Dumoine Thunder Boxes

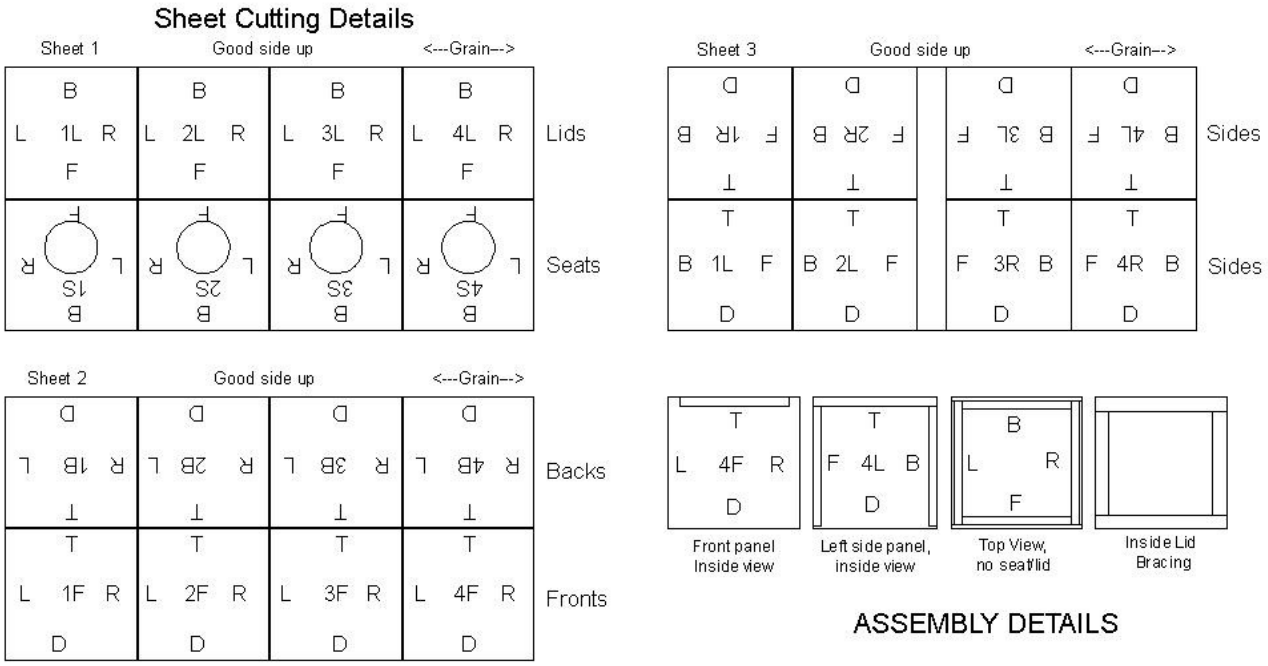
This process will produce 4 boxes, as pictured.

Materials

3 sheets 5/8" fir plywood, good 1 side
8 2" x 2" 8'
4 1" x 3" 8'
6' piano hinge
6' chain
256 #8 x 1 1/2" deck screws (for general assembly; up to 2" acceptable)
56 #8 × 1 1/4" deck screws (for lid assembly; length restricted)
72 #6 × 1 1/4" deck screws (for fastening the hinges)
8 #8 x 1 1/4" or 1 1/2" deck screws with 8 3/16" washers, OR,
8 1 1/4" long 3/16" bolts, each with 2 washers and 1 nylock nut
2 3.5 l Wood preservative: Home Hardware (#1874984) is what we used; it appears to be delisted, but is still available in some stores.

https://brantfordhomehardware.ca/p/home-35l-clear-zinc-wood-preservative-1874984

Cuts



[ ] Split 3 sheets down the middle, making 6 pieces 23 15/16" × 96"; with the best four, split each into 4, creating 16 pieces 23 7/8" x 23 15/16", give or take. These are the front, back, lid, and seat pieces. Select the most presentable 4 and label them 1S...4S; these are your seats. Select the next best 4, labeling them 1L...4L. These are your lids. The next four are your fronts 1F...4F, leaving the backs 1B...4B. The factory edges of our sheets were our worst edges, due to prior-to-me handling damage; these edges should be oriented down, into the dirt.

