How to systematically approach complex design problems

Using Concept diagrams to Communicate Design Concepts
Objectives

- Study of a floor plan
  - Designer point of view
    - Design elements
    - Properties
    - Attributes

- Drawing as design tool
  - 2D and 3D
  - Conceptual diagrams

- 5-step of conceptual diagrams
  1. Bubble diagram
  2. Bubble diagram with circulation
  3. Block diagram
  4. Loose plan
  5. Preliminary plan

- What are architectural and non architectural elements?
The study of a space plan

- A good plan is not as easy as it may seem
  - It almost always requires trial and error and refinements before becoming a good plan
- An average person sees?
- An interior designer sees?
What should designers see when they look at a space plan?

- **Design elements**
  - Architectural and non-architectural elements

- **Spaces and rooms**
  - These are defined by design elements

- **Relationships and locations**
  - Adjacencies and geographic placement

**Properties**
- Physical characteristic – elongated room, angularity of the wall, straightness of the arrangement, curvature of the wall

**Attributes**
- Subjective qualities resulting from the design
  - What kinds of rooms and spaces are included? Airy and openness feeling
  - What are the elements used?
  - How are functions placed in relation to design elements?
  - What are the nice spots?
  - Which spaces are private or public?
Exercise

- Given a floor layout - spacious and bright
  - Attributes

- Provide a written explanation about the Properties (physical characteristic) and Attributes (subjective qualities) for these spaces
The result

Expansive windows afford a strong connection between interior and exterior spaces and wash the interior space with abundant natural light.

The openness and absence of doors help provide a sense of flow between interior spaces.

The windows and door strongly connect the kitchen with the adjacent patio space.

The desire for openness was such that not even the bedrooms are separated from the adjacent corridors with walls.

L-shaped floating element provides just enough definition to establish different spaces while retaining openness and a sense of flow.

Interior built-in cabinetry bridge adjacent spaces and provide a sense of continuity.
Drawing as design tool

- **Floor plan**
  - Provide 2-D space plan
  - May show partition and what it’s made of
  - But not showing …… various spaces
    - Ceiling changes

- **Elevation and section**
  - 2-D environments
  - Why do you need them?
Drawing as design tool

- Perspective, isometric, axonometric, and model
  - Conceive and communicate a total 3-D environments
  - Why do you need them?
Drawing as a design tool

- Designers have to think 3-dimensionally as they design
- Drawing is the language of designers
  - They form and communicate ideas
Conceptual diagramming as a design tool

- Sketch like, quick, informative and least investment tool
  - Great for showing relationships between spaces and their spatial arrangements
  - Allow designer to examine many different ideas at the preliminary stage
Conceptual diagram - Preliminary design

- Work from the overview of the design to the small details
  - Don’t jump to design solution - let solution develop thru the natural course of the design development
    - Defeat the purpose of doing conceptual diagrams
Conceptual diagram - Preliminary design

- 5-step of conceptual diagrams
  1. Bubble diagram
  2. Bubble diagram with circulation
  3. Block diagram
  4. Loose plan
  5. Preliminary plan /Refined plan
Step 1 - Bubble diagram

- One of the most popular schematic phases of design studies
  - Quick, ….
- Use to study spaces and circulation

Step 1 – bubble diagram - indicate location of each space

Name the spaces: Living room, etc.
Step 2 - Bubble diagram with circulation

- Very important step
- Indicate HOW people are moved thru the spaces
- Indicate the major and minor circulation patterns
- Other form of movement
  - View
  - Public/private area
  - Common area

Step 2 – circulation
- Study the circulation pattern of the spaces
- What is circulation?
  - ......
Step 3 – Block diagram

- Converts the bubbles into basic geometric shapes
- Like a bunch of blocks
  - Be coming more like rooms
  - Basic blocks without any wall thickness, opening, door, furniture…….
Step 4 – Loose plan

- Converts the block diagram to loose plan
- Still like block diagram but with architectural elements
  - Showing walls, openings, doors, windows, built-ins
  - But no thickness
Step 5 – Preliminary plan/Refined plan

- Final step for conceptual design process
- Converts the loose plan to preliminary plan (to scale)
- You can see architectural and non-architectural elements
  - Showing thickness……
  - Showing furniture…..

Porcelain tiles
Exercise – conceptual design diagram

- Floor plan is given
- Design a ranch house for a couple
- Provide spaces below
  - Foyer
  - Living room
  - Half bath
  - Kitchen
  - Dining area
  - Bathroom
  - Closet area
  - Bedroom

- Study closely all 5 steps of conceptual diagrams
  - Quick freehand sketch
Exercise – conceptual design diagram

- Step 1 – bubble diagram
  - Indicate location of each space
  - Label all the spaces

Name the spaces: Living room, etc.
Study of bubbles

- Size of bubble relate to the size of the space
  - The size of the bubble relates directly to the size of the space it defines – based on proportion

- Foyer 6
- Living room 1
- Half bath 7
- Kitchen 2
- Dining area 3
- Bathroom 5
- Closet area 8
- Bedroom 4

Single dwelling house

<table>
<thead>
<tr>
<th>Room/function</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry</td>
<td>35 sq. ft.</td>
</tr>
<tr>
<td>Hall</td>
<td>3 ft. wide</td>
</tr>
<tr>
<td>Living room</td>
<td>13 x 15 (195 sq. ft.)</td>
</tr>
<tr>
<td>Kitchen</td>
<td>8 x 12 (96 sq. ft.)</td>
</tr>
<tr>
<td>Great room</td>
<td>12 x 20 (240 sq. ft.)</td>
</tr>
<tr>
<td>Family room</td>
<td>13 x 18 (234 sq. ft.)</td>
</tr>
<tr>
<td>Dining room</td>
<td>10 x 13 (130 sq. ft.)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>5 x 10 (50 sq. ft.)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>10 x 12 (120 sq. ft.)</td>
</tr>
</tbody>
</table>
Study of bubbles

- Physically touching
  - Two spaces are adjacent to one another
  - Not clear what is in between the spaces
    - a partition, some other form of space divider

- Overlapping
  - Spaces are shared function
  - Are linked in concept thru open-space planning

- An opening between
  - Spaces may be separated by a corridor
Step 1 - bubble diagram

- Show line weights and love your diagram
  - Label the spaces
    - Inside each bubble
  - Line weights
    - Medium – bubble
    - Heavy – text
  - Show exterior walls and windows
    - Single line
    - Heavy line weights
      - Cut elements
Exercise – conceptual design diagram

- Step 2 – circulation study
  - Major traffic
    - High traffic or main path
  - Minor traffic
    - Secondary path
  - View path

- Show line weights
  - Add circulation paths to your bubble diagram
  - Heavy – arrow heads, leaders, and letterings
  - Show thickness for arrow head

Key:
- minor traffic
- major traffic
- view
Exercise – conceptual design diagram

- Step 3 – converts the bubbles into basic geometric shapes
  - Bubbles transform to blocks
  - Don’t show door or opening and furniture
  - Notes – optional

- Show line weights
  - Heavy line – letterings and arrow heads (notes)
  - Medium line – blocks
  - Light line – leaders
Exercise – conceptual design diagram

- **Step 4 – loose plan**
  - Floor plan only shows architectural elements
    - Wall partitions, openings, door openings, and built-ins
    - Show single-line for architectural elements
  - Don’t include non-architectural elements except built-ins
  - Notes – optional

- **Show line weights**
  - Heavy line – all interior partitions, door, letterings, and arrow heads (notes)
  - Medium line – all built-ins (kitchen area, built-in seat, bed, and etc.)
  - Light line – door swing and leaders (notes)
Exercise – conceptual design diagram

- **Step 5 – preliminary plan**
  - To scale
  - Include architectural elements
    - Draw wall, and doors, and all built-ins
    - Show thickness
  - Include non-architectural elements
    - Furniture
    - Floor materials and patterns
  - Need to accommodate with verbal description (notes)

- **Show line weights**
  - Heavy line – all partitions, door, glass windows, letterings, and arrow heads (notes)
  - Medium line – all built-ins (kitchen area, built-in seat, bed, etc.), window sills, and furniture
  - Light line – leaders, door swing and floor materials/patterns
Ranch - 710 sq ft. – draw the shell
Research homework – A precedent study on a Tiny house

