

TECHNICAL
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RELEASE



Low-Cost Animal Cart Programme

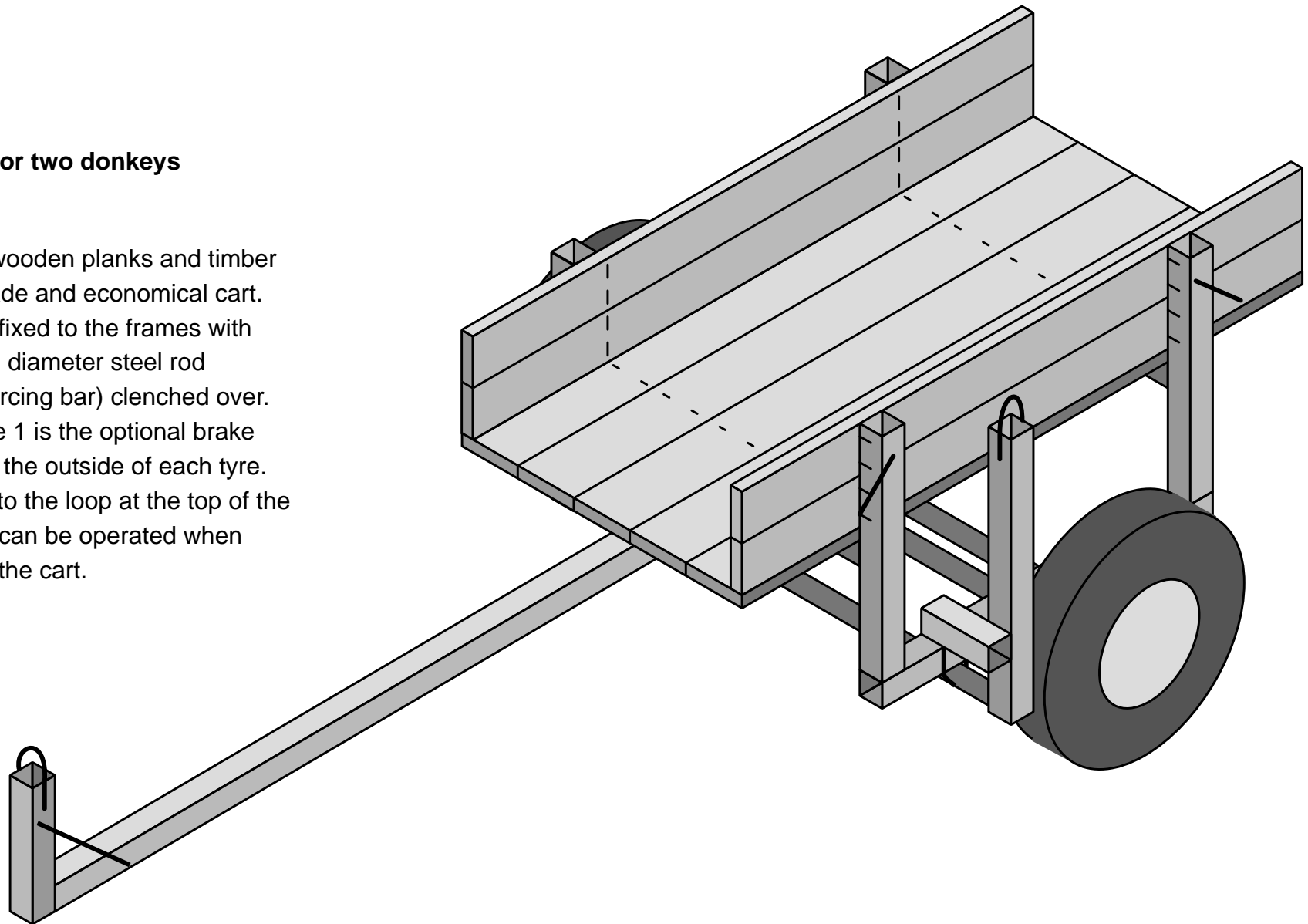
Low Cost Steel Framed Cart for Two Donkeys

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Figure 1: cart for two donkeys with brake.

This cart uses wooden planks and timber for a quickly made and economical cart. The planks are fixed to the frames with 8 mm or 10 mm diameter steel rod (concrete reinforcing bar) clenched over. Shown in Figure 1 is the optional brake which works on the outside of each tyre. If a rope is tied to the loop at the top of the lever the brake can be operated when walking behind the cart.



Two Donkey Cart made from Steel Box Tubing and Timber.

Introduction

In this booklet we tell you how to make a simple cart from square steel tube and timber. This Technical Release does not tell you here how to make the axle - you will have to read another Technical Release to for this. We have designs for stub axles with PVC bearings and with needle roller bearings that you can make yourself and we have designs for twin offset axles using PVC, wood and scrap ball bearings. All axles can be made without machine tools - in fact you do not even need a drill!

You should find that you can make the cart itself for about £ 40

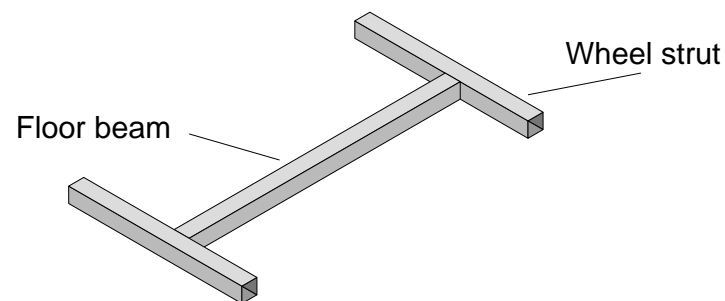


Figure 2: finished H frame.

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depending on the cost of the materials and labour. An axle plus wheels, tyres and tubes will cost another £ 50 - £ 60. Once you get organised, two men can probably make one cart in a day. We've designed these carts to be easy and quick to make.

Idea Behind Design

These carts are designed to be constructed without lots of special tools and jigs, and without any hard-to-get materials. The only tools which you must have are a welder, a wood saw, a hacksaw, and a hammer. You might find that a couple of 4" or a 5" G clamps (or something like it) are useful too.

The cart frames are fixed together by welding and the wooden planks are fixed to the frames with clenched steel bar. You weld 8 mm diameter re-bar (concrete reinforcing bar) to the steel box

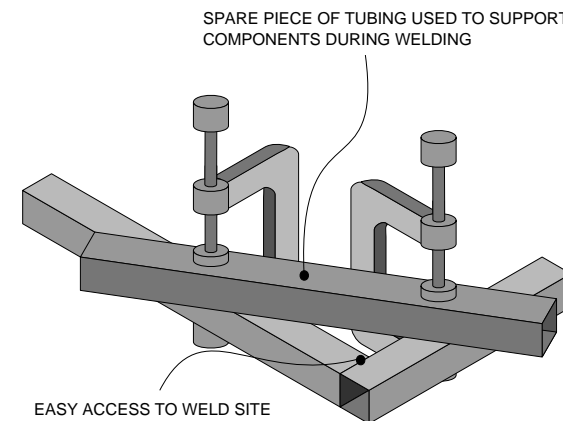


Figure 3: holding frame components during welding.

tubing so it sticks out about 20 mm beyond the surface of the planks, and then knock the ends over with a hammer so they lie on the surface of the wood.

You will see that there are no mitres or complicated angles or joints to cut when making the cart, so you save time. Also the exact lengths of the components are not very critical - again it saves a little time, but you will find that the carts look better if you take a little trouble to get things square and even etc and welding is easier with good square ends. It is much better to

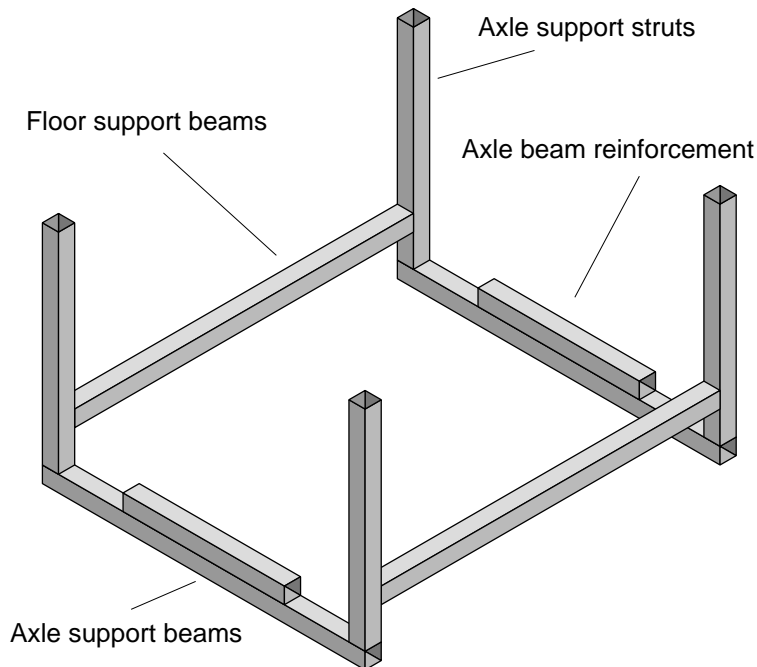


Figure 4: main frame assembly.

