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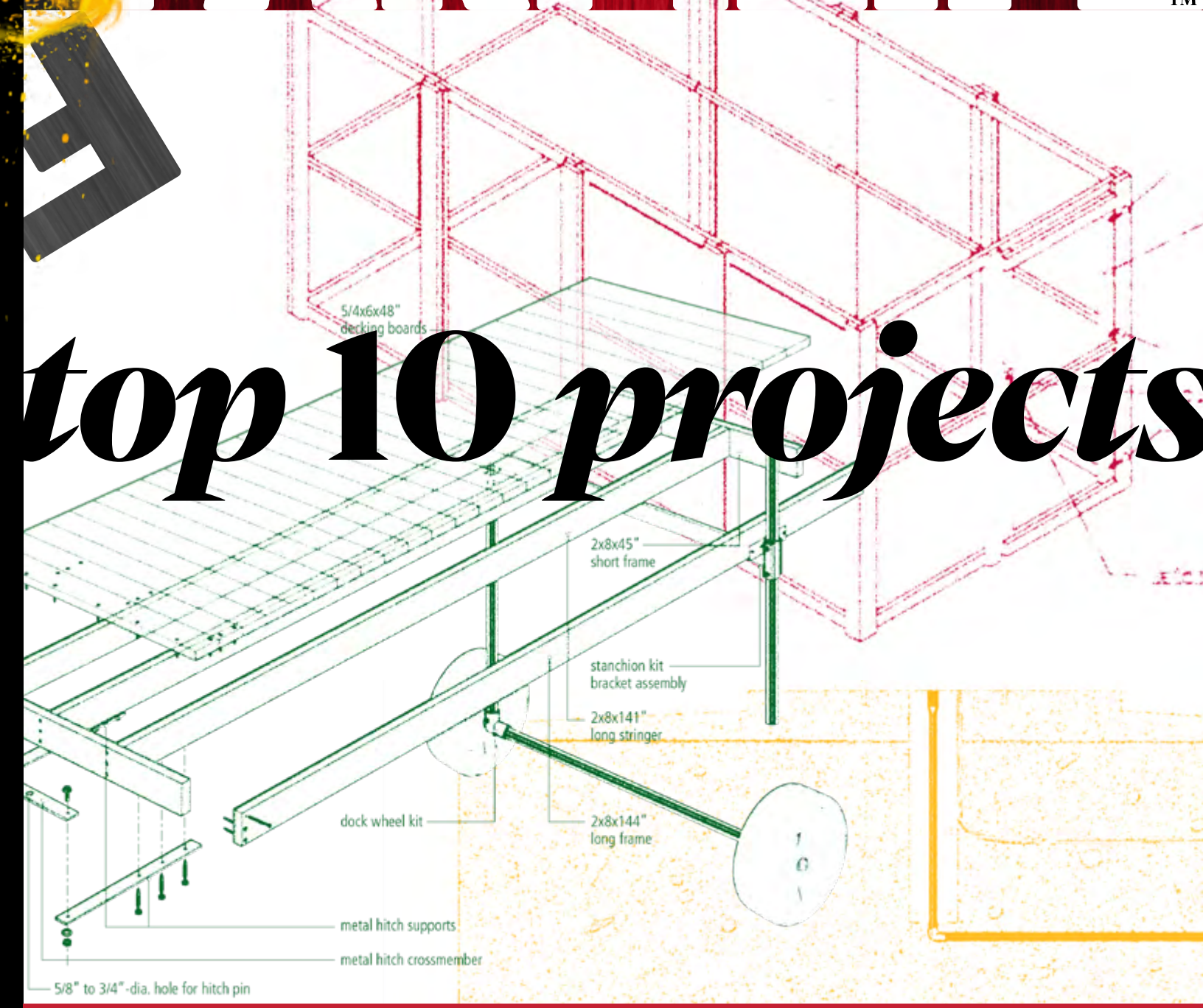

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top 10 projects

LAND

GARDEN

LIVESTOCK

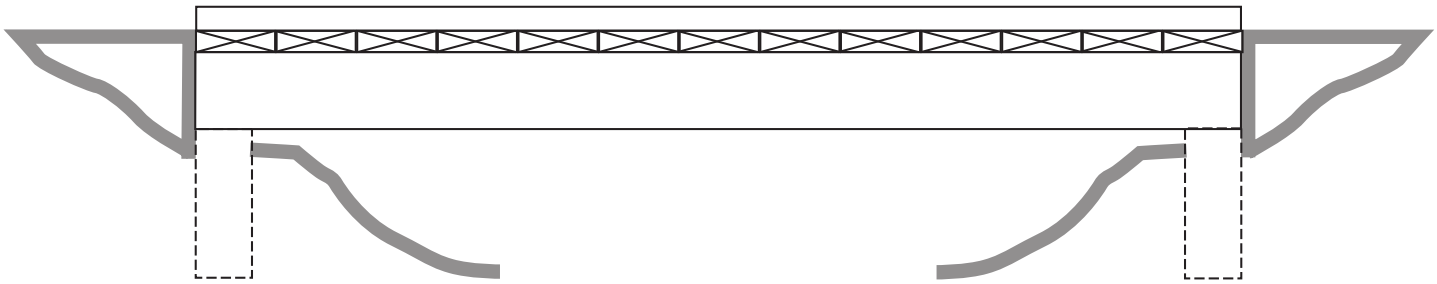
WATER

1

12 Steps For Building a Bridge

Build this simple structure and cross that ditch or swale with ease.

BY OSCAR H. WILL III



Visit **myFarmLife.com/bridge** to download detailed plans for a version of this bridge used by the U.S. Forest Service.

When you live out past where the pavement ends, you're bound to encounter a small seasonal creek, drainage ditch or damp swale that you wish to cross with minimal fuss, not to mention dry feet. You might even want to get your wheelbarrow, lawn tractor or ATV to the other side without tearing up the ground or the equipment.

While you might be able to procure a culvert and haul in sufficient fill to create a path across the gap, in many cases a bridge is more practical and aesthetically pleasing—and it may be the only method permitted in the case of controlled waterways.

Don't be afraid to modify the following plan to suit your situation, but be keenly aware of load-bearing capacities for the lumber you choose and the length of your span. Our bridge is plenty stout for a 4-foot-wide by 12-foot-long span that will handle a 1,000-pound live load.

Our project assumes that you don't have to worry about swift water flowing over the banks of the ditch and that you don't require a permit for your project. If the latter isn't the case, you will want to consult with your local permitting agency and possibly an engineering firm before proceeding.

1 Site your bridge where the banks are relatively level and at roughly the same elevation. For our example, we are assuming a 7-foot creek bed (gap) with a 12-foot bridge length. The extra length is to get the footings at least 2 feet back from the creek's banks.

2 Call 811 and consult your plat maps or any other records you may have to ensure that your intended bridge site is free of buried pipelines and cables. Level the areas where you want your bridge's ends to land.

3 Measure, square and stake a rectangle that's 4 feet wide and 12 feet long, centered lengthwise over the gap. You will install concrete or wooden footers just inside the four corners of your marked area.

4 Drill four 8-inch-diameter (or larger) holes, completely inside the rectangle's corners, at least 3 feet deep with your tractor. Then fill with concrete or an 8-inch-diameter post. If using concrete, take care that each pair of footings is at the same level—slightly above grade is ideal, if you can find an appropriate form. If using posts, trim them level once you have backfilled the holes.

5 Sister two ground-contact treated 2" x 10" x 12' dimensional boards by using 10 penny nails staggered every 8 inches or so to nail them together along their entire length. This creates what amounts to a 4" x 10" x 12' dimensional timber. Place the timber on edge across the gap, with the ends supported by the footers. Set the center of the timber on the footer's centerline.

6 Repeat step 5 and place the resulting timber centered on the other set of footers. Adjust the positioning to ensure the timbers are parallel and square.

7 Measure the distance between the two timbers and cut four pieces of 2" x 10" material to that length. Sister the 2" x 10" lengths by nailing them together in pairs to make crossbeams, and install them between the timbers (three 8-inch lag bolts per corner of the bridge), while resting centered on the footers. Attach timbers and beams to footers, using brackets and screws appropriate for wood or concrete footers.

8 Measure the distance between the cross beams, and cut two 2" x 10" x 12' treated dimensional boards to length (should be approximately 11'). Attach them to the crossbeams with metal hangers and galvanized screws at two points that are roughly one-third and two-thirds of the distance between the timbers, respectively (much like floor joists).

9 Measure the distance between the outer edges of the timbers and cut a piece of 2" x 6" treated lumber to length. Attach it to the bottom of the bridge halfway across the span, screwing it to both outer timbers and the two interior "joists" to keep them from spreading or twisting.

10 Cut sufficient 2" x 6" x 4' lengths (approximately 25) of treated lumber to deck the existing superstructure crosswise its entire length. Screw the decking down to the outer timbers and joists, leaving about a $\frac{1}{4}$-inch gap between the boards. The ends of the deck planks will extend beyond the outer timbers by about 2 inches on each side.

11 Install a curb on each side of the bridge by screwing a 2" x 4" x 12' treated dimensional board flat on top of the decking, flush with the ends of the deck planks. This will keep the deck ends even, reduce warping and reduce the chance of you accidentally running a wheeled vehicle off the edge.

12 Grade the approaches to the bridge to offer a smooth transition from the ground to the end of the decking. Use crushed rock rather than soil if you need to raise the elevation more than a couple of inches.

Materials Shopping List

Hardware & Supplies

- Galvanized 10-penny nails
- Galvanized or otherwise treated deck screws at least 3 in long
- Galvanized or otherwise treated deck screws 2¾ in long (for curb attachment)
- Hot-dip galvanized ½-in x 8-in lag bolts
- Metal hangers and brackets
- Concrete and forms (8-in diameter minimum), if pouring the footers

Lumber

- All wood should be ground-contact treated dimensional lumber
- 4 – 8-in diameter posts, 4-ft minimum (do not need if pouring concrete footers)
- 8 – 2 X 10 X 12
- 9 – 2 X 6 X 14 (Cut into 25 4' deck boards plus the bottom support in Step. 9)
- 2 – 2 X 4 X 12

Dimensions

- 4-foot-wide by 12-foot-long span
- 1,000-pound live load

Building a bridge is a big project that takes some time and commitment, but construction will go faster with the help of a **Massey Ferguson® 2700E Series utility tractor**. Equip it with a loader for hauling material and/or a PTO-powered posthole digger and you'll be done in no time. Add a rear blade to help level where your bridge's ends land.

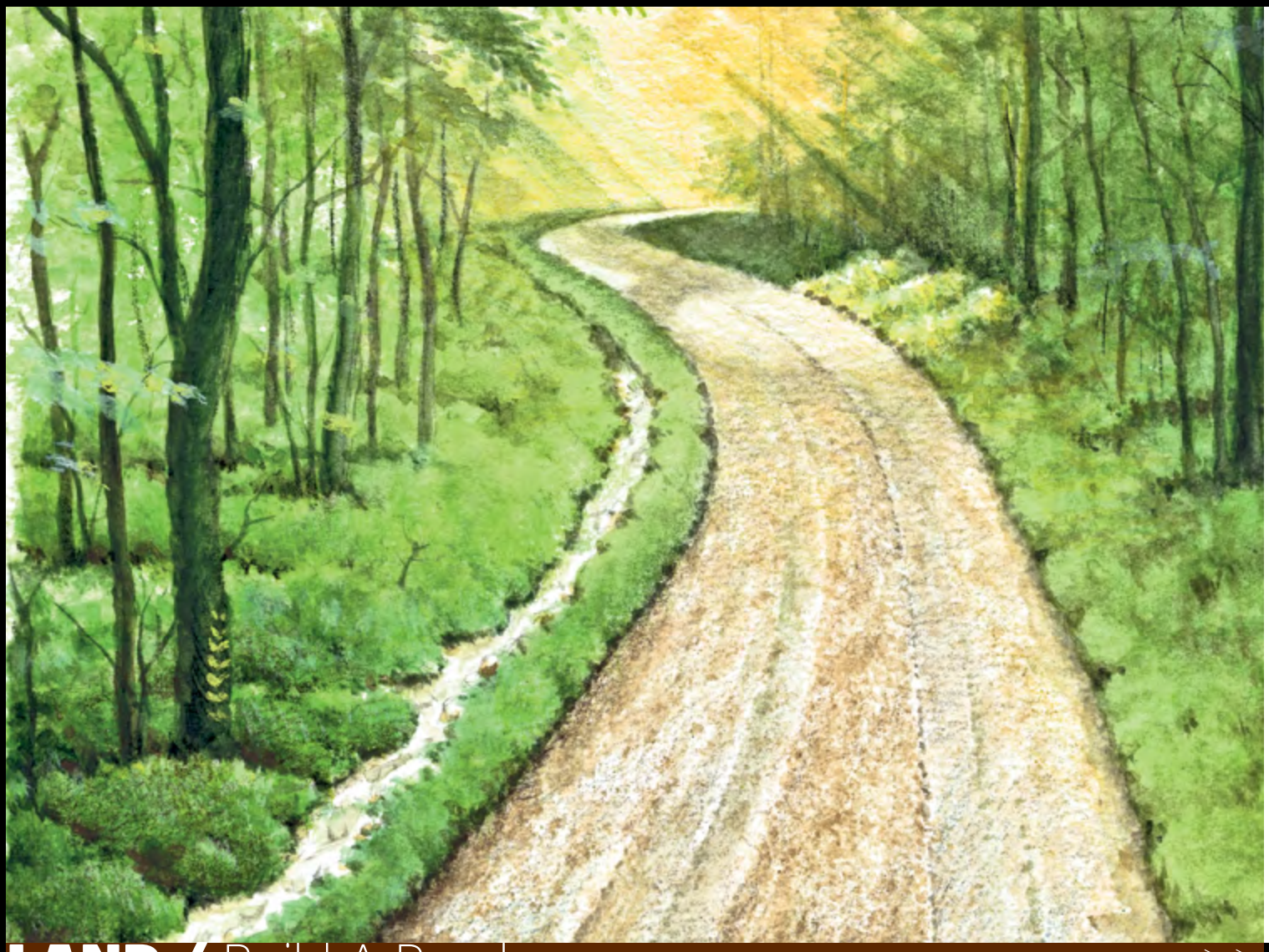
Model	Emissions Level	Rated Engine HP	PTO HP	Transmission	Rear Lift Capacity @ 24" behind lbs (kg)	Weight lbs (kg)
2750E	Tier 4 Final	48.8 @ 2600 rpm	41.4 Gear, 39.0 HST	8x8 Synchro Shuttle or 3-Range HST	2,425 (1,100)	Gear: 3,836 (1,740) HST: 3,880 (1,760)
2760E	Tier 4 Final	57.3 @ 2600 rpm	48.7 Gear, 45.9 HST	8x8 Synchro Shuttle or 3-Range HST	2,425 (1,100)	Gear: 3,847 (1,745) HST: 3,891 (1,765)

2

Build A Farm Road

Use your tractor with a couple of attachments to convert that muddy seasonal trail into a hardy, year-round road.

BY KAREN KEB WILL



Whether it's the main driveway to your home place or that trail from the hay yard to the feeding pens, with relatively minimal effort you can ensure those passageways will be reliable in all seasons. Entire libraries have been written on building roads, but with a little know-how, some common sense, and a few tools, you can build and maintain quality farm roads.

Siting

Ideally, you'll want your road to avoid serious lows, so when mapping its path, follow a natural ridge if possible. In most cases, however, you'll end up with an occasional low-ground crossing.

Even if you're crossing relatively flat ground, plan to build your road at least several inches above the surrounding soil to prevent it from becoming soggy and soft.

Build It

Once you have the roadway mapped out, equip your tractor with a loader and box blade to scrape away the vegetation and several inches of topsoil along the route. Stockpile that topsoil for other uses around the farm.

Create a shallow ditch on either side of the road, which will help convey water from the road surface during heavy downpours. Use your tractor with the box blade or a heavy-duty angle blade to grade the ditches smooth and to shape the road itself. If your subsoil consists of clay and/or gravel, pull that material from the ditch onto the roadbed. On the other hand, if your soil is extremely sandy, you might need to truck in sufficient clay to serve as a binder.

Construct your road with a crowned ridge to force rainwater and snowmelt to drain into the ditch. Contour the road so that it slopes evenly at a rate of about a half-inch per foot from the center to both edges. For instance, if your road is 10 feet wide, the crown should be about 2 1/2 inches higher than the edges.

Install culverts.

Materials

Once you've completed the grading, cap it with an all-weather surface. Some of the best material for capping an unpaved lane is unwashed, crushed stone that's been screened to about 3/4 inch in size. This material includes both angular pieces of rock and plenty of rock dust, pit-run clay and other fine materials that in combination will pack together to form a tight, water- and frost-resistant layer. Source this material at your local gravel pit or rock quarry. The pit salesperson can help determine the volume of material you'll need if you know the length and width of your lane, and how thick you want your crushed-stone cap to be. Ground-up concrete roadway from which any metal has been removed also makes a good cap, but avoid weathered natural

stone (such as pea rock)—the rounded surfaces will prevent the material from packing into a solid surface.

If your road is relatively long, have the dump-truck driver spread the crushed stone in a thin layer along its centerline. If your lane is relatively short, have the driver dump the material in one convenient location. In either case, use your box blade or angle blade to pull it toward the edges for an even covering; use your rear blade to grade it smooth. Once your road is capped to your liking, drive your pickup truck back and forth along the road (choosing a slightly different path each time) to pack the stone in place.

Maintenance

Gravity, rapidly moving water and driving on your road work together to erode, create potholes, and push loose stone from the crown to the road's edges. To avoid major road failures, grade it routinely.

If the road was crowned properly, you'll just need to periodically pull the material that moved to the edges back toward the crown. With a 6-foot box blade, start out by straddling the edges of the drive and cutting down the side-ridge, dragging the loose material to the middle. Then score the surface with the teeth of the blade's scarifier to loosen about an inch of material, which can be used to fill in the potholes and restore the smooth surface of the drive with repeated passes.

A 4WD tractor won't tear up the surface by spinning the back wheels, but the platform is small and nimble enough to maneuver on the narrow drive. You can create an almost-perfect driveway in six or eight passes.

The **Massey Ferguson 1700M** Series is a perfect road-building and maintenance tractor. Couple it with a rear blade, loader and/or box blade for shaping and leveling the driveway. Or, it can be equipped with a backhoe for those times you need to install a culvert. You can even order any one of the six models with a cab for a warm, comfortable ride while clearing snow from the driveway this winter via an attached blade or snowblower.

Other Massey Ferguson tractors that will easily handle the job include: 1700E Series economy compact tractors, 2700E Series utility tractors, and 4700 Series utility tractors.

Model	Engine Gross HP (kW)	PTO HP (kW)	Engine	Transmission	Hydraulics	3-Point Hitch Lift Capacity lb (kg)
1735M	36.2 (27)	27.5 (20.5) Shuttle 26.4 (19.7) HST	Shibaura 1.7 L 3-cylinder diesel, Tier 4 Final	12 x 12 power shuttle	Open center system	2,535 (1,150)
1740M	40.0 (29.8)	31.2 (23.3) Shuttle 29.1 (21.7) HST	Shibaura 1.7 L 3-cylinder diesel, Tier 4 Final	12 x 12 power shuttle	Open center system	2,535 (1,150)
1750M	48.8 (36.4)	38.1 (28.4) Shuttle 36.2 (27.0) HST	Shibaura 2.2 L 4-cylinder diesel, Tier 4 Final	12 x 12 power shuttle	Open center system	3,086 (1,400)
1755M	53.9 (40.0)	41.3 (30.8) Shuttle 39.7 (29.6) HST	Shibaura 2.2 L 4-cylinder diesel, Tier 4 Final	12 x 12 power shuttle	Open center system	3,086 (1,400)
1760M	59.9 (44.7)	46.1 (34.4) Shuttle 44.4 (33.1) HST	Shibaura 2.2 L 4-cylinder diesel, Tier 4 Final	12 x 12 power shuttle	Open center system	3,086 (1,400)

3

Weld A Light-Duty Farm Gate

A plan to make a gate just the right size for your needs.

BY OSCAR H. WILL III

Let's face it, not all openings on the acreage match neatly with the standard gate widths available at the local farm store. And sometimes you just don't need to spend the money for a heavy-duty gate when a lighter-duty one will suffice.

While this plan is for a 3-foot-2-inch-tall gate for a 5-foot-wide opening, you can adapt the method to the size you need. One option for doing so is to simply measure your opening, reduce the width by about 6 inches to allow for hinges and hardware, and weld together a "pipe" gate frame to that specific dimension.

The following steps include using electric metallic tube (EMT) conduit for the frame and 2-by-4-inch welded wire mesh to fill the gaps. You could use another type of thin-walled steel tube if you have it readily available, and you can use virtually any mesh for fill.

These instructions assume some welding experience, but the project can be accomplished relatively easily with a small, 110-volt flux-cored wire-feed (0.03 wire) welder. If you don't have much experience welding thin-walled material, you should definitely practice before embarking on this project.

1 Cut two 54-inch-long pieces of the ¾-inch EMT from one 10-foot section, and cut three 37-inch pieces from the other. Save the scraps for other projects—like making your own hinges. (See link above for the homemade hinge plan. Note: Attach such hinges before you do Step 3 of this gate plan.)

2 Using the bench vise, flatten both ends of the three 37-inch-long pieces by inserting the last ¾ inch of each end between the vise's jaws and

crushing them flat. Take care that the flat ends are both in the same plane (parallel to each other).

3 Clamp one of the 54-inch pieces of EMT to your worktable. Position two of the 37-inch pieces at each end of the long piece so that the edge of their flat end lands on the centerline of the 54-inch piece. Using the square and measuring tape, position the 37-inch-long pieces of EMT so they are perpendicular to the 54-inch-long piece and parallel to each other, and then clamp them to the table.

4 Adjust the welder to the recommended settings for welding 18-gauge metal using electrode-negative polarity.

5 Position your fan to provide a gentle cross breeze, and open windows, garage doors, etc., to enhance ventilation. Do not place the fan in such a way that it draws the fumes toward you.

6 Gear up (respirator, helmet and gloves), and weld the flattened ends of the two 37-inch pieces of EMT to the 54-inch piece. Short bursts with good penetration will help prevent burn-through.

7 Clean the welded areas with the wire brush once the beads cool.

8 Flip the structure around, and position the non-welded ends of the 37-inch-long pieces of EMT on the centerline of the other 54-Inch-long piece, square everything up, clamp

and weld as before—cleaning the welds with the wire brush.

9 Position and clamp the third 37-inch-long piece of EMT centered between the other two, weld, then clean with the wire brush once cool.

10 Spray all of the cleaned welds with liquid galvanizing compound to slow the formation of rust.

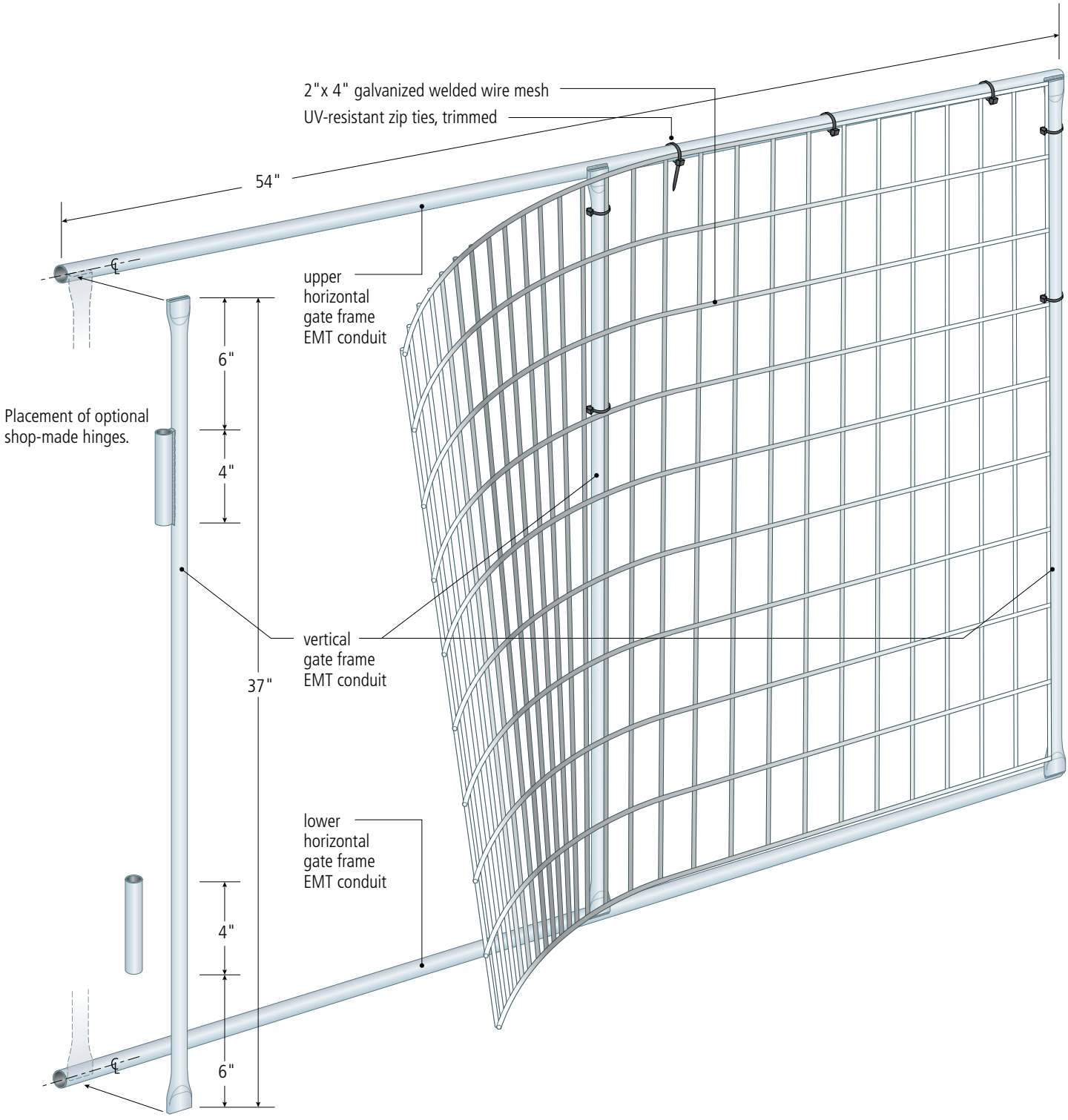
11 Position the gate frame on a flat surface weld-side up, and lay the welded wire mesh over the frame to cover the two large openings. Align the mesh on one end, then use wire cutters to cut excess mesh just flush with the other end of the frame.

12 Fasten the mesh to the outer frame tubing and the center upright, using evenly spaced zip ties.

13 Trim the ends of the zip ties with wire cutters.

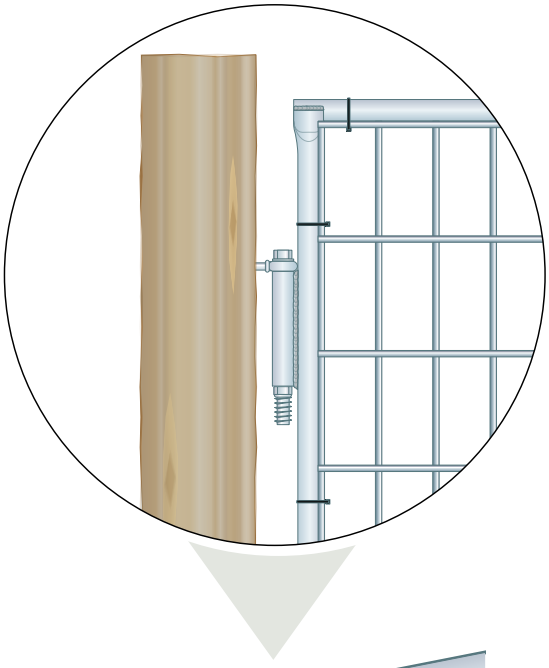
14 Install purchased hinges or hinges you make, hang the gate, and then install and adjust the latch of your choice. Tip: For a livestock pen, put the mesh side of the gate toward the (most) animals.

Gate Diagram



Materials

- 2 heavy-duty screw eyes, 5/8-inch (.625") interior diameter
- 2 ½-inch hex bolts, 4 to 5 inches long. Use 6-inch-long bolts if you want to secure bottom of hinges with a nut.
- 2 ½-inch nylon lock (nylock) hex nuts (optional)
- 2 4-inch pieces of ¾-inch electric metallic tube (EMT) cut from what is left over from the gate project



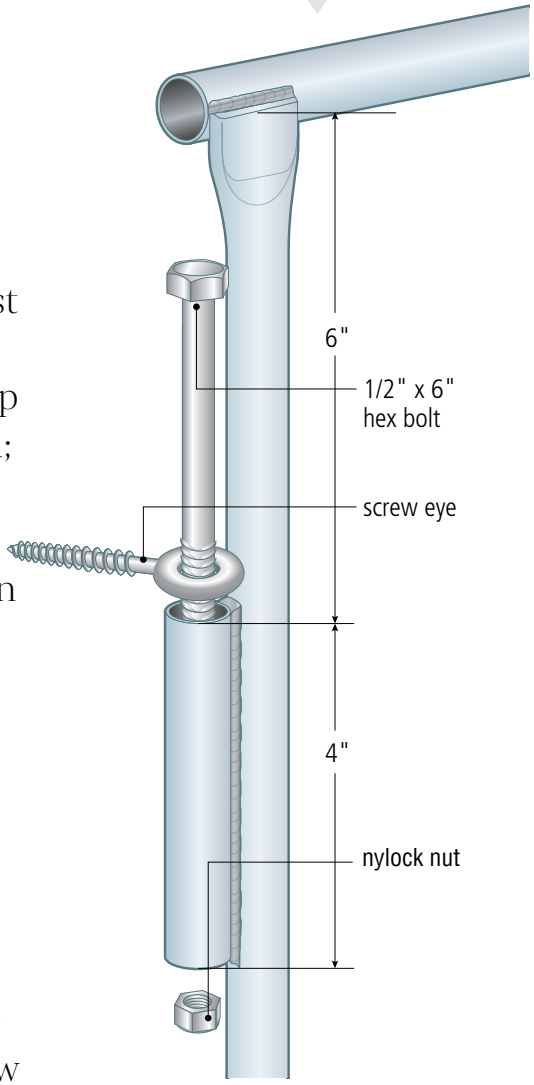
Steps To Make Hinges For The Gate

1 Cut two 4-inch pieces of leftover EMT.

2 Ideally before you weld the gate frame, clamp one of the 37-inch gate tubes to the work table. Align the two 4-inch hinge tubes against and parallel with the gate tube, positioned about 6 inches from each end of the 37-inch tube, and clamp to table. (You can do this after the gate is assembled; it's just more cumbersome.)

3 Weld both hinge tubes to the longer tube, then flip the assembly over to weld them from the other side. Once the beads cool, clean both sides of weld with wire brush.

4 Measure and mark screw-eye locations on the wooden fencepost where gate will hang so that so that the top eye is just above each hinge tube, if you're using bolts with nuts. If you plan to simply pin the hinges with a bolt (no nut) or other metal pin, mark the lower screw eye just below the lower hinge tube.



OPTIONAL
SHOP-MADE HINGE

5 Insert the screw eyes into the wooden fencepost, leaving eye opening facing the ground.

6 Place a ½-inch bolt (or your pin) through each of the eyes and into the hinge tubes, and you have hinges!

7 If you are using the 6-inch bolts, secure each one with a nylock nut below the bottom of the hinge tube. You can fasten the other end of the gate with a piece of chain, loop of heavy wire or other latch of your choice.

A **Massey Ferguson 1700E Series tractor** is the perfect fencing tool. A no-nonsense workhorse with up to 38.5 gross engine horsepower, the 1700E Series features a 4WD power train, and it can be fitted with any variety of fence-building tools, including a rear blade, loader, posthole digger or backhoe.

Model	Emissions Level	Rated Engine HP	PTO HP	Transmission	Rear Lift Capacity @ 24" behind lbs (kg)	Weight lbs (kg)
1735E	Tier 4 Final	34.1 @ 2,600 rpm	28.9 or 27.2	8x8 or 3-Range Hydrostatic	1,598	2,734 (Gear), 2,767 (HST)
1740E	Tier 4 Final	34.1 @ 2,600 rpm	32.6 or 30.8	8x8 or 3-Range Hydrostatic	1,598	2,756 (Gear), 2,789 (HST)

4

How To Build A Tomato House

Create a simple yet attractive home for your plants to help fend off winged and four-footed pests.

BY CHRIS HILL

Nothing is worse than spending hours upon hours slaving over a vegetable garden to discover your hard work has been consumed seemingly overnight by critters of flight or foot.

Healthy plants may be their own best defense against insects and disease, but they are deliciously attractive to rodents such as rabbits, squirrels, chipmunks and mice, as well as birds. Any Extension agent will tell you the best approach to handle this is to adopt integrated pest management (IPM).

Fighting Tiny Pests

IPM plans prevent pests by creating environments that are not only conducive to healthy and productive plants, but also by limiting situations that encourage pests. Familiar agricultural practices can be part of an IPM. For instance, by rotating crops, you remove a suitable food source for insects that hatched from eggs laid by last season's pests.

Most people know well the success of beneficial insects that kill or eat plant-devouring bugs. In certain situations, insecticides can also help if used sparingly. For smaller vegetable gardens, growers are encouraged to use organic options, such as soap sprays and plant-derived insecticides.

There also are benefits to growing companion plants. Grown in proximity to plants that are often the tasty targets of destructive pests, companion plants can often act as repellents. For example, marigolds discourage a wide variety of insects and nematodes near just about any vegetable. It's probably no coincidence that many folks choose to grow tomatoes near basil (which are, by the way, two ingredients in bruschetta), as the latter can ward off mosquitoes and flies.