- How to make a room into a multipurpose use space?
  - Briefly explain your idea or from your research
  - Provide images

- How architectural and non-architectural elements can be used in multipurpose way?
  - Briefly explain your idea or from your research
  - Provide images

- Analysis an existing tiny house
  - Come up with min. of 12 slides
  - Use PowerPoint format
  - Provide information about your precedent study
    - Profile
    - Square footage
    - Design concept
    - Provide images
      - Floor plan
      - Interior and exterior of the house

- [https://minimalistlifestyle.wordpress.com/category/tiny-house/](https://minimalistlifestyle.wordpress.com/category/tiny-house/)
Your Tiny House project information

- **Dimension**
  - Footprint: 19’ x 8’
  - Ceiling height: 6’-3”
  - Loft height: 3’-8”
  - Bedroom: at least 6’ x 6’
  - Porch: 7.5’ x 3’

- **Clients needs**
  - Make it into a comfortable vacation home
  - Use versatile and multipurpose architectural and non-architectural elements
  - Urban chic style
  - Love outdoor and nature
  - They are from the city

- **Design a tiny house for a couple – vacation home**

- **Min. require spaces**
  - Kitchenette
  - Eating area
  - Small living area
  - Bathroom
  - Closet area/storage
  - Bedroom
    - queen size bed
Final Project – design a Tiny house

- Main floor
- Loft area

Porch
7 1/2' x 3'
Door and windows

- Door height – 6’ (not your typical entrance door)
- Window height 24” (double hung window) and window sill at 3’ A.F.F.
- Loft window height 18” (fixed window) and window sill at 10” above ceiling line
Next class time

- Come out with Loose diagrams
  - 5 different bubble diagrams with circulation study
  - 5 block diagrams
- Informal presentation on your tiny house research
Generate alternative conceptual designs
Step 1 & 2 – generate alternative bubble diagrams

- Come out with 5 different bubble diagrams with circulation study
  - **Step 1 – bubble diagram**
    - indicate location of each spaces
    - Include all architectural elements (single line)
  - Label the space in the bubble
  - Draw circulation route for each bubble diagram
  - **Step 2 – circulation study**
  - Quick freehand sketch
  - Sketch book or tracing paper
Step 1 & 2 (combine bubbles and circulation)-
Generating alternatives

- Show line weights and love your diagrams
  - Show single line for all partitions and windows
  - Label the space in each bubble
  - Show circulation with leader and arrow head (show thickness)
  - Show door opening
Final on Velum paper

- Heavy line – all partitions, windows, door, arrow heads/leaders, and letterings
- Intermediate line – bubbles
- Light line – door swing

Bubble #4
Step 3 – generate block diagrams

These block diagrams convert all the 5 bubbles into 5 block diagrams:

- Bubbles transform to blocks
- No furniture
- Notes – optional
- Label all the spaces

Block #1

Block #2

Block #3

Block #4
Final on Velum paper

- Heavy line – all partitions, windows, door, letterings, and arrow heads
- Intermediate line – blocks
- Light line – leaders

Block #3
Step 4 – generate loose plans

- Step 4 – converts all the 5 block diagrams into 5 loose plans
  - Shows single-line floor plan with architectural elements and all built-ins
  - No furniture but include all the built-ins
  - Notes – optional
Final on Velum paper

- Heavy line – all partitions, windows, door, letterings, and arrow heads
- Intermediate line – all built-ins (kitchen area, built-in seat and bed)
- Light line – door swing and leaders

Loose #3
Step 5 – generate refined plans

- Final step – a preliminary layout (to scale/eyeball to scale)
  - Show architectural elements (wall, window, door thickness, and built-ins) and non-architectural elements (generic furniture are shown)
  - Floor materials/patterns
  - Important to include verbal description
Final on Velum paper

- Heavy line – all partitions, windows, door, letterings, and arrow heads
- Intermediate line – all built-ins (kitchen area, built-in seat and bed) and furniture
- Light line – leaders, door swing and floor materials/patterns
- Label all your diagrams

Refined #3