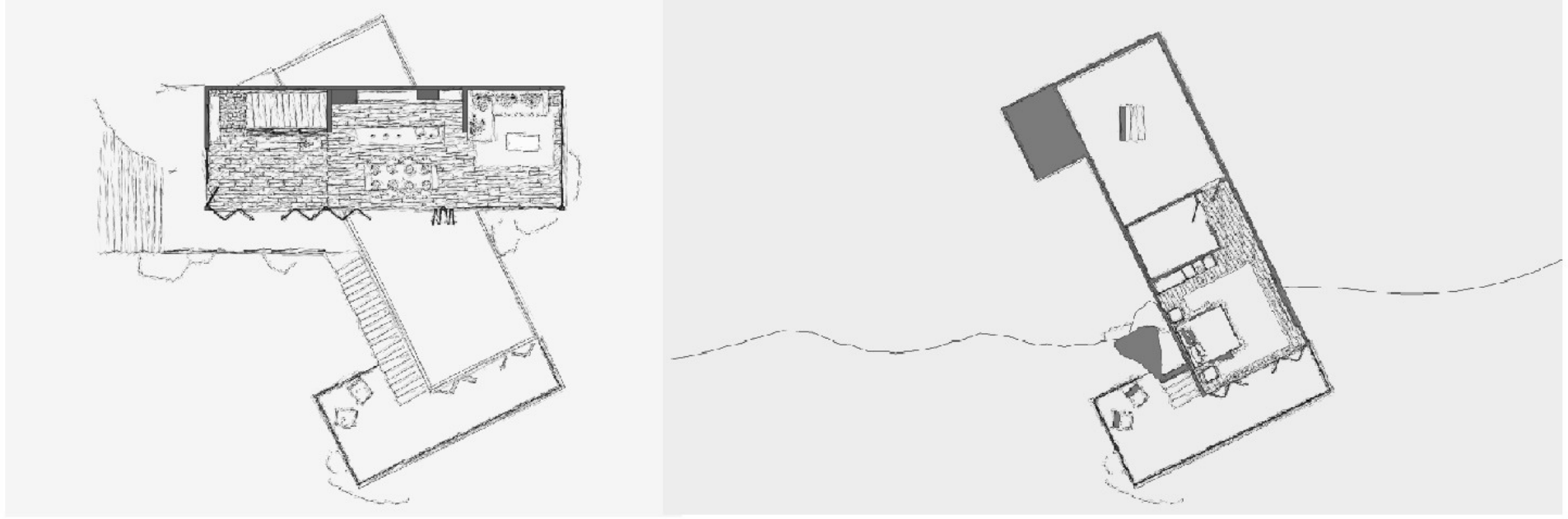
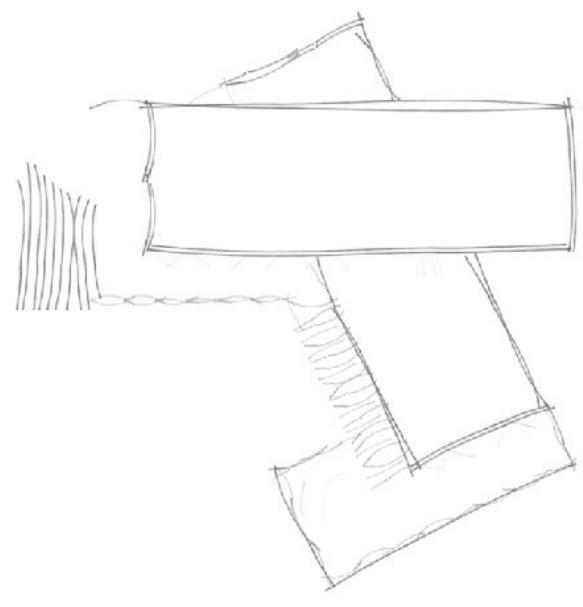


