

Bill of Materials

GNG 2101 Group 5
November 28, 2021

Item Number	Part Name	Description	Quantity	Unit Cost	Total Cost
1. Source	ABS Pipe 12 ft (Large)	Diameter: 2" Length: 3'	4	\$7.78	\$31.12
2. Source	ABS Pipe 3 ft (Small)	Diameter: 1 ½" Length: 6'	1	\$10.48	\$10.48
3. Source	ABS Wye Fitting	Fitting Size: 2" Connections: All Hub	4	\$3.96	\$15.84
4. Source	ABS 90 Degree Elbow (Large)	Fitting Size: 2" Connections: All Hub	2	\$3.45	\$6.90
5. Source	ABS 90 Degree Elbow (Small)	Fitting Size: 1 ½" Connections: All Hub	2	\$1.73	\$3.46
6. Source	ABS 45 Degree Elbow	Fitting Size: 2" Connections: All Hub	2	\$2.32	\$4.64
7. Source	Oatey Cleaner / ABS Handipack	Volume: 236 mL each	1	\$12.20	\$12.20
8. Source	Acrylic Sheet	Dimensions: 24" x 12" Thickness: 1/8" Color: Clear	1	\$13.00	\$13.00
9. N/A	SAE64 Metal Worm Gear Clamp	Maximum Diameter: 4" No webpage found for it.	4	\$2.10	\$8.40
10. Source	Yardworks Snow Shovel	Clearing Width: 18" Bought on sale.	1	\$9.99	\$9.99
11. Source	Paulin Round Head Square Drive Stove Bolts with Nuts	Length: 2 ½" Diameter: 3/16" Amount per pack: 6	2	\$2.97	\$5.94
12. Source	SERVALITE Toggle Switch	Amperage: 10 Amp Voltage: 125 V	1	\$5.99	\$5.99
13. Student	Electrical Wire	Type: SJTOW Gauge: 14/2 Supplied by student.	1	\$0.00	\$0.00
14. Source	Greenworks 10-Amp 16-inch Power Shovel	Type: corded Clearing width: 16" Clearing height: 6" Amperage: 10 Amp Bought on sale.	1	\$85.45	\$85.45
15. Student	Soldering Tool, Solder, and Electrical Tape	Supplied by student.	N/A	\$0.00	\$0.00

16. Source	Velcro All Purpose Strap	Length: 18" Width: 1" Colour: Black	1	\$4.99	\$4.99
17. Student	Additional Machine Screws, Nuts, and Washers	Diameter: 1/8" Length: 1 1/2" Supplied by student	4	\$0.00	\$0.00
				Total	\$218.40
				Total w/ Tax	\$246.79

Justifications

Items 1 to 6 will be used for the chassis' structure. The amount is approximately how much we need. Item 7 is the adhesive to attach these parts together.

Item 8 will be used as the shield. It is required to protect the user's wheelchair's electronic components from potential blow-back of snow. It will be propped up by ABS pipes on the chassis.

Item 9 will be the main clamps used to attach the snow plow to the wheelchair. They will be either be threaded through a hole made in the bars making up the chassis' structure and around the hanging bars of the wheelchair, or with be tightened around both bars. The clamps will require a flat-head screwdriver to work, which we will assume the client has.

Item 10 will be used as the manual snow-guiding portion of the snow plow. These will act as guides in pushing the snow into the power shovel, as the power shovel by itself does not have a clearing width wide enough to make a path for the wheelchair.

Item 11 will be used to attach the snow shovel (item 10) and power shovel (item 14) to the chassis of the snow plow. They will also be used in one connection between larger and smaller ABS pipes, as well as additional support between ABS pipes.

Items 12, 13, 14 will be used for the power shovel portion of the snow plow. The power shovel will be rewired so the user may turn the power shovel on and off at will. The switch (item 11) needs to be outdoor-usable if an alternative is considered. The wire (item 12) is subject to heavy change depending on the actual wire used in the power shovel (current listed wire is suspected to be used). As implied, the power shovel is corded, and will be powered by the user's home via extension cable and an external outlet of the house.

Item 15 will be supplied by the us students. It will be used to secure the rewiring done with item 13. Electrical tape, also proved by us students may also be used for a similar purpose.

Item 16 will be used as the fastener of a detachable box containing the power switch (item 12) and wiring of the power shovel after rewiring. This fastener will allow the user to attach the switch to the wheelchair's arm rests for ease of access. The box will likely be 3D printed.

All items will be bought and/or picked up in-person, eliminating shipping costs.

Notes

- As requested, I've done a rough temporary sketch on the CAD render of what the design will actually look like (check email attachments for full file, below for isolated version).
 - o The red represents the piping of the chassis and is needed and guaranteed to be used.
 - o The green represents the piping used to prop up the acrylic shield. We will use leftover ABS pipe that should amount to about 26 inches total (divided into 2 sides, so 13 inches in length up). Whether or not this is enough to clear the user's legs is questionable and will need to be looked into.
 - o The blue represents the acrylic shield. It will be inserted into a cut and screwed to the ABS pipe.
- As stated above with the sketch, the shield is still a tentative plan with little calculation backing it up. We'll get back to you after calculations, further consideration, and perhaps the in-person meet. For now, we've left it in the BOM.
- The electrical switch (Item 12) is also tentative. While confidence was gained on the type of wire needed, the switch to accompany it still needs some verification. The one listed in the BOM is what sounds ideal. Prices for such Garden Bender Switches should be of similar price.
- As stated in the discussion, the 12-foot pipe (item 1) is under the assumption that it will be cut for free at the store. Should that not be the case, 4 portions of 3-foot long pipe will be bought in place of it. This alternate option ends up costing $\$7.78 * 4 = \31.12 total or $\$9.64$ more (both not including tax).
- Don't know if this needs to be explained but just in case, like discussed in the meeting, a 3D printed box will be used to contain the switch and wires. It will be held together with screws and contain the switch, connecting ends of the wire, and a Velcro strap so that it may be fastened to the arm rest of the wheelchair. It will take some time and possibly some judgement with the in-person meet to design and formalize the design. However, the basic principles are straight-forward.

Isolated sketch in case, though in questionable resolution and control:

