North South University

Department of Electrical and Computer Engineering (ECE)

Fall 2017

EEE 154

Computer Aided Drawing (CAD) for Engineers

Course Instructor : Mansura Sharmin
Lecturer (Part Time), ECE
Room # 1044 A

Days : Saturday
Timing :
Room : LIB 609

Office Hour:

What is Engineering Drawing

- is a Technical Drawing in nature
- Is used to define fully and clearly the requirements for Engineering object(s)

- Prepared according to
  - basic principles
  - standard conventions
  - symbolic representations
  - recommended notations

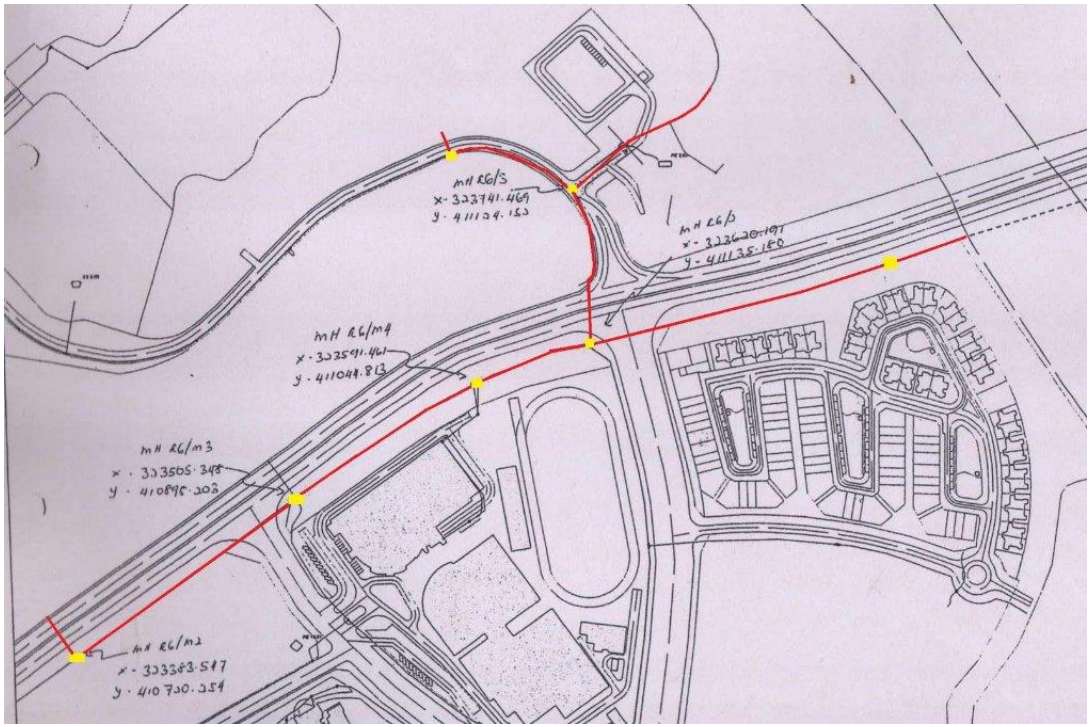
Bureau of Indian Standard (BIS)
American National Standards Institute (ANSI)

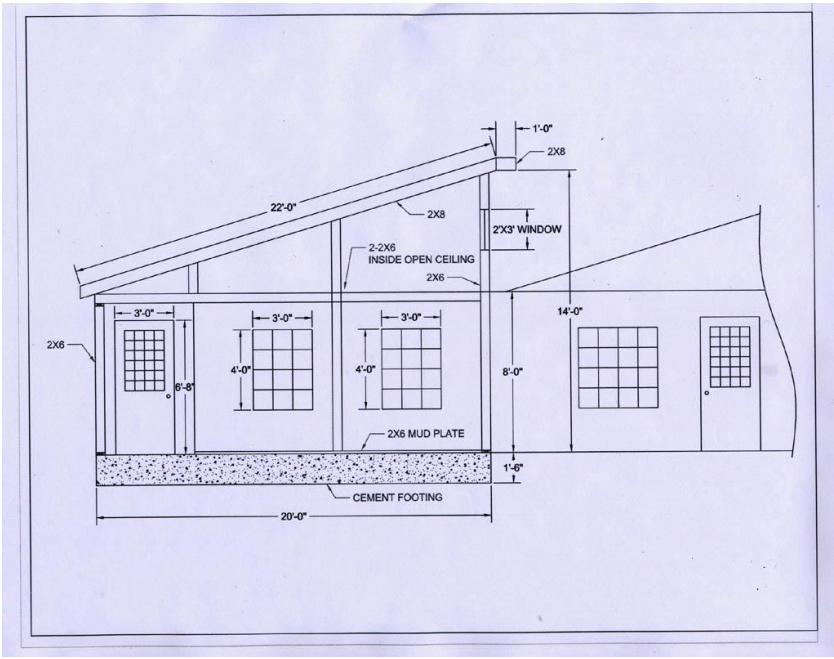
Categories of Engineering Drawing

- Geometric – Plane Geometry/ Solid Geometry
- Electrical and Electronic Engr.
  e.g. motors, generators, transformers, poles, towers, wiring dig.
- Mechanical Engr.
  e.g. machine industry, automobile industry
- Civil Engr.
  e.g. roads, buildings, bridges, dams, etc.
- Site Design/ City Planning
- Architectural

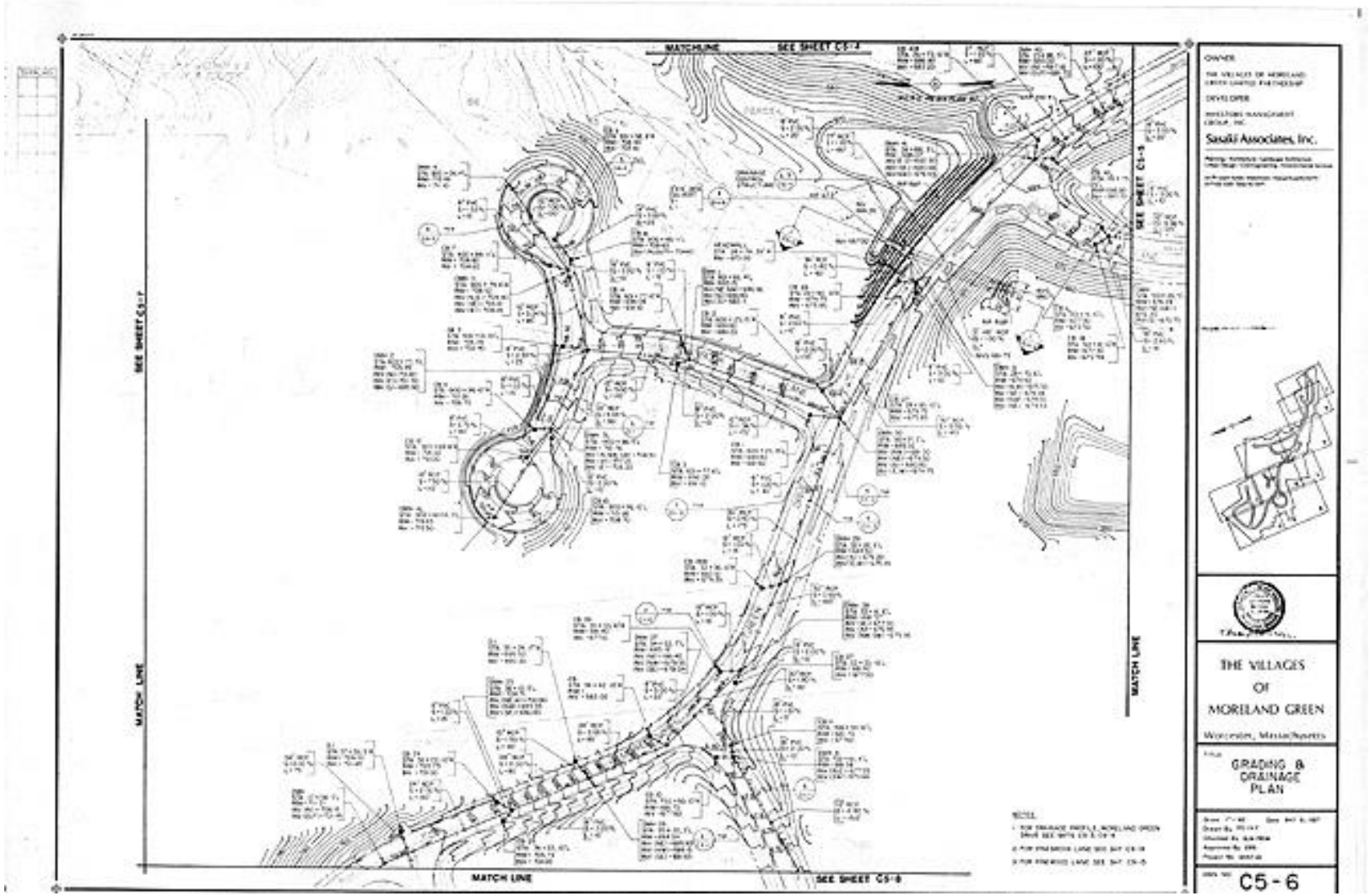
Why do we need to Learn Engineering Drawing

