Standard Cell Layout Guidelines

• Boundary layer (e.g. prbound, grlogic).
  • Non-physical. Defines height, width of cell.
  • Placer will use to abut and align cells.

• Some layers (e.g. NW, P-select) extend beyond boundary.
  • Will overlap with neighbors
  • Needed for legal layout when cell is alone or at an edge
Substrate & Well Contacts

- Well/Sub contacts on pitch (pitch = width + spacing)
  - Can straddle boundary if exact and consistent
  - Here all contacts have x-coord = Pitch*(\(\frac{1}{2} + N\))
  - Vertical abutment -> contacts will exactly coincide
  - Partial coincidence results in illegal shapes.
  - Cell width should be multiple of pitch

Spacing to boundary >= \(\frac{1}{2}\) min. spacing of relevant layer
Signal & Supply Pins

- Defined point for connections between gates
- Must be on a “routing grid”
  - Distinct from the manufacturing grid of a process/PDK
- Should be accessible on Metal 1
- VDD/VSS busses at top and bottom should connect by abutment to adjacent cells both vertically and horizontally

Spacing to boundary $\geq \frac{1}{2}$ min. spacing of relevant layer
Routing Grid

- Vertical wires evenly distributed on “vertical grid”
- Spacing sufficient for at least one via plus minimum spacing to an adjacent wire (line-on-via spacing)
- “Via-on-via” spacing (not shown) allows two adjacent vias
  - Provides more flexibility for via placement but fewer routing tracks
- Horizontal grid similar.
Routing Grid

• Routing grid should be either centered on grid at the origin (wires centered at N*HG, N*VG) or be offset by exactly one half-pitch from the origin (shown, wires centered at (1/2+N)*XG).

• Height is constant multiple of HG. Width is multiple of VG.
Routing Grid

- When cells are tiled together, grid is continuous, even with cells of different width
- Sub/Well contacts (not shown) willl also coincide