

6' x 10' – 3500# Duty Utility Trailer

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Construction Instructions

with Customization Options

6' x 10' - 3500# Utility Trailer Construction Instructions

Thank you for purchasing the plans for one of the best light utility trailers around. This trailer is designed with a low profile bed and lots of options for versatility. It has strength in the frame rather than requiring sides – though you can certainly add sides. It is designed tough for long, faithful service.

The trailer is engineered to perform as stated when built as defined with proper care in construction— including new materials, skilled construction techniques, and certified welding. Use only parts that meet or exceed the requirements including the axle, wheels, tires, coupler, bolts, locking fasteners, pins, safety chain, deck lumber, etc. **DO NOT EXCEED MANUFACTURERS STATED LIMITS.**

Because parts, material and construction are beyond our control, there is no expressed or implied warranty – not for a trailer or plans or construction, or any ways they are used, misused or abused.

Please check local legal trailer and towing requirements. Minor adjustments for local compliance that may be required and are your responsibility. For instance: Side marker light requirements, safety chains may need to cross. Check compliance for lighting, chains, connectors, brakes, etc.

As a reminder, these plans are for individual use only. Any use of these plans for resale or for producing products for sale is prohibited. Licensing for production and/or resale is available on request. Intellectual property rights for all materials are reserved. Thank You.

We truly hope you will enjoy your trailer, and to help that, we have included a section of **Towing Tips** at the end. Please use caution and proper safety equipment while building and using the trailer.

Getting Started:

The plans and drawings go together. The drawings show views of the trailer in various stages of construction, with notes for understanding. These instructions give steps, added descriptions and tips.

Before building, please look through these documents and choose the options you want. **Make sure the chosen options are all compatible**, then purchase the appropriate components and materials.

Options:

Several options are included with these plans. Some are functional (like various tie-down options, multiple sides ideas and ramp options), while some are add-on's (like motorcycle stands, a toolbox, etc.). Some options are mutually exclusive (like deck type, side choices, tailgate, and some material choices). And there are variations for components like axles, wheels, jacks, lights, etc., so you will need to choose.

Consider your needs and how you will use the trailer, then incorporate the options that best fill those needs. Also, other options of your own creation can certainly be included. You will likely have the trailer for a long time, so take a moment and think about what options are best. You'll be glad you did.

Components Required:

= Axle Assembly:

Several Axle variations are available. The axle you choose should fit your application and the vehicle that will tow it. Consider the following, then order with the desired configuration.

- Spring Center Distance – 72", Centered on the trailer main frame rails.
- Hub Face Width – 88" as shown for drop axle. Can be 86" – 88" depending on your choice of tires, straight or drop axle, etc.. See axle manufacturers limits.
- Axle Capacity – Design capacity is up to 3500 lbs including trailer weight. Choose an axle to fit this requirement. This will determine how much weight the trailer can carry.
- Straight or Drop Axle – This option is a factor in trailer bed height and ground clearance. A drop axle lowers the trailer 4" from the straight axle. Consider bed height for loading and unloading, as well as the height of the hitch for the tow vehicle.
- Spring Type – We recommend "double eye" leaf springs for this trailer. Longer leafs give a softer ride. This trailer is **not** designed for coil or pneumatic or torsion springs. (Torsion Axle conversion plans are available at MechanicalElements.com)
- Underslung or Overslung Spring Mounts – this will also effect trailer height – overslung is higher. We recommend underslung springs for stability.
- Camber – We suggest positive camber if the loaded trailer will see a lot of highway miles.
- With or Without Brakes – If you carry heavy loads, particularly with a lighter tow vehicle, we recommend brakes. Choose Hydraulic or Electric. Electric is more common, and easier to adapt for tow vehicles. Check local laws and requirements.

We recommend ordering axles to meet your exact needs rather than settling for parts that may be on the shelf. Axles can be ordered from local vendors (check area listings) and from on-line sources. Check with Rigid Hitch, Dexter Retailers, Northern, or many other places. Buy the attachment hardware (spring hangers, bolts, etc.) to match.

The axle shown in these plans is 3500#, Drop axle with Spring Centers at 72", Hub Face distance at 88", and 26" eye to eye underslung springs.

- Wheels and Tires – must match the axle bolt pattern. Trailer wheels and tires are usually available with the axles, but another option is automotive. Be sure the load rating of the tires exceed the load rating of the axle. We recommend 10% or more over rated.

Tires shown in the plans are 215-75 R15D 106N. Other sizes are also available. Choose a load rating (ex. 106) for the capacity, and a speed rating (ex. N) to meet your needs.
- Spare Tire – A spare is not specifically shown in the drawings, but is recommended. There are many options for mounting, so select a place, then fabricate or purchase the mounting hardware. The spare should match with the same wheels and tires chosen above.
- Trailer Fenders – We recommend fenders. They come in many sizes, styles and materials. Choose plastic or composite for wet weather conditions (they will mount different than in the plans). Fenders must accommodate tire size and width. Check local laws about fenders.
- Trailer Ball Coupler – must fit the ball size you use. We recommend a 2" ball for capacity. To mount on this trailer, the coupler must connect on a 2" wide rectangular tube.
- Safety Chains – are required in most places. We always recommend good safety chains. Please make sure they are rated for a 3500# trailer or preferably more. Also, make sure they are mounted properly so they will function right if they are ever needed. See the Tips section below for a link to an article with a lot more information and examples.