Repelling Varmints

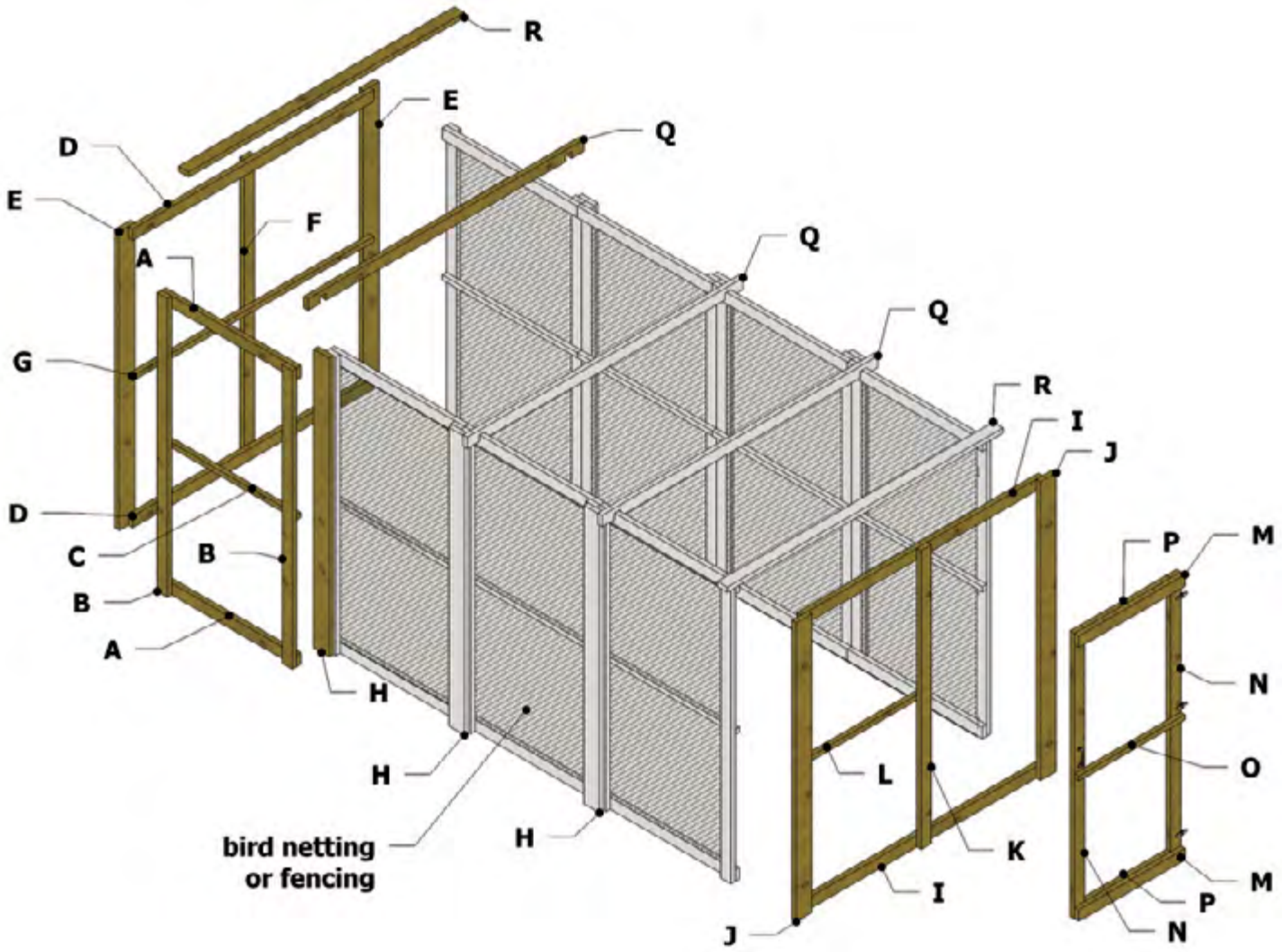
But back to larger pests. Traps are always an option, but they require attracting the varmints and direct contact with them. There are dozens of other tips and tricks—from placing human hair in the garden to tin pie plates and even red, round Christmas ornaments. Such methods are, however, hit and miss, and require the gardener to constantly monitor and maintain them. Yet, one surefire way of deterring pests is cutting them off from the source. That's where the following project comes in.

While we call it the tomato house, it can protect a variety of plants by creating an enclosure to discourage the vast majority of produce predators. Anyone who has happily gone out to the garden to pick a basket full of tomatoes and has been shocked by the signs of birds pecking away the fruit (mainly to obtain the water inside), can recognize this project's advantages. Same goes for lettuces that have been devoured by chipmunks or dug up by squirrels looking for buried nuts.

Building the House

Site selection and preparation are essential before beginning this project. A flat but well-drained spot that gets plenty of sunshine is ideal. You can either place your plants directly in the soil in the house area, create raised beds inside or add large pots.

By covering this structure—which is made from treated 2 x 2s, 2 x 4s, 2 x 6s and $2\frac{1}{2}$-inch deck screws—with bird netting or fencing, you create a barrier that keeps pests out but allows sunshine and rain in. A latched door allows you access to tend to the plants. It's designed to be modular, so you can create a smaller version if desired by simply eliminating some of the side sections.



Parts List

A Side Rails (1½ x 3½ x 47) – 16
B Side Posts (1½ x 3½ x 90) – 16
C Center Side Rails (1½ x 1½ x 47) – 8
D Back Rails (1½ x 3½ x 84) – 2
E Back Posts (1½ x 5½ x 90) – 2
F Center Back Post (1½ x 1½ x 84) – 1
G Center Back Rail (1½ x 3½ x 90) – 1
H Side Trim Posts (1½ x 5½ x 90) – 6
I Front Rails (1½ x 3½ x 84) – 2
J Front Posts (1½ x 5½ x 90) – 2
K Center Front Post (1½ x 3½ x 90) – 1
L Center Front Rail (1½ x 1½2 x 42) – 1
M Door Rails (1½ x 3½ x 37) – 2
N Door Stiles (1½ x 3½ x 86) – 2
O Center Door Rail (1½ x 1½ x 37) – 1
P Filler Strips (1½ x 3½ x 29⅞) – 2
Q Rafters (1½ x 3½ x 96) – 3
R Top Trim (1½ x 3½ x 96) – 2

Dimensions

Length: 191 inches
Width: 90½ inches
Height: 91½ inches

So Much More

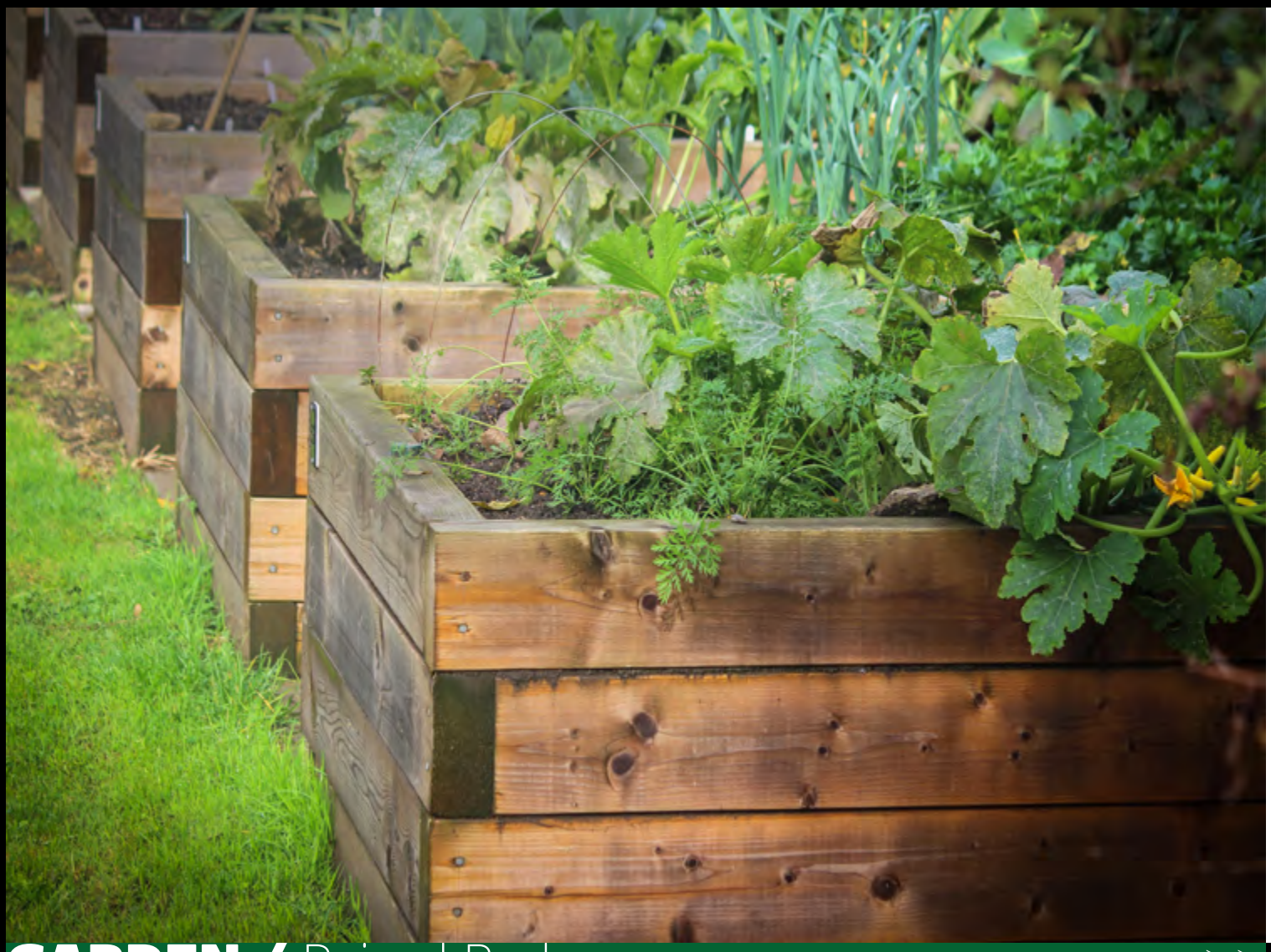
A full set of woodworking plans—7 full pages packed with every cut and step—is available at **myFarmLife.com/tomatohouse**.

5

How To Build Tall Raised Beds

Make gardening easier on your back and give roots more room to grow.

BY OSCAR H. WILL III



So you've heard or read about the advantages raised beds offer to organize and tend your garden, but why not raise them high enough to keep the aches and pains at bay? Some tall raised beds are set up on posts or legs, but we suggest that you build your containers right on the soil to avoid the need for a superstructure that could fail. Plus, your plants get to be in contact with native soil, and your deep-rooted vegetables won't get cramped roots!

You can build your beds about any size you wish. Our plan calls for roughly 3- x 5-foot dimensions with a depth of 30 inches, but feel free to modify based on the most efficient use of the material you source. We chose Douglas fir—untreated, since we're growing food—because it has fair rot resistance above-ground, is easily obtainable and relatively inexpensive. If a six- to seven-year lifespan is not sufficient for you, then you might opt for Western red cedar, which can last for as long as 10 to 15 years.

Materials for Each Bed

Untreated dimensional lumber (Douglas fir, Western red cedar or similar):

- Eight 2" x 8' x 5' (1.5' x 7.25' actual dimension)
- Eight 2" x 8" x 3'
- Four 2" x 4" x 3'

Hardware and Tools

- 5 pounds coated, exterior-grade deck screws, about 2.75 inches long, with either a square- or star-shaped drive
- Several corresponding bits for handheld drill
- One roll of 36-inch-wide hardware cloth
- Pneumatic or manual staple gun with staples
- Measuring tape and hammer

1 Using your tractor's loader and/or grader blade, create a level area for your bed(s). Leave at least 3 feet between the beds for pathways, and plan ahead so you can expand to more beds in the future.

2 Put your boards to the lengths indicated in the materials list or to suit your modification of this plan.

3 With a helper, stand two of the 3-foot lengths of 2 x 8 vertically, and place a 5-foot length of 2 x 8 across the top of them, aligning the ends. Using your drill, drive two screws through each end of the 5-foot 2 x 8 and into the end grain of the vertical 3-footers.

4 Carefully flip the structure over so it resembles a "U," and set another 5-foot 2 x 8 across the two vertical boards. You might need to rack or twist the structure slightly to get the ends to line up. Screw the 5-footer in place as above.

5 Carefully lay the rectangle down and square it up, measuring the distance diagonally from corner to corner in both directions. When the distance is the same, the rectangle is square.

6 Stand a 3-foot length of 2 x 4 in one of the corners of your rectangle so the long (4-inch nominal) dimension is flat against the 3-foot side and the edge is against the 5-foot side. Secure the 2 x 4 with at least three screws from the outside of the box into the edge of the 2 x 4 and three into the flat side of the 2 x 4, being sure to avoid existing screws!

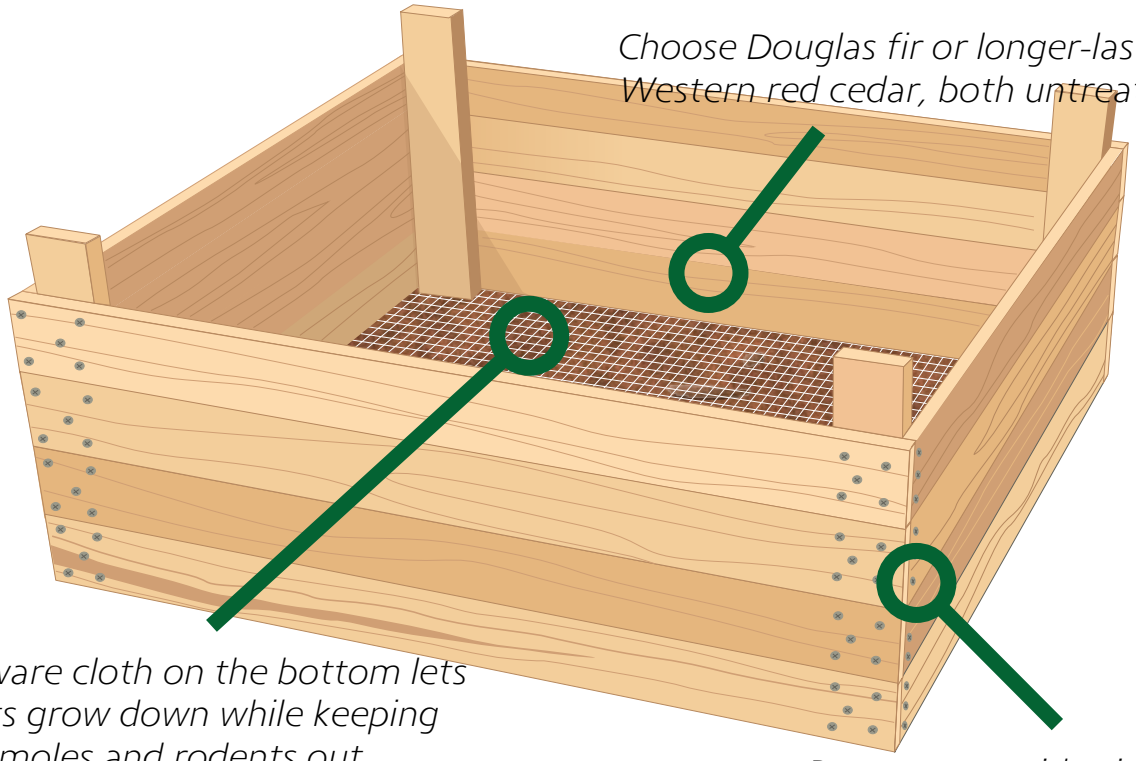
7 Repeat step 6 with the other three corners of the rectangle.

8 Repeat steps 3 and 4 to make a second rectangle, and carefully drop it over the exposed ends of the 2 x 4s, then screw into place. The 2 x 4 will help square up the second layer; don't be afraid to use a hammer to get it all to fit.

9 Repeat steps 3, 4 and 8 to create the remaining two layers of the box. You should now have a box with sides about 30 inches tall, an outside length of 5 feet and an outside width of about 39 inches (36 plus the thickness of the side boards times two). Use the remaining 2 x 4 extending above each corner as a support for trellises or row-cover frames, or to locate another rectangle layer of sides to make it taller.

10 Flip the box upside down and, using a pneumatic or manual staple gun, fasten the hardware cloth to the bottom of the box using two lengths of 36-inch-wide material about 39 inches long, overlapping the excess in the middle. The purpose of the hardware cloth is to keep moles and rodents from burrowing up into your raised bed from below, yet still allowing roots to grow down into the soil below.

11 Set the box, hardware cloth side down, in your garden, and fill to the top with your favorite compost or garden soil mix. Pure topsoil should be avoided. (We use 2-year-old compost.)



Choose Douglas fir or longer-lasting Western red cedar, both untreated.

Hardware cloth on the bottom lets roots grow down while keeping moles and rodents out.

Be sure to avoid existing screws when attaching the upright 2 x 4s.

You can haul materials or level off a spot for your garden projects with a **Massey Ferguson GC1700 Series** tractor and loader. Yet, you'll find 100-plus other uses for it too, like mowing the lawn, tilling a spot for the rest of the garden, smoothing out the driveway or moving snow in the winter.

Model	Rated Engine HP (kW)	Rated Engine RPM	PTO HP (kW)	Hydraulics GPM (LPM)	Rear Lift Capacity 24" Behind Pins lb (kg)	Max Loader Capacity lb (kg)
GC1723E	22.5 (16.8)	2600	18.3 (13.6)	6.3 (24.0)	661 (300)	870 (395)
GC1723EB (Backhoe Package)	22.5 (16.8)	2600	18.3 (13.6)	6.3 (24.0)	661 (300)	870 (395)
GC1725M	24.0 (17.9)	3000	18.5 (13.8)	6.9 (26.3)	661 (300)	870 (395)
GC1725MB (Backhoe Package)	24.0 (17.9)	3000	18.5 (13.8)	6.9 (26.3)	661 (300)	870 (395)

6

Best Tips For Restoring A Pasture

You need the right process—and the right equipment—to get your pastures in shape, especially if they're new or neglected. Here's how to do it.

BY OSCAR H. WILL III

Spring is a great time to think about preparing for your perennial pasture improvement plans. In most cases, you don't want to completely kill the existing plant matrix, as you can get positive change without starting over.

Before starting, it's good to know what your desired outcomes are: Do you wish to add more legumes or wild flowers to help attract beneficial insects? Do you want to revitalize a flagging cool-season pasture with more heat-tolerant grasses?

This is possible, and much more, when adding a pasture-improvement strategy to your grazing strategy.

The process of pasture improvement can be divided into four steps: assess, prepare, seed and manage. Our assumption with this project is that you are working toward maximum plant species diversity with your pasture, and that you have access to the proper equipment for the job.

Assess Your Pasture

Walk your pastures and note perceived problems with weeds, sparsely populated areas, wet or dry areas, and come up with a plan for improvement. This is best accomplished with research, and by consulting with your local agronomists and/or Extension agents. Let them know what your goals are. Be persistent, and if the local experts are unfamiliar with your goals, find others who are.

Pull soil samples from problem areas as well as productive areas of the pasture and have them analyzed for macro and micro nutrients. It's more expensive, but can be quite useful when considering mineral supplement needs for your livestock. Fertility and pH issues will need to be solved with your target goals in mind. Inputs should be applied as recommended by the soil tests, while taking your goals into account. Save money by only applying the needed supplements in the areas that most need them.

Prepare Your Pasture

It's good to graze a pasture hard going into winter, to the point of overgrazing, particularly in areas where you want to elicit the most change. This may require an infrastructure investment; electric fencing is a good partner. If you haven't grazed down the pasture, mow it close with a rotary cutter. You want to set back the perennial matrix and open up the bare soil so that it can better receive seed.

Apply any recommended lime, but not fertilizer, to avoid loss over winter and to give the existing vegetation a head start come spring.

In many cases, this is all the preparation that you need to accomplish before seeding, especially if you plan to employ frost seeding as your planting strategy (see more below about frost seeding). If frost seeding is not a likely strategy for your area, then you can lightly till with a disc harrow with the disc gangs set to almost straight, or you can use a forward-rotation rotary tiller set to about an eighth of an inch or so. Don't try making a clean seedbed with it, you just want to scratch up some soil. Tillage should be carried out as close to the seeding window as possible to avoid erosion.

The Woods Precision Super Seeder can help with seed-to-soil contact.

Seed Your Pasture

Seed application can be accomplished with either a precision seeder, a 3-point broadcast seeder or pull-behind drop spreader. The Woods Precision Super Seeder will work well in existing sod as well as on bare ground, and it includes a rear roller to handle pressing the seed into contact with the soil. You will use less seed with the Precision Super Seeder, and should get better germination compared with other methods.

If broadcasting, apply half the seed in one direction and the other half perpendicular to the first to minimize skips. Once the seed is spread, however, you need to get it into firm contact with the soil for best results.

Frost seeding is the least labor intensive broadcast seeding method. In the north, where late winter and early spring offer a good period of freeze, thaw cycles you can let that process draw the seed into contact with the soil or even bury it in the little cracks that the cycle creates. You will want to time seeding to coincide with the temperature cycles for your area. Frost seeding is not typically used with tillage, and can yield very good germination.

If you employed some form of tillage ahead of spreading seed, and even if you simply spread seed on non-tilled ground, you will increase germination by pressing the seed into firm soil contact. You can accomplish this very effectively by pulling a culti-packer over the seeded areas; choose a model that is suited to your tractor's capacities. Alternatively, you can fence the planted areas and feed the last of the season's hay to your herd in the area. The hoof action of sheep, goats and cattle will do a great packing job.

Manage Your Pasture

Getting good seed placement and optimal seed-to-soil contact will go a long way toward improving your existing pasture matrix. However, you can bring it along further and faster with careful management. Assuming you receive timely rains, the seed should germinate well and the seedlings should become established.

Once established, you can apply the fertilizer that was recommended by your soil tests. As the less desirable plants begin to grow and compete with the newly planted seedlings, you can put them at a disadvantage by cutting the pasture to slightly taller than the new seedlings. Alternatively, you can "flash-graze" the paddock by employing a large herd for a relatively short period. Flash grazing can significantly set back the larger and better established vegetation and favor the smaller seedlings. You will want to monitor the forage carefully to ensure that the new seedlings aren't being grazed preferentially and you will want to be ready to move the herd to a new paddock quickly. Through the first season, you can continue to help the newly planted forages by repeating the cycle.

Monitor your improved pasture as you might normally and understand that getting to the ultimate end goal might take a couple of seasons. The advantage to this approach is that you can still run a lot of forage through your animals in that first season and use them to help the process, in addition to timed mowing and additional smaller seed applications to reach the pasture matrix that delivers on the goals you set out to achieve.

A **Massey Ferguson 4700 Series tractor** gives you the power to handle any pasture application, from planting to mowing.

Model	Max Engine Power HP (kW) @2,000 RPM	Rated Engine Power HP (kW) @ Rated RPM	Engine	Transmission
4707	75 (55.9)	57 (42.5) @ 2,200 RPM 63 (46.9) @ 2,000 RPM	AGCO Power™ 3-cyl, 3.3 L, inter-cooled turbo-charged, high-pressure common rail direct fuel injection (HPCR)	Deluxe 4707: 12F X 12R, 2 range, power-shuttle, electro-hydraulic shuttle lever
4708	85 (63.4)	67 (49.9) @ 2,200 RPM 73 (54.4) @ 2,000 RPM	AGCO Power™ 3-cyl, 3.3 L, inter-cooled turbo-charged, high-pressure common rail direct fuel injection (HPCR)	Deluxe 4708: 12F x 12R, 2 range, Power-Shuttle, electro-hydraulic shuttle lever
4709	95 (70.8)	77 (57.4) @ 2,200 RPM 81 (60.4) @ 2,000 RPM	AGCO Power™ 3-cyl, 3.3 L, inter-cooled turbo-charged, high-pressure common rail direct fuel injection (HPCR)	Deluxe 4709: 12F x 12R, 2 range, Power-Shuttle, electro-hydraulic shuttle lever
4710	100 (74.6)	88 (65.6) @ 2,200 RPM 88 (65.6) @ 2,000 RPM	AGCO Power™ 3-cyl, 3.3 L, inter-cooled turbo-charged, high-pressure common rail direct fuel injection (HPCR)	Deluxe 4710: 12F x 12R, 2 range, Power-Shuttle, electro-hydraulic shuttle lever

7

Water In Winter

A frost-free fount eliminates chopping ice to water livestock when ponds, hoses and troughs are frozen.

BY OSCAR H. WILL III

There are few winter chores more miserable than chopping ice so your livestock can drink. Even when you use a tank rather than a pond, you still have to manage hoses and have a frost-free water hydrant nearby. That means connecting, disconnecting and draining hoses to keep both the hose and the hydrant from freezing up.

There is a better way that is likely worth the investment if you water livestock through the winter in freezing conditions. When the ground isn't frozen, consider installing a frost-free water fount, also called a frost-free stock waterer. Installation details will be specific to your particular model, but in general you can use the following steps, modifying as needed if you choose a non-electric, frost-free fount model.

Stock Waterer Installation Steps

1 Survey your winter stock facilities, and determine where best to install the waterer.

2 Call 811 to locate all utilities in the vicinity as you will need to run both electricity and water to the fount location. Consult your own private water and power maps to find the most convenient place to tap into those services and to be sure you're not damaging any existing lines.

3 Map out the route for your new water line and power line. We recommend burying the power and water lines; check local codes to determine how the electric line needs to be located relative to the buried water line. Resist the temptation to place them in the same trench unless your code specifically allows it. Hire an electrician if you have any doubts.

4 Using your tractor-mounted backhoe, dig separate trenches for the water and electric lines from their connections to the location of the new fount. Dig the water trench 4 feet deep or 1 foot below frost-line depth—whichever is deeper.

5 Install the water line and electric cable in their respective trenches, leaving enough extra length at each end to make the final connections.

