Task #1: The Tools

Task #2: Pitches & Distances

The six minimum distances are as follows:

- Poly pitch 1 : $0.06 + 0.13 = 0.19$

- Minimum metal extension beyond contact when minimum wire width is used : 0.04 when metal1 wire is the same width as the contact.

- Poly pitch 2 (Minimum poly pitch with contact to active in between) : poly width + 2*contact spacing to gate + contact size $= 0.06 + 2*0.055 + 0.09 = 0.26$

- Poly pitch 3 : poly width + 2*contact to poly overlap, all sides + contact to poly width + poly space $= 0.34$

- Poly pitch 4 : same as poly pitch 3 ie. 0.34

- Minimum drain extension : contact spacing to gate + contact width + minimum contact overlap $= 0.055 + 0.09 + 0.015 = 0.16$

Task #3: Layout of Ripple-Carry Cell

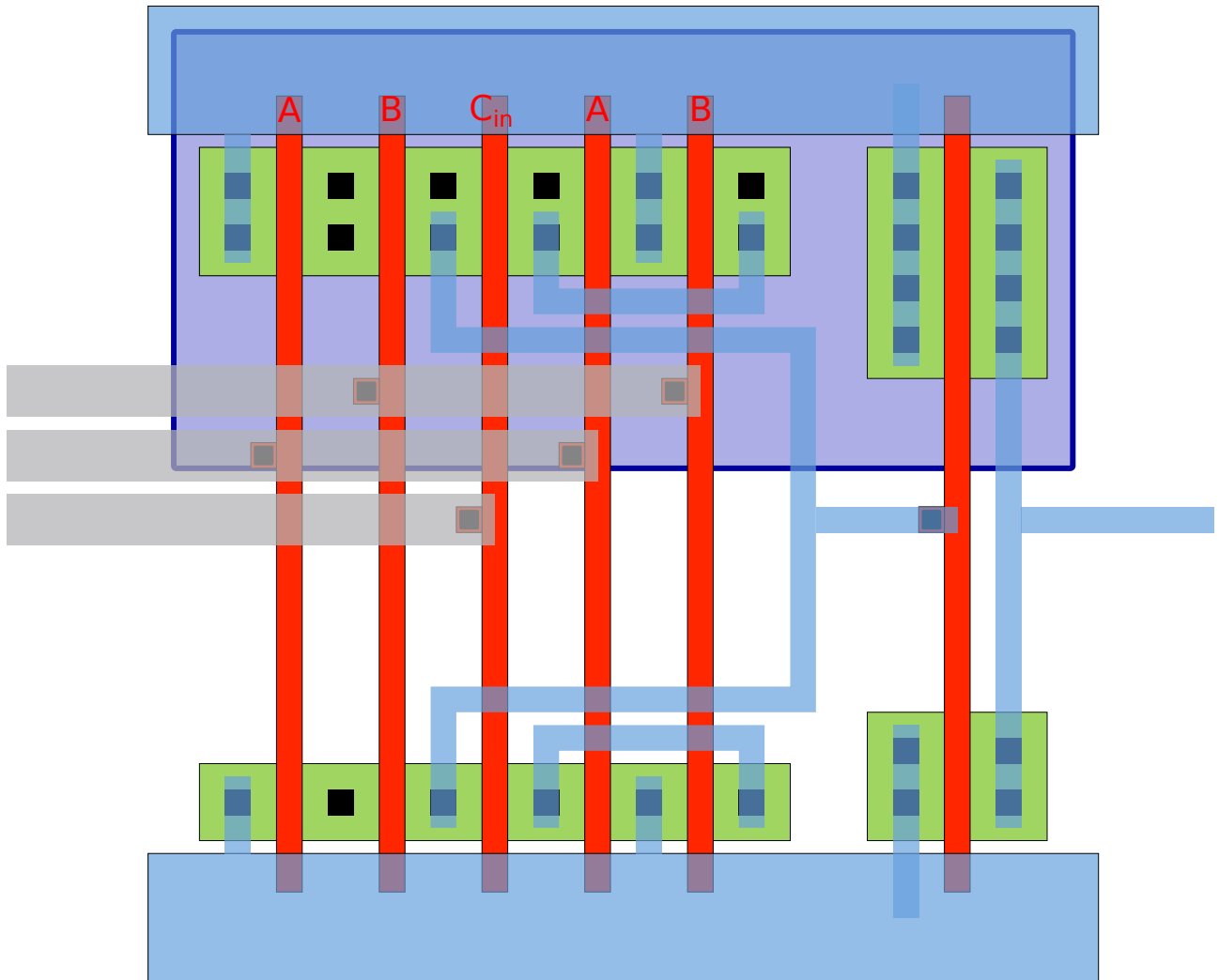The layout for the ripple-carry cell can be drawn as follows:

Figure 1: *The layout of the ripple-carry cell. Not to scale. Note the positions of the input and output when cells are placed next to each other.*

Task #4: Parasitic Delay Calculation

Since the ripple-carry cell is scaled X2 and the output is tied to two active areas that share two gates each

$$p_{\text{ripple}} = \frac{4C + 2C}{3C} = 2$$