- **Lights, Wiring and Electric Connector** – These items will depend on taste, choice of brakes, and connector type. See www.mechanicalelements.com/trailer-wiring-diagram for help.
 - Trailer lights are available in many sizes and styles. We recommend water-resistant (submersible preferred), sealed LED lights (readily available on-line or in local trailer parts stores). Feel free to customize both the lights and the mounting as desired.
 - **Taillights:** Plans show **Optronics STL59RCB** to mount in the C-channel for protection. Similar lights are available from many sources.
 - **Side Marker Lights:** Plans show **Optronics AL82AB** (amber, forward), and **AL82RB** (red, rear), but many styles and options are available. One option for mounting is given.
 - **Wires:** We recommend 16 gage for lights, 14 or 12 gage for brakes and ground wire.
 - **Vehicle Connector** and lead wire. See the listed wiring diagram link above for info about connectors. Shield the lead wires to avoid damage. Use a strain relief of some sort where the wires attach to the trailer as this is a common location for wire failure.
 - **Breakaway Kit:** Check local laws to see if this is required on your trailer. If needed, use a system like **6550021** (universal-ish part number) and mount in the tongue area.
 - Fasteners, ties or Adel clamps and/or conduit as desired for trailer wiring.

- **Optional Equipment** – for even greater utility with your trailer.
 - **Tongue Jack** and/or Swivel Wheel – to help in loading the trailer and moving it when not attached to the vehicle. Many products will fit with this trailer to jack up the tongue, then fold up to the side of the tongue for towing. See instructions below.
 - **Hitch handle** – to lift tongue up to the hitch – not of much use with a heavy trailer load.
 - **Toolbox** – pictured in some views of this trailer. Many varieties exist in industrial metal styles or in plastic, even simple boxes from vendors like Rubbermaid.
 - **Trailer Sides** – pictured in some views in the drawings – may be temporary or permanent. See drawings for ideas. Modify the ideas to fit your needs. You are not limited to options shown, so Be Creative.
(Note: These plans make suggestions, but do not define requirements for sides.)
 - **Tailgate** – One version is detailed in the plans. Many other varieties can be made.
 - **Ramp(s)** – Shown in some views of this trailer. Build it longer or shorter to fit your needs. Plans show one option where the ramp can slide in and store under the trailer.
 - **Tie-Down Bars** on the edges of the trailer frame are shown in some views. Many other tie-down options exist. Choose what you like.

- Fasteners for suspension, lights, holding wires, etc., are not specifically listed. Some come with the components, and others are choices to construct the trailer. For most things on a trailer, we recommend Grade 8 Bolts with washers and locknuts (or other retaining method).
- Hitch Pins and Keys – for tongue jack and hinged tailgate. See drawings.
- Paint and/or other finishing supplies (depending on finish desired).

- **Conversions & Variations:**
 - Plans for a tilt top conversion are available for this trailer. The option replaces the fixed tongue of this trailer with a tilt version. Plans sold separate at MechanicalElements.com
 - Plans for a torsion axle version of this trailer are available. The axle change requires different mounting to properly support the torsion loads. If this is desired, please see MechanicalElements.com for the conversion plans.

Materials:

- Steel (All ASTM A36 or Better.)
 - 4" x 2" x 11 gage (1/8") (or thicker) wall, Rectangular Tube
 - 2 @ 120" – main side rails.
 - 3" x 3" x 3/16" wall Square Tube
 - 1 @ 99.5" – tongue tube.
 - 4" x 5.4 lb. C-Channel
 - 2 @ 74" – Bed back bumper channel & Bed front channel.
 - 2" x 3" x 3/16" Angle
 - 8 @ 70" – cross members.
 - 2 @ 70.5" – tongue angle braces – Option: 1.5" x 2.5" x 16 gage rect. tube.
 - 2 @ 42" – axle spring mount angles.
 - 2 @ 20" – rear bed angle braces.
 - 1 @ 30" – rear bed support – OR longer as desired, See drawings.
 - 2" x 1/4" Flat Stock
 - 2 @ 8" x 45° ends – frame gussets.
 - 1 @ 10" As shown on [Drawing Page 6](#) – under tongue braces.
 - 4 @ 11" – fender mounting brackets.
 - 4 @ 8" – side marker light brackets – can use thinner material, see drawing.
 - 1 @ 68" – tongue stiffener.
 - 1 @ 8" – tongue stiffener I-Brace.
 - 6 @ 2" and less – tongue stiffener bars.
 - Material for Sides, Tailgate, Supports, Ramps, etc. (**optional**). See below and drawings.

Trailer Bed Options – Select ONE – See instructions and drawings to choose.

- **Single layer Plywood** as show on drawings:
 - 4' x 8' x 3/4" Plywood – 3 sheets – consider grade and treatment.
 - Note thickness of plywood and space from cross members. Deck as shown allows a 1/4" step to the frame for load slide security. To make the deck top flush with the frame rails top, use 1" thick plywood, or use 1/4" shims on cross members under decking.
- **Double layer Plywood** as show on drawings:
 - 4' x 8' x 1/2" Plywood – 4 sheets – consider grade and treatment.
 - Follow instructions on [Drawing Page 15](#) for cut sizes and assembly.
- **Plank Bed** option:
 - Use appropriate 8' 2x8 or 2x10 planks as desired – consider grade and treatment.
 - This option will require more bolts and a different offset of the frame for cross members. See [Drawing Page 3](#). Be sure to make that adjustment in construction.
- 5/16" – 18 x 1.75" Carriage Bolts with locknuts and washers – (2.5" length for plank deck option) – select appropriate number for chosen bed option – for securing decking to frame members.

Trailer Sides Options – Select ONE – See instructions (below) and drawings to choose.

– Rail Sides Option:

- 2" x 1.5" x 16 gage, Rectangular Tube
 - 2 @ 127.25" – sides top rails sides (see drawing for options that effect length)
 - 1 @ 78" – sides top rail front.
- 1.5" x 1.5" x 1/8" Angle
 - 16 @ 18.5" – rail sides vertical support members.
- 2" x 1/4" Flat Stock
 - 4 @ 26.1" – diagonal supports and fender mounts for rail sides.

- **Box Sides Option:** This will depend on your preferences – side height, top or no top, gate or door configuration, permanent or removable, etc. See drawings for more information.

