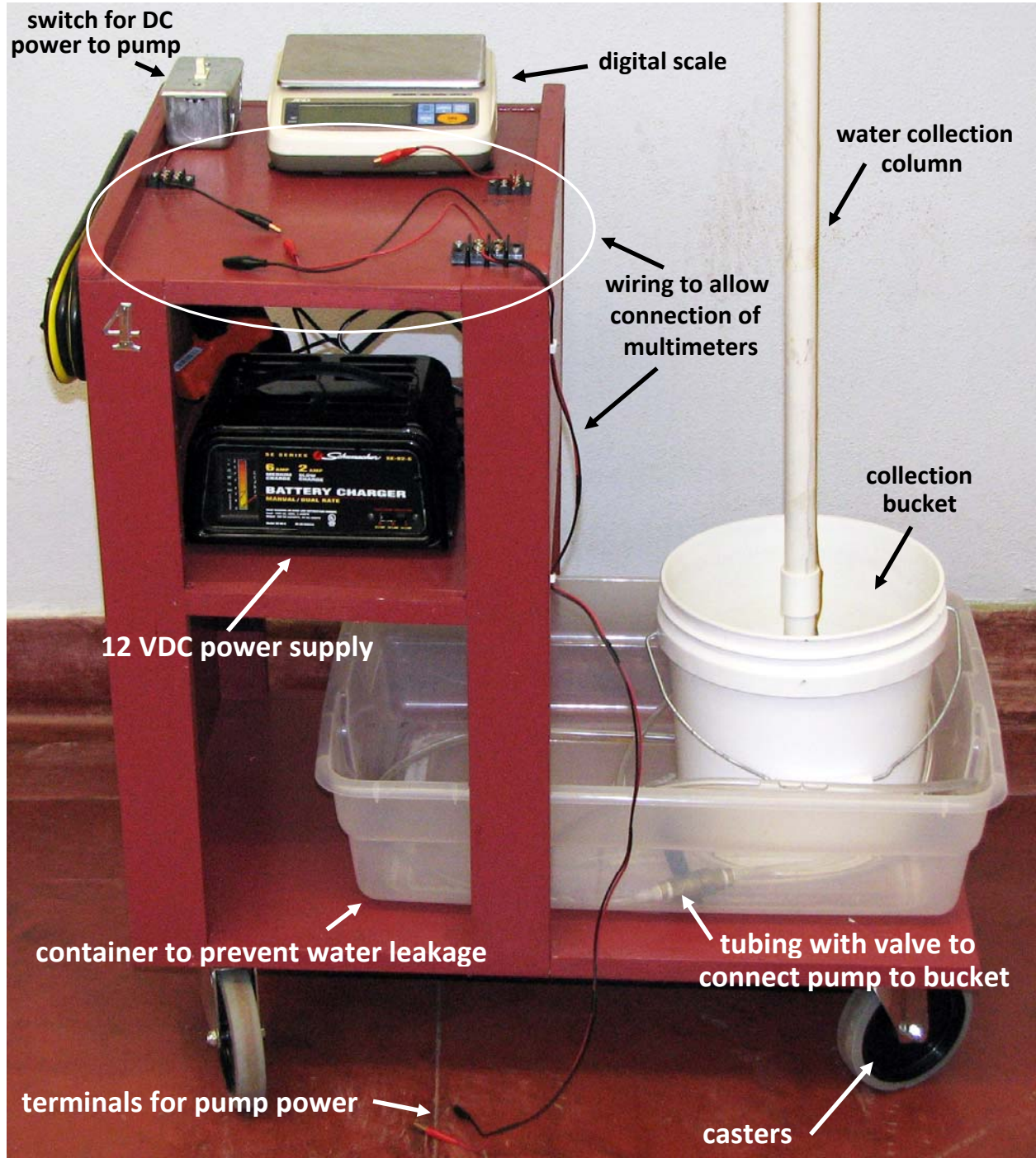


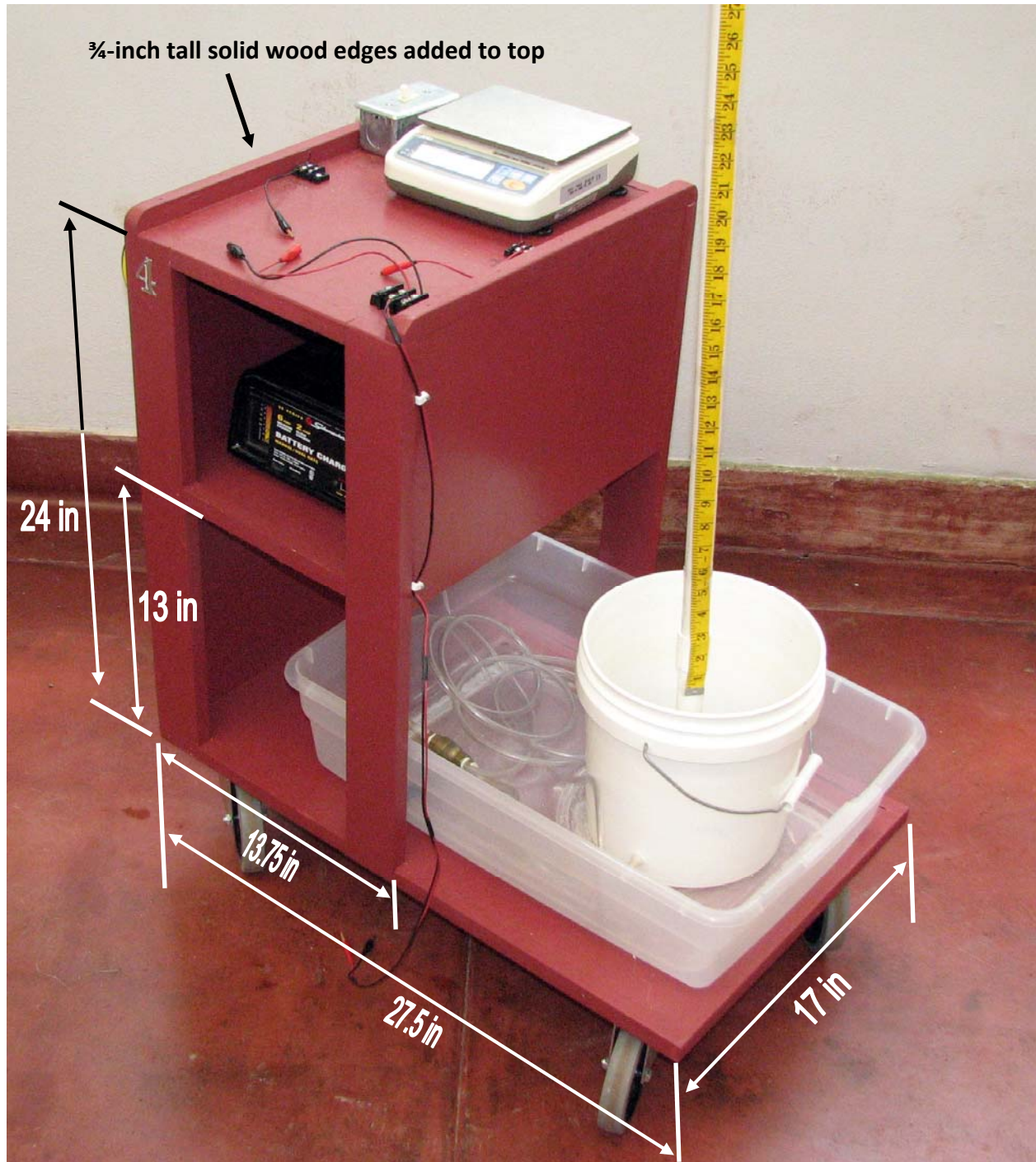
Design of a Station for Pump Testing

The system below was developed for use in the First Year Engineering Program at Louisiana Tech University. Using water around electrical devices can be hazardous. Louisiana Tech and the faculty who designed the system bear no liability for others building or using this design.

