Automatic Blast Gates

Here are some directions I have thrown together on the gate construction. The drawing was for my use, so there might be some confusion on the dimensions. I built this one for 4" metal pipe, but the hole for the hose can be made bigger for different 4" fittings. I have also attached the drawings for 5” and 6” gates.

I bought my parts from Grainger, and MSC, they are available other places as well. It is really neat to turn on the machine and hear the air opening those gates, not to mention I did not like opening gates. I did not have the DC cycle on and off with each gate opening because I think that will burn out the motor. I have a Long Ranger remote that I use.

The measurements are spread out over the three different drawings.

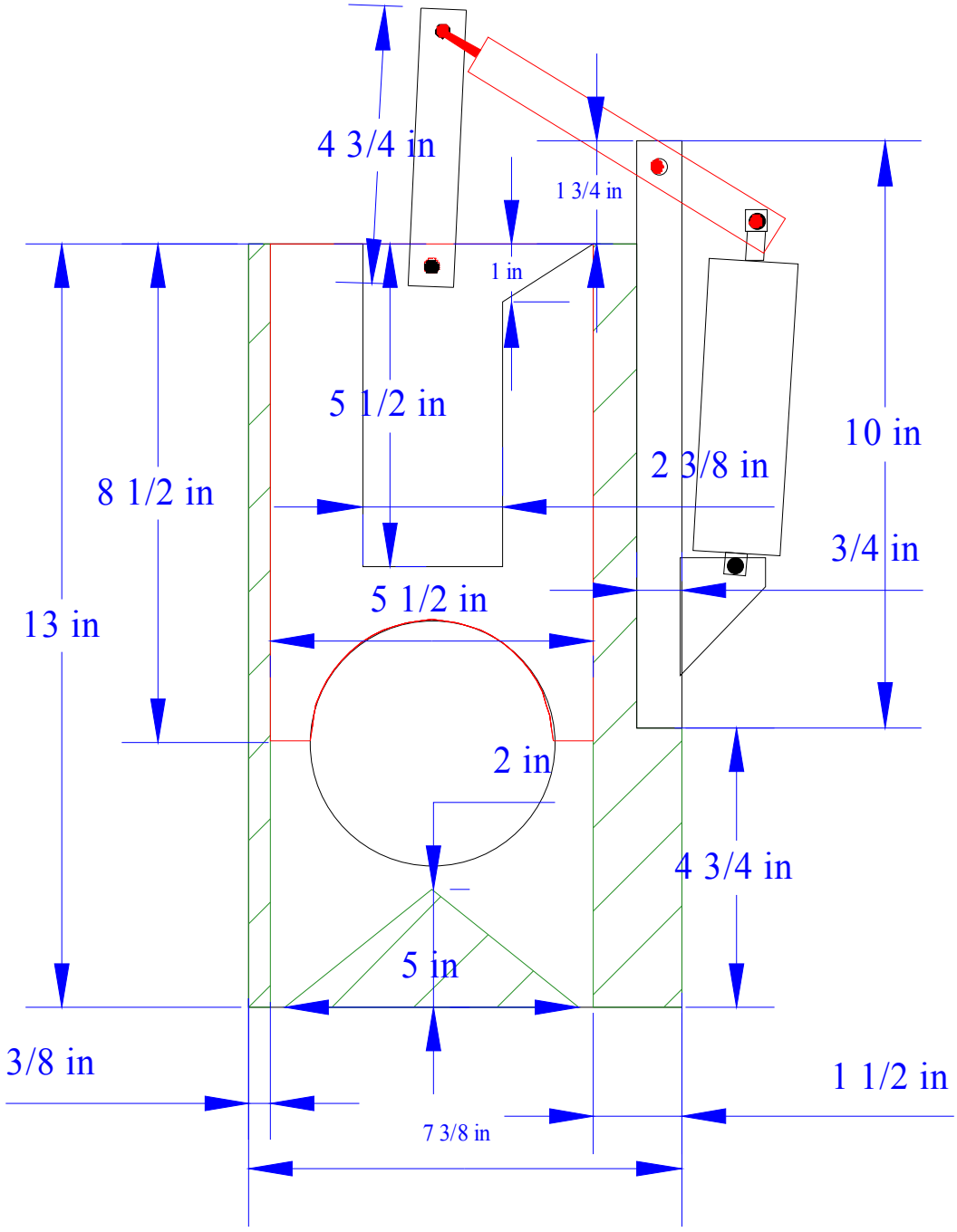
If you have any questions let me know. I will be building another gate, so I will take pictures during the construction.