** Due to the vast number of different requirements, the plans show several options for box sides, but materials required are not included in this list. Box sides shown in drawings are made from 2" x 1" x 14 gage Rectangular Steel Tube and 2" x 1.5" x 1/8" Angle for the framing. 1/2" plywood is used inside. (Use larger, stronger material if needed.)

- **Flat Bed or Front Shield Option:** Again, this depends on your preferences. See drawing images for ideas and for more information.

Other Options – Choose those needed.

– Hinged Tailgate Option (instead of ramp):

- 3" x 2" x 3/16" Angle
 - 6 @ 46" (or length of ramp) – linear cross members (vertical when gate is up).
Note: Gate length can change as required. Make length match accordingly.
 - **Option:** For heavy loads on tailgate (such as driving machinery), make vertical members of 3" x 2" x 1/8" rectangular tube.
 - 2 @ 73.25" – end pieces, width of tailgate.
- 2 1/2" x 1/4" Flat Stock – (or 3/8" thick) – Hinge Tabs
 - 8 pieces, see [Drawing Page 24](#) for more information.
- 72" x 48" Expanded Metal or Plywood – for hinged tailgate / ramp surface
Note: Gate length can change as required. Modify these materials to match accordingly.
- 5/8" diameter @ 76" length Steel Rod – for Hinge.

– Pull-out Ramp Option (instead of hinged tailgate), (stores under trailer):

- 3/4" x 3/4" x 1/8" Angle
 - 2 @ 101" – under trailer ramp storage rails. See [Drawing Page 9](#).
- 2 1/2" x 1/4" Flat Stock – (may be 1/8" thick for lighter weight and lighter duty.)
 - 2 @ 96" – ramp side stiffener.
 - 2 @ 6.25" – ramp catch plate end hooks.
- 4" x 1/8" Flat Stock
 - 1 @ 24.25" – ramp catch plate.
- 2x4 or 2x6 x 96" boards – 3 – for wood ramp core.
- 4 x 8 x 1/2" Plywood – 1 sheet, halves cut @ 96" & 86" – for wood ramp top and bottom.
- 100 #8 x 2" wood screws.
- Large hitch pin or other method of retaining ramp under deck. (Pin concept shown.)

- Tie-Down Bars option: 1" x 1/4" Flat Stock or 1" x 3/16" Flat Stock or 1.25" x 1/4" Flat Stock.
 - 2 @ 49" + 2 @ 25" – optional side mounted tie-down rails.
 - 12 @ 1" (or 1.25") – center supports for optional side mounted tie-down rails.

Engineering Notes:

The trailer described in these plans is strong, by design. It is not intended as the lightest trailer, but it is intended to serve you well for many years. Build it well, and it will perform wonderfully.

The plans and drawings go together for a complete guide. Please use both. If there are size or length or quantity discrepancies between the drawings and instructions, we truly apologize. Please follow the drawings as they are the CAD models, and any errors are probably transcriptions.

The base trailer is the flatbed. None of the options shown in these plans change the load capacity, but please recognize that the total capacity includes the trailer, any options added, and the payload. Do not exceed 3500# total.

Customization is encouraged. You can change many portions of the trailer and add options to fit your specific needs. However, some things should not change. Please read the article about customizing at: <https://mechanicalelements.com/when-safe-to-customize-the-plans/> for more information.

There are two areas with a high strength requirement: 1) Points where the axle / springs mount to the frame; and 2) The tongue tube intersection with the front of the frame. The Tongue Stiffener and the Axle Spring Mounts handle full loads effectively. If these are omitted, at full load, the trailer frame stresses approach the engineering limits. The trailer is designed strong to last and to serve, so the Tongue Stiffener and Axle Spring Mounts are highly recommended.

Axle position shown in the drawings is good for most applications. Please load the trailer such that 10% to 15% of the trailer weight is on the tow ball. More or less than that can create drive problems. For trailers built specific for a particular load, adjust the axle position if needed.

For most situations, when bolts are used on trailers, we recommend high-grade bolts (Grade 5 or 8) and vibration resistant retention like NyLock nuts. Trailers are a high vibration environment.

If you choose the Tilt Top Conversion (plans sold separate at <https://mechancialements.com/>) there are a few changes to the frame outlined in those plans. Please note the differences with materials.

Tools Required:

- Saw, to cut steel (circular saw may be used with a metal cutting abrasive blade).
- Saw, to cut plywood and wood spacers (if applicable).
- Welder capable of welding steel at 1/4" thick. (Plus welding skill to go with it.)
- Hand grinder – for grinding welds and fitting metal pieces.
- Adequate Drill and drill bits for up to 9/16" holes in steel.
- C-clamps or other styles (many, varying sizes).
- Layout tools and a place to setup the trailer frame straight and flat.
- Straight edge (min 48"), Square and Tape measure.
- Wrenches, pliers, screwdrivers, hammer, files, wire cutters, and other common hand tools.
- Finishing tools and supplies – sandpaper, wire brush, painting, etc..
- Method of lifting heavy items (to mount heavy components, to flip the frame, etc.). Gantry crane, fork lift, engine hoist, lots of strong friends,

Tips Tricks and Helps:

The website at MechanicalElements.com is full of DIY tips and information. The **Mechanic's Post** is a library of info about building stuff, like trailers. Articles include many topics including Frames, Axles, Lights, Wiring, Safety Chains, and so much more.

Here are some helpful links to answer questions. Please let us know about things to improve.

- Axles mechanicalelements.com/trailer-axles-101/
- Wheels & Tires mechanicalelements.com/wheels-and-tires-for-your-trailer/
- Needs in mounting Axles mechanicalelements.com/mounting-trailer-axle-springs/ and mechanicalelements.com/welding-on-trailer-spring-brackets/
- Safety Chains mechanicalelements.com/how-to-attach-safety-chains/
- Customizing the Plans mechanicalelements.com/when-safe-to-customize-the-plans/
- Wiring Diagrams mechanicalelements.com/trailer-wiring-diagram/
- Breakaway Kit mechanicalelements.com/trailer-breakaway-kit/

Good Luck with your trailer build project.

Material Suppliers:

Local Steel Supplier. If you don't already have a metals source, contact local suppliers. Buying the full length sticks is cheapest, but many will also cut for you. Many also deliver.

Online Suppliers. Some online sources like DiscountSteel.com or MetalsDepot.com can get you just what you need – small pieces OK – but they are usually more expensive than local. Shipping is also expensive. We recommend these places when you just need a short piece of something.

Component Suppliers:

- **Rigid Hitch Inc.** Phone: 800-624-7630 or (952) 895-5001
We like Rigid Hitch as they carry quality parts. Call them, they'll refer you to a dealer near you.
- **Johnson Trailer Parts** Phone: 602-292-9690 www.JohnsonTrailerParts.com/
- **eTrailer.com** www.etrailer.com/ Big selection, and lots of extra info.
- **Northern Tool & Equipment** Phone: 800-221-0516 www.northerntool.com/
- **Search the Internet** – There are lots of places that sell trailer parts and accessories on line.
- ☆ **Check Local Sources** – Most cities and towns have a local source for trailer parts and accessories. Check local listings. This is a great way to see things prior to purchase, and usually a great way to get good advise.
- ☆ **Trailer Component Kits** – Check at MechanicalElements.com/Trailer-Parts-Kits/ to see if a kit is available for your needs. Kits include the major components (with some options) needed to build the trailer as shown in the plans.

Utility Trailer Construction Instructions:

1. **Locate and Print the trailer drawing sheets.**

For easy access in the workshop, print the drawing sheets.

Print at the desired size. Standard letter size works (Acrobat Reader gives options for print size or “Shrink to Fit” large pages). For larger prints (Full size is C, 22”x17”), contact a local print shop.

2. **Look through these instructions and the drawings,** read everything, to determine which options you wish to include on your trailer. Then get the appropriate components and materials.

3. **Layout the outer frame.** Layout the 4 perimeter pieces (2 c-channel ends and 2 rectangular tube sides). [Drawing Page 3](#). Use clamps and straps to assure the parts will not move. Clamp diagonal braces across the frame to hold position. Check that the measurements from opposite corners are equal – this will validate squareness – assuming cut lengths are equal.



4. **Tack weld the 4 corners** then check squareness and flatness again. Make any adjustments necessary. It is critical at this point that squareness is established as a sloppy start will yield a sloppy finish, and this will effect how well the trailer tows.

5. **Drill the decking mount holes** in cross members before welding. It may be easier than after.

6. **Lay in the cross members.** Depending on the deck to be used, shims (such as boards or metal scraps) may be used to “lift” the cross members to position. Sometimes building the frame up-side-down can help. With spacers, the cross members will line-up vertically for a flat bed.



Trailer Frame with cross members. Representation. See drawings for details.

7. **Tack weld the cross members in place.** Keep checking squareness as you go because welds tend to “pull” as they cool and you need to keep the frame square.

8. **Layout, then tack in the angle braces and gussets** shown on [Drawing Page 4](#). Use the same spacers as above for the cross members to assure a flat bed. (Note: The 3 pieces in the back can be lighter material if you have stock lying around, but don’t buy it special. The cross member angle (as shown) works great.) Again, keep checking squareness as you go.

9. **Lay in the tongue tube.** Set the tongue tube on the cross members and front channel member. In the standard design (shown in the drawings), the tongue tube attaches to each. See [Drawing Pages 3 & 5](#). The tongue must be centered and square with the trailer frame. Tack this in place.

Tongue Option Note: The trailer tongue can be extended or shortened up to 6 inches if desired. If done, make sure to note the change in the bill of materials and the distance to the axle centerline.

10. **Fab on the tongue stiffener.** The tongue stiffener can be bent and welded in place over the center portion for a perfect fit. Several short pieces are then welded in place between the tongue stiffener and the tongue tube. This part is required for full tongue strength, but not required for lighter duty.

Engineering Note: Two areas with a high strength requirement: 1) Points where the axle springs mount to the frame; and 2) The tongue tube intersection with the front of the frame. The Tongue Stiffener and the Axle Spring Mounts handle full loads effectively. If these are omitted, at full load capacity, the trailer frame stresses approach safe design limits. The trailer is designed strong to last and to serve, so the Tongue Stiffener and Axle Spring Mounts are highly recommended.

11. **Tongue support braces** are shown on [Drawing Pages 6 & 7](#). Each brace is angle cut to fit against the tongue tube. Tops of the support braces align with the tongue tube top. These will also support the front toolbox or front storage area if that option is used. Tack the braces in place.

Option Note: Angle iron is shown for the tongue support braces. An option is rectangular tube as listed above, which is lighter and stiffer. The tube also has a different look. Either choice is OK.

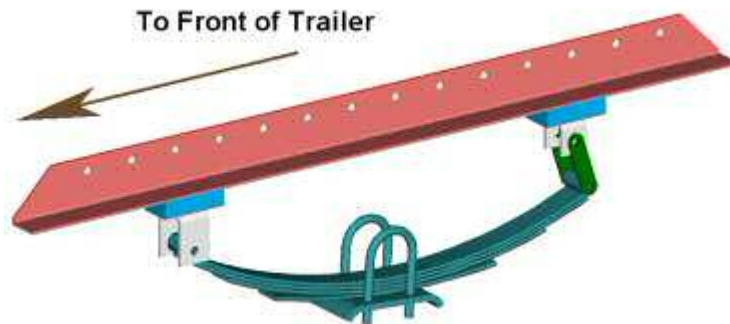


Tongue Stiffener Braces Under the 6x12 Trailer. Others Trailers Similar.