Front View:



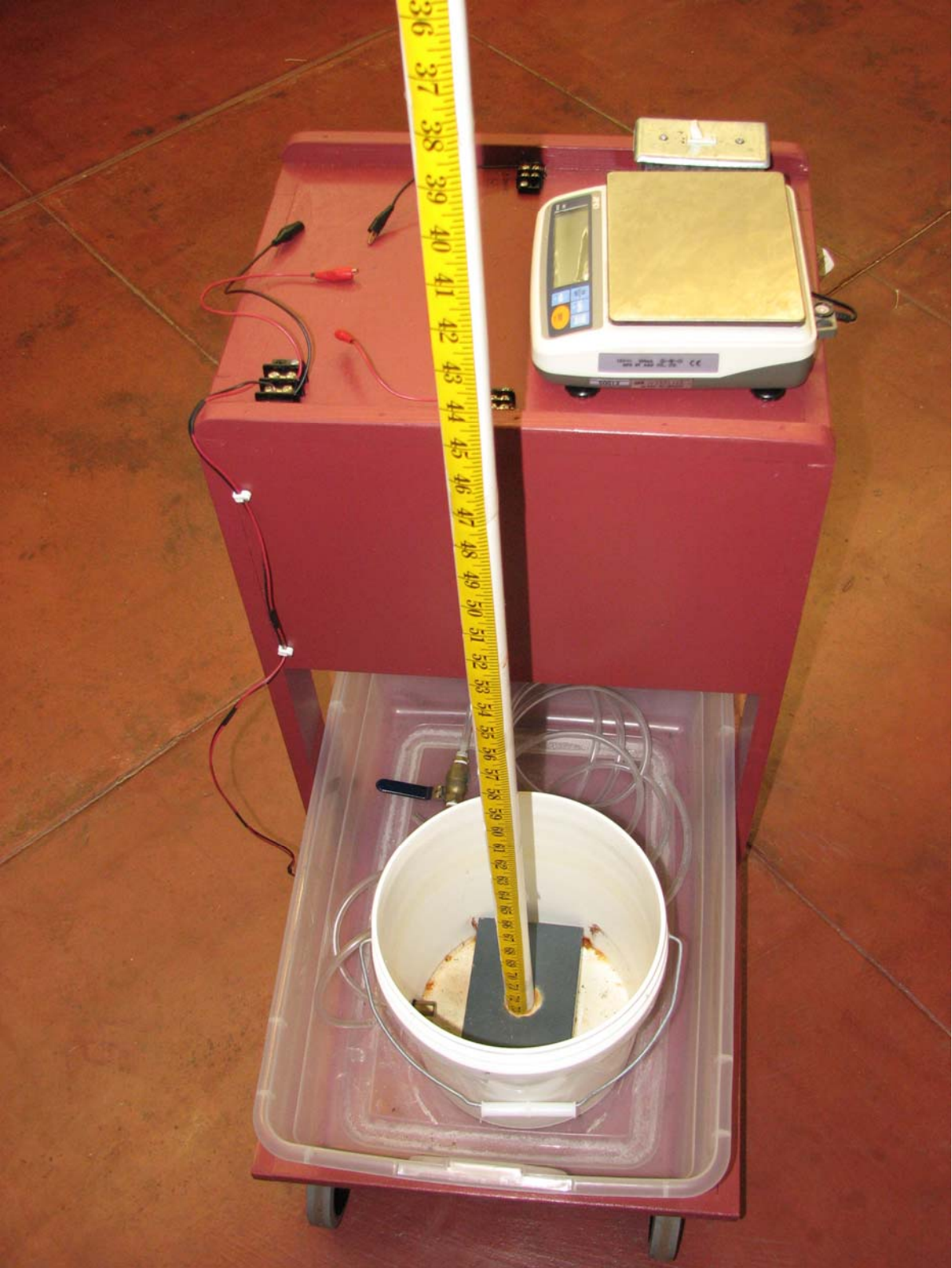
Construction Details: The testing station was made of $\frac{3}{4}$ -inch diameter cabinet-grade plywood and trimmed with $\frac{3}{4}$ -inch thick solid wood strips. Look closely at the pictures to see how the solid wood strips are wrapped around the plywood. The cabinet pieces were fastened together with nails and glue and later painted to protect the wood from water damage and improve appearance. Casters with 5-inch wheels were attached with screws.



