Sect. 1 Notes

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Contents

1 Basic Aerodynamic Principles

1.1 Vocabulary

- Pressure: limiting form of the force per unit area:

$$p = \lim \left(\frac{dF}{dA} \right)$$

  - Pressure is a point property; it can have different values within the fluid.

- Density:

$$\rho = \lim \frac{dm}{dv} \qquad dv \to 0$$

- Aerodynamics - fluids in motion is key; we use streamlines to represent them.

- Center of pressure - the location where the resultant of a distributed load effectively acts on an aerodynamic body.

1.2 Engineering applications of lift and drag coefficients

- Engineers are concerned with the coefficients of lift and drag and how they are changed inflight, unintentionally or intentionally.

- Certain devices can be used to intentionally change these coefficients, like flaps, slats, spoilers, etc.

- Lift and drag coefficients are constantly changing; they can depend on the airspeed, angle of attack, and many other factors. Thus, engineers must analyze and design aircraft based on empirical data.

2 Principles of Urbanism

2.1 What makes a city a city? What is urbanism?

- Cities vs metro areas: the city area is typically much smaller than the greater metro area. The city limits are defined by land boundaries (New York consists of the five boroughs, yet the greater NYC metro area includes and extends farther - to long island, near upstate, some of north and central NJ, etc. This is why the term "Chicagoland" exists).

- Definitions and characteristics of cities change depending on how you choose to define them.

2.2 How do we see and observe a city?

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2.3 The "Ideal City" Paintings: Early Ideas of a Utopia by Design

- The Ideal Cities show a more artistic/architectural perspective of Urban design through the lens of the Renaissance.

- This becomes markedly more abstract than any scientific study of urbanism, but it is still helpful to capture the ideas represented by it.

- The Ideal City (Urbino Panel):

  - A description of the painting: The painting has an extreme sense of symmetry and detail. It is drawn in one-point perspective. The painting shows the viewer looking upon a plaza in front of a circular building. The ground appears to be made of white, finished masonry with blue accents. To the sides of the round building are a series of different buildings that extend into the distance, each a different color. At the street level, there are arches that visually support the buldings. In the foreground, there are two column bases *that do not extend higher than the waist level.* The sky has three distinct shades of blue, with the darkest in front, and becoming white in the distance. There are a few grey clouds in the sky. There are no people displayed in the painting whatsoever.

  - Some unanswered questions about what is going on within the painting:

    * What is the purpose/point/function of the two unfinished columns? They are not unfinished per se; there is no exposed sign of construction; yet they are not columns. They may represent obstacles, blockages, or tools for the soft delineation of space, but why *this*?

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- The Ideal City of Baltimore (Baltimore Panel):

  - Description: The Baltimore Panel shares some similarities but many differences to the Urbino Panel. Here, there is a plaza, again made of stone with grey accents and small grassy areas. In the center is a small fountain. There are four narrow columns in the plaza. The most notable detail of this panel is that the plaza is recessed into the ground; there are several steps down into the plaza. Behind the plaza are three buildings: In the center, a grand arch, to the left, an ampitheatere, and to the right, a building resemblant of the Baptisery of Florence. In the nearer right, there is a white building with window details, but no arches. To the left, there is a building with mildly ornamented windows and square arches. The viewpoint of the painting is similar to the Urbino panel, and the sky blue in a similar way.

- The Ideal City of Berlin (Berlin Panel):
  - Description: