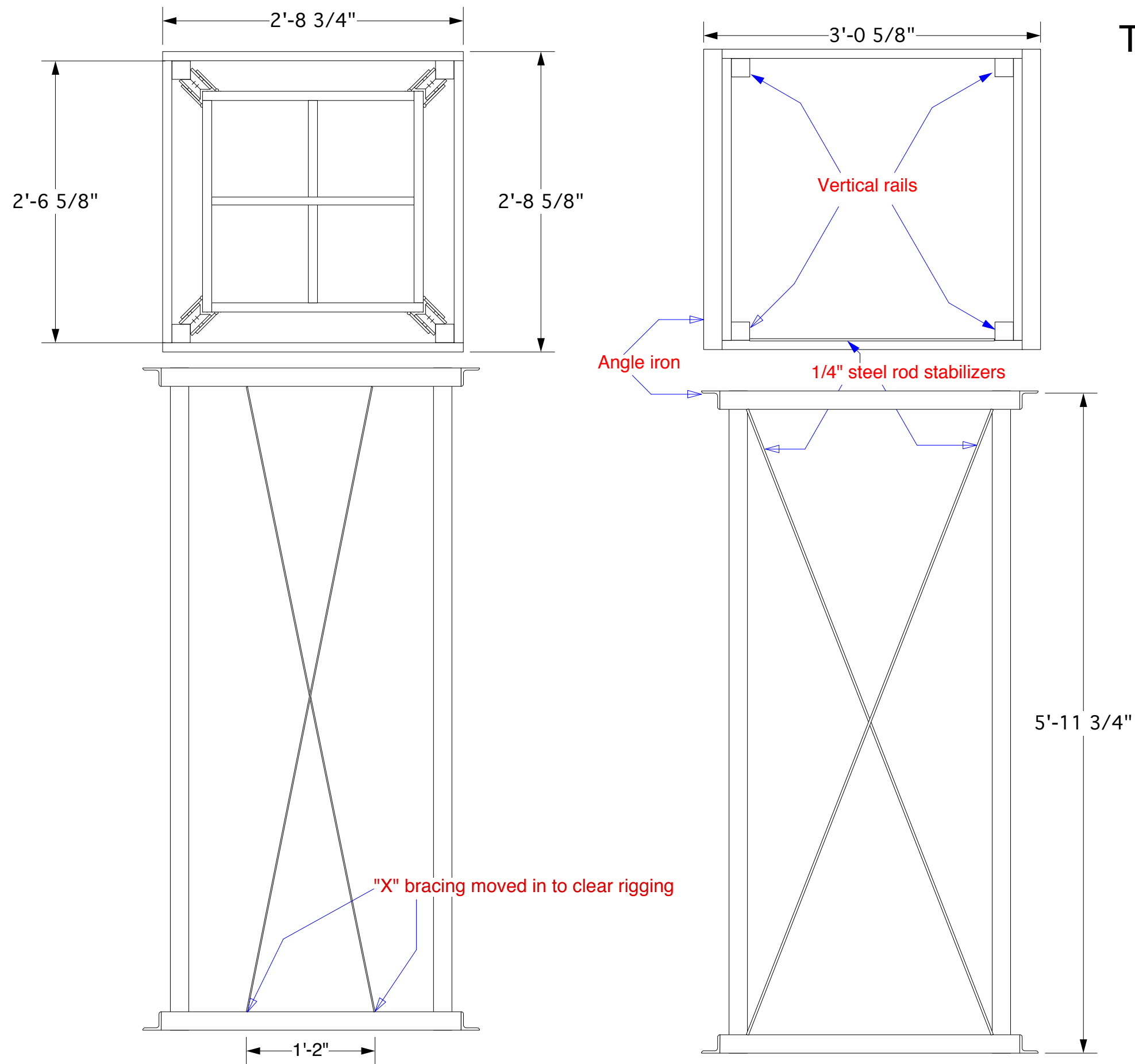
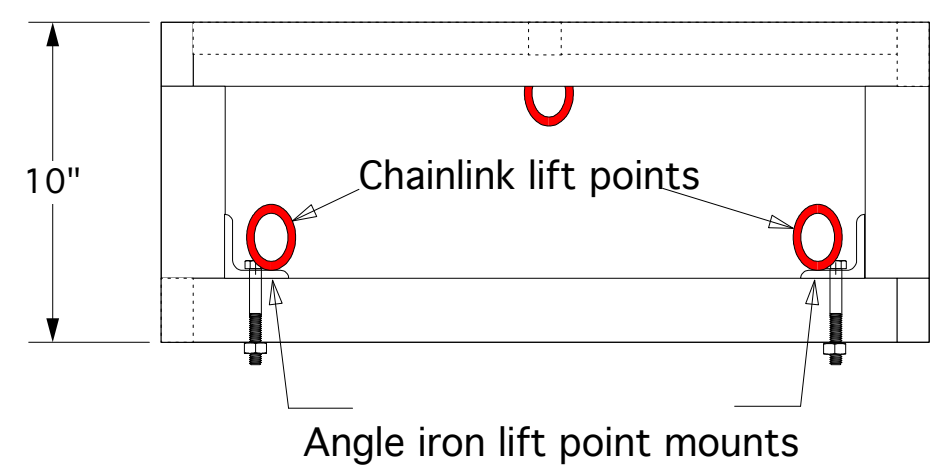