- Universal Language to communicate among Engineers
- Team work

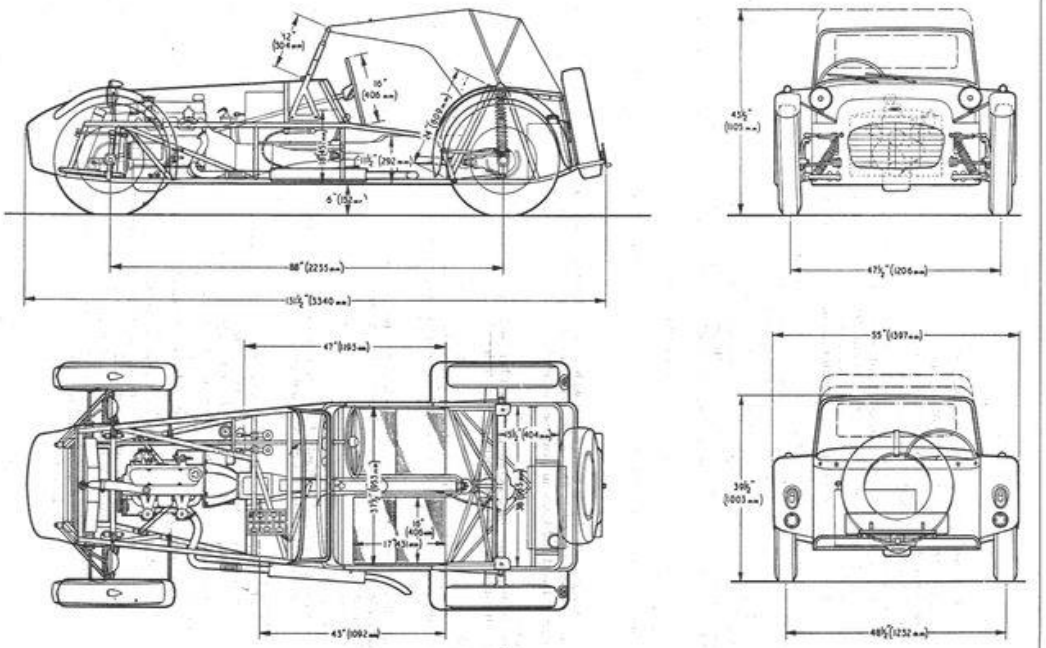




Civil Drawing


MATCHLINE
SEE SHEET C5-7
SEE SHEET C5-5
MATCH LINE
SEE SHEET C5-8
Sasaki Associates, Inc.
THE VILLAGES
OF
MORELAND GREEN
GRADING &
DRAINAGE
PLAN
C5-6

Site Plan



LOTUS SEVEN—GENERAL ARRANGEMENT

X-Sectional View

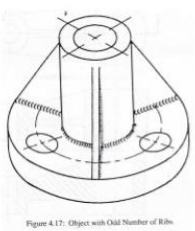
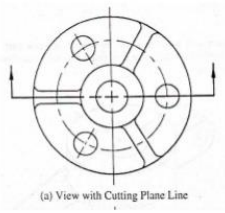
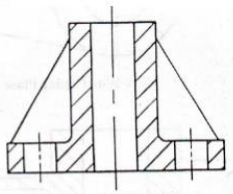