Email: todd.crow@crowsnest.us
Website: http://www.crowsnest.us

4” Blast Gates

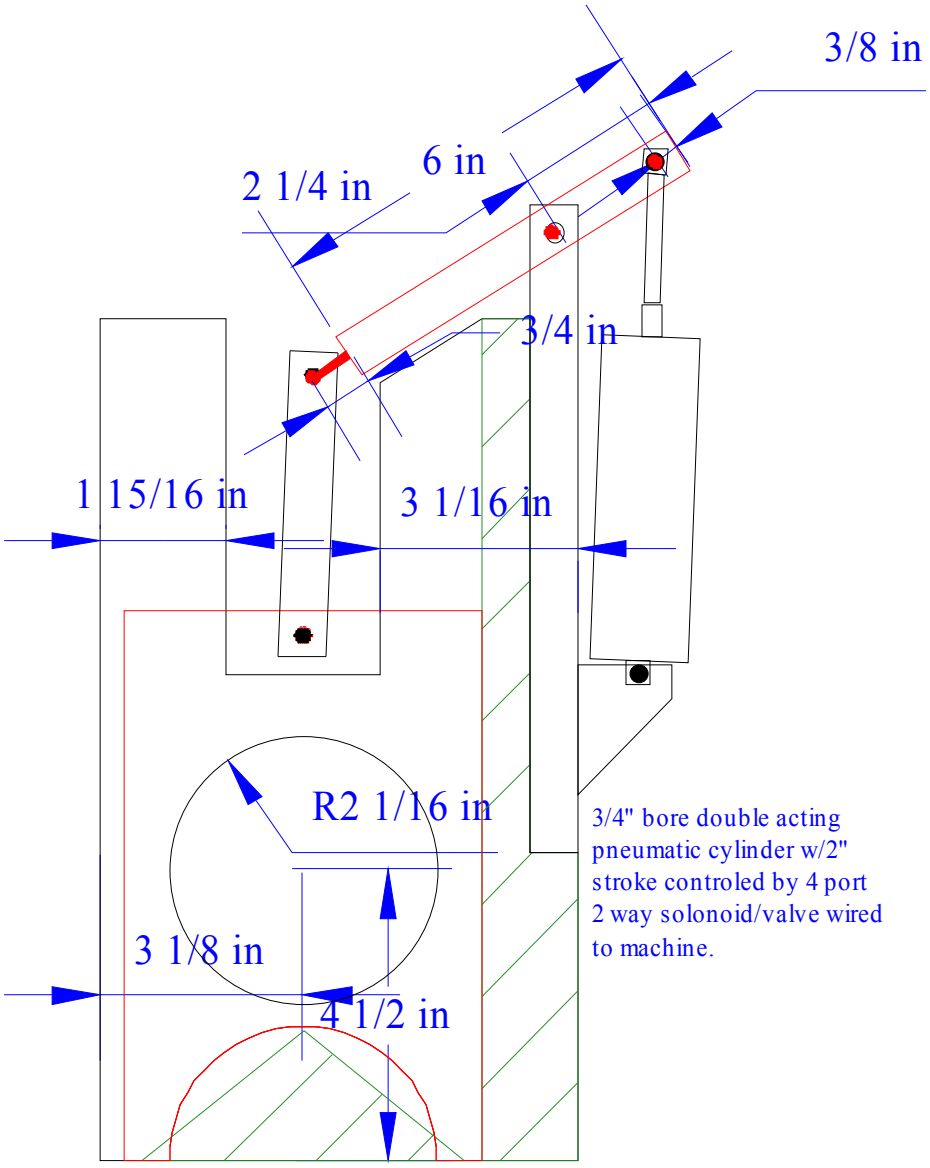
These are designed to fit over 4” metal duct. Adjust the opening in the plywood exterior pieces to fit over you pipes.

The red is the ¼” thick slider, and the pivot arm. The green is the spacers between two ¾” thick plywood pieces. The linkages are 7/8” x 1” oak. The vertical brace that the ram attaches to is ¾”+ x 2” oak.