# simple yet refined

Flat Roof

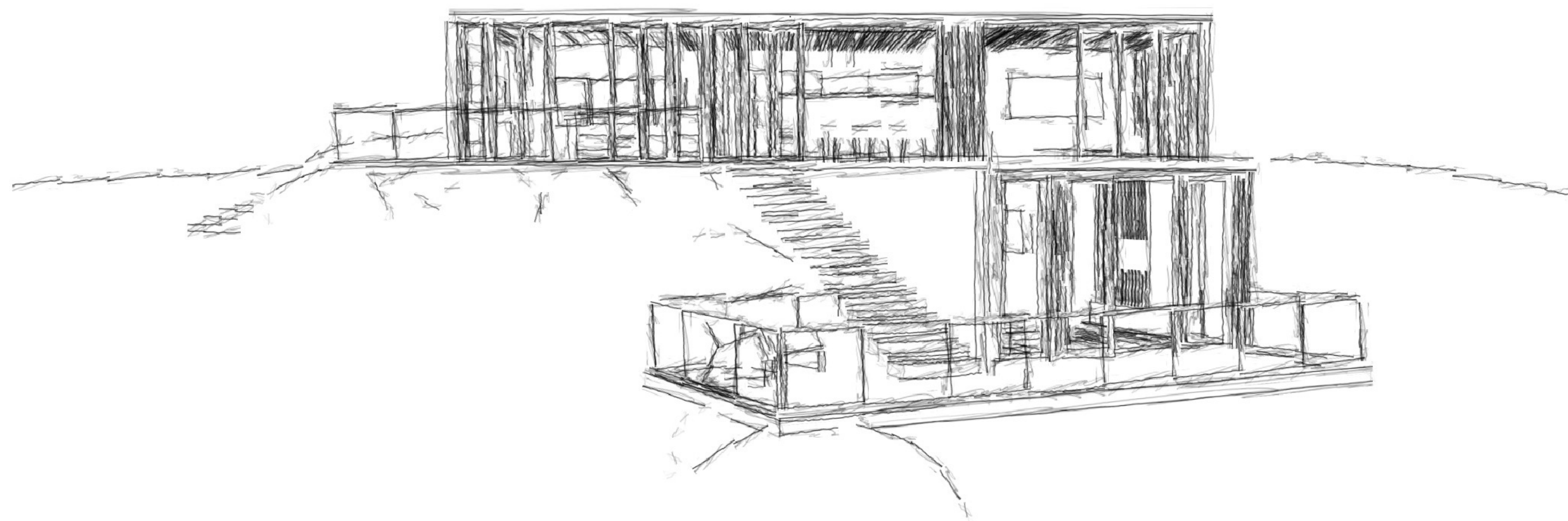


## The Modern Flat Roof

**Uses & Benefits:** Modern architecture has traditionally been characterized by flat roofs. Flat roofs create long horizontal planes, reminiscent of the broad horizon line seen often in nature. They're simple in form and function, and are a good example of the modernist principle of "clean lines". Flat roofs can cantilever into daring overhangs for shade protection and solar gain control. They can be planted to create usable vegetated gardens and green roofs. They can even be accessible, unlike other roof styles, providing additional living space and used for viewing platforms displaying panoramic views of the surrounding landscape.

**Framing & Insulation:** Flat roof framing is relatively straightforward. It can be framed like a floor system with horizontal framing members at 16" 19" or 24" o.c. Depending on the span, many different materials can frame a flat roof: 2x framing, wood joists, timber framing, laminated beams, steel, concrete, or SIPs. This flexibility in design allows for more opportunities on how the ceiling can be detailed and if the framing members are concealed or exposed. Insulation can be located between ceiling joists or above the roof sheathing. It can be batt insulation, spray foam insulation, rigid board insulation or SIPs. Just don't forget to determine if your roof needs to be vented.

**Rainwater discharge:** Contrary to its name, a flat roof isn't actually flat. Flat roofs are built with a slight pitch of at least 1/8" per foot so water can drain – either to centralized drains, scuppers, or a gutter system. This modest slope can be achieved in a number of ways :On larger roofs, it's probably cheaper to use tapered foam insulation on top of the roof sheathing .On small jobs, ripping down 2x4s into wedges and nailing them to the joists is probably more cost-effective. There's always the option of sloping the roof framing entirely but that's usually over-complicating things. The unfortunate side effect of such a modest slope is that the angle isn't big enough to look intentional. It can sometimes actually look "crooked" to the eye, which isn't a good design move. There are creative ways to hide this "crooked" eave.