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use a try square to mark the position of a cut than guess.

These carts have been tested in Nigeria, Kenya and Uganda and we have had only a few serious failures caused by poor welding or incorrect material. We think that they are strong enough, but we cannot be sure - somebody will always break anything.

Cutting list and costs

Table 1 shows a cutting list for a complete cart - Recent prices of materials in Kenya are shown converted into £_{UK}.

TABLE 1: 50x50 RHS vestigial frame donkey cart.

| description | length m | # | total m | cost £ _{UK} |
|---|----------|----|-----------------|----------------------|
| 50x50 RHS: | | | 11560.00 | 27.71 |
| floor beams 7 x 160 mm (planks 160 mm) | 1120.00 | 2 | 2240.00 | |
| wheel struts 3 x 160 + 25 + 60 + 240 | 805.00 | 4 | 3220.00 | |
| axle support beams 1000 mm long | 1000.00 | 2 | 2000.00 | |
| draw pole | 2700.00 | 1 | 2700.00 | |
| draw pole upright extn | 400.00 | 1 | 400.00 | |
| draw pole reinforcement | 1000.00 | 1 | 1000.00 | |
| R8 | | | 3900.00 | 6.01 |
| plank fixings each plank (13 off) takes 6 | 75.00 | 52 | | |
| R12 | | | 1200.00 | 0.33 |
| yoke loop | 400.00 | 1 | 400.00 | |
| tie cleats for rope | 200.00 | 4 | 800.00 | |
| 6"x1" timber | | | 23.40 | 4.99 |
| tray planks 13 off | 1.80 | 13 | 23.40 | |
| TOTAL COST = | | | | 39.04 |

Construction step by step

- 1) First get all the material together and clear a space to work. Ideally you will be able to work on a flat area of concrete. Start by cutting the 50 × 50 box section steel into the right lengths, as in the cutting list, then cut the bottom and side planks. Lastly cut the 8 mm dia or whatever re-bar for the fixings ie the studs.
- 2) Next make up the two H-shaped frames shown in Figure 2. If you have a couple of G clamps you can use them to hold

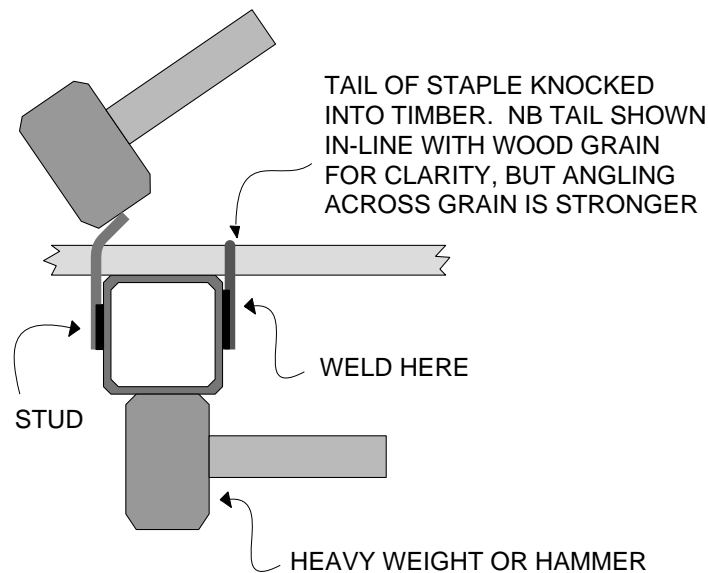


Figure 5: tightening welded stud.

two pieces of the frame together during welding as shown in Figure 3. It's quick and you can tap the parts with a hammer until everything is square and straight and then weld.

