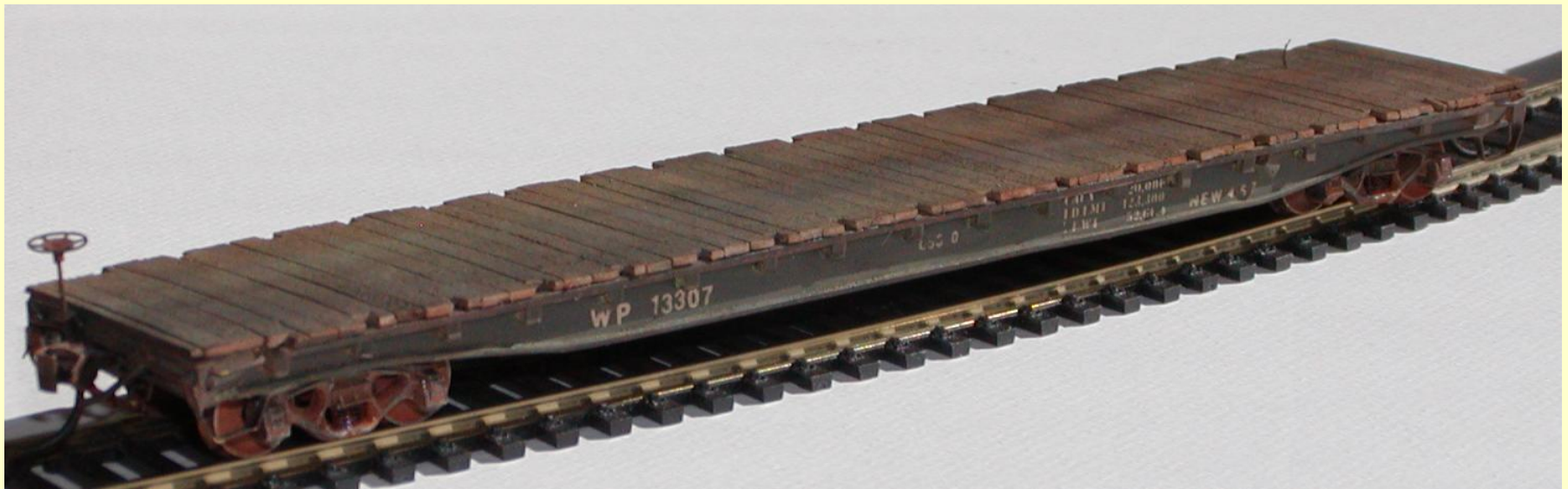


Scratch Built Flatcar

This presentation is the 1st in a series that takes you step by step in scratch building this Thrall flatcar from styrene



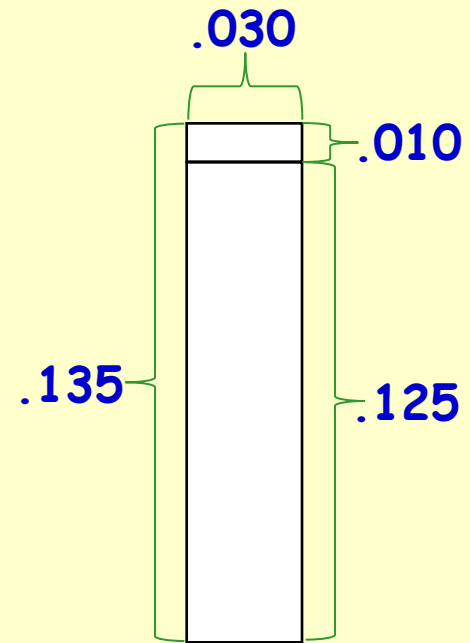
The prototype is a standard gauge 55'6" long steel frame flatcar. It may also be made into a narrow gauge and/or a shorter version by simply adjusting your measurements as you go.

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Most of the scales, other than HO, require some combining of available size styrene to make the desired size

Here's an example

$$N - .030 \times .125 + .030 \times .010 = .030 \times .135$$



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Begin by cutting the 4 beams a scale
55 ft 6 in long

Depending on your scale you will need:

Z - .020x.100

N - .030x.125 + .030x.010 = .030x.135

HO - .060x.250

S - .080x.250 + .080x.100 = .080x.350

O - .100x.250 + .100x.188 + .100x.015 = .100x.453

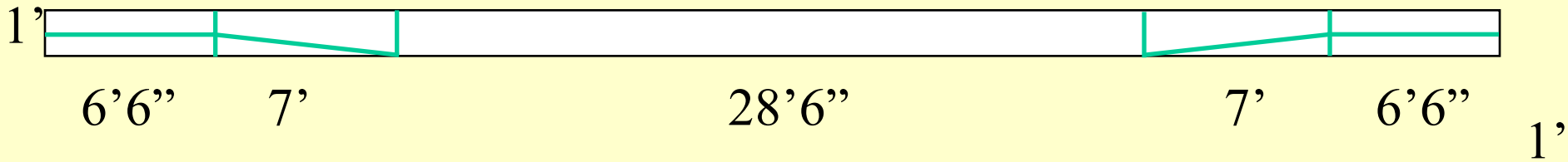
G - .250x.750 + .250x.188 + .250x.030 = .250x.968

If your scale requires multiple pieces then glue them together to
form the dimension shown in **BOLD**

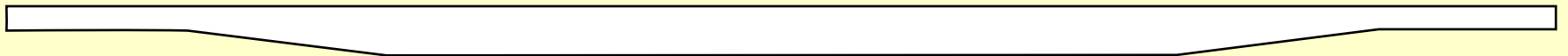
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Now shape all 4 beams

55'6"



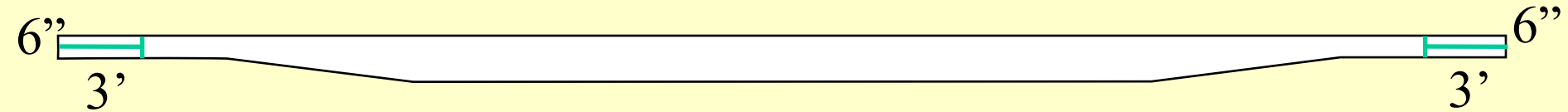
Measure and mark the first beam as indicated



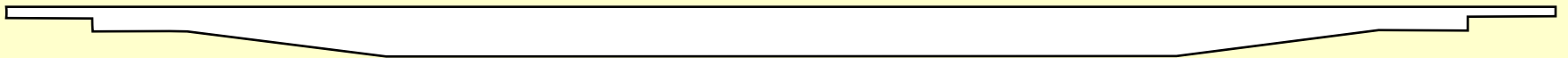
Then cut the piece to form this shape.
Use your first beam as a pattern to mark and cut the
other 3 beams

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Cut out coupler pockets in **2** of the 4 beams



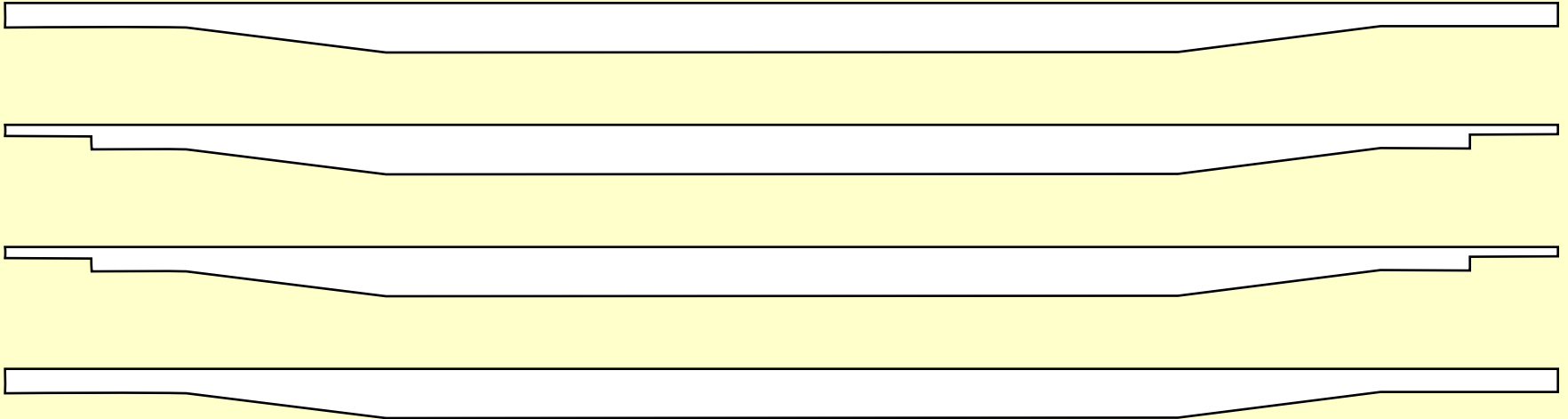
These two will form the center beam



These two will also need to be trimmed/sanded at each end to make them slightly shorter than the outside beams. This is to make up for the thickness of the channel material that will be used to begin the end sills. This will be done as we assemble the frame.

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You should now have 4 beams



2 inside with coupler pockets and
2 outside without coupler pockets

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To complete the beams we'll need to add a piece to create the horizontal bracing

Depending on your scale you will need:

Z - .010x.040

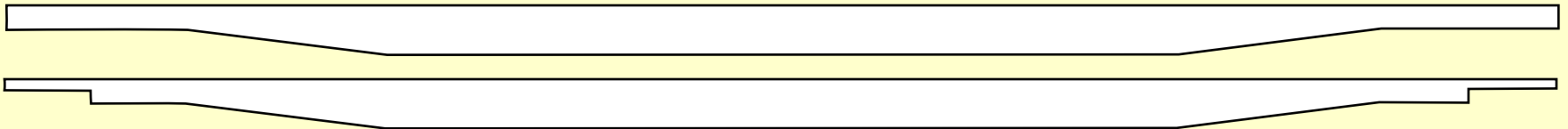
N - .010x.040 + .010x.015 = .010x.055

HO - .020x.100

S - .030x.125 + .030x.010 = .030x.135

O - .040x.188

G - .080x.375

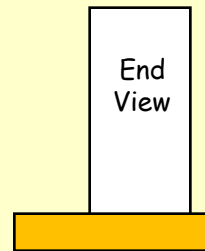


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Starting with the 2 outside beams and glue the horizontal section along the bottom profile of the beam



Glue to profile and trim ends



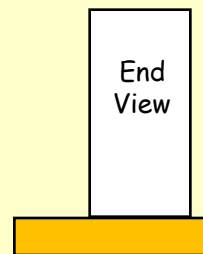
Just a very slight ledge on one side ($\sim .005$ in HO). For other scales this ledge is about $1/4^{\text{th}}$ the thickness of the horizontal section

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Repeat with the 2 inside beams leaving the coupler pockets clear



Glue to profile and trim ends



Just a very slight ledge on one side (~.005 in HO).

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Form the center beam by using the 2 beams with the coupler pocket cut outs and a length of spacer material the same dimension as the width of the beams

Spacer

Z - .020x.020

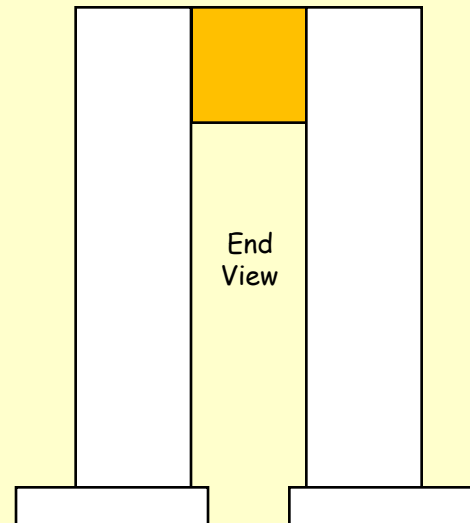
N - .030x.030

HO - .060x.060

S - .080x.080

O - .100x.100

G - .250x.250



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Next we'll add a piece of 2x12 cut **55 ft** long to the top, centering it in both directions



2x12 approx

Z - .010x.060

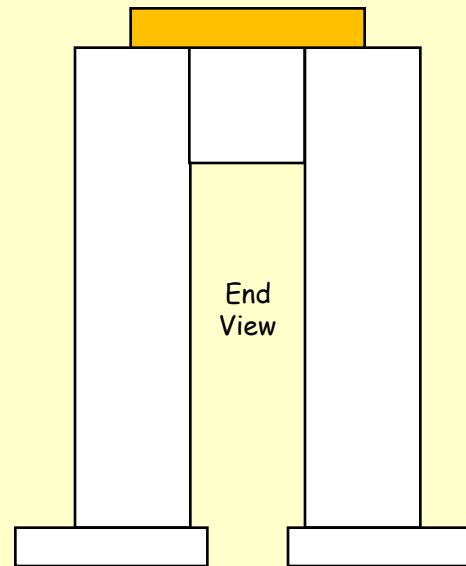
N - .015x.080

HO - .020x.125

S - .030x.188

O - .040x.250

G - .080x.500



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The end sills are made up of 2 pieces, we'll start with the inner piece made from channel styrene

Depending on your scale you will need:

Z - 1/32" channel

N - 1/16" channel

HO - 1/8" channel

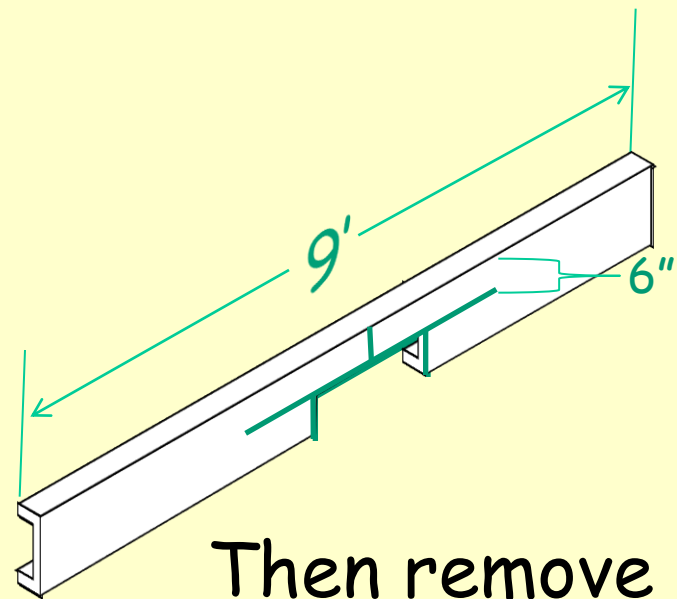
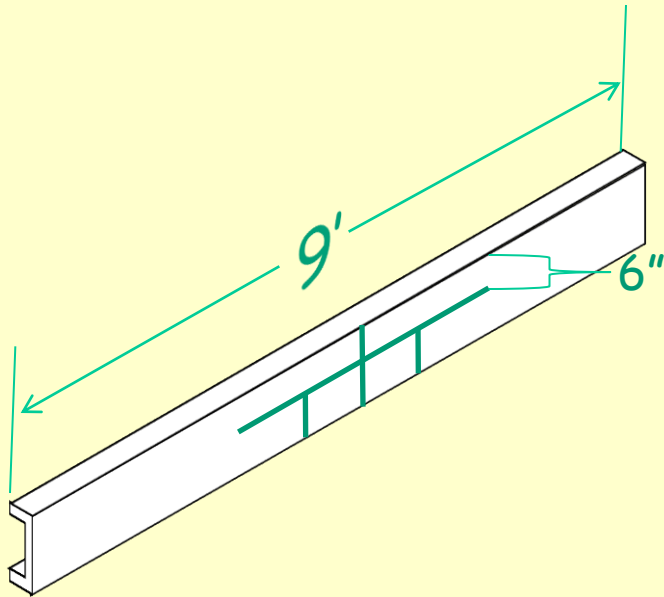
S - 3/16" channel

O - 1/4" channel

G - 1/2" channel

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Measure cut 2 pieces of channel **9'** long. Then mark a box the size of a coupler pocket, **6"** down from the top edge and centered on each piece



Then remove this section to make room for the coupler

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Now we'll cut the outer section of the end sills

Depending on your scale you will need:

Z -.010x.080

N -.010x.100

HO -.020x.188

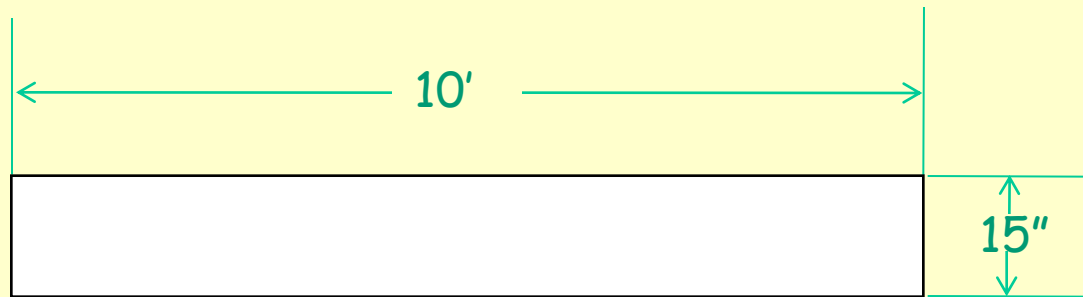
S -.030x.250

O -.040x.250 + .040x.080 = .040x.330

G -.080x.500 + .080x.188 = .080x.688

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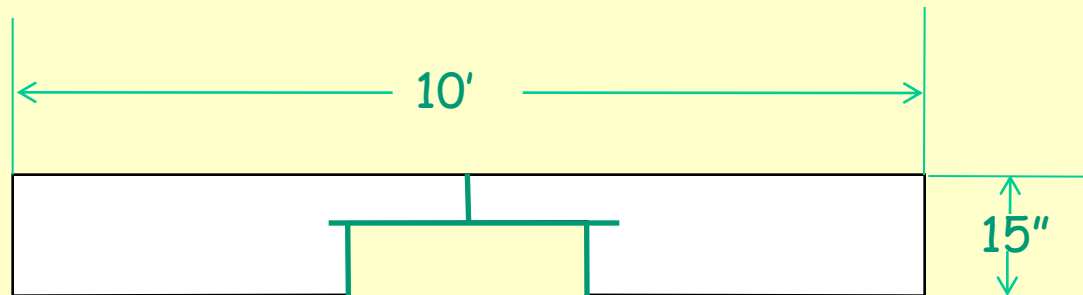
Cut 2 pieces a scale 10ft long



Measure, mark and cut the height at 15''

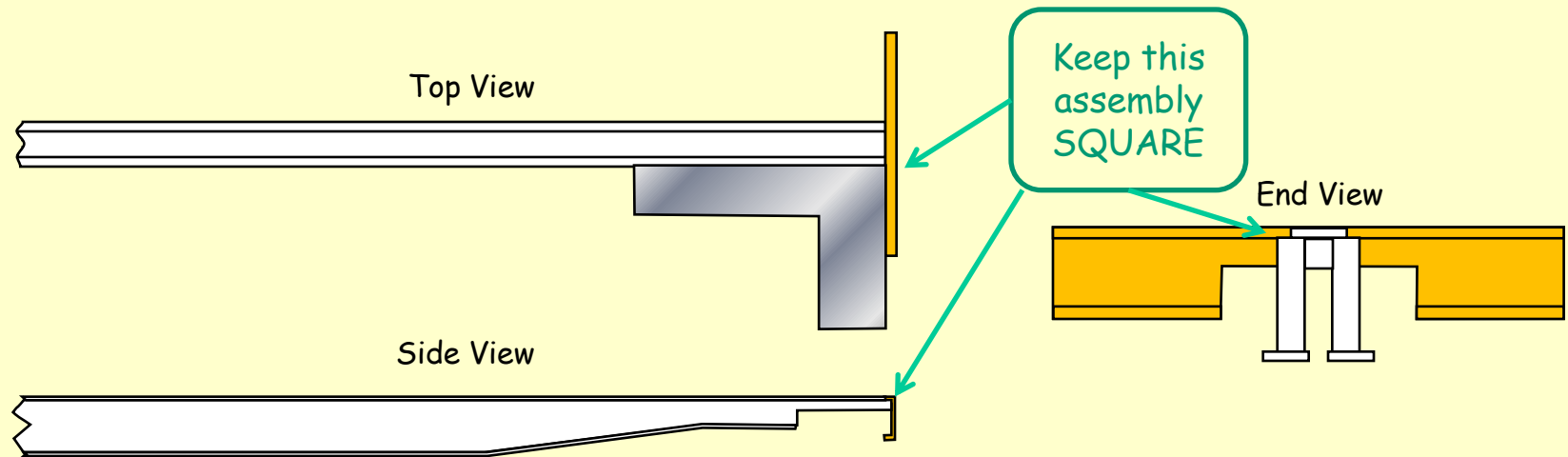
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Using the same techniques as we did on the channel, we need to cut out for the coupler pocket on each outer sill section



Scratch Built Flatcar

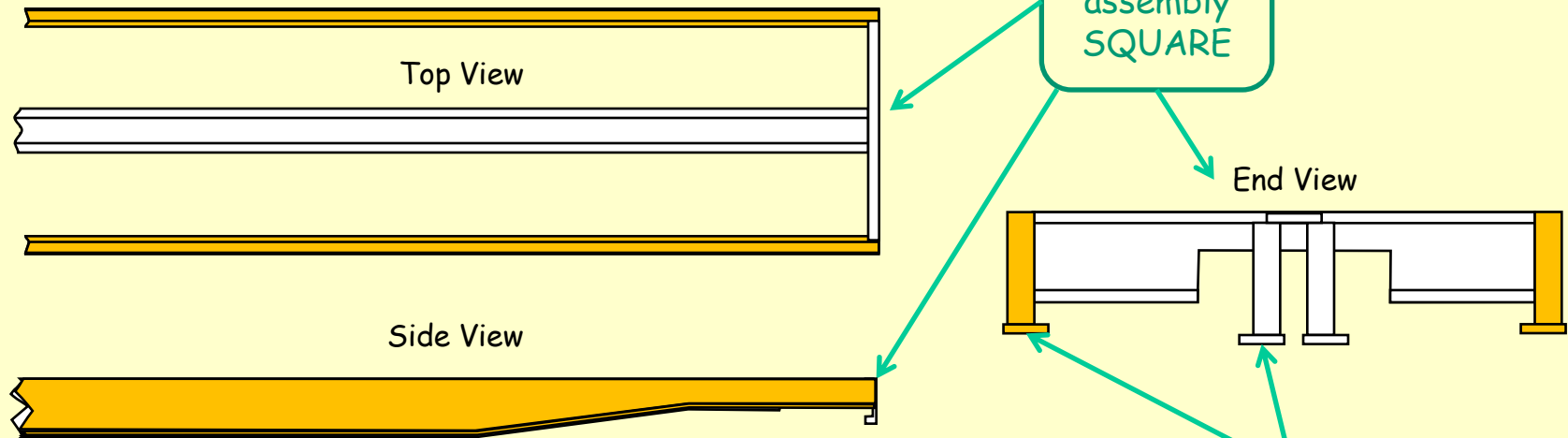
Now it's time to assemble what we've got so far. Test fit along with the side beams and trim the ends of the center beam to account for the thickness of the channel material



