TMS Installation Opions

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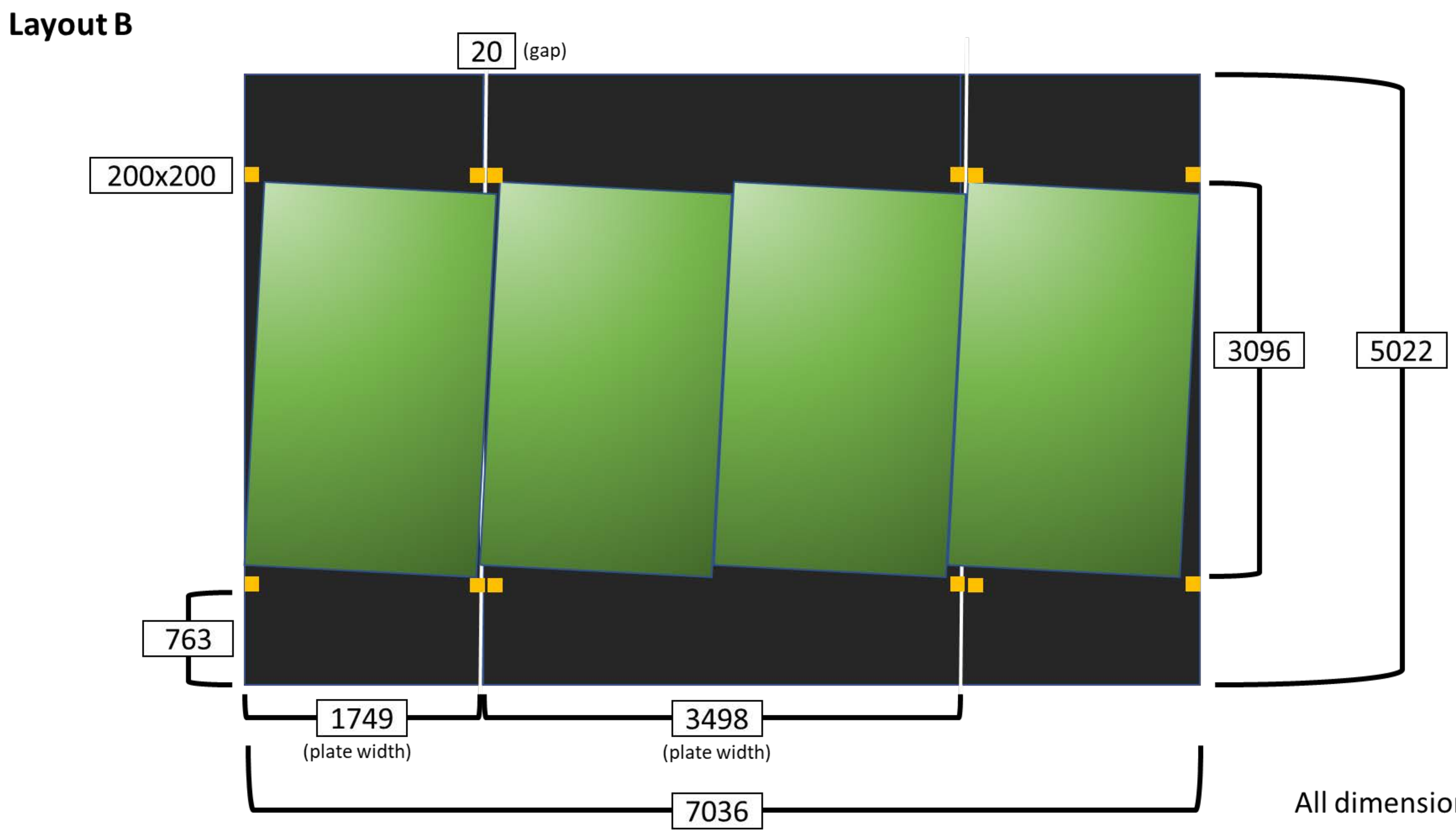
What Problem Are We Trying To Solve?

- The basline (CDR) design traps the electronics
- Installation is done by alternating steel and active planes – if one slodes down, so does the other
  - If equipment needs to be rented, we need to rent it for many days, even though we don't use it most of a day
  - We do not have the option to pre-assemble steel on the surface

- Life would be easier iof we could remove and install detector panles

Detector Plane + Detector Panel Geometry (Baseline)

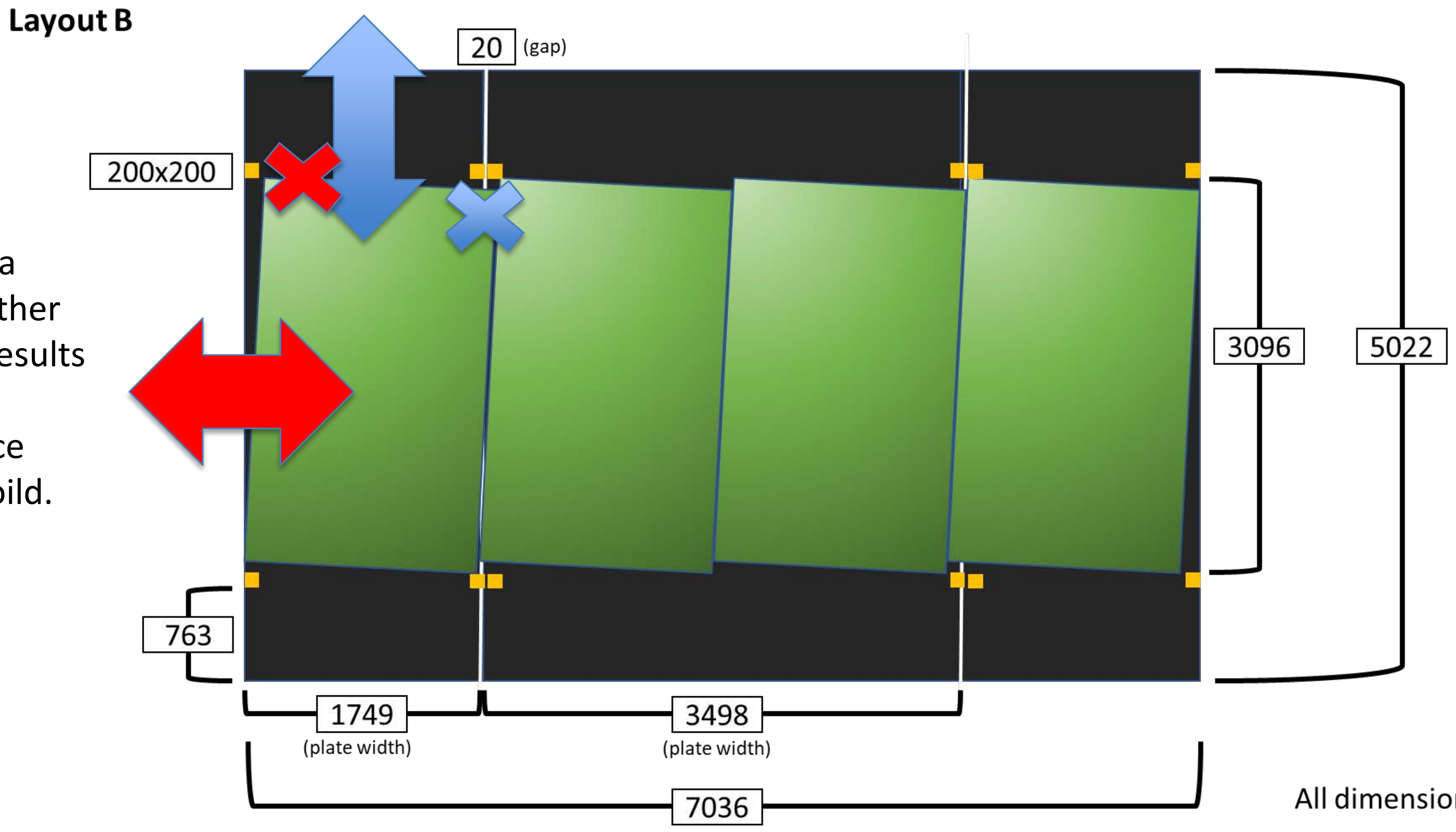


All dimensions in mm

Counter boxes are 1710 x 3010

Detector Plane + Detector Panel Geometry (Baseline)

Extracting a panel in either direction results in an interference wity the coild.



All dimensions in mm

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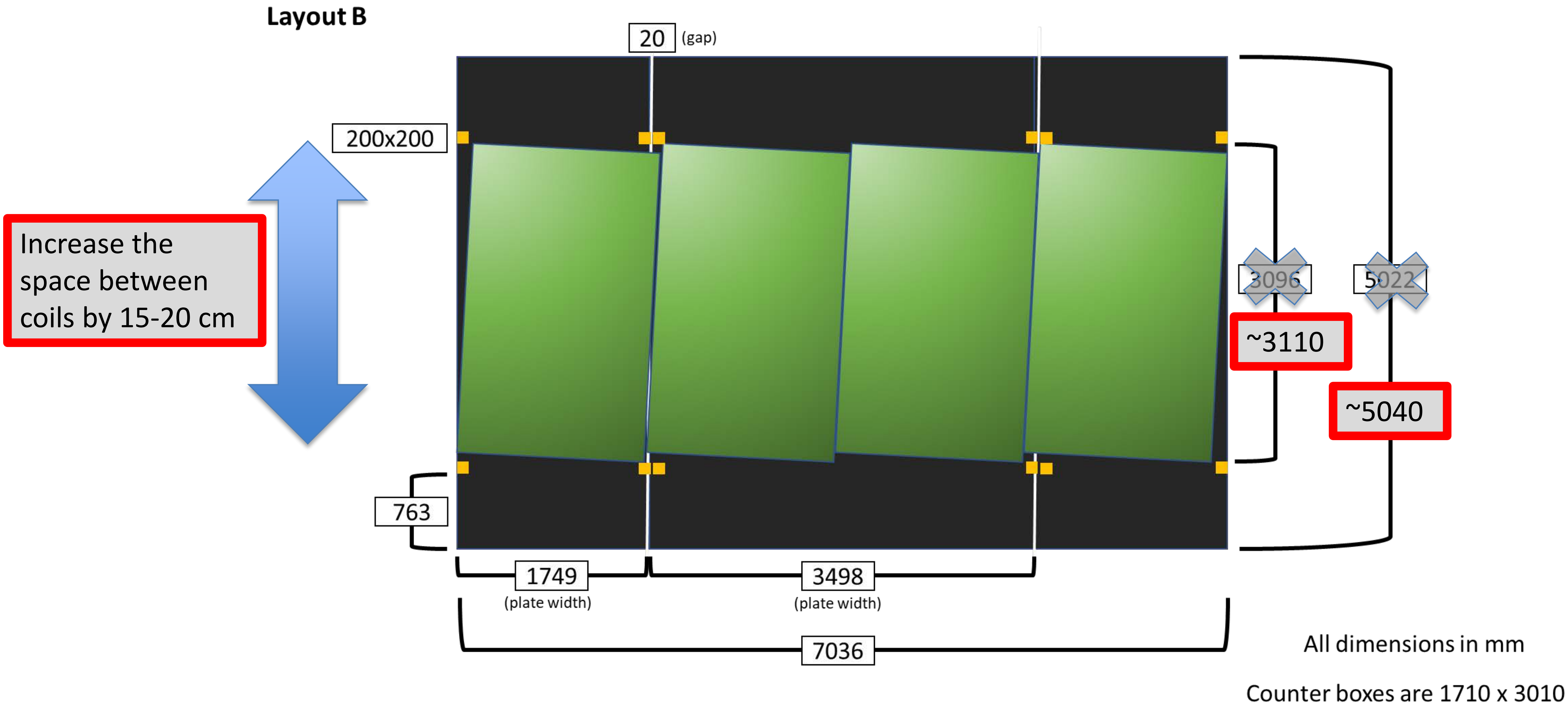
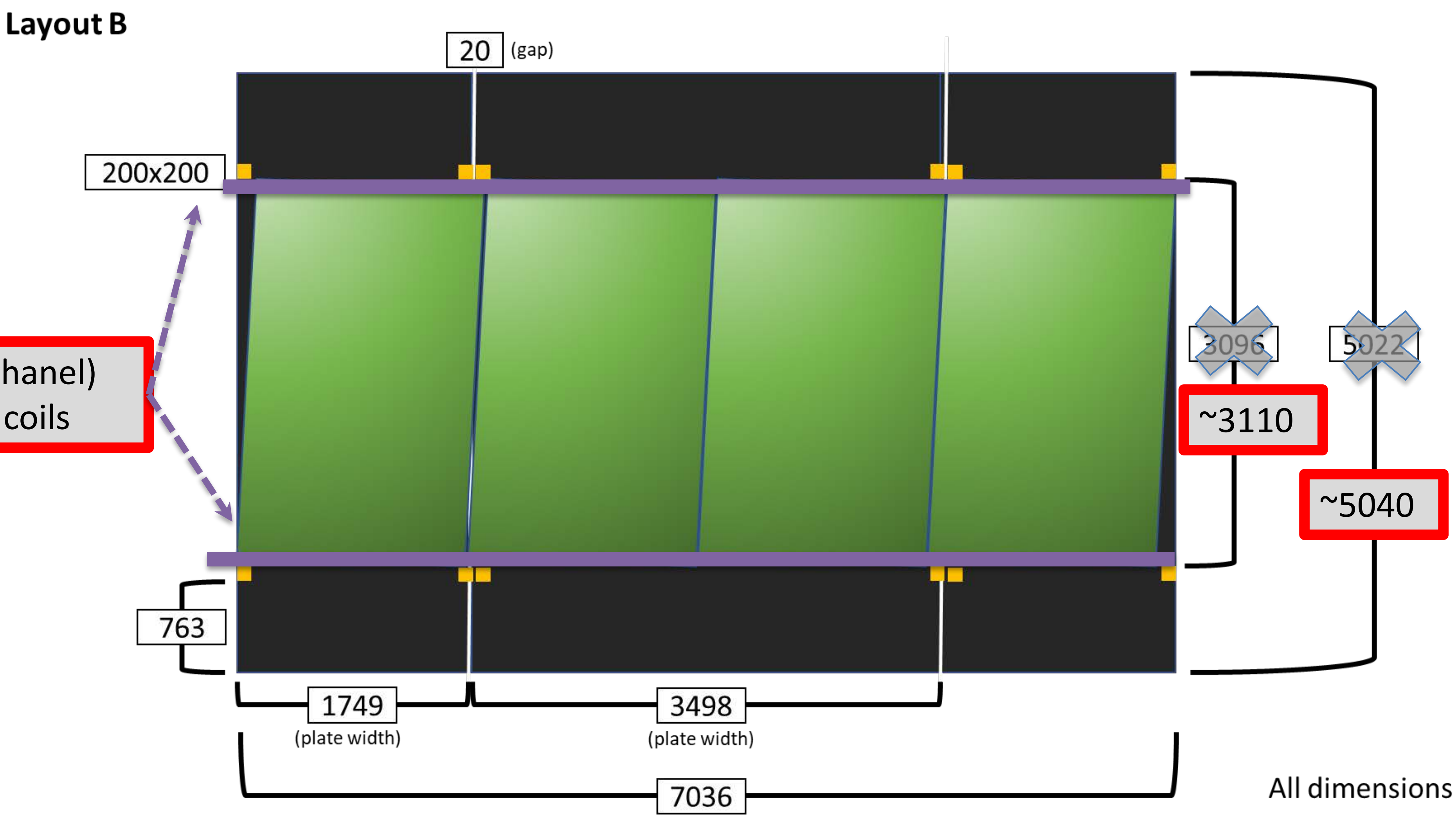
Fixing the Problem – Step 1



Fixing the Problem – Step 2

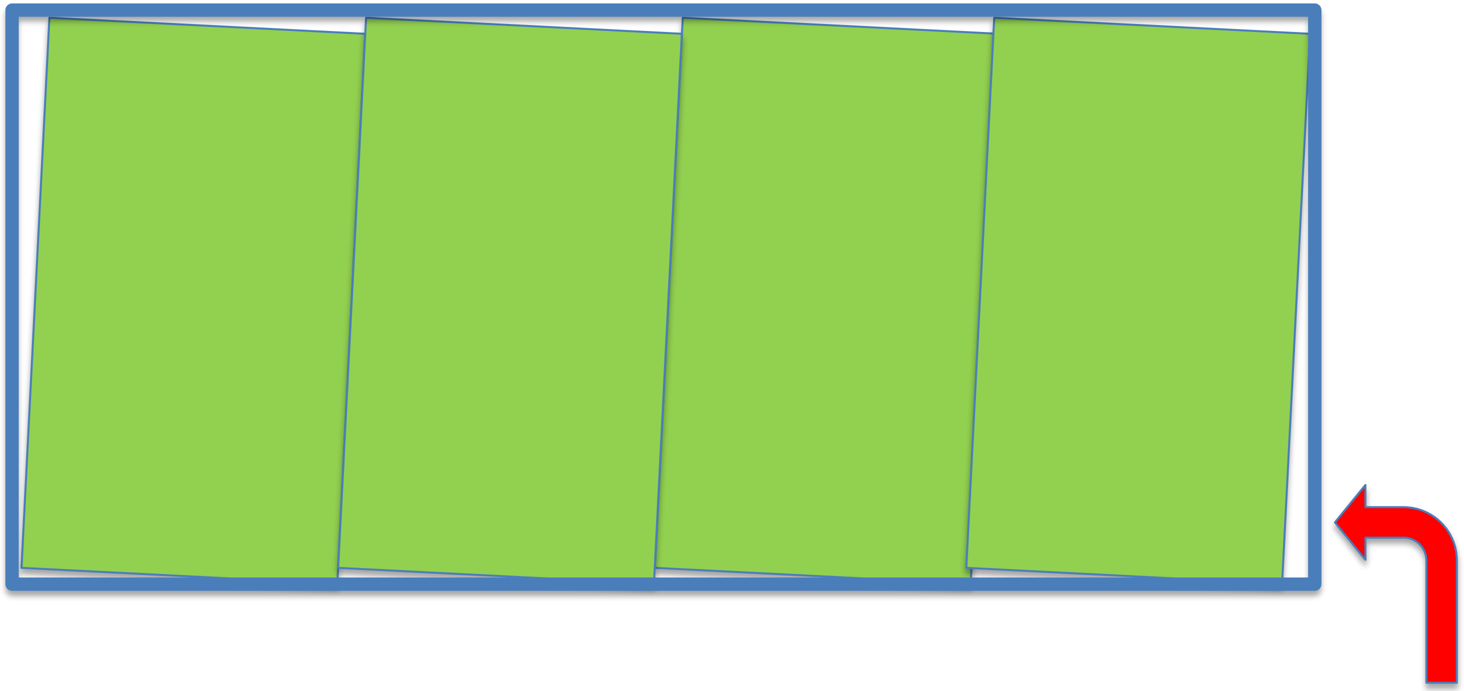


All dimensions in mm

Counter boxes are 1710 x 3010

Fixing the Problem – Step 3

- All four panels go into a Unistrut-like frame.
- There are spring-loaded casters on the top and bottom sides.
- All four panels slide in (and out!) as a unit.



Electronics connections probably go here

Comments

- There needs to be a pin or similar locking mechanism to hole the panel fram in place. This is especially important with PRISM motion.

- This design depends critically on having flat steel plates

- There is little to prevent the panel fram from twisting during handling
  - This is a rectangle. Triangles are strong. Rectangles are not.
  - We need to have a “frame frame” to hold it flat as we roll it onto TMS
  - Thicker scintillator will be helpful and perhaps necessary – doubling the thickness increases the thickness by a factor of 8. This also have physics advantages
  - We could think about a diagonal brace, but is there room for it?

- The spacers need to be designed to be removable for this to work.

Comments 2

- Four panels is no longer a “magic number”.
  - We could go to 6 or 8 – see Andy Furmanski’s talk
  - Some of these options match better to the CAEN and/or KlauS optoions

- We might want something like Kevlar between the frame and the pamels
  - Prevents damage udirng insertion/extraction, and helps with light tightening