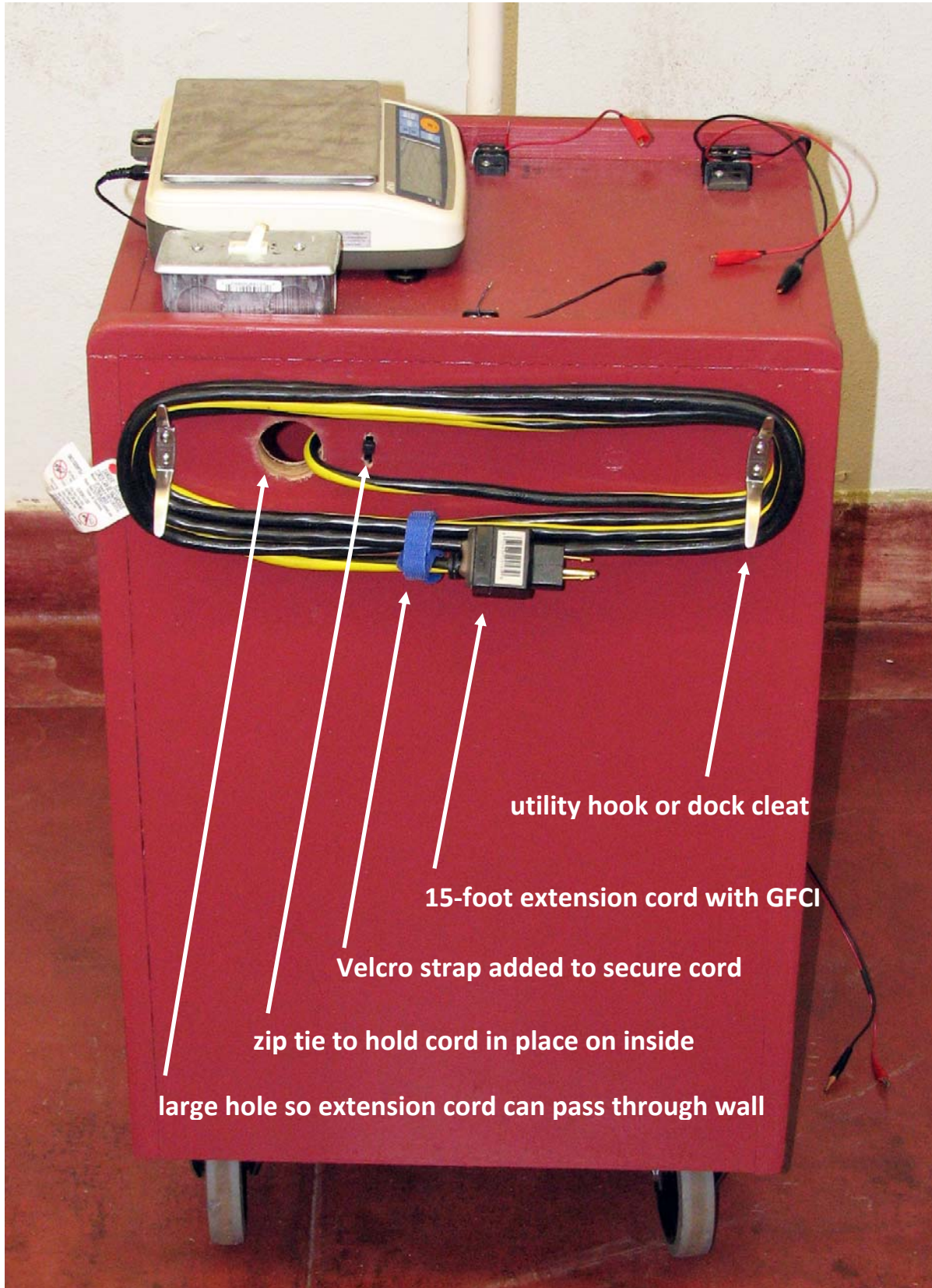
Partial Listing of Parts: The cost will depend on the number of units fabricated and on the parts selected. Shipping and labor are not included in this estimate. Power supplies which provide a readout of voltage and current will reduce the effort to determine pump efficiency; students may learn more if they have to struggle to use their own multimeters to determine the power delivered to the pump.