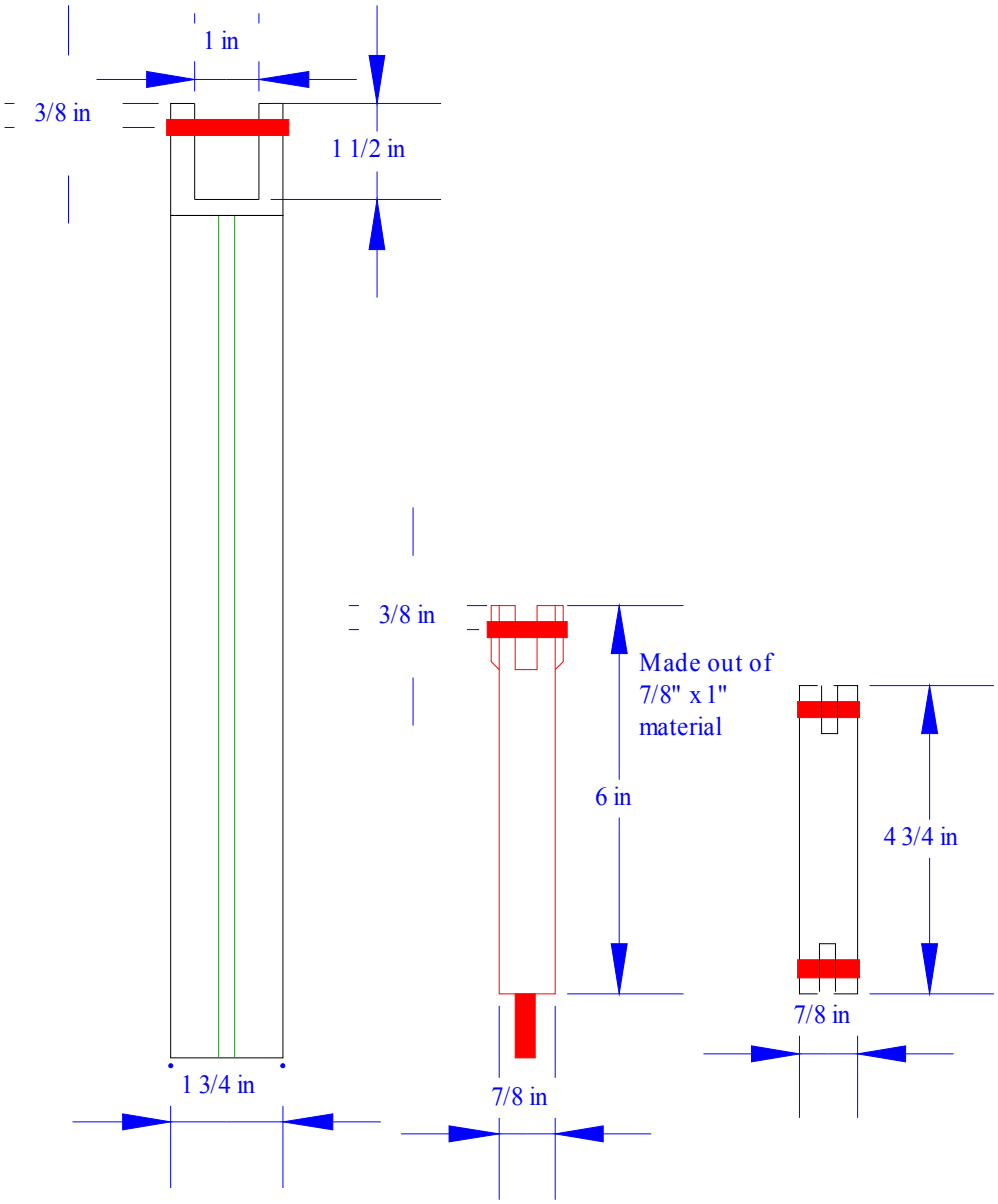
This is the gate in the open position

4” Blast Gates



This is the gate in the closed position

