

Kitchen table project work plan

May 17, 2019

Materials

5/4 plank ID	Rough width	Rough length	Use for	Finished width	Notes
A	12"	59½"	Top	4-3/16"	
A	12"	59½"	Edge strips	~7¾"	As needed
B	12½"	77½"	Top	12-3/16"	
C	11½"	75½"	Top	11-3/16"	
D	12"	62-¼"	Seat	11-11/16"	
E	8¾"	53½"	Backrest slats	4 X 1-5/8"	Warped
G	8¾"	122"	Seat (G1)	8-7/16"	
G			Seat skirt (G2)	6"	Re-saw to 1/2" thick
F	8¾"	55¾"	Top	8-7/16"	

Work steps

Prepare planks

- Cut plank G to 73-5/8" length with clean ends for G1, leaving 48-3/8" for G2.
- Plane one surface of all planks smooth. The smooth surface allows easy passage through the jointer in the next step.
- Joint one edge of these planks, removing as little material as possible:
 - ◆ Plank D
 - ◆ Plank F
 - ◆ Plank G1
- Joint one edge of these planks, removing as little material as possible:
 - ◆ Plank A
 - ◆ Plank B
 - ◆ Plank C
 - ◆ Plank F

- ◆ Plank G1

Plane planks to final thickness

5. On all planks, plane both surfaces smooth to a finished thickness of **one inch**. Plane all planks with the same planer setting – they must be **exactly** the same thickness.

Rip planks into boards with final width

6. Rip-smooth and/or joint the second edge of all planks to the finished width shown in the materials table. Now we have finished “boards.”
 - ◆ **Note:** All exposed edges on the table, seat, and backrest will be flush-routed and sanded smooth in the final steps.

Fabricate seat backrest slats

7. Fabricate the backrest slats:
 - ◆ Plane both surfaces of plank E to remove warp and tun it into a “board.”
 - ◆ Cut board E to 55³/₄” length for the backrest.
 - ◆ Rip board E into four 1-5/8” backrest slats.
 - ◆ Rip-smooth the edges of all backrest slats.
 - ◆ Re-saw the backrest slats to half the thickness of board E.
 - ◆ Plane all backrest slats to the same final thickness.
 - ◆ Round-over the top edges of the backrest slats to 1/4” radius.

Test-fit and measure table and seat

8. Lay top boards F, A, C, and B on the workbench and clamp them together snugly to confirm that the total width is 36-15/16”, which includes three not-yet-cut tongue widths.
9. Lay seat boards D and G1 on the workbench and clamp them together snugly to confirm that the total width is 18-5/16”, which includes one not-yet-cut tongue width.

Label tongue-and-groove edges

10. Label on blue tape the tongue and groove edges on these boards:
 - ◆ Top board F, ripped edge: “tongue.”
 - ◆ Top board A, ripped edge: “groove.”
 - ◆ Top board A, second ripped edge: “tongue.”
 - ◆ Top board C, ripped edge: “groove.”
 - ◆ Top board C, second ripped edge: “tongue.”

- ◆ Top board B, ripped edge: “groove.”
- ◆ Seat board D, ripped edge: “tongue.”
- ◆ Seat board G1, ripped edge: “groove.”
- ◆ *Note: Board G2 has no T&G edges.*

Rout tongue edges

11. Set up the T&G **tongue** router bit for 1”-thick top and seat boards.
 - ◆ Set up the bit with the wood *good side down*.
 - ◆ Make one or more test cuts in top or seat board cutoffs.
 - ◆ Label the final test cut.
12. Rout **tongue** edges on boards A, C, D and F, as labeled on blue tape.

Rout groove edges

13. Set up the T&G **groove** router bit for 1”-thick top and seat boards.
 - ◆ Set up the bit with the wood *good side down*.
 - ◆ Make one or more test cuts in top or seat board cutoffs.
 - ◆ Label the final test cut.
14. Test-fit the final test cuts to confirm that the boards mate flush and smooth on the top surface. Adjust the **groove** router bit height and re-cut a test groove until this is achieved.
 - ◆ Rout all T&G edges with the *good side down* to ensure a flush joint.
15. Rout **groove** edges on boards A, C, B, and G1, as labeled on the blue tape.