Glue the channel material to the center beam structure with the beam centered on the sill and flush at the top. **Let this dry before going on.**

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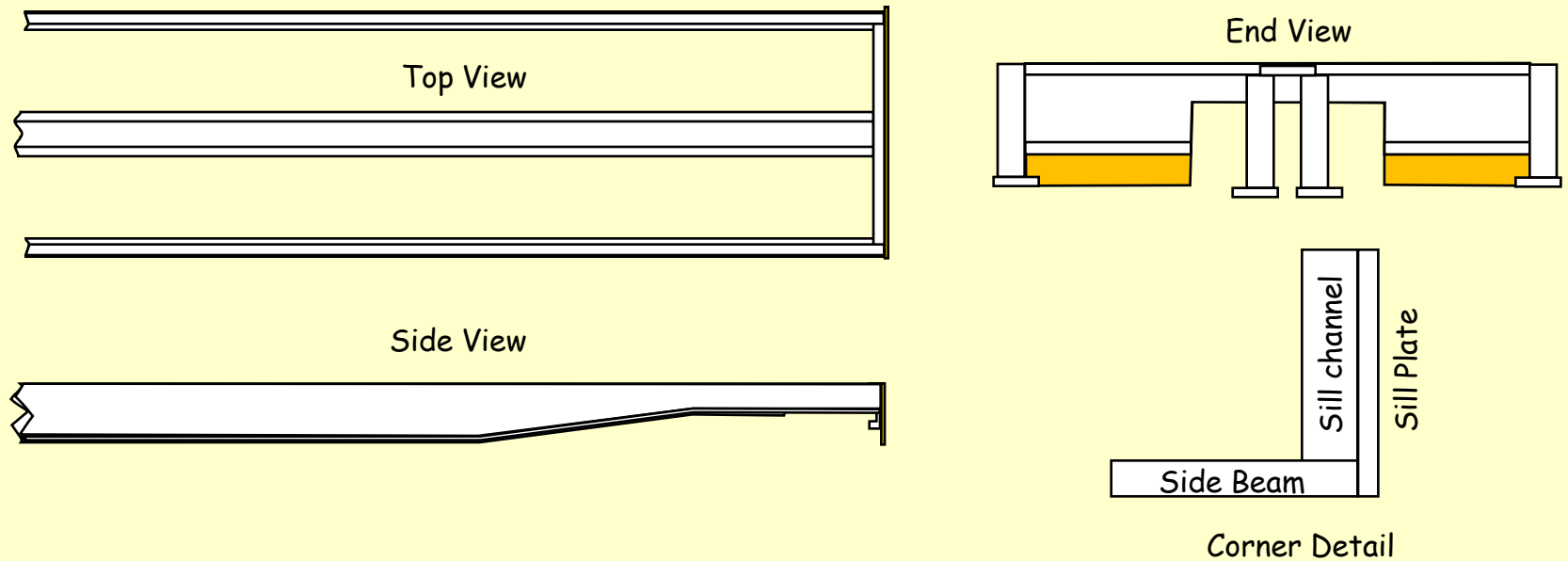
Now add the 2 outside beams to the outside edge of the sill beam channel



The sides glue to the outside edges of the channel material, flush on the top

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Complete the end sills by adding the outside piece we cut earlier



Then trim the width to match the sides
Repeat the last several steps for the other
end of the car

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The last step in this phase is to cut and add the bridge beams

Depending on your scale you will need:

Z -.020x.100

N -.030x.125 + .030x.010 = .030x.135

HO -.060x.250

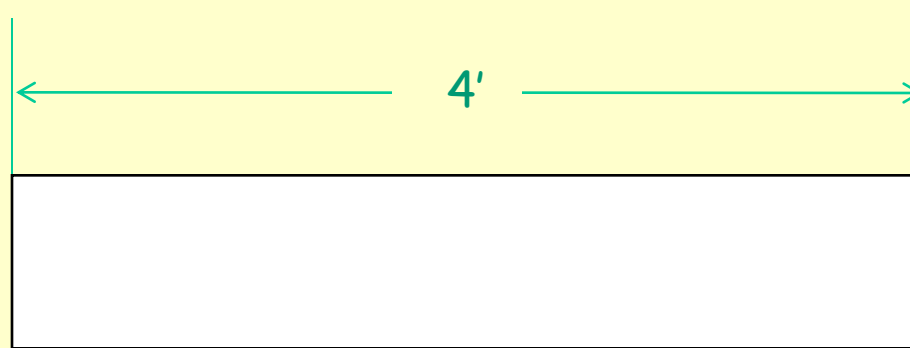
S -.080x.250 + .080x.100 = .080x.350

O -.100x.250 + .100x.188 + .100x.015 = .100x.453

G -.250x.750 + .250x.188 + .250x.030 = .250x.968

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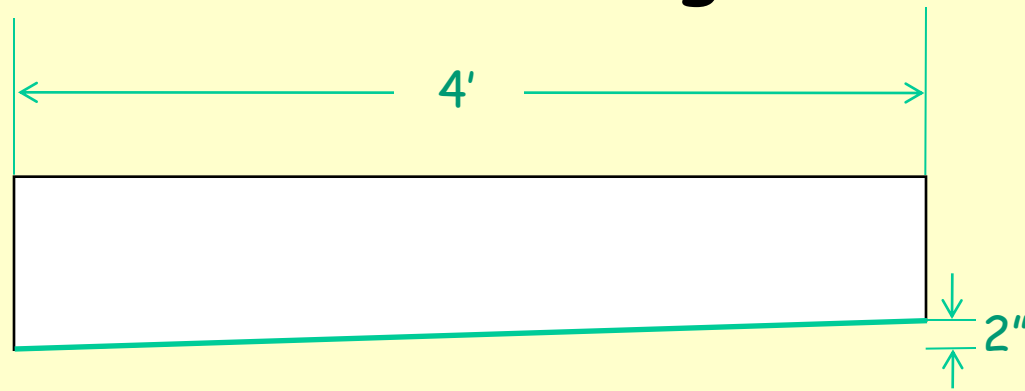
Cut 8 pieces a scale 4ft long



These are a little long and will be trimmed to fit as they are installed

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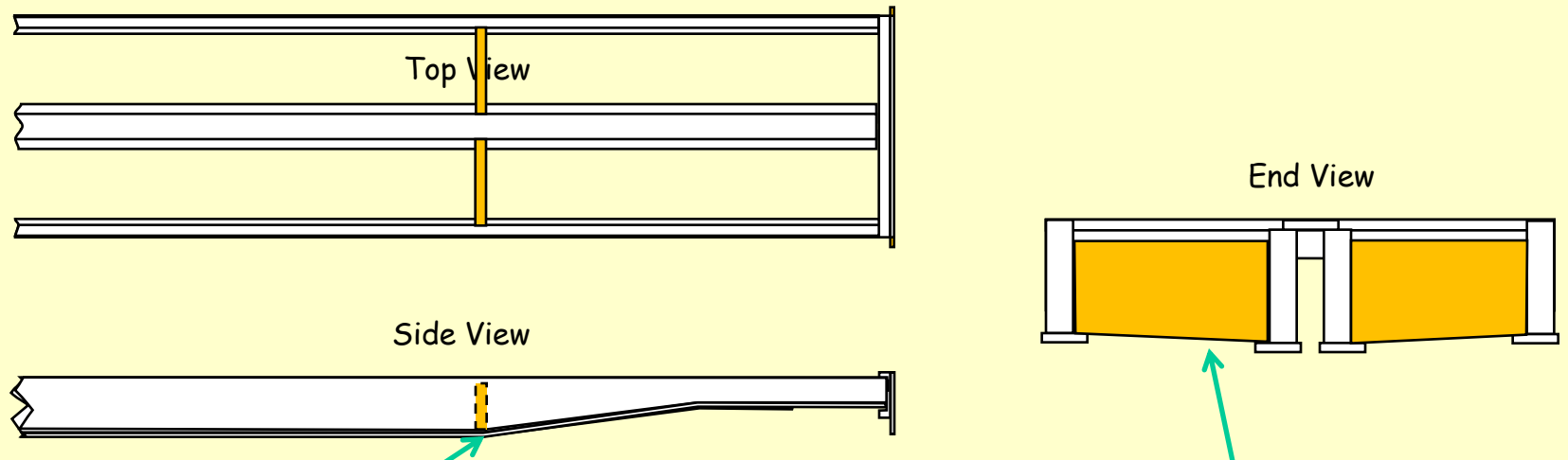
We need to put a slight angle along the bottom of all 8 bridge beams



This is to compensate for the center beam assembly being slightly lower than the end beams

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Now we add the 8 beams to our cars frame,
trimming to fit as we go