12. **Double check Squareness.** At this point, all structural members of the frame are tacked in place. If it is square and flat, you are ready to weld it all together. If there are tweaks to be made, do it now.
13. **Completely weld the frame together.** Start in the corners and stitch a few areas. Do not complete any one weld until adding several tacks to all joints – especially angle braces and gussets. Check squareness again, then complete the welding. By doing a little at a time as you go around, the likelihood of creating a “pull” out of square is reduced. The extra effort is worth it.
14. **Mounting For Lights.** Select taillights, then build brackets, drill holes for mounting, and test the fit. Make the side marker light brackets – test for proper fit with the light – then weld brackets to frame.
15. **Option: Under trailer ramp storage.** If desired, weld on the under trailer ramp storage angles shown on [Drawing Page 9](#). These must be straight and evenly spaced. Note the orientation. See instructions below and [Drawing Page 27](#) for building the ramp.
16. **Safety Chains.** There are 2 schools of thought with Safety Chains. 1) Weld them on for permanent attachment that can't come undone. 2) Connect them in a way allows length adjustment for the tow vehicle (usually this means bolted). It is your choice. Decide, then attach them.
17. **Construct the Axle Spring Mounts.** The left side axle spring mount is shown on [Drawing Page 10](#). You will need a right and a left. The axle spring anchors shown on the drawing are purchased with

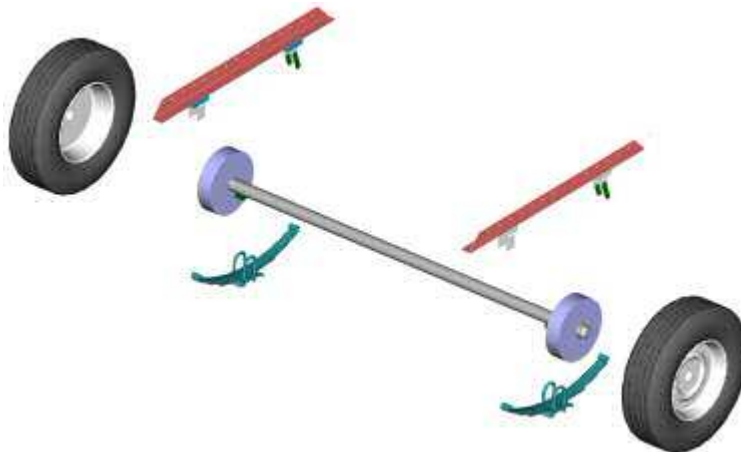
the axle and spring hardware. We recommend assembly of axles, with springs and mounts, then set it on the trailer frame for tack welding. This assures alignment. Disassemble to finish welding.

Option Note: For bolting the axle to the frame, holes must be drilled in the spring mount as shown on the drawing. The image below shows many holes, but only 2 are required (more allow a movable axle option. If you are so inclined, go for it. After setting the axle at the correct position on the frame, use the holes in the axle mount angles to drill through for the holes into the trailer frame.)



Adjustment: Axle spacing blocks (BLUE in the image above) may be required for proper space to items under the trailer (like the ramp option). Some springs have less arch so they won't lift the trailer as high. Some hangers are short. If needed, raise the frame to allow 3" of vertical motion space above the axle.

18. **Build the Axle.** Assemble the axle components including the axle spring mounts built in the previous step as shown in on the [Drawing Page 11](#) and in the picture below. Tires and wheels must also be assembled. Check for tire clearance to the spring mounts. (Note: If you are using wide tires trailer specific rims or shims may be needed to set reasonable wheel clearance.)



Straight, Underslung Axle Assembly Shown. Others Similar. See Axle Vendor Instructions.

19. **Assemble fenders to the axle spring mounts.** With tires and wheels on the axle, measure for placement of fenders. Clamp fenders and brackets to the spring mounts. [Drawing Page 11](#). Allow 3" to 4" of suspension travel. We recommend clamping both fenders and mounting brackets before welding so they match. Tack in place then disassemble items (like tires) for welding.

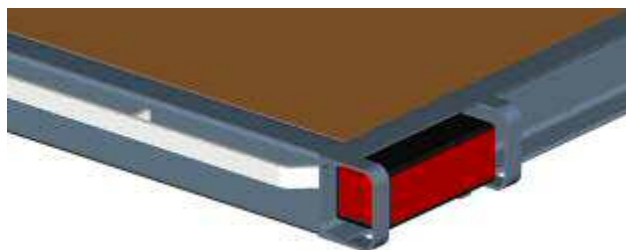
Note: For removable fenders, use bolts instead. It's not as strong, but removal is much easier. For fenders of other materials, like plastic, bolts are required. Use washers near the plastic for strength. Also, to avoid splash, fill the space under the fender with sheetmetal or wood.