Assemble seat

16. Fabricate from corrugated cardboard strips and hot-melt glue a template for the seat that matches the bump-out walls.
17. Lay seat boards D and G1 on the workbench good side down and clamp them together.
18. Lay the seat template on boards G1 and D, and align the east edge with the wall edge of the rear seat board.
19. Adjust the seat template and boards longitudinally until the template fits completely on both boards.
20. Clamp the boards tightly.
21. Align the template's long side with the seat rear edge. and tape it in place.

22. Apply blue tape spanning two boards across the T&G joint. Carefully slice the tape with a razor blade at the joints, and label each pair "align."
23. On the seat's underside, trace along the template's short edges to create end cutting lines on the boards.
24. Remove the template, and **save it to cut the 1/4" plywood shelf that will be attached beneath the seat.**
25. Fabricate three 3/4" x 1-1/2" x 12" oak stringers to install on the bottom of the seat across the T&G joint 20 inches either side of the seat's front-to-rear center line.
26. Mark, drill, and countersink clearance holes for flat head screws in the stringers.
27. Set the three stringers in place on the seat underside. Allow 2" clearance from the seat's rear edge, and 4" clearance from the seat's front edge.
28. Use a center punch to mark the locations for mounting screw holes. Drill pilot holes for the screws into the table boards.
 - ◆ Use a depth-stop on the drill bit.
 - ◆ Label each stringer and both seat boards to identify their locations.
29. Glue boards D and G1 at the T&G joint.
 - ◆ Use sacrificial wood blocks at the clamp jaws to avoid marring the table boards.
 - ◆ Clamp tightly, and ensure that the joint does not bend upward.
30. Before the glue cures, attach the three stringers across the T&G joint, using glue and flat head wood screws.

Finish seat

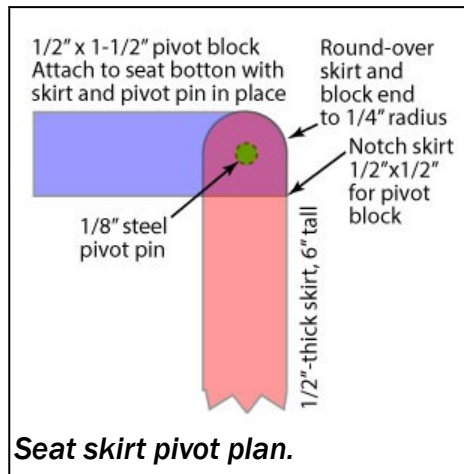
31. Saw the angled seat ends as marked.
 - ◆ *Saw with the seat's good side down.*
32. Sand smooth the seat's ends.
33. Round-over the top and bottom edges of the seat's *front* board to 1/4" radius, to match the radius on the backrest slats.
34. Round-over the *top* edge (*only*) of the seat's *rear* board and both ends to **1/8" radius.**
 - ◆ Do not round-over the bottom edge.
35. Attach a length of 1" steel angle iron along the length of the seat, 3" from the front edge.

Fabricate seat front skirt

36. Board G2 was cut to a length of 48-3/8" in step 1. Now cut it to 40".

37. Board G2 was planed to its final thickness in step 7, and ripped to 6" wide in step 9. Re-saw G2 to half its thickness.
- ◆ Note: Use the table saw and rip fence to re-saw, flipping the board end-for-end after one pass to keep the same face against the rip fence. Reason: The band saw blade wanders during a re-saw, and does not produce a straight cut.
 - ◆ Plane both pieces to *exactly* the same thickness after re-sawing.
 - ◆ These pieces become boards G2a(1) and G2a(2).
38. Cut G2a(1) to 40" length.
39. Cut G2a(2) to 43" length.
40. Rout a 3"-long recess in one end of G2a(1) and G2a(2). The recess should be *exactly* half as deep as the thickness of the G2a pieces (which should be *exactly* the same thickness from step 37).
- ◆ Make test cuts on the G2a cutoffs and adjust the router bit elevation to achieve a lap joint that is flush and smooth.
 - ◆ The recess should allow G2a(1) and G2a(2) to mate with a lap joint that produces a total length of 74" to match the seat front.
 - ◆ The lap joint on the outside face of the seat skirt should be in the center, or 37" from each end.
41. Round-over the top-front edge of the skirt to $\frac{1}{4}$ " radius.

Fabricate seat skirt pivot



will be rounded-over to $\frac{1}{4}$ " radius to allow the skirt to pivot upward. The top of the pivot block will be rounded-over to the same radius to match the skirt edge.