- 3) Then stand the two H frames on the axle support beams as shown in Figure 4 and weld up the main frame. If you are using our PVC bearing system then weld on some axle beam reinforcement as shown in the figures but with the ball bearing and wooden bearing types you do not need this.
- 4) Next you can fit the side and the bottom planks to the

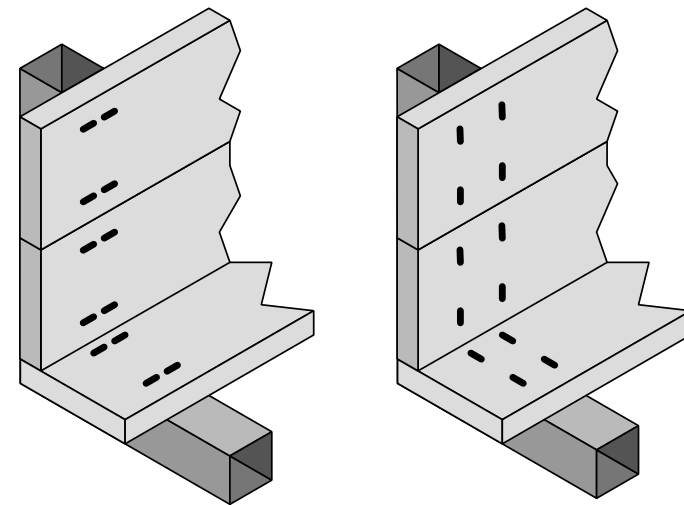


Figure 6: studs or staples bent in line with grain (left) or across it (right).

frames with studs. Studs are just short lengths of round bar welded to the sides of the box section as shown in Figure 5 (which also shows how these studs can be tightened with a hammer and a weight or another hammer).

Studs can either be put through holes in the planks or they can just be welded at the edge of each plank and then simply bent over the edge.

When you bend the end of the stud over you can either bend it in line with the grain of the wood or across the grain, as shown in Figure 6. Bending it in line as shown on the left lets it go into the wood nicely and looks neat, but bending it over across the grain gives a stronger joint.

5) Nearly there! Now you need to fix the draw pole. It is best

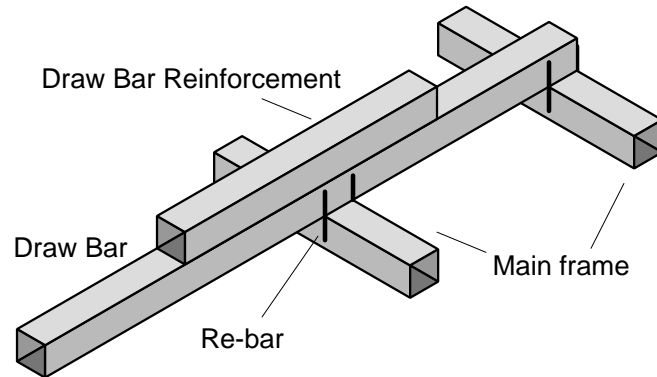


Figure 7: method of fixing draw bar to body. (View of cart upside down.)

to fix the draw pole to the body so it can be taken off and replaced if it gets damaged. A good way to do this is with short lengths of round bar welded on as shown in Figure 7. It is easy to cut through the re-bar hoops if you need to change the draw bar. You will need to use new re-bar of course when you put the new draw bar on. Also shown in Figure 7 is an easy way to reinforce the boom with an extra piece of steel tube welded to the main tube.

6) If you want to make it so that the ends of the load tray can be removed easily you can do so in the way we have shown in Figure 8. This is a good way because it is cheap and very easily repairable.

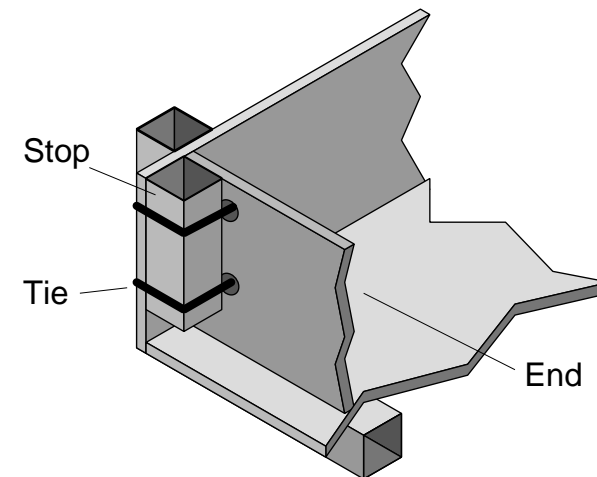


Figure 8: method of fixing tray ends with rubber or rope

7) Paint or creosote the cart. You've finished it!

Modifications

There are many different versions of this cart. You can try longer or shorter carts and you can make them wider or narrower. When you do this, check the length and width of the planks of wood that you will use - you do not want to find that you are two inches short of being able to get two runs of plank out of one piece of timber, or that its just too narrow and you have to fiddle about and fit in a narrow strip.

Other DTU cart developments

The DTU has been working on a range of carts for use with both donkeys and oxen. It has designs for wooden and steel framed bodies and for a range of wheels and axles. All steel framed carts can be fitted with a simple brake. The DTU also has designs for single and double donkey harness.