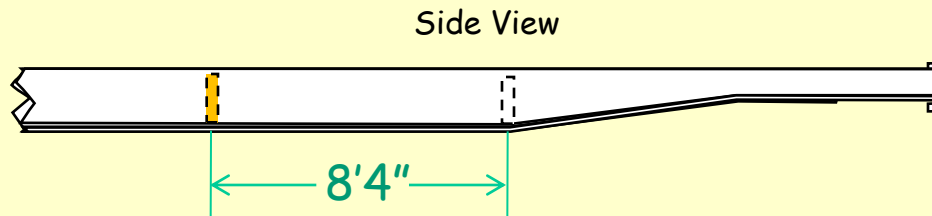
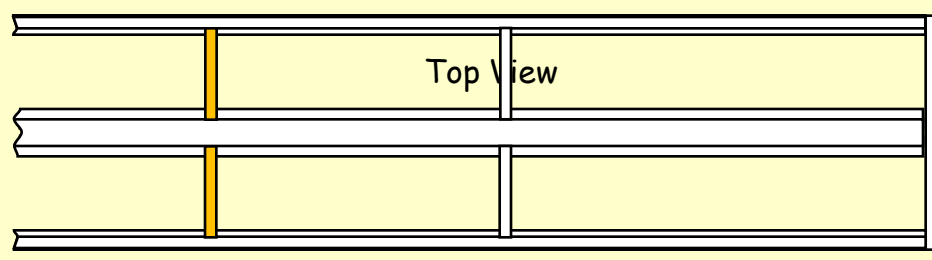


The first 4 are attached where
the side frames begin their bend
upwards
(repeat on other side)

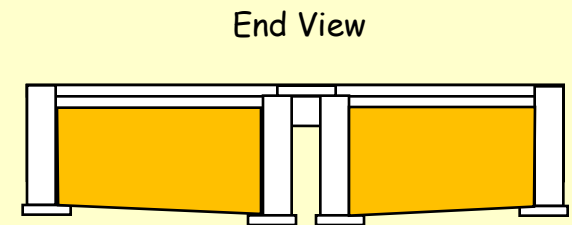
The Bridge Beams should
rest on the ledges of the
side and center beams
and a small gap should
exist at the top

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Then measure inward 8ft 4in and add the middle beams



NOTE: If you've chosen to make your car shorter then the center spacing will be smaller or you may even delete one set of center bridge beams and use only 6 instead of 8



This should leave approximately an 11'10" space in the middle of the car

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To this step we need to add a bottom plate to each of the bridge beams

Depending on your scale you will need:

$$Z \text{ -.010x.040}$$

$$N \text{ -.010x.040 + .010x.015 = .010x.055}$$

$$HO \text{ -.020x.100}$$

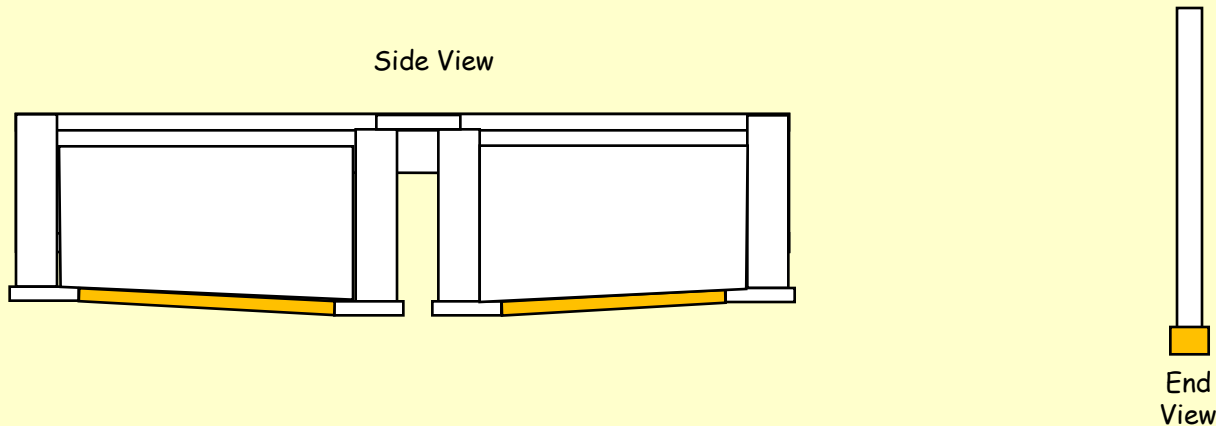
$$S \text{ -.030x.125 + .030x.010 = .030x.135}$$

$$O \text{ -.040x.182}$$

$$G \text{ -.080x.250 + .080x.125 + .080x.010 = .080x.385}$$

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Cut 8 pieces to fit



And attach them to the angled sides of each bridge beam, centering them and abutted to the bottom caps on the main beams

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Your car should look something like this at this point