The pivot blocks will be secured to the seat bottom with flat head wood screws (no glue).

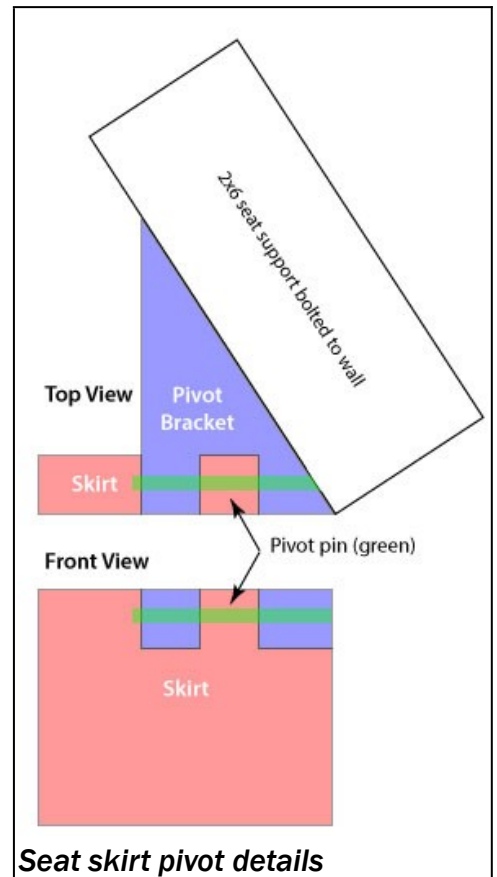
Here are the fabrication steps:

42. Cut two oak pivot blocks $\frac{1}{2}$ " x $\frac{1}{2}$ " x $1\frac{1}{2}$ " long.
43. Round-over the top-front end of each pivot block.
44. Notch each end of the skirt to allow space for the pivot block.
45. Test-fit the skirt and pivot blocks on the seat bottom, and measure to confirm that the total length is the same as the seat length.
46. Drill a #30 (0.128") hole $\frac{3}{8}$ " deep in each top-end of the skirt, located half the skirt thickness from the front surface and from the top edge.
47. Drill a #30 (0.128") hole $\frac{3}{8}$ " deep in each pivot block, located half the skirt thickness from the front end and from the top edge.
48. Cut two lengths of $\frac{1}{8}$ "-diameter steel rod $\frac{3}{4}$ " long. File-smooth the ends. Coat each pin with sealing wax.
49. Insert the pivot pins into the holes in the skirt ends and the holes in the pivot blocks.
50. Clamp-up the pivot blocks to the seat bottom, and confirm that the blocks pivot easily.
51. Drill screw mounting holes through the blocks into the seat bottom – use a depth stop on the drill bit.
52. Enlarge the holes in the blocks for a screw clearance fit, and countersink on one face.
53. Attach the pivot blocks and skirt to the seat bottom.

The seat skirt will hang from $\frac{1}{8}$ " steel pins, one in each end, that insert into blocks attached to the seat bottom.

The pivot block and the skirt will have mating tabs and notches to the pivot pin to penetrate both.

The top edge of the skirt



Seat skirt pivot details

Lay out and saw table

54. Fabricate two focus points to draw the ellipse. These can be small nails through 2" squares of clear plastic; the plastic can be taped to the cardboard with the nails over the foci points.
55. Cut a length of paracord and form a loop on each end tied with a bowline knot. The length of the cord from loop-to-loop must be 64-45/64" (64.704"). This is the "ellipse-tracing string."
- ◆ *Note: The paracord stretches slightly under tension.*
56. Temporarily clamp table boards F, A, C, and B good side-up on pipe clamps.
57. Create a cardboard template for the table:
- ◆ Tape two pieces of cardboard together. Label this joint as "front-to-rear center line."
 - ◆ Label one straight edge of the cardboard, "rear edge."
 - ◆ Along the rear edge, front-to-rear center line, measure 21" from the center in each direction. Label each of these points "rear corner."
 - ◆ From 12 inches beyond each "rear corner" mark on the rear edge, measure 28" from the rear edge toward the front. Connect these two points with a straight line, and label this "ellipse center line."
 - ◆ From the "rear corner" marks on the rear edge, measure 36" perpendicular from the rear edge toward the front. Connect these two points with a straight line, and label this line "front edge."
 - ◆ Along the "ellipse center line," measure 31.14" in each direction from the "front-to-rear center line." Label these points "F1" and "F2."
58. Draw the ellipse:
- ◆ Tape the two plastic/nail ellipse focus points to the cardboard at the "F1" and "F2" points.
 - ◆ Use the ellipse-tracing string and a pencil to draw the ellipse on the cardboard.
 - ◆ Place as little tension on the string as possible to minimize stretching the paracord.
 - ◆ The front edge of the ellipse should fall close to the "front edge" line.
 - ◆ The ellipse should measure 8" from the "ellipse center line" to its widest perimeter at the front edge, and 16" across the widest perimeter points along the "front-to-rear center line."
59. Complete the table template:
- ◆ Note the points where the ellipse ends intersect the "ellipse center line."
 - ◆ Draw a straight line from each end of the ellipse to the nearest "rear corner." These are the table "end lines."
 - ◆ Measure as necessary to confirm that the table outline is symmetrical, that the rear-to-ellipse-front is 36", and both "end lines" are the same length.