The trolley rollers are made by sandwiching 2 of the aluminum wheels between 2 steel plates. Nylon washers are placed between the wheels and the steel plates to reduce noise and friction. It is very important to make up the trolley rollers before the rail frame since they will determine the final dimension of the trolley once they are welded to the trolley. The rollers are stitch welded to the trolley once assembled. Be careful not to let the plates warp away from each other during the weld process, by performing interior tack welds. A weld 1" - skip 1" stitch pattern should be sufficient.

Trapdoor Elevator Trolley



The trolley is a 2' x 2' x 10" steel framed box made of 1" x 2" x 0.065" steel tubing. It is made of 2 frames with pieces of 2" x 2" x 1/4" angle iron running vertically to connect the 2 frames at the corners. The tubing crossing the middle of the top face is made of 1" x 1" x 0.065" steel tubing with a rigging point welded to the bottom of the center. The pieces of Angle iron that are used to mount the lifting points are bolted to the trolley once the trolley is placed inside the rail frame.



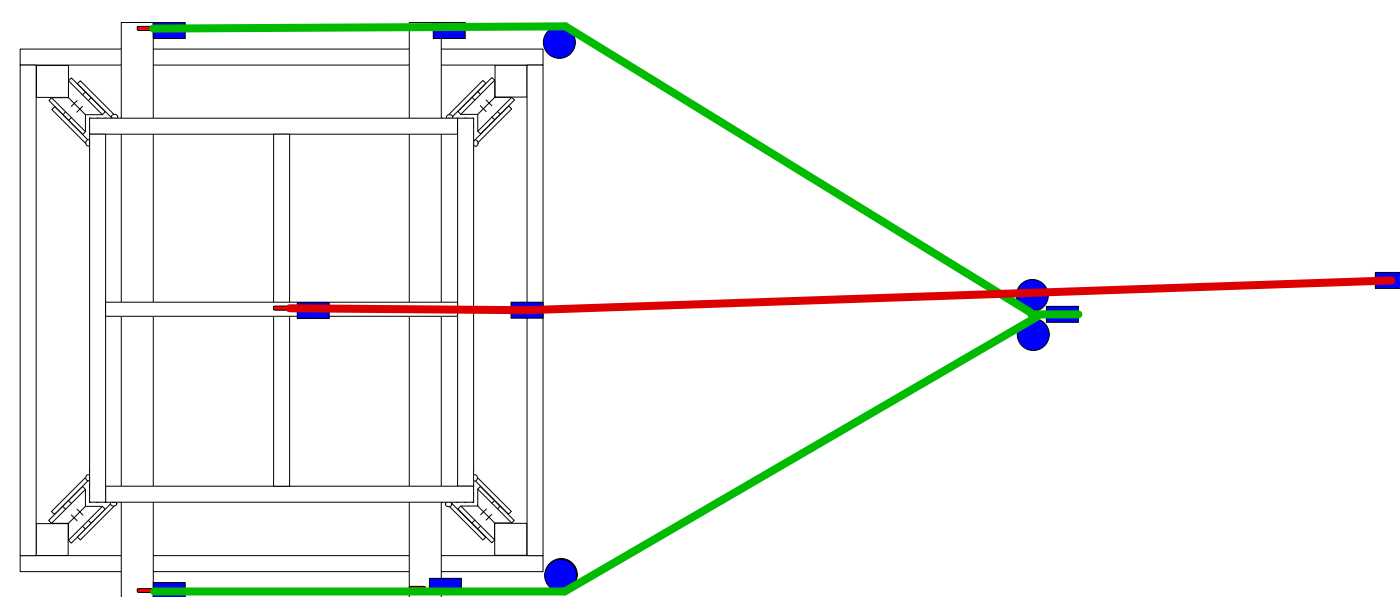
Trapdoor Elevator Rails

The rail frame is made as tall as possible to fit into the available space. 2 sides are X framed to full width, but the other 2 sides are X framed towards the center to allow clearance of the rigging.

The Rails are 2" x 2" x 0.065" steel tubing with the rest of the framing made up of 1" x 2" x 0.065" steel tubing, with 2" x 2" x 1/4" angle iron on the top and bottom to mount the rail frame to the floor and to the bottom of the stage deck. The X framing must be held to the outside of the rails to allow clearance for the rollers.