[ ] The two pieces of the third sheet must be cut such that you finish with 23 15/16" x 22 5/8" pieces. These are the side pieces. Discard the narrow leftover pieces.

[ ] Cut 16 pieces of 2x2 22 1/4" long; these are vertical braces in each box

[ ] Cut 8 pieces of 2x2 19 1/2" ; these are left-right horizontal braces under the seat

[ ] Cut 8 pieces of 2x2 22 1/2"; these are front-back horizontal braces under the seat

[ ] Cut 8 pieces of 1x3 23 7/8"; these are left-right stiffeners on the lid

[ ] Cut 8 pieces of 1x3 18 7/8"; these are front-back stiffeners on the lid, fitting tightly between the two crosswise stiffeners

[ ] Cut the hinge into 4 equal lengths; we used a hacksaw, and filed the edges smooth; gently crimp both ends of each hinge, to keep the pin from drifting.

[ ] Divide the chain into 4 more or less equal lengths

Assembly

Note - some care is required to get the top edges of each front/back/side piece in alignment with it's adjacent piece. It is irrelevant if there is a bottom variation(it's in the dirt!), so make the top edges align to the best of your ability, so that the seat piece fits flush.

Sides: Select a left side piece. Using 4 of the 1 1/2" screws, fasten the 22 1/2" front-back brace across the inside top edge, flush with the edge; then fasten the two 22 1/4" vertical braces along the front and back edges, again, flush with the edge.
Repeat with the 3 other left side pieces. Now, do the 4 right side pieces the same way.

Front and Back: Fasten the front piece to it's respective assembled left and right pieces; add it's top edge brace. Do the same with the back piece for that box to form a 4-sided box. Add the 19 1/2" horizontal braces along the top edge of the front and back, again flush with the edge. Repeat for the other three boxes.

Seat: You should now be able to fasten the seat piece in place, screwing it to the four top braces on the fronts and sides. Then, cut your chosen hole, and smooth all edges of the hole, starting with a rasp and finishing with at least 80-grit sandpaper; 120 or 150 grit would be nicer.

Lid: The underside of the lid requires the longer 1x3 stiffeners mounted across the front and back edges with 4 screws each, and then the sides get filled in with the shorter pieces, 3 screws each. Use the #8 1 1/4" screws here; take care not to sink the screws too deep into the plywood, or they'll start to protrude on the lid side. Alternatively, for a smooth lid, drive the screws through the stiffener into the plywood; again, be sure not to drive the screws too deep, as they'll then protrude from the surface of the lid.

Hinge: Now, mount the hinge, centered on the rear top surface of the seat, by opening the hinge 270 degrees and placing it so it overlaps the back edge and folds down along the back, and screwing it down to the seat surface using the #6 1 1/4" screws. Then, rotate the hinge 180 degrees up to the vertical, and screw it to the back edge of the lid. Alternatively, the hinge may also be mounted by placing the lid in it's location, and then screwing the hinge to the back edge of the seat, and the back upper edge of the box, but this method forces you to screw into the edge of the seat plywood, which is generally not a good idea; it does, however, provide the best seal for the lid-to-seat edges, keeping the critters out (unless the lid then warps, of course).

Chain: With a 1 1/2" screw and washer, fasten your chain about half-way from front to back on the outside left or right edge of the seat (down an inch, so the screw enters the 2x2), then fasten the opposite end about halfway from front to back on the side of the lid with another screw and washer - this screw should enter the 1x3 stiffener's edge. Swing the lid open, and reduce the chain length, if needed, an appropriate number of links to allow the lid to just lean back enough that a stiff wind would be required to blow it closed. 5-10 degrees is enough; avoid over-straining the mounting points for the chain by leaning the lid back too far.