6 Where the water line will come up to the surface (beneath the fount), run it up, centered inside a piece of 4-inch-or-larger-diameter PVC pipe; or better, choose an insulated tube designed specifically for this purpose from your fount's manufacturer. Don't add any insulating material in the tube (meaning pipe or manufacturer's tube). Allow the tube and water line to extend from the bottom of the trench to about 10 inches above grade.

7 Drive a copper-clad steel ground rod next to the tube, leaving the rod top about 10 inches above grade. Bring the electric cable up against the outside of the tube in a similar fashion. Backfill the area around these installations to grade.

8 Using the recommendation of your fount's manufacturer, stake and build a concrete form using dimensional lumber around the perimeter of the fount's installation site. The form will shape the concrete pad that will support and anchor the fount. Plan on about 8 inches total concrete thickness for the pad and about 2 feet of extension on all sides of the fount. Be sure to level the form.

9 Calculate the approximate cubic feet of concrete you will need by multiplying the length and width (in feet) by the average depth (convert inches to feet by dividing by 12). If your pad is 4 feet x 3 feet x 8 inches (0.75 feet), you will need roughly 9 cubic feet, or one-third of a cubic yard. For jobs this small, you would be better off mixing your own bagged material than calling a concrete service. If your installation requires a cubic yard (27 cubic feet) or more of concrete, explore having it delivered. If you choose delivery, be sure to have everything ready before the truck arrives, including a means to get the concrete to your pad location if the truck cannot drive up to that spot.

10 Pour the concrete into the form, smooth with a board, and work with a trowel to get a reasonably smooth and level surface across the pad and around the installed tube, ground rod and electric cable in the center. Brush or otherwise make rough the surfaces that will be exposed after installation to help livestock with traction. Allow the concrete to cure. Protect from rain, but keep moist in hot weather until cured.

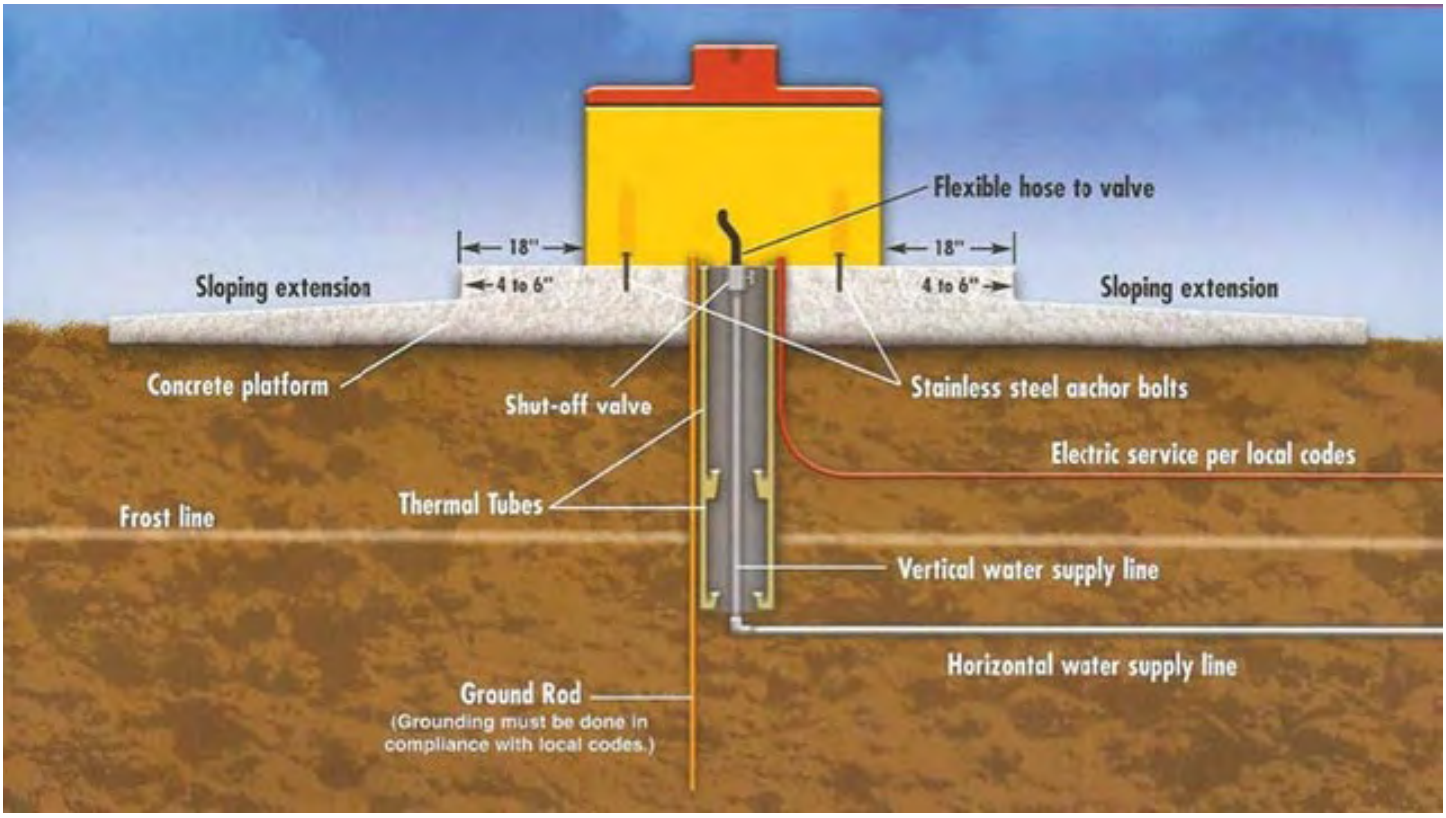
11 Trim the tube as recommended by the fount manufacturer; trim the ground rod if needed; trim the water line, and install a shutoff valve at its end.

12 Using appropriate stainless-steel anchors, install the fount on the concrete pad using the manufacturer's instructions. Connect the water and electric lines, electric ground (call an electrician if you have any doubts) and backfill to the edges of the pad with crushed rock or other packable material to keep the area from becoming muddy and to offer the animals firm footing.

13 Connect the water line to its source, and backfill the trench.

14 Connect the electric line to its source with an easily accessible shutoff switch, and backfill the trench.

15 Adjust the fount's water level, and confirm the heat source works. You can turn off the electricity during warmer months.



A **BH322** backhoe paired with a 1700E Series tractor will help you dig where needed for the frost-free hydrant. Bucket widths of 9", 12", and 16" give you options for any other job on the farm.

8

Build A Movable Pond Dock

Hitch up your tractor to put this portable dock in your favorite spot.

BY OSCAR H. WILL III

Enjoying your ponds from the shore is great, but using a dock for swimming, fishing or even just relaxing adds to the fun. If you're going to build a dock, why not make it one you can move to different spots around the pond and even from pond to pond? These plans for a 12- by 4-foot dock will get you out over the water about 10 feet from shore. It features a hitch so you easily can pull it with your tractor when relocating it or storing it for winter.

In general, for this project, you will need treated (or cedar) dimensional lumber and deck boards, fasteners, steel bar, a dock stanchion kit and a dock wheel kit (both offered at roll-in-docks.com).

Materials

- One deck stanchion kit, for 4-foot-wide dock, with legs to fit the depth you need
- One dock wheel kit, for 4-foot-wide dock
- Treated or cedar dimensional lumber
- **4** 2" x 8" x 12'
- **1** 2" x 8" x 8'
- Pressure-treated decking boards
- **13** 5/4" x 6" x 8'
- Steel bar: Approximately 6 feet of 2" x ¼" mild steel bar, cut into two 2-foot pieces and a third piece cut to measure while building hitch (at least 15 inches)
- Optional
- **3** steel fence T-posts
- Hardware and tools:
- **24** 3-inch coated deck screws
- **208** 2-inch coated deck screws
- **6** 3/8-inch lag bolts, 3 inches long
- **2** 3/8-inch bolts, 1½ inches long with flat washers and lock nuts
- Drill bits, wrench for lag bolts
- Hitch pin with lynch pin or clip

1 Measure the water depth at a distance that is about 10 feet from the bank. This will help you determine how long your dock's legs need to be.

2 Order one stanchion kit for a 4-foot-wide dock with legs at least 2 feet longer than the depth measured above. Order a 4-foot-wide dock wheel kit.

3 On a smooth and flat surface, lay out in parallel (on edge) two 12-foot lengths of 2 x 8 pressure-treated board.

4 Cut two 2 x 8 pressure-treated boards to 45-inch lengths from one 2 x 8 x 8, and insert them on edge between the ends of the 12-foot boards. Fasten the 12-foot boards to the 45-inch boards with three 3-inch coated deck screws at each corner to make a rectangle, drilling pilot holes first.

5 From two 2 x 8 x 12 treated boards, cut two boards 141 inches long each. Measuring diagonally from corner to corner, square up the rectangle you made in the last step, and insert the 141-inch boards between the ends of the rectangle to make longitudinal stringers. Position the board ends centered at 15 inches from the inside of each edge board. Fasten to the end boards with three 3-inch coated deck screws.

6 Cut 13 treated 5/4 x 6 x 8 decking boards into 26, 48-inch lengths. Starting at one end of the rectangle, screw them to the top of the dock frame using eight 2-inch coated deck screws per board—two screws going down into the edges of each of the four longitudinal boards. At each end of the dock, be sure the last row of screws goes into the 45-inch end pieces to secure the frame.

7 Flip the assembly upside down.

8 Assemble your stanchion kit. Most kits include a pair of stanchions that will bolt to the outer longitudinal dock members and then also connect beneath the dock frame with a cross piece. The stanchions will support the dock legs. Attach the assembly to the dock, centered width-wise, 10 feet from one end of the dock.

9 Fabricate a hitch to make it easy to attach your rolling dock to the tractor's drawbar. To do so, cut two 2-foot-long pieces of 2-inch-wide by 1/4-inch-thick mild steel bar. Bore three 3/8-inch holes centered at 2 inches, 6 inches and 10 inches from one end of each bar. At the other end of each bar, bore a 3/8-inch hole centered at 2 inches from the end. Using a marker, draw a line across the bars 10 inches from the end that has the single 3/8-inch hole.

10 Use a 15/32-inch diameter bit to drill pilot holes into the bottom of the 141-inch longitudinal boards (the center two stringers). Install the bars onto the bottom of these boards with three 3/8-inch lag bolts that are 3 inches long. Position the bars so that the lines you drew on them are even with the outer end of the dock, where the hitch will be located. These bars—the hitch supports—will support the hitch's crossmember.

11 Measure from outside to outside edge at the outer ends of the two hitch supports, and cut another piece of 2-inch-wide by 1/4-inch-thick steel bar to form the hitch's crossmember.

12 Position the crossmember bar beneath the holes in the hitch supports (top side when dock is right-side up), and mark the hole locations for boring. Drill 3/8-inch holes in the crossmember, centered at your marks, and then bore a 5/8- to 3/4-inch hole centered between the ends for the hitch pin. (Start with a smaller hole and enlarge.)

13 Position the crossmember on top of the hitch supports (bottom side when the dock is right-side up) and flush with the ends of the supports, and bolt it on using two 3/8-inch bolts, 1 1/2 inches long, with flat washers and self-locking nuts.