## Building Siting: Where to locate the home on the land

The first big design element to consider is the siting of the home. Each site is unique with different topography, solar orientation, climate, views, access, context, and vegetation. Each site also has a unique set of challenges and opportunities. By exploring your site's characteristics, you should be able to determine if the terrain is steep, if you have awesome views to the East, if you have a really old oak tree worth preserving, or if your lot is hemmed in with really close neighbors. Depending on your location, you may need to address some or all of these siting elements. Homes on rural sites typically need to address topography, views, vegetation, access, and connection to the site. Those on urban and suburban lots will most likely address zoning constraints, security, views, and the surrounding context more than anything else. Nonetheless, locating the home on the site (and site planning in general) is one of the first things you should do.

## Space Planning: How the spaces are organized

Figuring out how to organize the spaces in your home goes hand in hand with figuring out the building massing. You can start with an idea for the building massing then infill the footprint with different spaces. Or you can start with figuring out what spaces want to be located next to other spaces and soon enough you'll start to see a pattern and recognize a building massing start to form. Either way, the design process tends to go back and forth between building massing and space planning until both are refined into a working design. Many architecture students will be familiar with the book, *Architecture: Form, Space & Order* where Francis Change illustrates the five main patterns for organizing space: centralized, linear, radial, clustered, and grid pattern. These patterns are a good jumping-off point to start thinking about how to organize space. Here are some additional (more actionable) themes to explore: Public versus private spaces – Finding a clear way to organize spaces makes for a better design. Strategies for this include grouping private spaces together and public spaces together in separate clusters (either on the same floor or different floors), organizing them along an axis (private spaces on the north side, public spaces on the south), or a spoke-and-wheel approach (public spaces are the nucleus with private spaces branching out from it). Adjacency – Understanding each specific function and how it relates to the spaces around it can inform which spaces should be next to each other. Strategies for this include grouping spaces based on similar types (bedrooms together), frequency of use (kitchen near the pantry), related infrastructure (kitchen and bathrooms near each other or stacked to consolidate plumbing), privacy (bedrooms away from street-facing side), and related functional or performance goal (needing a bedroom on the first floor or needing outside deck access for the kitchen). Circulation – Creating a thoughtful approach to how you will circulate through the house can help define your organizational strategy. Strategies for this include defining a circulation axis or spine in which rooms are located off of (whether you justify the circulation to one side or bisect the house with rooms on both sides), stacking circulation paths (to improve efficiency and intuitiveness), and having discreet circulation paths through spaces (to reduce dedicated hallway space). Being thoughtful about space planning and the organization of spaces has a lot of advantages. It feels better, it looks better, it flows better, it's more efficient, it maximizes access to natural light, it minimizes construction cost, it centralizes support functions, it improves productivity, it improves accessibility, it minimizes traffic congestion, it eliminates redundancies, and it improves convenience. Once we've thought about the spaces, we typically sketch out some space diagrams to convey our thinking about relationships, views, circulation, and massing. It's super rough and sketchy, but it enables us to think through the project requirements and program in a way that starts to confirm the right design direction.

## Building Massing: The size and orientation of the home

Another big design move is to figure out the building massing. Think of your home in terms of volumes of space (forms) that enable a series of activities (functions) to be performed in them. How these volumes are grouped together starts to suggest the overall big picture massing of your home. Massing can take the form of a long linear shape (ranch-style, dogtrot), of a tall slender one (rowhouse or condo), a boxy one (suburban home) or of any shape in between. Each massing shape has its own set of characteristics that make it uniquely suited for certain situations and certain sites. Depending on your particular site and circumstance, you may choose a simple rectangle form or a crucifix form. Or you may be forced into a certain massing given the zoning constraints or existing conditions. In a similar vein, each massing shape has different impacts when it comes to not only its orientation on the land and natural daylighting, but also construction cost and foundation design. By exploring different massing schemes for your home, you can start to see what these impacts may be and how you can either minimize or optimize them. For example, long slender forms are great for natural daylighting but also have a lot of exterior surface area to insulate. Boxy forms are more efficient and cost-effective to build but aren't as visually attractive.