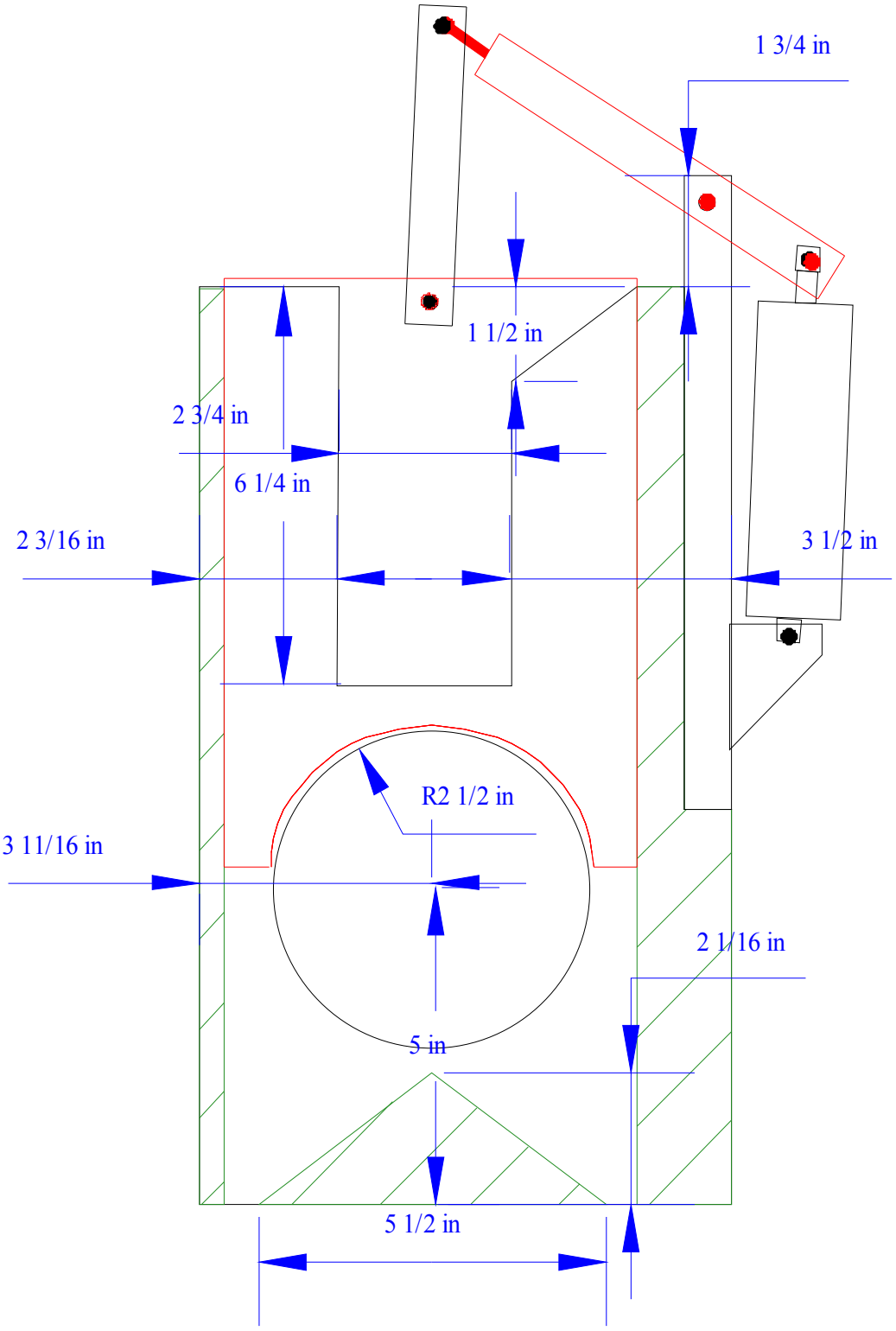
4” Blast Gates



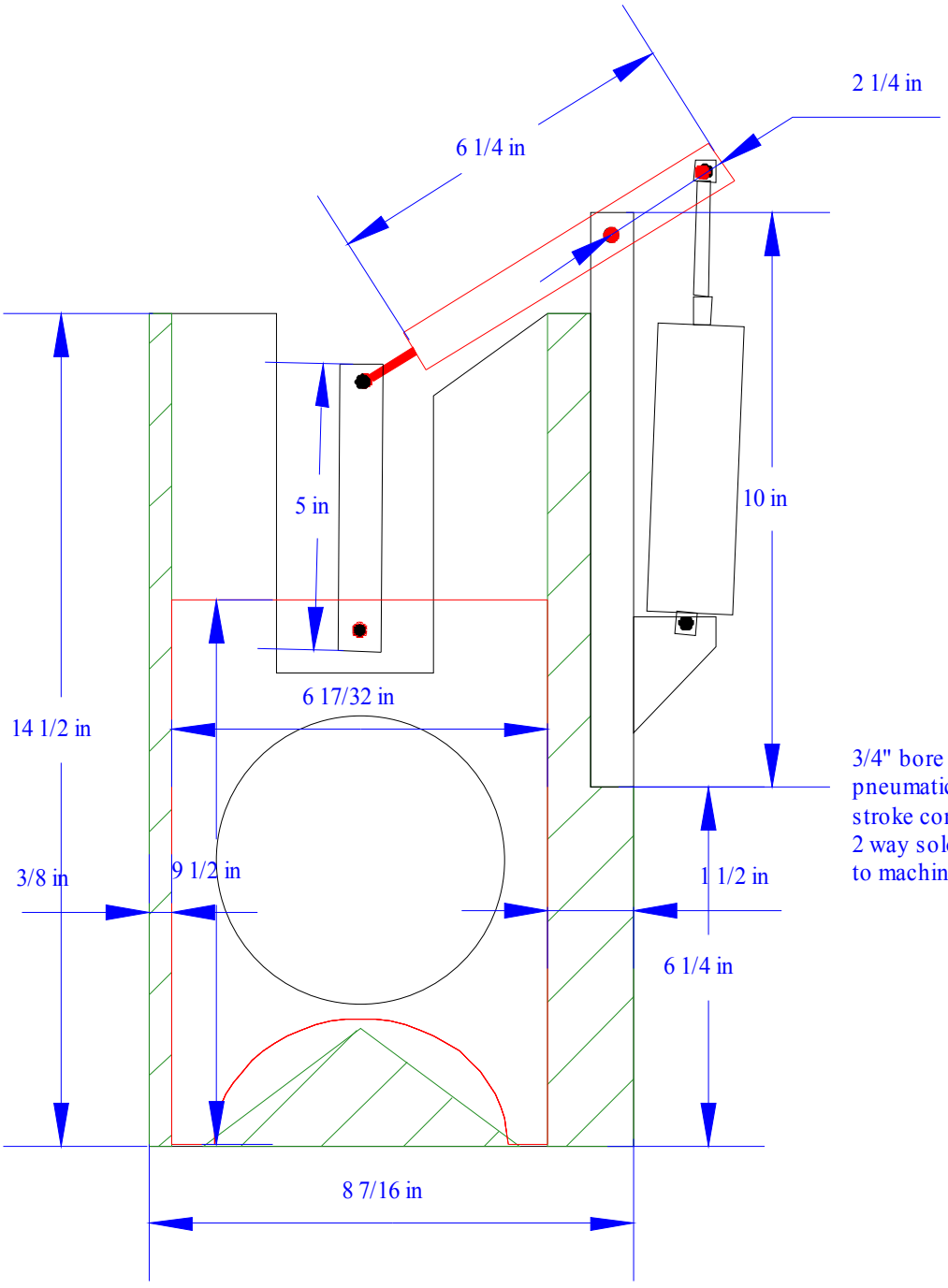
These are the side view and the pivot and drag linkages for the gates.