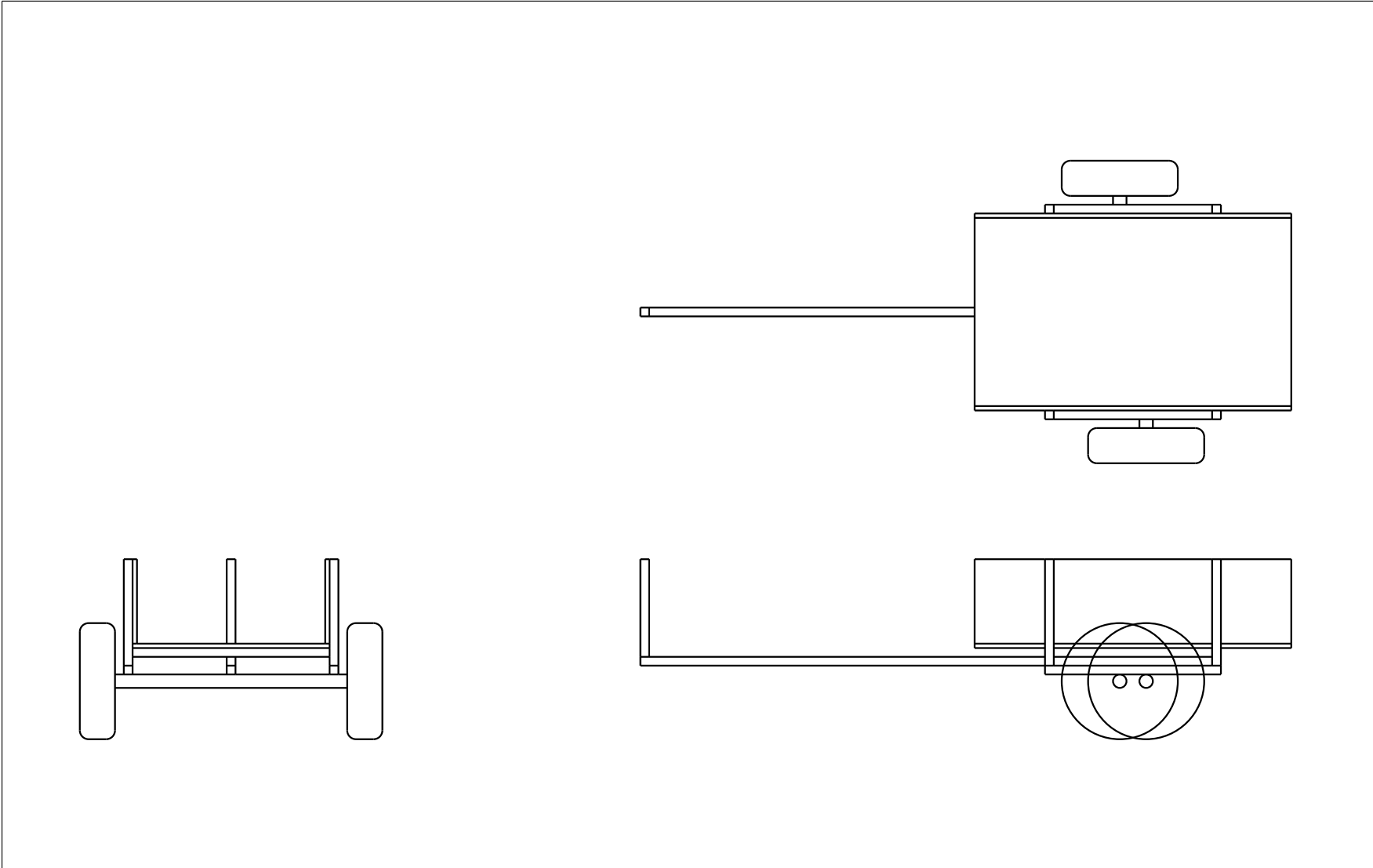
Cart Drawings


You will find two drawings on the next pages, the first one gives a general view of the cart, and the second gives a view of the main components. As we have said you can vary the size of the cart quite a bit and even make it much longer if you add extra frames. You could even make a four wheeled cart like this!

Acknowledgements

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|--|--|--|--|--|-------|---|--|----------|-----|
| | | | | | Scale | 80 mm  | Title STEEL & WOOD TWO DONKEY-CART | Drawn by | CEO |
| | | | | | Date | 9/7/95 | | Dwg No. | 1/2 |