- ◆ Remove the cardboard from the table.
 - ◆ Cut the cardboard along the straight end lines and the curved half-ellipse at the front. This completes the table template.
55. Carry the template to the kitchen to confirm it is the correct size and shape.
57. Determine which portions of the boards to use in the table:
- ◆ Lay the boards close together, good side-up, on two pipe clamps.
 - ◆ Lay the template on the boards with the “rear edge” near the edge of the rear board. Slide the template and the boards left-and-right until the best portions of the boards are covered by the template (and thus will remain part of the table)
 - ◆ Clamp the boards together tightly.
 - ◆ On the underside of the boards, apply blue tape spanning two boards across each of the three T&G joints. Carefully slice the tapes with a razor blade at the joints, and label each pair “1,” “2,” or “3. These are “board alignment marks.”
57. Transfer the template's position to the underside of the table:
- ◆ Clamp the boards together tightly.
 - ◆ Align the template's “rear edge” with the edge of the rear board.
 - ◆ Tape the template in place.
 - ◆ Transfer the front and rear end points of the template's “front-to-rear center line” to the underside of the rear board and the underside of the front board.
 - ◆ Transfer the template's “rear corners” to the underside of the rear board.
58. Trace the template outline on the underside of the table:
- ◆ Remove the template and un-clamp the boards.
 - ◆ Flip each board end-for-end so the good side is down.
 - ◆ Align the three “board alignment marks” on the blue tapes, and clamp the boards tightly.
 - ◆ Lay the template upside-down on the boards. Align its “rear edge” with the edge of the rear board, and its “rear corner” marks with the marks transferred from the board's good side.
 - ◆ Confirm that the blue tapes with the “board alignment marks” are still in place, and still aligned.
 - ◆ Trace the template's outline onto the boards.
 - ◆ Leave the boards clamped tightly.

Mark leg locations on the table underside

Refer to these two illustrations for details on how legs will be attached to the table.

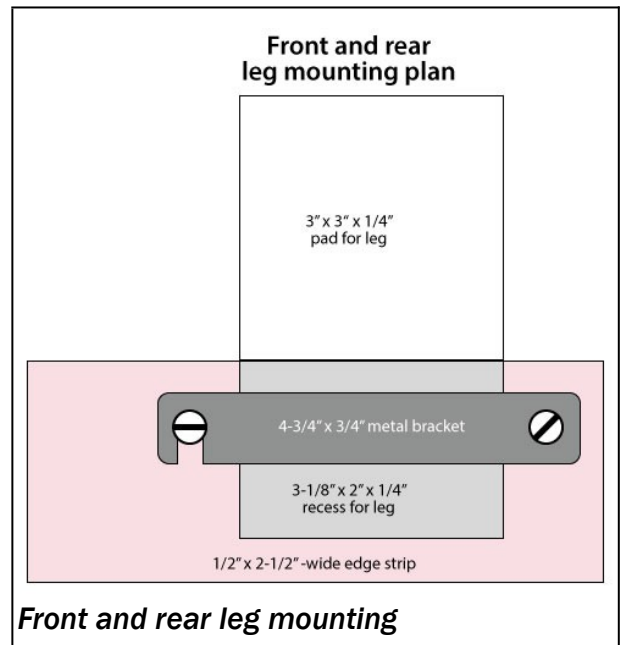
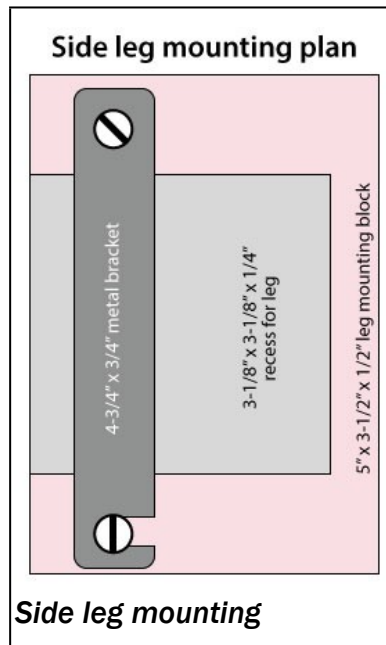
Legs will not be bolted to the table, but will be secured in mounting blocks by steel brackets that swivel to release the legs.