5” Blast Gates

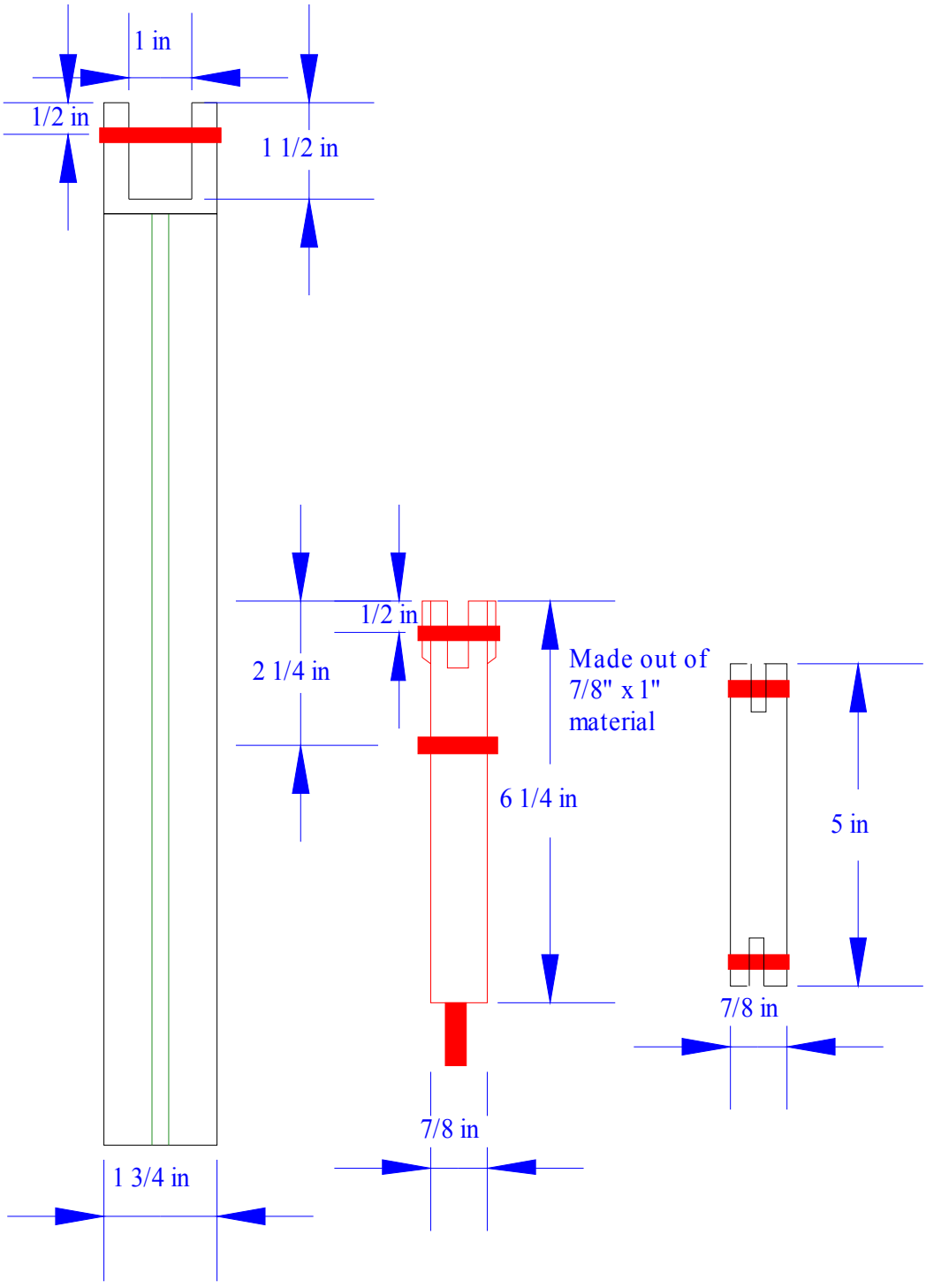
The red is the ¼” thick slider, and the pivot arm. The green is the spacers between two ¾” thick plywood pieces. The linkages are 7/8” x 1” oak. The vertical brace that the ram attaches to is ¾”+ x 2” oak.


1 3/4 in
1 1/2 in
2 3/4 in
6 1/4 in
2 3/16 in
3 1/2 in
R2 1/2 in
3 11/16 in
2 1/16 in
5 in
5 1/2 in