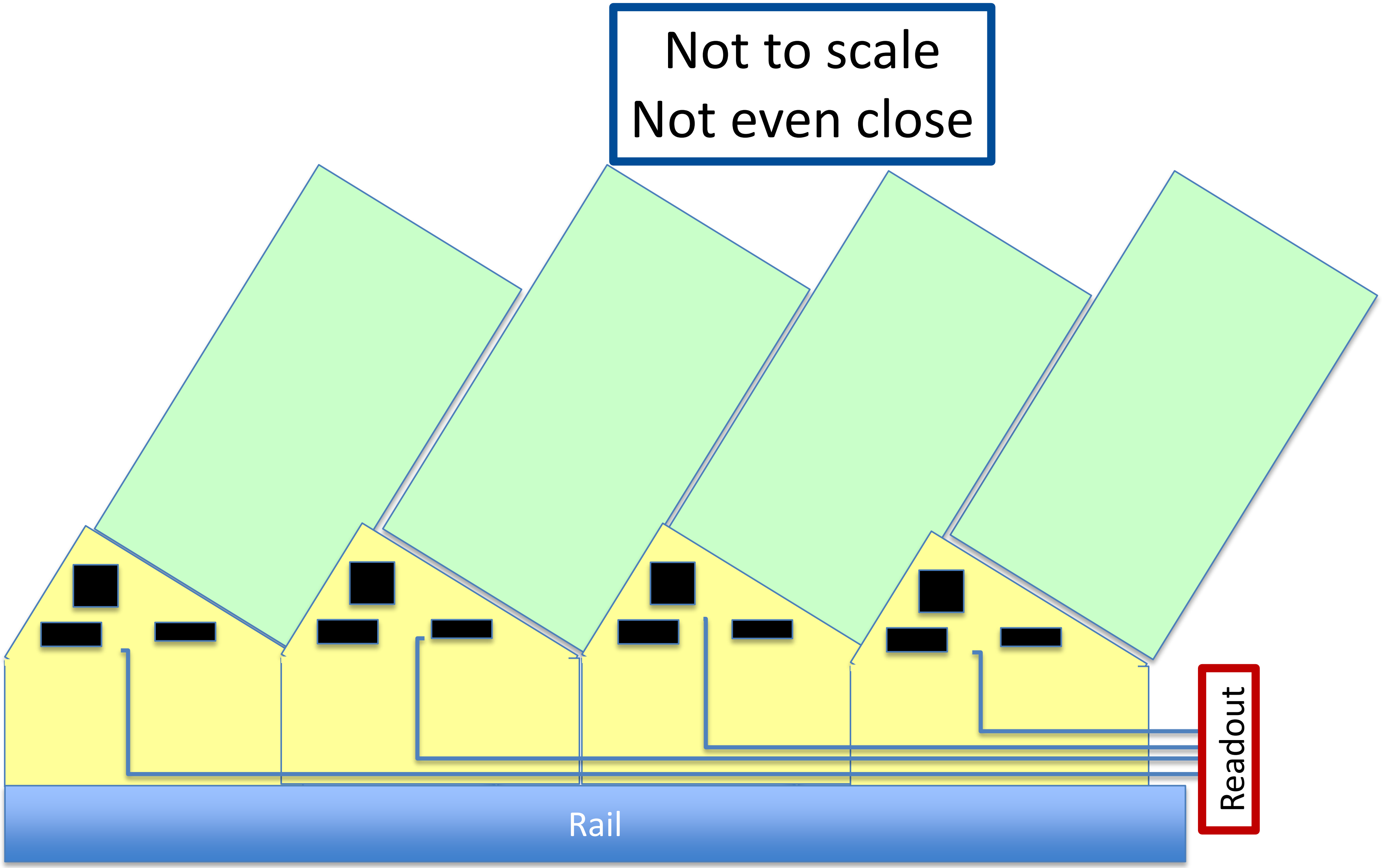
- Bringing out 400 cables (the baseline design) is going to be a lot easier than 19200 (some of the alternatives) – this reduces the available space for connectors

- This was drawn for the CDR option, but it works with the Short Stack or orthogonal counters as well.

Electronics Locatios

- The digitizers can go in the triangular spaces. Not enough room? Make them pentagonal.
  - We have 18 square centimeters per panel – but it is long and skinny.

- I drew this with all signals going to the bottom left, but we have our choice – top//bottom and left/right



Conclusions 1: Cons

- Cost – this probably is not cost neutral (but we don't know for sure – there are offsetts)

- For the same performance we need more steel
  - For each centimeter we move the coils without adding more steel, we lose 1% of the B field

- This restricts where we can place cables – cables from one layer cannot block extrtaction of another
  - There are likely additional restrictions elsewhere – e.g. what side do we install from and is there a mezzanine on that side or the opposite side?

- As mentioned earlier, we need more tooling: these weigh 1000 pounds and are the size of billboards
  - 2000 pounds if we double the scintillator thickness.

- Installing the rails on the plates is non-trivial. We also need to ensure we do not bend or twist them.

- Magnetics – does this have to be stainless or aluminum?

Conclusions 2: Pros

- Electronics and/pr bad panels can be repaired or replaced.

- Installatioon of the steel and the detectors is decoulpled – saves installation time (pissibly as much as six months)
    - We could think about purchasing the steel early (CD-3A in DOE-speak)