The legs are made of $\frac{1}{4}$ "-thick steel.

Each side leg will rest in a $\frac{1}{4}$ "-deep recess

routed into a $\frac{1}{2}$ "-thick oak mounting block that will be screwed and glued to the table underside approximately 11 inches from the table end.

Similarly, the front and rear legs will rest in $\frac{1}{4}$ "-deep recesses routed into $\frac{1}{2}$ "-thick oak edge strips along the table's front and rear edges. The difference is, the edge strips will be $2\frac{1}{2}$ " wide, instead of the full $3\frac{1}{2}$ " width of the side leg mounting blocks. Consequently, $\frac{1}{4}$ "-thick oak pads are needed to support the full 3" flat area on the legs. The plan shows a 2" x 3" pad, but a 1"-wide pad will suffice.



59. Refer to the table plan drawing to see the location of the four legs.
57. Draw a line on the table underside connecting the marks for the "front-to-rear center line."
- ◆ Check that the line is perpendicular to the rear edge.
 - ◆ Mark the center of this "front-to-rear center line."
57. On on the "front-to-rear center line," measure and mark 18" from the table's rear edge. Label both points "all legs center."
58. On the "front-to-rear center line," measure and mark 1" and 35" from the table's rear edge. Label both points "leg end."
56. From the "all legs center" point, measure and mark 23" in both directions toward the table ends, and 18" from the table's rear edge. Label both points "leg end."

Fabricate table stringers

60. Lay the four table boards on pipe clamps, good side down, and clamp tightly.

61. Fabricate four $\frac{3}{4}$ " x $2\frac{1}{2}$ " x 27" oak stringers to span all four boards across the T&G joints, two 7" either side of the "front-to-rear center line," and the remaining two 17" either side of the "front-to-rear center line."
62. Mark, drill, and countersink clearance holes for flat head screws in the stringers.
63. Set the four stringers in place, and use a center punch to mark the locations for mounting screw holes. Drill pilot holes for the screws into the table boards.
 - ◆ Use a depth-stop on the drill bit.
 - ◆ Label each stringer and all four table boards to identify their locations.

Saw the table front board half-ellipse

64. Un-clamp the table boards, and clamp the table front board to the workbench in preparation for sawing
65. Saw the front board along the half-ellipse line:
 - ◆ **Note:** The sabre saw is best for cutting the table half-ellipse. Use a hollow-ground blade.
 - ◆ Saw with the board's good side down.
 - ◆ Carefully saw along the half-ellipse and end lines drawn on the board. **Label the curved cutoffs and the matching areas on the board. Save the cutoffs to serve as parallel clamping blocks for glue-up!**

Glue-up the table

Note: Follow these steps to glue each of the three T&G joints:

- ◆ *Glue with the boards' good side down.*
 - ◆ Apply glue to the mating tongues and grooves.
 - ◆ Remove excess glue.
 - ◆ Lay the two boards on pipe clamps, and partially mate the T&G joint.
 - ◆ Align the "board alignment marks" and the ends on both boards.
 - ◆ Use sacrificial wood blocks at the clamp jaws to avoid marring the table boards.
 - ◆ Clamp the boards tightly, and ensure that the joints do not bend upward.
 - ◆ Attach the four stringers across the T&G joint immediately after the two boards are glued and clamped.
 - ◆ Loosen the clamps to prepare for gluing the next board.
66. Glue Board C (half-ellipse front board) to Board B. **Use the ellipse cutoffs to provide a parallel clamping surface.**

67. Glue Board A to Board CB.
68. Glue Board F (rear board) to Board CBA.
69. Allow the glue to cure, then un-clamp the table.