5” Blast Gates

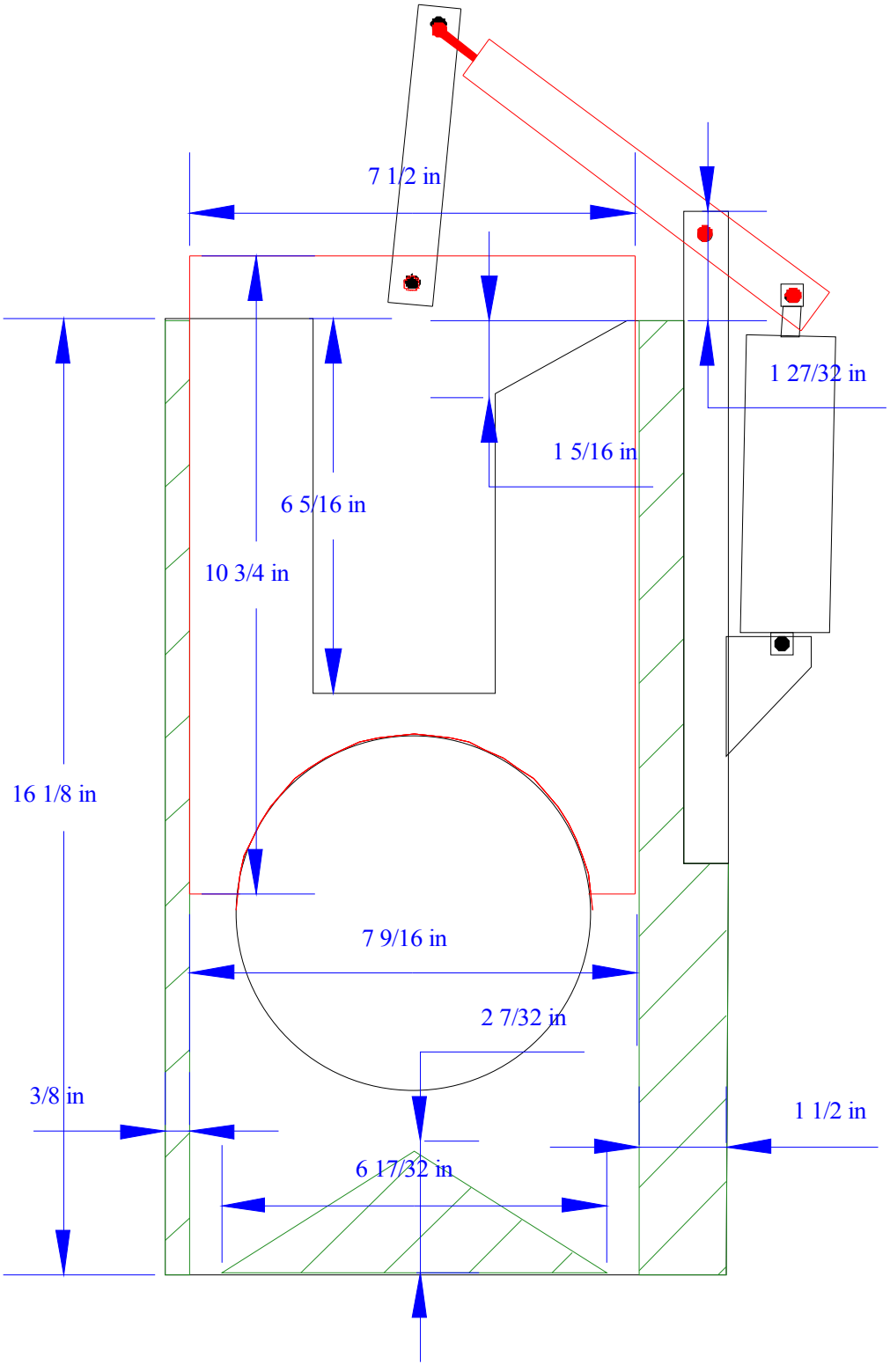


5” Blast Gates

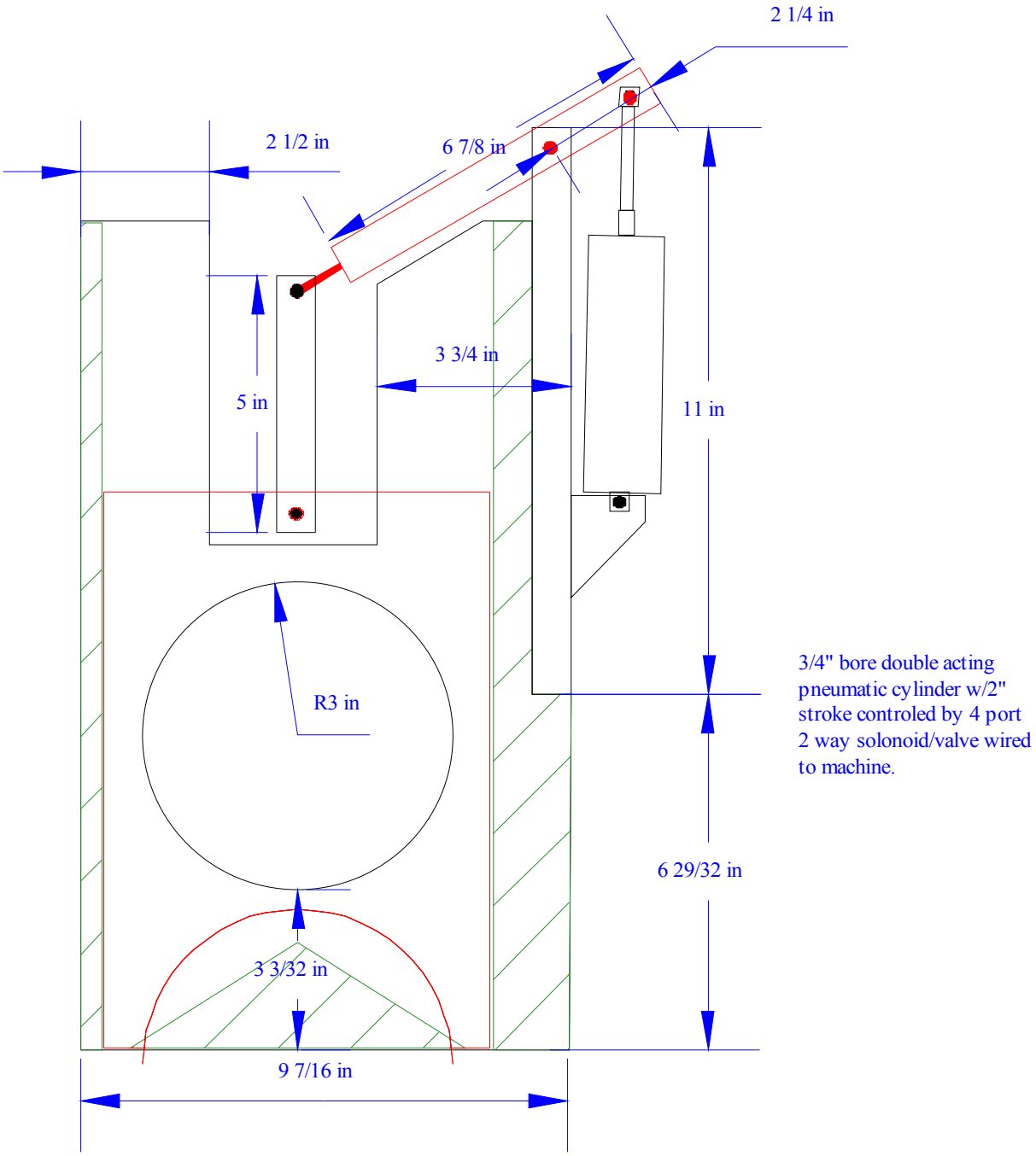


6” Blast Gates

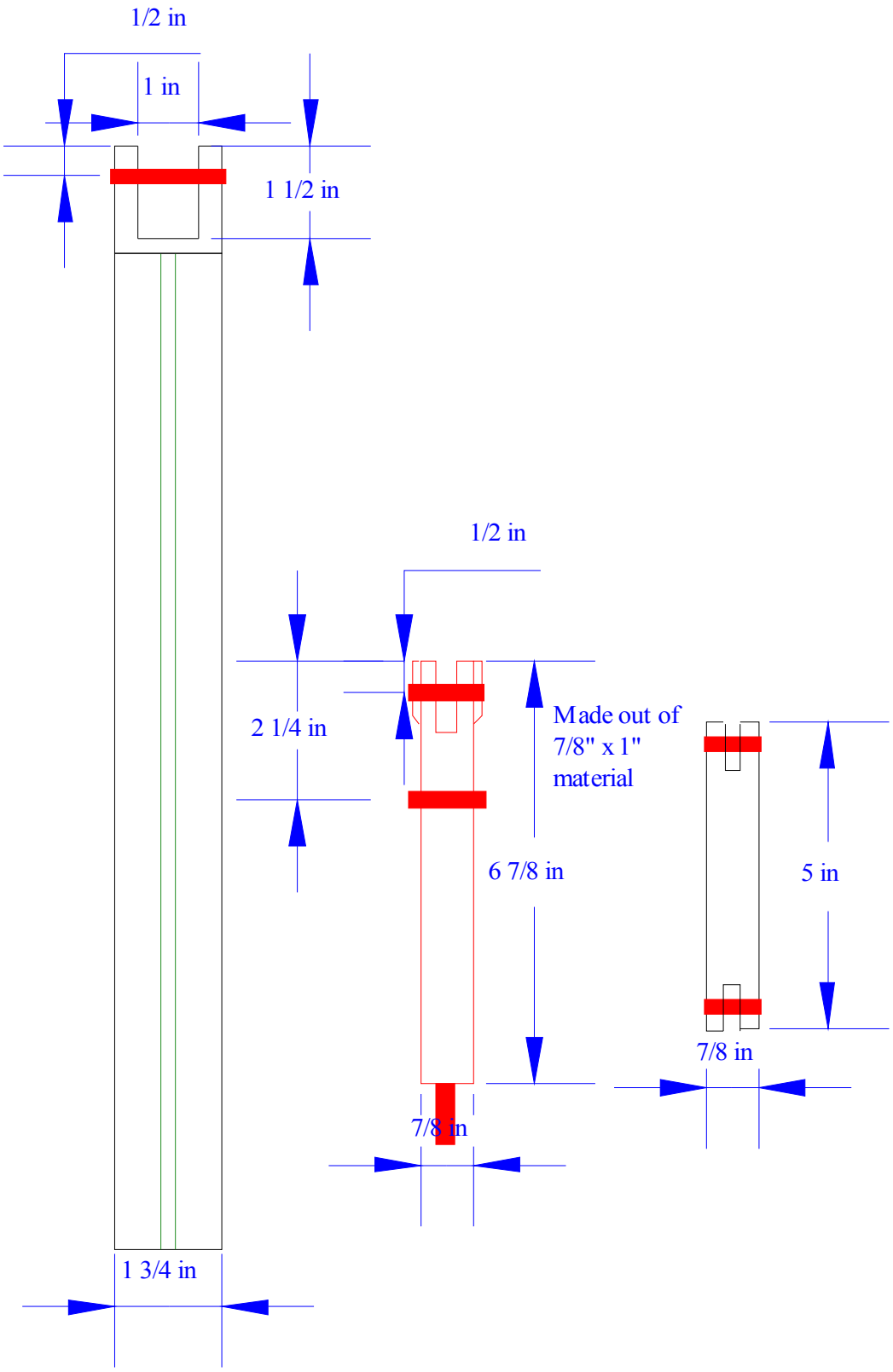
The red is the ¼” thick slider, and the pivot arm. The green is the spacers between two ¾” thick plywood pieces. The linkages are 7/8” x 1” oak. The vertical brace that the ram attaches to is ¾”+ x 2” oak.


7 1/2 in
1 27/32 in
1 5/16 in
6 5/16 in
10 3/4 in
16 1/8 in
7 9/16 in
2 7/32 in
3/8 in
1 1/2 in
6 17/32 in