20. **Mount the axle assembly to the trailer frame.** Drawing Pages 12 & 13. Measure carefully from the center of the tongue tube (where the hitch will go) diagonally to the center of the front spring bolts. This dimension must be the same both sides. Dimensions shown on the drawing are good for most applications; however, the axle may be placed slightly forward or back if needed. When it is in the right place, secure it to the trailer frame with clamps.
21. The position of the axle on the frame affects towing stability, so consider it carefully. To adapt for specific load requirements, adjust the axle position so the tongue will carry 10% - 20% of the load. (Dimensions shown on the drawing will give ~12% - 15% tongue weight for an evenly loaded trailer. Do not exceed manufacturer load ratings for the hitch, ball or receiver.)
- a) **Weld Option:** Weld the axle assembly to the frame. Do not weld at the ends of the spring mount angle as the welding will become a stress point. Because the axle is mounted on a separate bar, not a lot of weld is required to secure it to the frame. Weld on the sides.
- b) **Removable Axle (Bolt-on) Option:** With the axle assembly secured on the frame, drill the 2 holes (2 each side of trailer) indicated on Drawing Page 13. Use the holes in the mount as a guide. Drill through the main frame side rails. Bolt through these, but not so tight as to crush the beam. Use lock nuts on all fasteners. Vibrations have loosened too many bolts to take a chance.
22. **Option:** Cap open ends of tubes to prevent moisture getting in and rusting things from the inside. Can use thin gage material as strength is not required. Allow for wire routing if that is intended.
23. **Attach the ball coupler.** If welding, position the coupler and weld in place. For bolting, clamp the coupler in place, then drilling the tongue tube through the holes in the coupler. Once the holes are drilled, insert the mounting bolts and tighten. Again, use locknuts.
24. **Option: Mount a Tongue Jack and/or Swivel Wheel.** If you have chosen to use a tongue jack or swivel wheel, mount it to the tongue tube or tongue brace. The jack shown in the drawings has a cylinder welded to the tongue brace, then the jack attaches to that. Other jacks have bolts or plates that wrap around the tube. Place it where it fits and allows handle clearance and swivel action.
25. **Pre-Wire the lights and brakes (if used).** Make the wire paths needed, then wire up the lights, connectors and brakes (if used). Follow manufacturer instructions. Trailer wiring diagrams are online at <https://mechaniclelements.com/trailer-wiring-diagram/>

Put protection around wires to the vehicle connector to avoid damage with use. Secure the sleeve and wires at the trailer tongue. An added bracket, welded on for anchoring, can be very useful.

Drawing Pages 8 & 14 show mounting for lights. Many options exist, so choose lights you like. Mount the breakaway system also (if needed) and run the appropriate wires. Run wires through the tongue tube (or use conduit) for protection. Plastic conduit works well. Mount everything now, then remove it for painting. All holes and brackets are now set.

26. **Option: Taillight protectors.** If thin lights are recessed into the back channel as shown on Drawing Page 14, then light protectors are probably not needed. However, other styles might want them. Install light protection bars near the lights if desired. See image below. Install the lights to assure proper fit, then remove for welding. Allow space to service the lights if needed.



Taillight protectors and perimeter Tie-down bars are highlighted in this image.

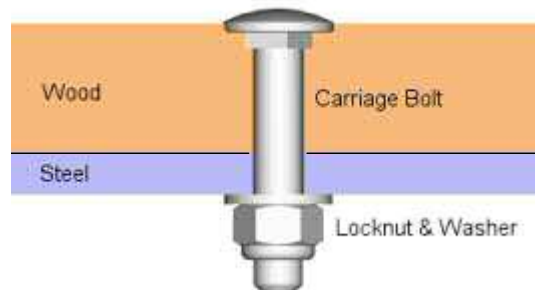
27. **Build the trailer deck.** The standard deck is double layer treated, painted plywood as shown on [Drawing Page 15](#). Follow those instructions. Other options are given on [Drawing Pages 15 & 16](#).

Option: - For weight reduction, use a single layer of 3/4" plywood. It will leave a 1/4" step up from the deck to the side rails. This may help so things won't roll or slide off as easily (while loading).

Option: - If a single layer of 3/4" plywood is desired, and the deck is to be flush with the top of the rails, put 1/4" wood spacers under the plywood on top of each cross member.

Option: - If you prefer "2 by" plank decking, install the cross members 1/2" lower for 1-1/2" thick boards. See [Drawing Page 3](#). Use 2x6 or 2x8 or 2x10 boards cut to fit (length and width), then lay planks lengthwise (long-wise) and fasten with bolts. See screw option on [Drawing Page 16](#).

28. **Assemble the deck to the frame.** Set the deck on the frame, then drill holes for bolts – 5/16" or 3/8". Drill 3 or 4 places each cross member. Tighten bolts until head just pulls into the wood.



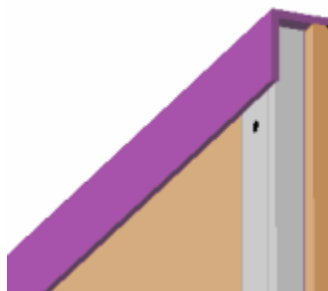
Please note: Different bed options – like plank option – may require different bolts or quantities.

29. **Option: Build trailer sides.** Two styles are shown in the plans – Rail Sides; or Box Sides. Consider the height and strength required, as well as if sides are permanent or removable.

Option – Rail Sides: Most views with sides in the drawings show the Rail Sides option. Build them by following instructions on [Drawing Pages 19-21](#). Rail Sides are constructed with a rectangular tube (top rail) and angle iron (uprights). Other materials may be substituted. Diagonal flat bars over the axles add rigidity as well as a place to anchor the fenders.

Option – Box Sides: Several variations for box sides are shown on [Drawing Pages 17 & 18](#). These are thought starters. Because needs vary, the materials and sizes are not listed. For box sides, use these ideas, then plan as desired. Since you are building your own trailer, you are obviously smarter than average, so figuring out sides with the help of the included ideas will be easy.

Measure and build from the completed trailer frame. Note how a tailgate or door will interface. Weld (or bolt) uprights. Note: drilling holes in tubes for bolts allows opportunity for corrosion inside. Consider axle position when locating uprights. Sides on [Drawing Page 20](#) are 2" x 1" x 1/8" tube with 2" x 1.5" x 1/8" angle, and plywood. Substitute other materials as desired. See image below.



The above image shows an option for the top edge of box sides, which covers the edge of the plywood and gives a place for tie-downs to hook. Other configurations will also work.