Erasing: Now, go over all boxes and remove any visible pencil marks, erasing what will erase, and if necessary sanding off any marks that won't erase.

Treatment: Ideally, now disassemble everything and apply as many coats of preservative as you can, until you run out; a single can will not quite allow you to complete two coatings on four boxes. Let it all dry, then reassemble it. Alternatively, treat all accessible surfaces on the completed boxes. This will leave some surfaces susceptible to rot when water inevitably seeps into the joints. How much difference this will make is unknown to me. Allow the treatment to dry for at least a week (month?) in open rain-free space. Then, apply artwork as you see fit.

Notes

About grain orientation: it's best for appearance if you are consistent with the grain direction. I chose to run the grain around the box, with seat and lid grain running across from left to right. If you are going to care about this, it's easiest to go though all pieces now, marking all edges "top", "left", "right", "back", "front", and "dirt" as appropriate(see pdf drawing for one approach). If you were to run the grain vertically, then you'd want to make the cuts on the last sheet differently, so think it through. Mark all pieces on the good face, with light pencil. You will want to erase these marks later, so be gentle.

About the seat hole: We traced an available toilet seat. You could just make a 7" round hole(you could even just trace the bottom of the treatment can); though suboptimal, humans are adaptable in necessity. Front edge of the hole should be around 4" from the front edge of the seat, likely more if you use a round template. Best to mark in situ once the box is assembled, including sitting on it to make sure you're not too far back, or forward... We also cut the hole, and smoothed it's edges, in situ. The hole can also have it's edges shaped with a router, if one is available.

About markups: For a really tidy look, you may choose to pre-mark all screw positions, measuring to ensure a regular appearance. If so, 6" spacing of the 4 screw locations is about right (i.e. at 3/9/15/21 - though in some places, you'll need to bring the 3", and 21" positions in an inch, to avoid a screw being placed 1/2" from the end of a 1x3, for example), along each edge of each panel. This marking needs to be on the visible surface, obviously.

About the wood treatment: The chosen preservative is STINKY. It would probably be ideal to pre-treat all pieces of wood, but when I assembled the first batch of boxes in 2019, the stench in my workshop was so bad I had to work with the door open, and I could still smell the residue a week after the boxes were removed. For the recent set of boxes, I chose to assemble, then treat all accessible surfaces on a sunny day in the open air on my driveway. It was still a stinky process, and my work clothes still smelled after a washing.

About accuracy: If every cut is perfect, these instructions will work. Between slight variations in saw settings, measurement accuracy, etc. I found it necessary to make the 2x2 pieces up to 1/8" shorter, depending upon the piece being fitted. But, in reality, what is it we're making? Not fine furniture...

Miscellaneous:

Complaints - The box height is a bit excessive if it's just resting on the ground. Human anatomy varies, but feedback here is the box perimeter should be dug in 4-6"(I don't like that, as it will likely rot faster), or alternatively, provide a 4-6" step at the front edge for the shorter among us. Our first tester was "amused" to no end when his feet dangled 3" from the ground, necessitating a slide forward off the box. Seems he was worried about splinters...

Optimization - one could eliminate the 1x3 purchase by cutting a 2" strip off of each side/back/front, and using those to stiffen the lid. This would also address the box height complaint, but does reduce the total "volume" of the box. Tradeoffs, tradeoffs!

Other ideas - A rope handle for the lid? A hanger on the side, to hold a bag with TP in it? Motivational text on the inside of the lid -- after all, it'll likely become a location for graffiti, so why not do it first? Use your imagination!

Siting - Make visits inspirational, but not entertaining; choose a location with a view, but with some privacy for those of us who pathologically fear the GO-Pro wielders among us!