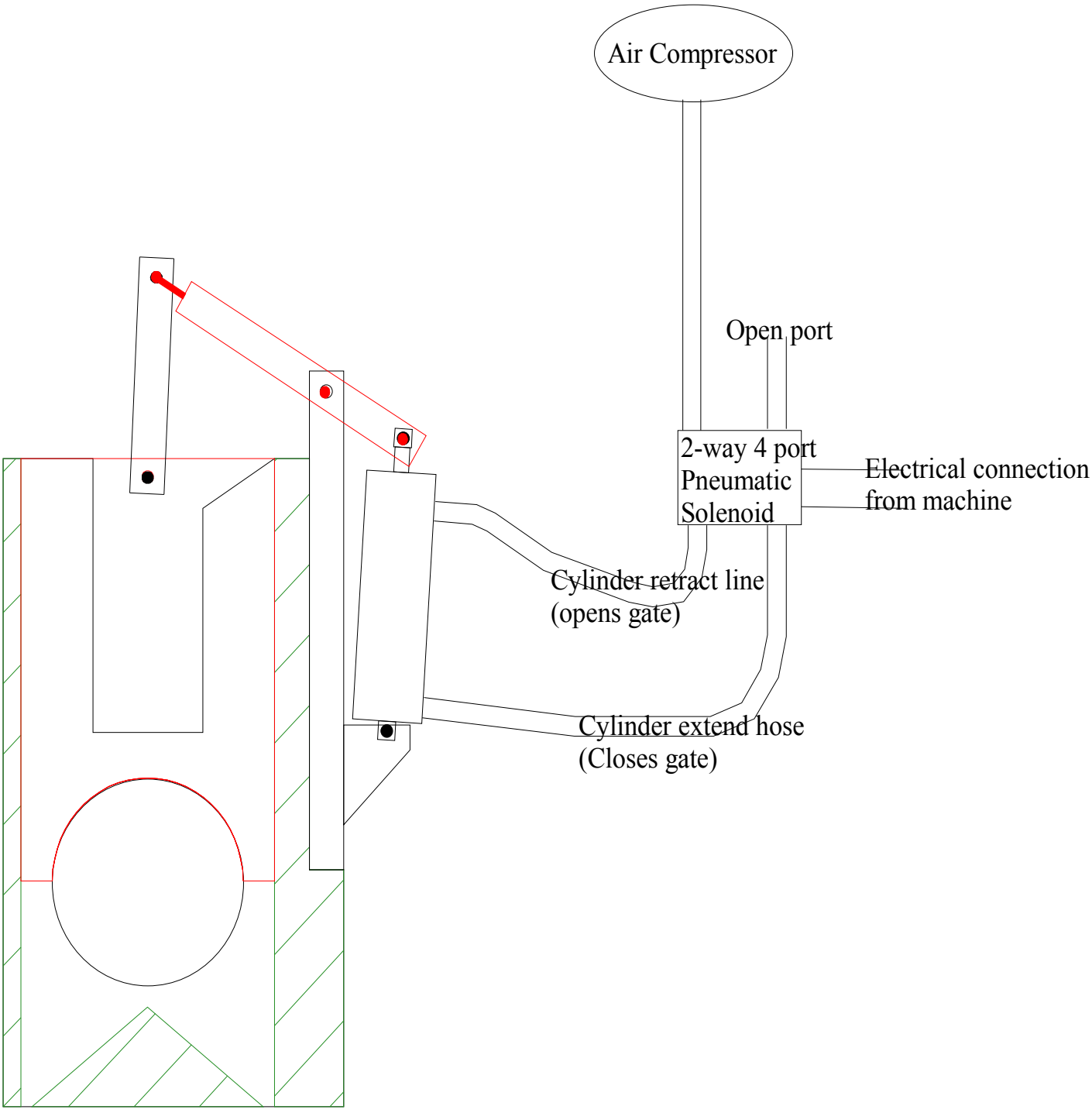
6” Blast Gates



6” Blast Gates



This diagram shows the connections to make one gate operate.



Make up one model for test before making a production run.

The only critical dimensions are the gate clearance and the rocker arm.

The basic gate consists of two identical ¾" thick sides of plywood or MDF. A hole is bored in them for the duct to fit into. Match the hole size to fit your duct. On some of my gates I have a short piece of 4" PVC pipe so I can shove a black plastic coupler into it to make a quick connector. I used my drill press and a circle cutter for a perfect fit. If you use some PVC duct glue it in place with "Liquid Nails". I have found this works much better then silicon rubber because it "cuts" into the PVC. Two spacers and the wedge separate the two sides the correct distance. A wedge is inserted in the bottom to direct sawdust away from the slider. This wedge bleeds just enough air when the gate is open to clear out stray sawdust to prevent jamming.
I glue over size spacers and the wedge shaped piece to one side of the ¾" gate side. When the glue is dry, I run it through the planer until it fits the gate slider properly. Allow about 1/32" clearance but watch out, this may compress when you glue it up and jam the gate. Sand smooth and seal all inside parts that touch each other before gluing both sides together. Then I glue both sides together. Trim the sides for appearance after glue up. This technique eliminates making a frame, which is a pita.

The slider consists of a ¼" thick sheet of plywood, High density poly pro or UHMW plastic. This slides up into the slot. Use a band saw to cut a partial circle. A slip fit is needed so the slider will not jam. If it is to tight the ram may not have enough power to open it. If the slider is to loose it will leak air when closed. If it is to tight the slider can be planed down to fit.

I used spherical rod ends to reduce friction and eliminate wear. These rod ends are adjustable so the gate can be fined tuned to line up with the hole when assembled. I drilled and taped the wood link ends to receive the rod ends, and this backfired. The rod end split the oak under use. Right now I have drilled out the end of the linkage and epoxied three nuts into the end of the linkage. Seems to be holding.

The solenoid that controls the pneumatic cylinder is wired to your machine across the motor or switch. When the motor turns on the solenoid is activated. You can bring the wires out to a switch box with a receptacle and plug the solenoid into it or hard wire the solenoid direct to the machine.

I used a 3/4" bore double acting pneumatic cylinder w/2" stroke controlled by a 4 port 2 way solonoid/valve with speed control wired to the machine.

To attach the gates to the pipe, I used pipe collars screwed to the side of the gates and them sealed them from leaking with duct sealant. I attached them to the ductwork with screws to keep them from coming off.

Just to give credit where credit is due, this plan was inspired by Jim Halbert's auto gate design.

Parts to build one gate:

Some ¼ and ¾ plywood
Some small pieces of oak
Some bolts ¼ X 24 of various lengths

From Grainger, or at least that is where I bought them

	Grainger Part #
1/8” 4 way-2 position 120 volt solenoid valve w/speed control	6JJ42
3/4" bore x 2” stroke double acting pneumatic cylinder	6W100
1/4" rod end – male	6G187
1/4" rod end – female	6G171
Pivot bracket mount	6W163
Fittings- 1/4" male connectors (6 per gate)	4HN10
Some 1/4" x 28 nuts	

To build the system you will also need some tubing and misc fittings

1/4" tubing	4HM13 (100 feet)