The inside dimension of the rails is determined by the final outside dimension measurement of the trolley rollers.

Trapdoor Elevator Rigging



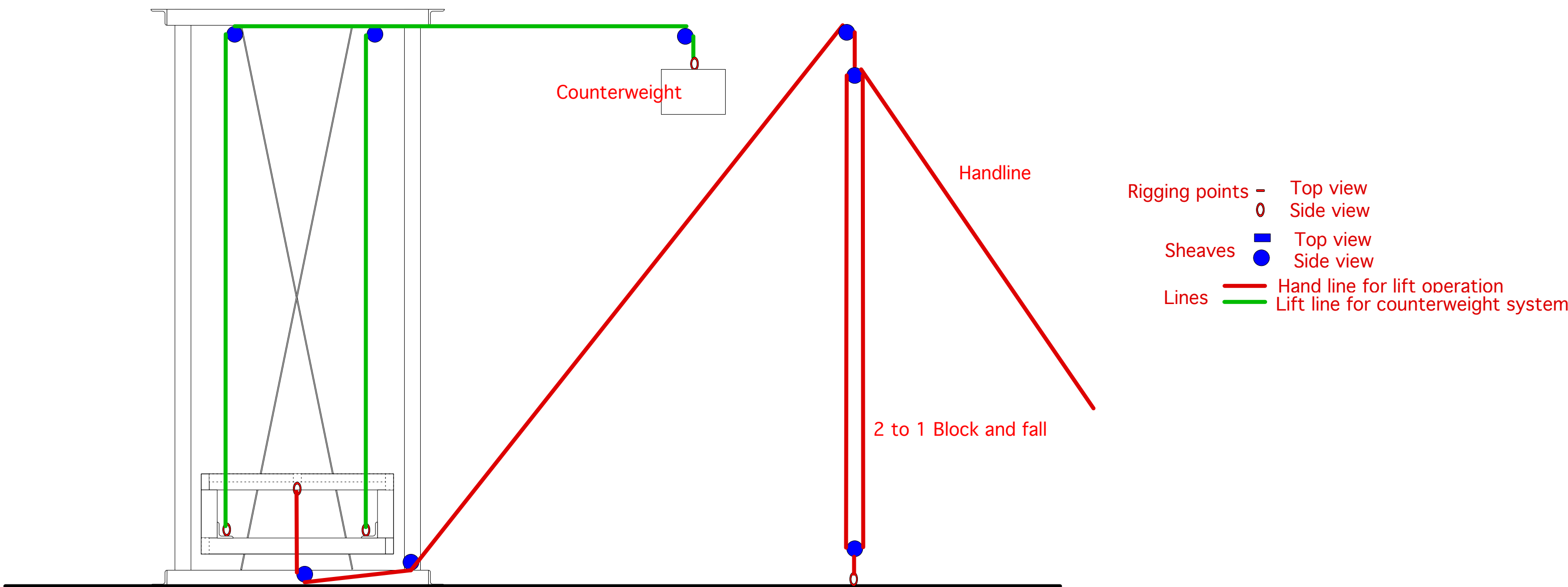
The rigging system is arranged to allow a counterweight that equals at least 150% of the weight of the heaviest actor who will stand on the trap. The counterweight will keep the trap from lowering accidentally if someone steps on it before it is needed to lower.

The operation of the lift is simple. To lower the trap, the handline is pulled using a 2-to-1 "block and fall" to pull the trap down. To raise the trap, the handline is played out till max height is reached. All rigging should be run with at least 1/8" steel cable or 1/2" nylon rope. Anchor points for rigging are chain links welded to lift points or eyebolts. The trap section of the stage is fastened to the top of the trolley, so when the trolley is at its topmost position, the trap is flush with the surface of the stage.

This system gives a great deal of control over the lift trolley. An electric winch could be used for the raising or lowering, but it would be more difficult to adjust the speed, unless you use a DC drive motor with a speed controller, and limit switches.

I built this lift for the Renton Civic Theatre, and it has since been loaned all over Seattle to other theatres.

Conversion of these measurements to metric I leave in your hands if necessary. These drawings should give the basic idea of the system.



Rigging points - Top view
Side view
Sheaves - Top view
Side view
Lines - Hand line for lift operation
Lift line for counterweight system

Stagesmith Productions

Date: 5/21/98 Scale: 1" = 1'

1" = 1'

2" = 1'

Trapdoor Elevator

Designed by Ernie Leimkuhler

Drawn by: Ernie Leimkuhler

Original concept by Grant Kobelarchek (Seattle Opera Assoc.)

Originally built for Bruce Jackson (Renton Civic Theatre)