Description	Supplier	Part Number	Cost	Quantity	Cost Per Station
Construction of Platform					
3/4" birch plywood (4'x8' sheet ripped into 15.5-inch wide strips)	local		\$ 40.00	1/4 sheet	\$ 10.00
1x4 solid wood, 8' long (ripped 7/8-inch wide)	local		\$ 5.00	12 feet	\$ 2.00
1x4 solid wood, 8' long (ripped 2.5 inches wide)	local		\$ 5.00	8 feet	\$ 3.00
1.5" long finishing nails	local				\$ 1.00
wood glue	local				\$ 2.00
paint	local				\$ 5.00
5" diameter light weight swivel plate casters	surplus center	1-3191	\$ 1.99	4	\$ 7.96
1/4" dia, 3/4" long hex-head screw for casters (wood or sheet metal screws)	local		\$ 0.15	16	\$ 2.40
stamped metal character (if you have multiple stations that you want to number)	McMaster	1549T22	\$ 1.31	1	\$ 1.31
Electrical Parts					
15' extension cord with GFCI	local		\$ 50.00	1	\$ 50.00
plug multiplier (3 outlets)	local		\$ 5.00	1	\$ 5.00
stainless steel utility hook (for winding extension cord - had to bend slightly)	McMaster	11855A42	\$ 3.82	2	\$ 7.64
velcro ties (to secure extension cord)	local		\$ 1.00	1	\$ 1.00
braided wire (red and black)	local				\$ 10.00
terminal blocks for 2 circuits, 0.38"	McMaster	7527K42	\$ 1.07	3	\$ 3.21
alligator clip with crimp connection (should need 6 of the box of 10)	McMaster	7236K29	\$ 4.40	1 box	\$ 4.40
red insulator caps for alligator clips (should need 6 of the box of 10)	McMaster	7236K381	\$ 2.60	1 box	\$ 2.60
black insulator caps for alligator clips (should need 6 of the box of 10)	McMaster	7236K382	\$ 2.60	1 box	\$ 2.60
electrical box for switch	local		\$ 2.00	1	\$ 2.00
electrical box cover for switch	local		\$ 0.60	1	\$ 1.00
electrical switch	local		\$ 1.50	1	\$ 1.50
Water Supply & Collection Parts					
2 gallon bucket (approximately 10" dia and 9.5" tall)	local			1	\$ 4.00
clear plastic storage container to hold bucket (16" wide x 22" long x 5" deep)				1	\$ 4.00
3/4" diameter PVC pipe (7' length) for water measuring column	local		\$ 3.00	1	\$ 3.00
cloth tape measure to attach to water measuring column	local		\$ 2.50	1	\$ 2.50
white nylon barbed fitting (3/16" tube ID x 1/8" NPT) - sold in box of 10	McMaster	5116K82	\$ 2.88	3	\$ 0.86
1/8 NPT straight brass coupling to screw inside bucket onto barbed fitting	McMaster	9171K71	\$ 4.89	1	\$ 4.89
O-ring to stretch around part of barbed fitting before screwing on 1/8 NPT coupling	local			1	\$ 0.10
ball valve with 1/8 NPT female fittings on end	McMaster	4112T12	\$ 10.50	1	\$ 10.50
PVC clear tubing - 3/16" ID x 5/16" OD	McMaster	5233K532	\$ 0.14	11	\$ 1.54
4" steel channel for base of water column (4" wide, cut to fit in bucket)	local or scrap		\$ 4.00	1	\$ 4.00
3/4" all thread, 4.5 inches long	local		\$ 3.00	1	\$ 3.00
Equipment					
12DCV power supply (2 to 5 amps)	local		\$ 35.00	1	\$ 35.00
digital balance weigh scale - price depends on quality	online			1	\$ 200.00
Total:					\$ 399.01

Top View:



Left Side View:



utility hook or dock cleat

15-foot extension cord with GFCI

Velcro strap added to secure cord

zip tie to hold cord in place on inside

large hole so extension cord can pass through wall

Right Side View:



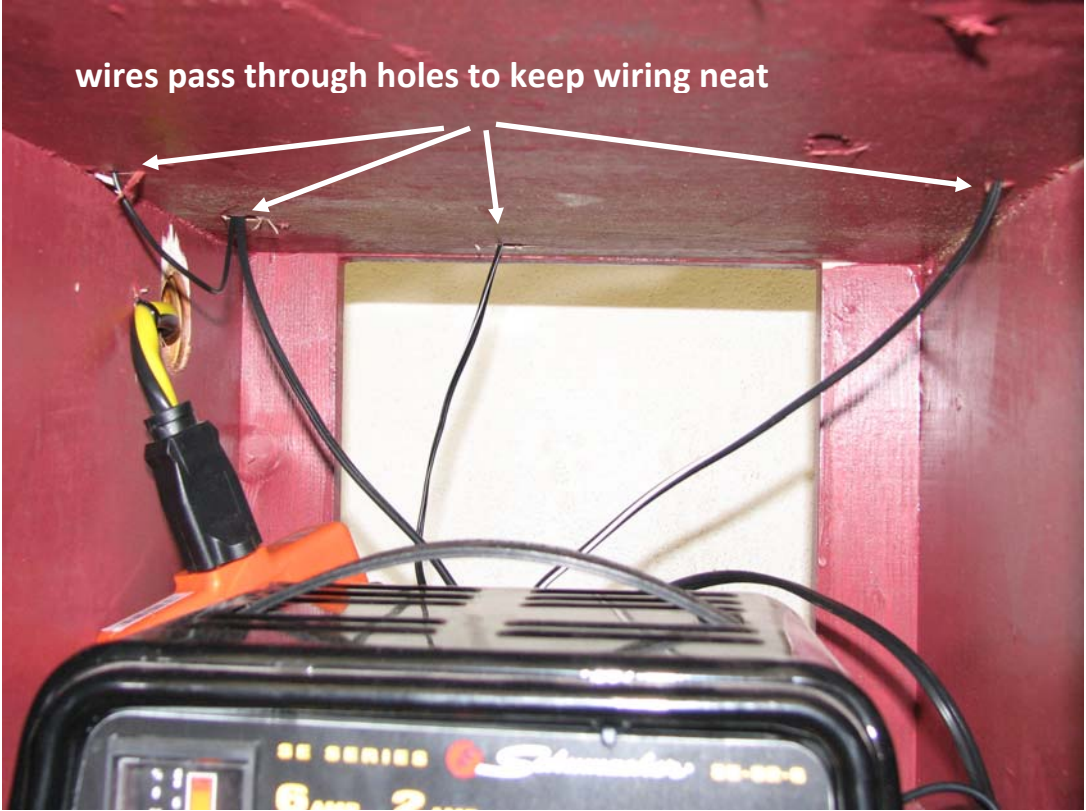
Back View:

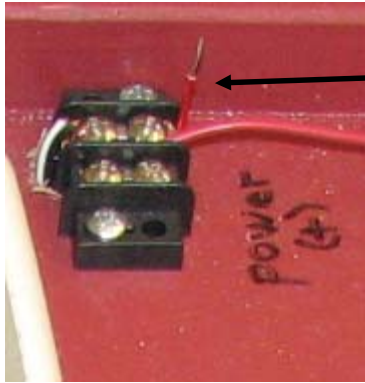


Electrical Wiring:

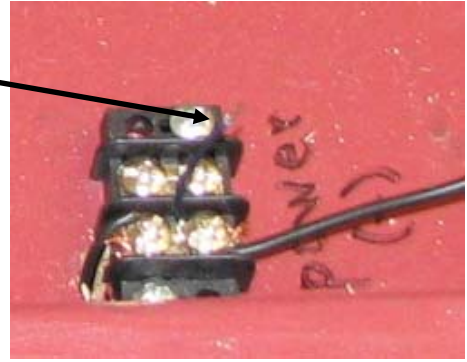


wires pass through holes to keep wiring neat

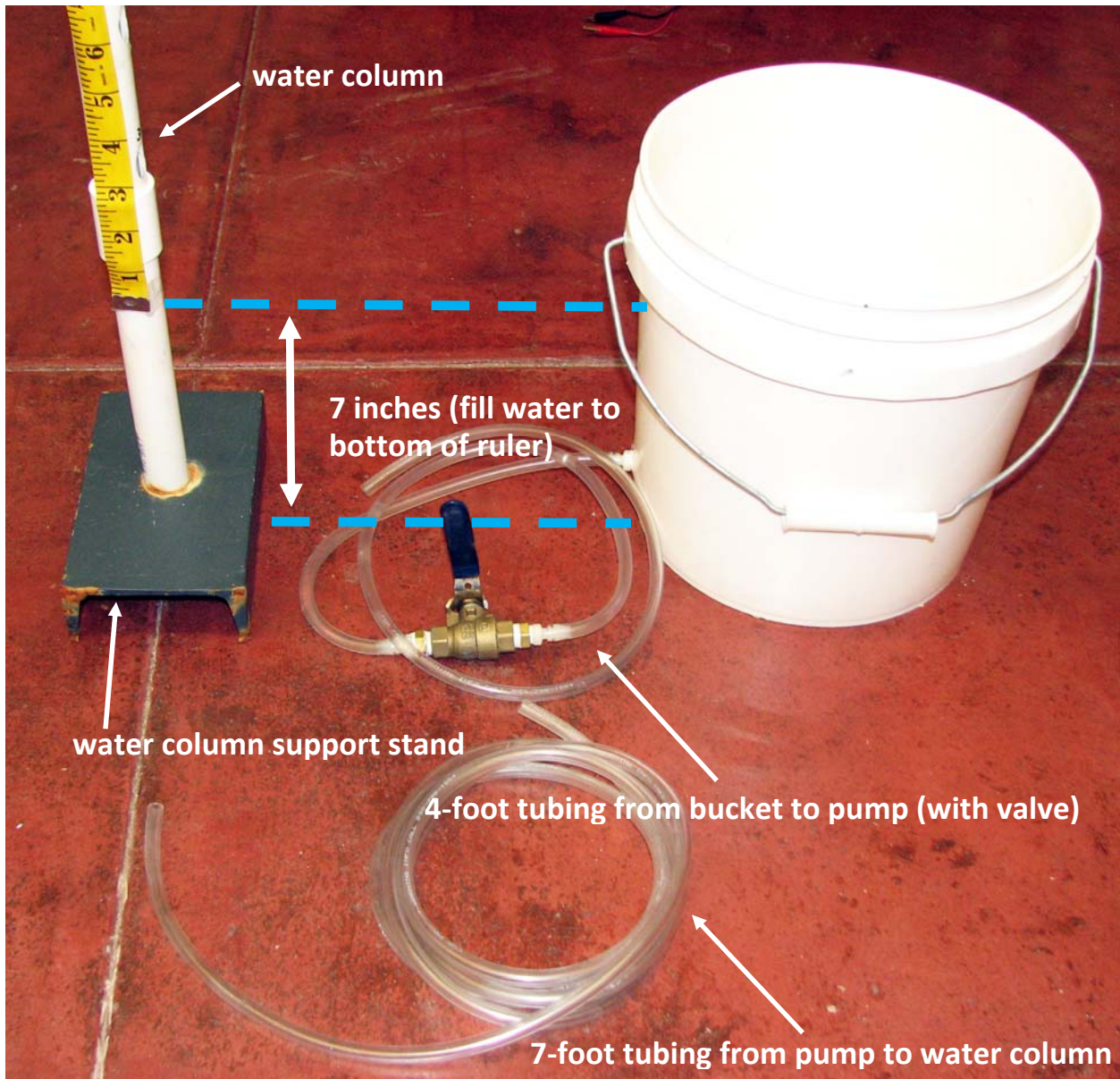




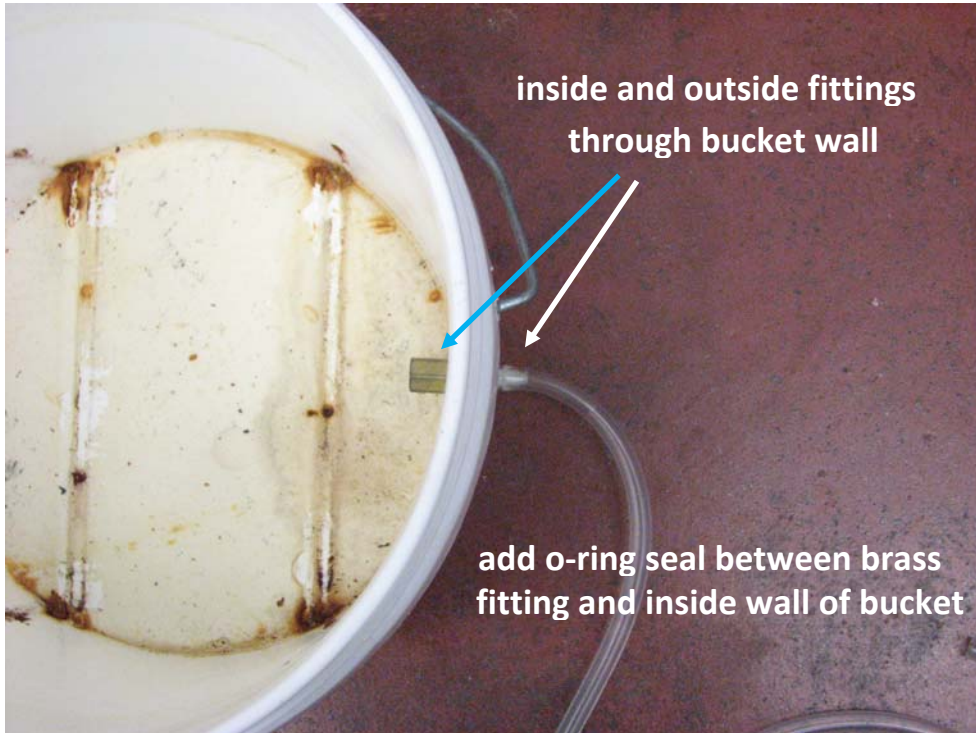
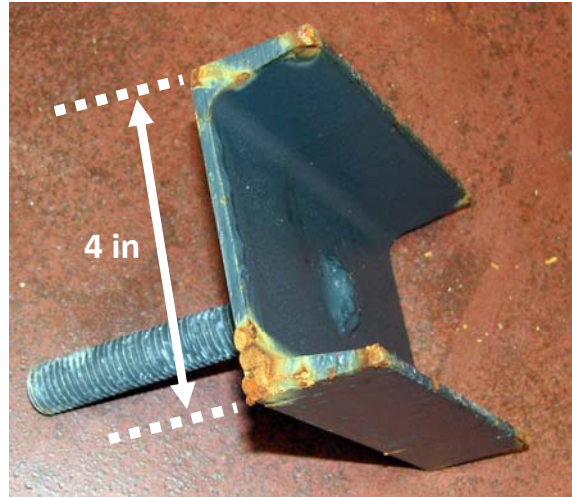
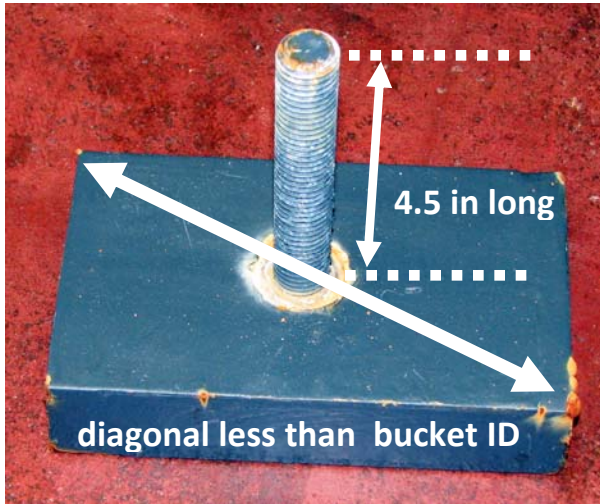
short segments of wire added to make it easy to measure voltage across pump leads



Water Handling System:



Water Column Support Stand:



Water Column: 7-foot segment of $\frac{3}{4}$ inch PVC pipe with $\frac{3}{8}$ -inch diameter angled holes drilled every 3 inches