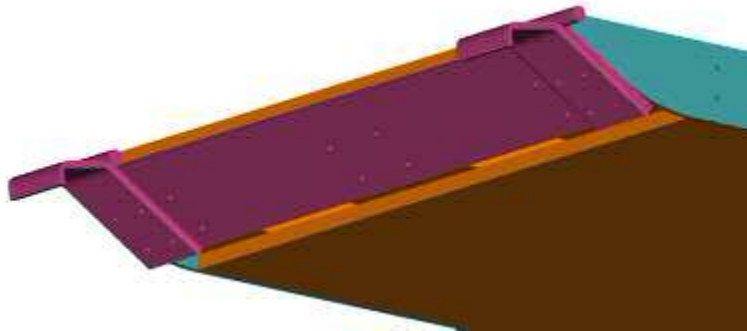
30. **Option: Build the hinged tailgate/ramp.** Layout the ramp as shown on [Drawing Pages 22 - 25](#). Note areas that are chamfered. For light duty, thinner (wall thickness) angle iron can be used. For heavier duty, use thicker materials.

The top of the ramp can be expanded metal or plywood. Expanded metal offers visibility from the rear-view of the tow vehicle, and less aerodynamic drag. Plywood is cheaper.

The hinge is created by welding tabs to the gate, and opposite tabs to the back channel. For best function and set-up, support the tabs and tailgate in place with the rod through the holes, then tack weld the hinge brackets in place. Remove the rod and back tailgate to finish welding.

Many options are available for securing the tailgate up-right for travel. Some people like a spring assist to lift the tailgate; some prefer simplicity. The Rail Sides design on Drawing Page 19 is our suggestion. If sides are not wanted, create an angled brace pinned from the trailer side to the tailgate. Use one, or one each side for greater stability.

31. **Option: Build the ramp.** Construction details are shown on [Drawing Page 27](#). This ramp is for people, not heavy machinery. It has a wood core (2x4's and plywood), steel side stiffeners and a front catch plate. (2x6's can be substituted in the core for more strength (more weight). 1/8" thick steel can substitute on the sides for less weight (less strength).)



This ramp will store under the trailer and slide in and out from the back. The 1/2" round bars (guide pins) weld to the catch plate (shown on the drawing and in the picture above) slide in the angles welded under the trailer frame. [Drawing Page 9](#). Catch plate hooks grab the back C-Channel of the trailer frame while loading and unloading. The picture above shows the ramp catch plate, guide pins and hooks. For greater strength, weld the catch plate to the side stiffeners.

To secure the back end of the ramp in the stored position, drill holes and use a locking pin or bolt. Use something that won't vibrate loose as you travel.

Make the ramp easy to grab and pull out by adding a couple 1 x 2 pieces of wood as handles.

If this ramp is used with a flush top deck option, notch the decking (trailer floor) where the ramp is to hook. The hooks on the catch plate keep the ramp from sliding off while in use.

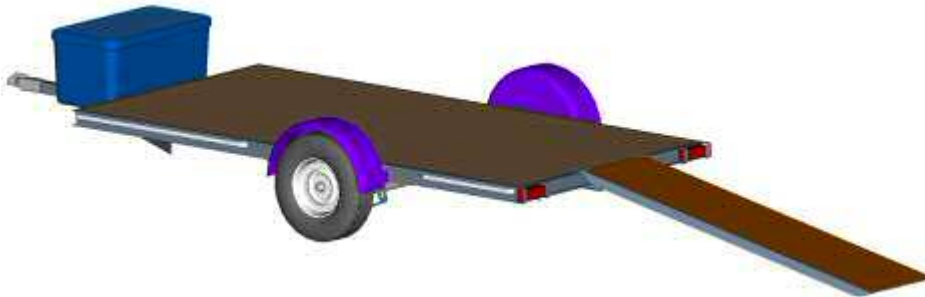
32. **Option: Install Tie-down bars around the frame.** Bars in front (and behind) the wheels can be added to the trailer frame for tie-down as shown on [Drawing Page 26](#). These offer nice options for tie-down attachment – even with sides, these can come in handy. Be sure to allow space for axle positions changes if you want the movable axle option. Is not compatible with some sides options.
33. **Option: Install Tie-down hooks or D-rings.** For more tie-down options, consider hooks or D-rings added at strategic locations – like on the bed and/or on the frame. Many choices are available including recessed rings that mount into the bed. If the rail sides are used, consider adding small bars within the angles as tie points as shown on [Drawing Page 21](#).

When mounting onto the bed, attach at cross members or put a metal plate behind for strength.

34. **Option: Attach a spare tire.** There are three easy locations for a spare tire (if you want one). The first is on the tongue – there are several bolt-on products available to accomplish this. The second location is under the back of the trailer – weld a bracket and use some long bolts. Third is to mount it on the side – (works best if sides are permanent) – again bolt-on products are available.

Choose the position of the spare tire where it won't be in the way of other functions. A spare is always a good idea, but they are seldom used. Cover the spare to avoid dry rot or sun damage so it will be in good shape if you ever need it.

35. **Option: Attach a tool or storage box.** A tool or storage box can be added and mounted on the trailer tongue if desired. The picture below shows a mounted box. High quality waterproof industrial boxes are available as well as less expensive ones from Rubbermaid and others. Most can attach to the trailer by bolting through the bottom. For better support, bolt a piece of plywood between the box and the tongue triangle. To waterproof it, use RTV sealant around each bolt.



A Trailer Shown with Optional Toolbox, Tie-down bars and Ramp

36. **Paint and finish.** Reflect your personality. We strongly recommend taking time to protect your investment. Remove or mask all components that will not be painted (axles, chains, decking, bolts, lights, wires, jacks, etc.) Prepare the steel by sandblasting, then use a good primer and paint. We recommend a 2-part epoxy primer, available at most industrial and automotive paint centers.

Powder-coating the frame is even better than paint, but requires special equipment. Usually, it is fairly economical to have it done, but with a large trailer you may have to search for a facility large enough to handle it. Have them prepare the frame with corrosion resistance as well.

Use an industrial outdoor rated primer and paint on the wood deck – house paint will not last very long. Consider where and how the trailer will be used and stored when selecting paint.

37. **Re-mount pieces removed for painting.** When re-attaching hardware after painting, secure all bolting for the long haul. Use anti-seize in areas where corrosion may be an issue. Tighten all bolts appropriately. Again, use locknuts and other locking hardware to avoid vibration loosening.
38. **Complete the lights and wiring.** After taking everything off for painting, re-install and wire complete. Install all the lights and electrical connections. Crimp connections are typical, and OK, but we recommend solder if you can. Solder takes more time, but is not as subject to internal corrosion.

Cover all the connections with heat shrink or something similar for moisture protection. If you use electrical tape, put zip-ties over the tape end to keep it from unraveling over time. Use sealant in areas where wires go into a conduit or other housings. Finally, secure all the wires and wiring channels so they will not snag anything. This is especially true in the tongue area with the pigtail going to the vehicle connector, and the breakaway box and pin switch connecting wires.

39. **Make it legal.** Most local jurisdictions require an inspection of trailers prior to submitting for a license and/or title. Check with your local Department of Transportation or other authority to find out what is required. Take the trailer in, and do whatever is needed to get it on the road – legal.

If a serial number or tag is required, place one where the law requires it, and put a second one up under and hidden (maybe stamped into the frame) so the trailer is permanently marked with your ID number. Stolen trailers are easily re-tagged and hard to trace, but if you have a permanent mark (where only you know it is), then the trailer is much easier to identify as yours.

40. **Notes of Caution:** This trailer is designed for heavy duty action, however, it will not compensate for poor choices. Here are a couple things to remember:

- When loading really heavy items on from the back, please support the trailer end while loading. Heavy point loads (like driving a tractor onto the back) put high stress on the trailer frame and hitch components. Failures and hitching foibles can be very destructive. Proper support of the trailer can avoid these possible issues.
- Load the trailer as evenly as the load will allow. Central and centered evenly distributed loads tow better, and more stable – making them safer – and a lot more pleasant to pull.
- Secure all loads. Over-secure them – always.
- Retain ramps that store in the trailer. Lock or latch them every time you put them away. If they fall out, it will be a big loss, plus, they may hurt someone. Safety is a big responsibility.
- While in use, Ramps must be solidly and securely placed – both bottom ends on secure ground – or they can move or twist. Set them solid to be safe.
- Safety and common sense are required. Please take a minute to check things each time you use the trailer. The Darwin award will not help, so please use care.

We hope you to enjoy the project. Build it well, take care of it, and the trailer will serve you a long happy time. Thank you for purchasing plans at MechanicalElements.com

41. **Hook it up and take it for a spin! Enjoy it, you've earned it!!**

Trailer Towing Tips:

- Secure all bolts and fasteners in vibration resistant ways – use things like Nyloc nuts, Loc-tite, cotter keys or wired nuts. Be sure the methods are appropriate for the situation.
- Check bolts, fasteners, lights and brakes before towing. Double-check the hitch.
- Inspect the trailer regularly to assure there are no cracked welds, loose bolts, or other issues.
- Inspect the tires carefully – especially after storing. Dry rot is a common tire failure mode for trailer tires. Keeping tires covered when stored helps, but does not avoid it completely. Check regularly.
- Inspect the spare tire (if used) to be sure it is inflated properly and in good condition.
- Double-check the hitch to be sure it is connected securely.
- Double-check the breakaway system – battery charged, cable connected, pin inserted correctly.
- Inspect wires for signs of wear or damage – especially those going to the main vehicle connector.
- Use strong safety chains – not wimpy ones – appropriate for the load capacity of your trailer. Secure them to a sturdy part of the tongue or hitch. Connect to the tow vehicle with non-open methods.
- For stability, distribute the load on the trailer evenly – not disproportionate on one side or the other.
- Again, for stability, the trailer should be loaded such that 10% - 15% of the weight is on the hitch.
- If you have a problem with swaying or instability, re-distribute the load. Most instability issues come from improper trailer loading. Other issues come from improper assembly (things not lined up or square) – so, take time and care when building the trailer.
- Do not overload. Also, be aware of towing limits of the pulling vehicle and the hitch. Trailer towing capacity is defined by the weakest part in the system.
- Do not overload the tires. We recommend tires with 10%-15% over capacity.
- Support the end of the trailer when loading very heavy items onto the back. Block the tires to avoid trailer movement. This avoids many loading and safety issues that can be very destructive.
- When using Ramps, make sure all 4 corners are solidly and securely placed – both on the trailer and on the ground. Poorly placed ramps can move or twist under heavy, unbalanced loads.
- Secure the load so it will not shift or move in transit. Keeping a lower center of gravity is also good.
- You are responsible for the load in your trailer. Anything that blows out or falls off is your responsibility. Not just as litter, but flying items can injure or kill. Be sure things are secure.
- Double check tie-downs, tarps, ropes, etc. so nothing will “flap in the breeze” or drag on the ground.
- If the trailer has high sides or a tall load, avoid traveling when high cross winds are present.
- It is a good idea to stop and double-check the load, the tie-downs, and the overall situation after driving a few miles from the start. The load will “settle in” with vibrations and bumps of the road.
- Set tire pressure appropriate for the load. When traveling empty, tire pressure may be reduced significantly to allow the tires to absorb bumps and other anomalies. This can keep an empty trailer from bouncing, and shaking the tow vehicle. Full tire inflation pressure is needed for a full load.
- Allow added distance for acceleration and braking. Even if the trailer has brakes, it can take (sometimes) a lot more distance to stop.
- Take corners a little wide. Trailers take a shorter radius, and need more space than the tow vehicle, especially for a long trailer. Hitting curbs and posts can cause big damage and high costs.
- Drive with greater awareness of what is happening around you on the road. Maneuvering with a trailer takes more time, more care and more space – and the larger the trailer, the more it takes.

Drive Carefully, and Enjoy Your Trailer. Check out [MechanicalElements.com](https://www.mechanicalelements.com) for lots more trailer info.