Fabricate table edge strips

70. From 1 $\frac{1}{4}$ "-thick board cutoffs, rip approximately 100 inches of 2 $\frac{1}{2}$ "-wide strips.
71. Re-saw each strip to half its original thickness, yielding ~200 inches of ~ $\frac{1}{2}$ "-thick strips .
72. Plane all strips to the same thickness.

Set up the front and rear edge center strips

73. Make one rear edge strip at least 8" long, mark its center, then place this center over the table's "front-to-rear center line." Label this strip clearly – it will be routed later to accommodate a table leg. Label this the "rear edge center strip."
74. Make one half-ellipse edge strip at least 8" long, mark its center, then place this center over the table's "front-to-rear center line." Label this strip clearly – it will be routed later to accommodate a table leg. Label this the "front edge center strip."
75. Lay the table upside-down on the workbench.
76. Mark, drill, and countersink clearance holes for flat head screws in the strips.
77. Set the two strips in place, and use a center punch to mark the locations for mounting screw holes. Drill pilot holes for the screws into the table boards.
 - ◆ Use a depth-stop on the drill bit.
 - ◆ Label the strips to identify their locations.

Set up and rout the front and rear edge strips for the front and rear legs

78. Fabricate two oak spacers 3" X 3" approximately $\frac{1}{4}$ "-thick to be used between the legs and the underside of the table.
 - ◆ **Important!** Plane the spacers so their thickness plus the legs' thickness (close to $\frac{1}{4}$ ") equals the thickness of the edge strips.
79. Set the front/rear legs on the underside of the table, and bolt them together.
 - ◆ Position the legs so the ends are inside the "leg end" lines from step 57.
80. Using screws only in the two holes closest to the center, gently screw the front and rear "edge center strips" in their locations.
81. Mark on the legs with pencil the inside edge of the edge strips.
82. Mark the edges of each leg on its edge strip. This is the "leg recess width."

83. Remove the edge strips.
84. Measure and note the distance on each leg from the pencil marks to the leg end. This is the “leg recess length.”
85. Remove the legs from the table.
86. On the front and rear “edge center strips,” lay out recesses for the legs.
- ◆ Make the recess a width of “leg recess width” plus $1/8$ ” along the “leg recess width” lines from step 82.
 - ◆ Make the recess into the strip a distance of “leg recess length” (step 84) plus $1/8$ ”.
87. Rout the leg recesses into the front and rear “edge center strips.”
- ◆ Use a $1/4$ ”-diameter bit for small corners.
 - ◆ Route the depth so the remaining wood is exactly as thick as the leg spacers (step 78). When the leg rests in the recess, it should be flush with the surface of the edge strip.

Confirm front and rear leg attachment, and attach the edge strips

88. Temporarily screw the front and rear “edge center strips” to the table underside.
89. Set two leg spacers (step 78) next to the leg recesses in the edge strips.
90. Set the front and rear legs on the leg spacers and the edge strip recesses, then bolt them together.
91. Remove the legs.
92. Apply glue to the bottom of the leg spacers, then press them in place.
93. Use the pinner with 1” pins to hold the spacers in place as the glue cures.
94. Apply glue to the front and rear “edge center strips,” and screw them securely to the table underside.

Fabricate and attach the remaining edge strips

95. On the table underside, cut and lay out the remaining edge strips around the perimeter.
- ◆ Where strips meet, miter the ends so no gap is visible when the excess strip is removed.
 - ◆ On straight side and ends, align the edge of the strip slightly proud of the table edge.
 - ◆ Label each strip and the table boards to identify their locations.
96. Mark, drill, and countersink clearance holes for flat head screws in the strips.
97. Set the two strips in place, and use a center punch to mark the locations for mounting screw holes. Drill pilot holes for the screws into the table boards.
- ◆ Use a depth-stop on the drill bit.

◆ Label the strips to identify their locations.

98. Install the edge strips along the table perimeter in both directions between the front and rear “edge center strips.” Glue and screw each section to the table underside.

Finish table edges

99. Saw If necessary, then flush-rout and/or sand the table double-thickness edge so it is smooth, with no hills or valleys.

100. Round-over the table's top and bottom edges to $\frac{3}{8}$ " radius.

101. Sand smooth the table's edge.