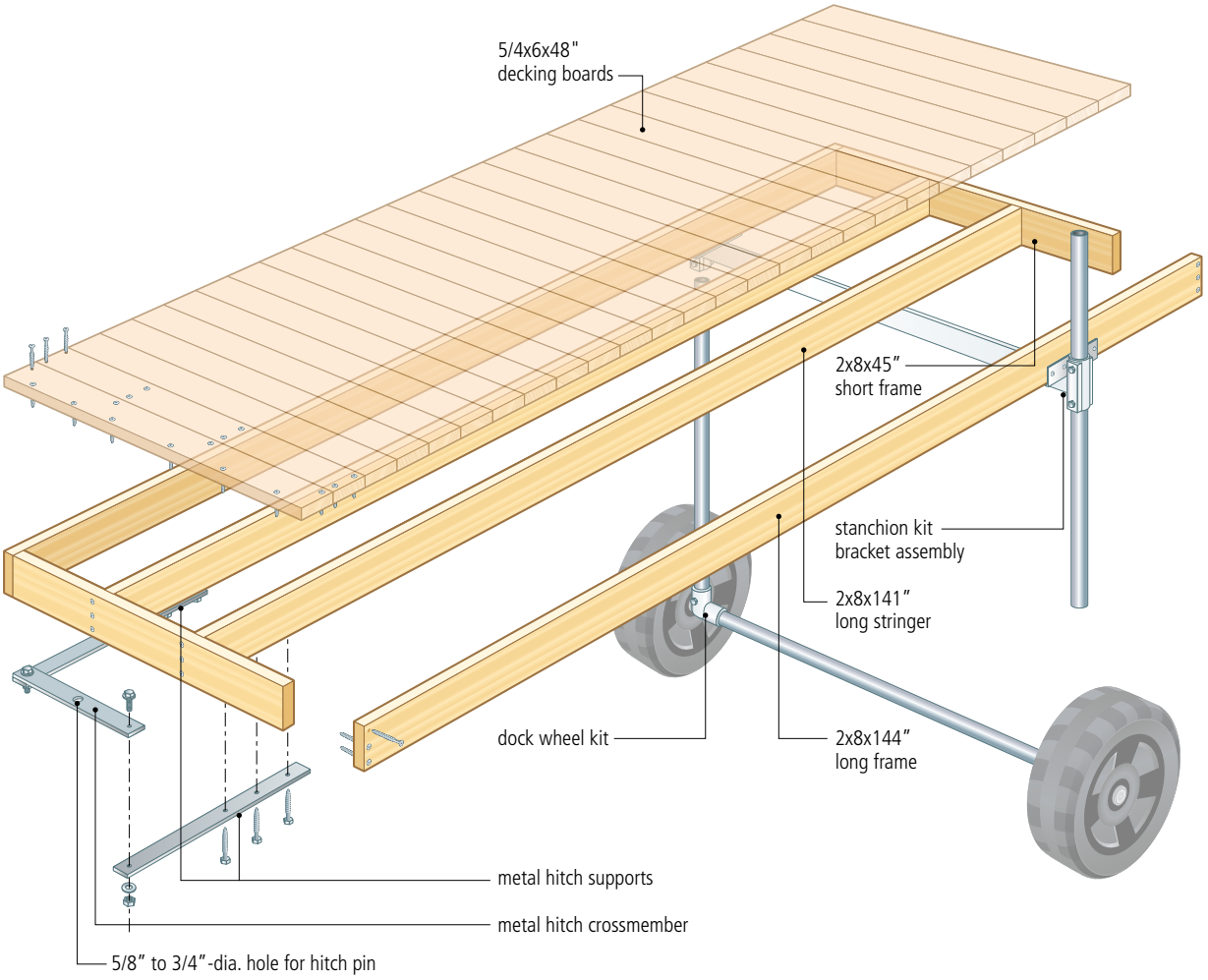
14 Insert the legs into the stanchion, and secure them per the kit instructions. Assemble your wheel kit, and bolt it to the bottom of the dock's legs per the instructions supplied by the manufacturer.

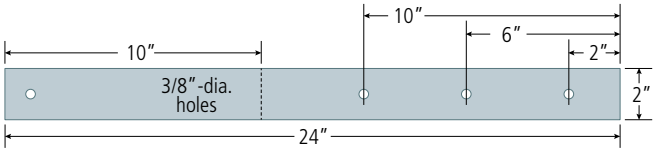
15 Flip the assembly right-side up. Attach the dock to your tractor's drawbar with a suitable hitch pin secured with a linchpin or clip. Tow the dock to the pond, backing it slowly into the water. Stop at the point where at least 2 feet of the dock is still resting on land, and unhitch it.

16 Secure the dock by driving a stake or steel fence T-post between the hitch's crossmember and the dock. Adjust the dock leg heights as directed by the stanchion manufacturer.

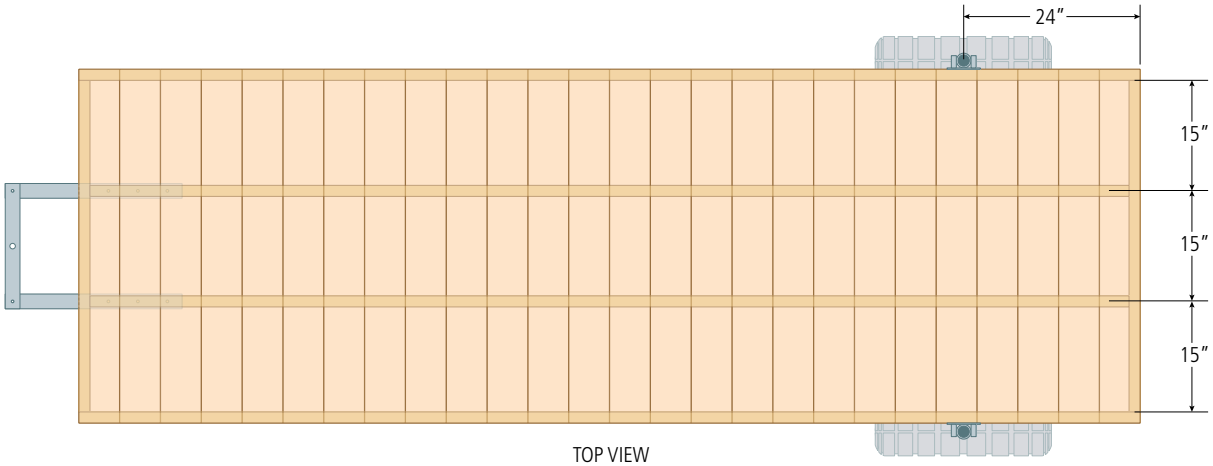
17 If your dock is subject to conditions such as high winds, drive a T-post right next to each side of the dock, about 2 feet from the hitch end, to brace against lateral movement.

Dock Diagram





HITCH SUPPORT DETAILS



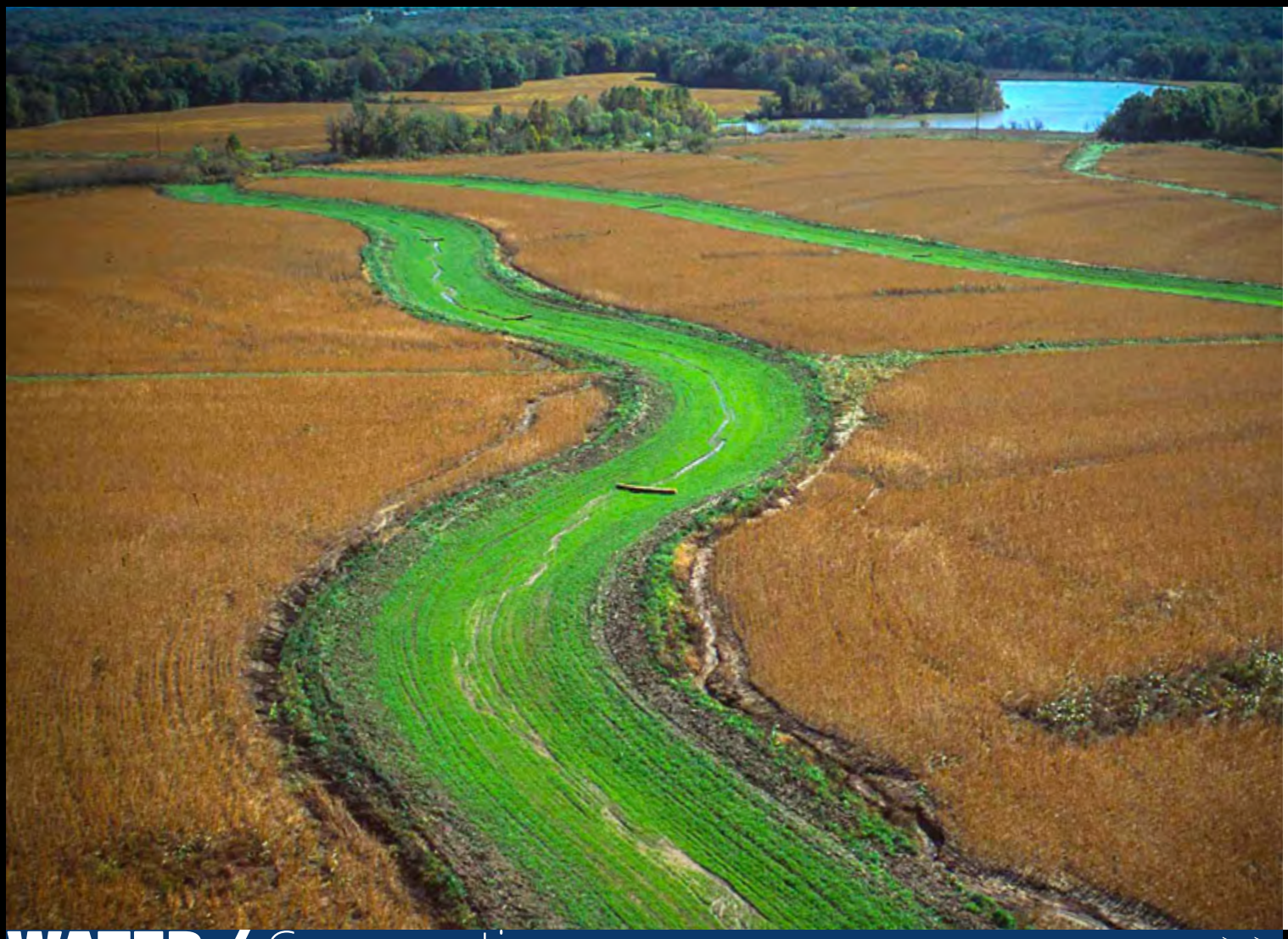
TOP VIEW

9

Working With Waterways

Grassy waterways are a great conservation practice to keep soil and nutrients from leaving your place.

BY OSCAR H. WILL III



Grassy waterways and swales can direct water flow while preventing, or at least minimizing, soil erosion on your property. With proper design, seeding and maintenance, waterways slow and spread the flow of water so that soil particles will settle out on your land instead of in some distant river delta.

Here's how to plant and maintain a new waterway on earthworks that direct rainwater into a pond or wetland and/or carry cropland runoff into a natural drainage area. Once you have engineers design waterways for your place and the heavy equipment has left, you can plant and maintain those earth structures yourself with know-how and a few tools.

Planting

1 After your earthmoving company has finished grading—to the USDA's specifications if for a grassed waterway on land in the Conservation Reserve Program (CRP)—you can do a final smoothing of the waterway, using your tractor and rear blade to blend any accidental ridges or dips in the soil surface left by the larger equipment.

2 Ask your county Extension or other local expert for advice on what perennial seed mix makes the most sense to plant on your new waterway. Include a fast-germinating nurse crop, if recommended. If your waterway project is part of an official USDA program, its guidelines will likely make many of the decisions for you.

3 Pull a few soil samples from various locations in the waterway, and have them tested through your county Extension office. Your test results should include a recommendation on needed amendments to ensure that the seed mix you plant can thrive.

4 Apply the amendments using a rented broadcast-spreader buggy from your local elevator; or if your area is small enough, you can use a 3-point mounted broadcast spreader on your tractor. If amendment incorporation is recommended, a light disking or shallow rotary tilling should suffice.

5 Rent or borrow a solid-stand seeder sized appropriately for your tractor. Make sure it has the needed seedboxes for legumes and native grasses, should they be included in your seed mix. Apply the seed to the waterway. With well-timed rains, your seed should sprout rapidly and begin to form a protective cover for the soil.

6 In the first year, control weeds by mowing when they begin to flower. Set the mower to the highest level to cut weeds while staying above the planted vegetation. (Note: Once the grass is fully established, mowing and other maintenance is not allowed on CRP grassed waterways in the United States between April 1 and Aug. 1 to protect ground-nesting wildlife.)

7 If your new waterway receives significant runoff and small areas of erosion occur, repair them by regrading and replanting. Spread straw or even place straw bales in the areas of highest flow to slow it down during the establishment year.

Maintenance

1 Control weeds and trees in your waterway with mowing or judicious spraying. Remember that chemicals in runoff may cause damage to downstream waterways. If you hay your waterway, take a single cutting (if allowed by your USDA contract), and focus on maintaining a good stand of soil-holding plants first and foremost.

2 Repair bare or thin areas using a no-till drill designed for interseeding into established pastures and meadows, and treat those areas as you would a newly established waterway.

3 If your waterway is not just part of an erosion repair practice in a perennial pasture or hay meadow, pay close attention to the interface between cropland and the waterway. Even with minimal tillage in the field, over time, a ridge can form where the cropland and the waterway meet. This ridge will divert runoff from the cropland along the interface with the waterway, defeating its purpose. Likewise, if your waterway includes stoloniferous grasses (having horizontal, above-ground, creeping stems with roots and shoots), it will tend to creep into the cropland, thus shrinking tillable acreage. Maintain the cropland/waterway interface with careful tillage and grading using your tractor's tiller or disc and the rear blade.

4 Even with the best waterways, rare rain events can cause some of the vegetation to wash out, leaving eroded passages in the waterway. Those washouts are best repaired quickly by moving soil back into place or obtaining new soil to fill them. Then replant and protect the seeding with straw bales to give the new fill time to settle and the new plants time to get established.

These instructions assume a small, grassy waterway. As scale increases, so too must the size of the equipment in order to be efficient. To establish and maintain a small waterway, you will need the following equipment:

- utility or larger tractor
- rear-blade attachment
- broadcast spreader
- rotary tiller or disc
- solid-stand seeder
- rotary cutter or hay mower
- no-till drill for interseeding

Designed with the larger landowner in mind, the **Massey Ferguson 5700S Series** is ideal for loader work, mowing, hay production or any other job you can throw at it, including pond and waterway maintenance. Whether you just need to mow around the pond, haul brush to be used by fish as cover or repair the dam, a 5700S tractor can handle the job. These durable tractors have just the right mix of innovation, technology and comfort.

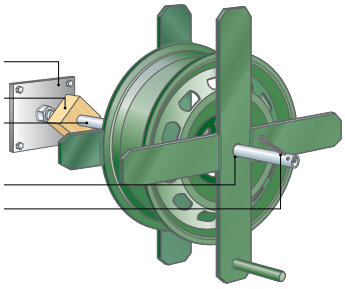
Model	Max Engine Power HP	PTO HP	Hydraulic Flow (GPM)	Max Gross Weight (lbs.)
5711S	110	85	29	18,700
5712S	120	95	29	18,700
5713S	130	105	29	18,700

Bonus

Build a DIY Hose Or Cable Reel

Corral power cords and shop hoses on reels you make yourself from wheel rims.

BY OSCAR H. WILL III



Looking for a rotating version of the reel? Visit **myFarmLife.com/rotate** for complete plans.

Few things can tangle up your day's work as much as unruly power cords and pneumatic or liquid-transfer hoses. While you can purchase reels designed to help settle the snarls, they can be expensive.

So rather than spending your hard-earned cash on a new reel, take a walk to your junk pile and grab an old steel wheel rim from a truck or implement and some scrap steel. Or you can source the rim at a local salvage yard and purchase a new or used steel plate for a fraction of what a new reel might cost. (Note: You could use aluminum for this project, but such material would require specialized equipment and training.)

Our plan below is for a simple fixed reel, mounted to a wooden post or column, with an extended cross to help keep the cord or hose on the reel. Once you get the hang of creating these reels, you can locate them wherever you have hose or cord congestion. Plus, you can modify the design to bolt it onto a compressor cart and even convert to a rotating reel if you wish.

Tools, Welding Equipment and Supplies

- Welding helmet
- Welding gloves
- Metal inert gas (MIG), wire-feed or stick welder

- Sufficient welding wire or rod to complete about 30 inches of weld. Choose 0.030 to 0.035 ER70S-6 wire for MIG; 0.030 to 0.035 flux core wire for wire feed without gas; E3/32-inch E6013 rod for stick. Tip: For best results with MIG, clean the metal thoroughly. If there is some paint and rust left on the metal, choose flux core wire feed or stick.
- Means to cut steel bar or plate: plasma cutter, hacksaw, oxy-acetylene cutting torch, abrasive cutoff saw, small angle grinder with cutting wheel etc.
- Means to smooth metal and ready it for welding: Bench and/or hand-held power grinder(s) with abrasive flap wheels, wire wheels, medium-grit stone wheels.
- Bench vise
- Drill press, hand-held corded drill or heavy-duty cordless drill; assorted bits
- Assorted clamps
- Slag-chipping hammer and wire brush, if stick welding
- Measuring tape or ruler
- Assorted sockets capable of driving lag screws
- Paint brushes
- Solvent, compressed air or a cloth for cleaning

Materials

- Single-piece steel wheel rim that is 15-inches in diameter X 8 inches wide or wider (wider will offer you more hose or cord capacity)
- 84 linear inches of ¼-inch-thick by 4-inch-wide steel bar or plate. Improvise with scrap that you might have available
- Two ½-inch lag screws, 3 inches long
- Rust converter
- Rusty metal primer
- Rusty metal finish coat

1 Cut 4-inch wide steel bar into six pieces, two that are 23 inches long and four that are 9.5 inches long. Or cut the pieces individually out of larger pieces of plate.

2 Make 45-degree cuts on all four corners of the 23-inch long pieces. To do so, measure in 1 inch from each edge and make a mark; these are the legs of the right triangle formed by the corner. Connect those marks with a diagonal line and cut on that line.

3 Again, measuring 1 inch from the edge, make 45-degree cuts on the two corners, but at just one end of each of the 9.5-inch-long pieces.

4 Round all sharp edges with the bench grinder. To use a hand-held angle grinder, either grip the stock in the vise or clamp it to the table.

5 Measure and mark the transverse centerline on the 23-inch pieces (12.5 inches from the end).

6 On one of the 23-inch pieces, bore 9/16-inch mounting holes 1 inch from both ends, centered.

7 Measure and mark the longitudinal centerline on the 9.5-inch long pieces on the ends without the cut corners (in 2 inches from each long edge).

8 Align the centerlines of two of the short pieces with the transverse centerline of one of the 23-inch pieces to abut the welding surfaces to create a 23-inch by 23-inch cross. (The ends of

the 9.5-inch pieces abut to the outer edges of the 23-inch piece.) The clipped corners should all face outward from the center.

9 Clamp the pieces in place and butt weld on both sides. Clean up the welds with the slag-chipping hammer and angle grinder with wire wheel.

10 Repeat the previous two steps with the other three pieces of steel.

11 Lay the wheel rim on one of the crosses so it is centered on the cross, and mark on the rim where it touches the edges of the cross's arms. Flip the rim onto the other cross and repeat. You needn't align the arms of both crosses, but if you want them to be aligned, now is the time to do it.

12 Grind, sand or otherwise remove as much paint, dirt and rust as you can from the rim surfaces where it will touch the cross (between the marks).

13 Place the rim on one of the crosses, taking care to center it up again. Clamp if needed, and weld the rim edge to all four arms of the cross. Flip and repeat to weld the other cross to the other side of the rim.

14 Prepare the reel for finishing by, at minimum, removing all loose paint, loose rust and welding slag from all surfaces by sanding, grinding and wire brushing. Then clean the reel with solvent, compressed air or a cloth.

15 Coat the reel with rust converter, and let it cure. (This is optional, but worth it!)

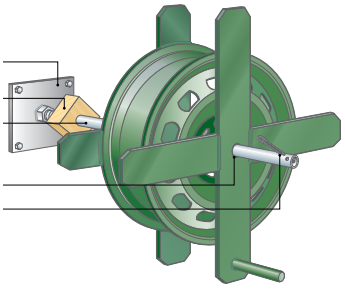
16 Coat the reel with sufficient layers of primer to get complete coverage. Apply and cure primer per directions on can.

17 Apply topcoat of rusty metal finish coat to the reel; let cure.

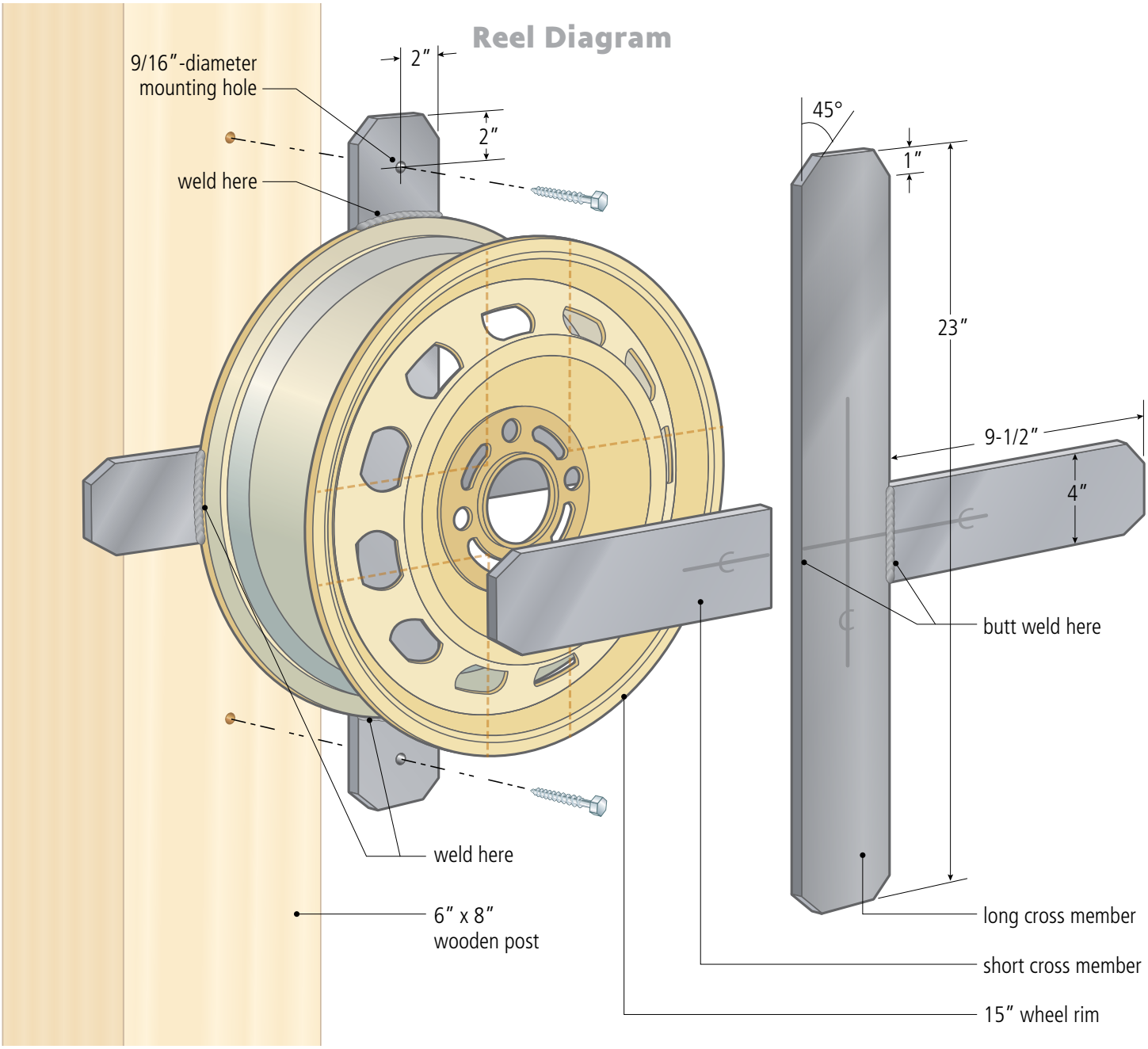
18 For this fixed, stationary reel, place your completed reel against the wooden post with the mounting holes centered on the post, then mark the centers of the holes on the post.

19 Bore a 5/16-inch diameter hole about $2\frac{3}{4}$ inches deep centered at each mark on the post.

20 Hang the reel by inserting the lag screws through the 9/16-inch diameter holes in the cross and turning them snugly into the post using an appropriate wrench.



Looking for a rotating version of the reel? Visit **myFarmLife.com/rotate** for complete plans.



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