Figure 4.17: Object with Odd Number of Ribs

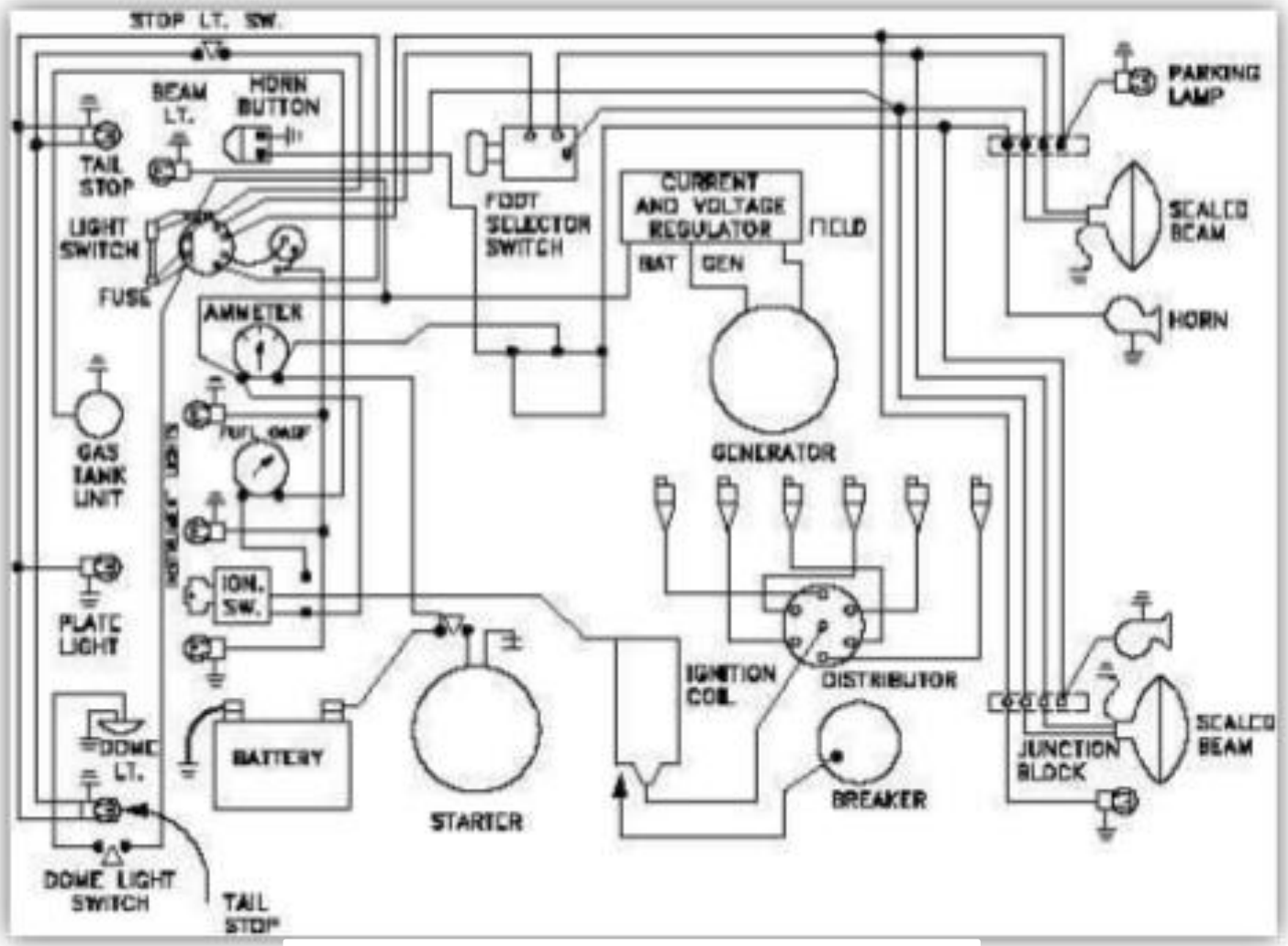


(a) View with Cutting Plane Line

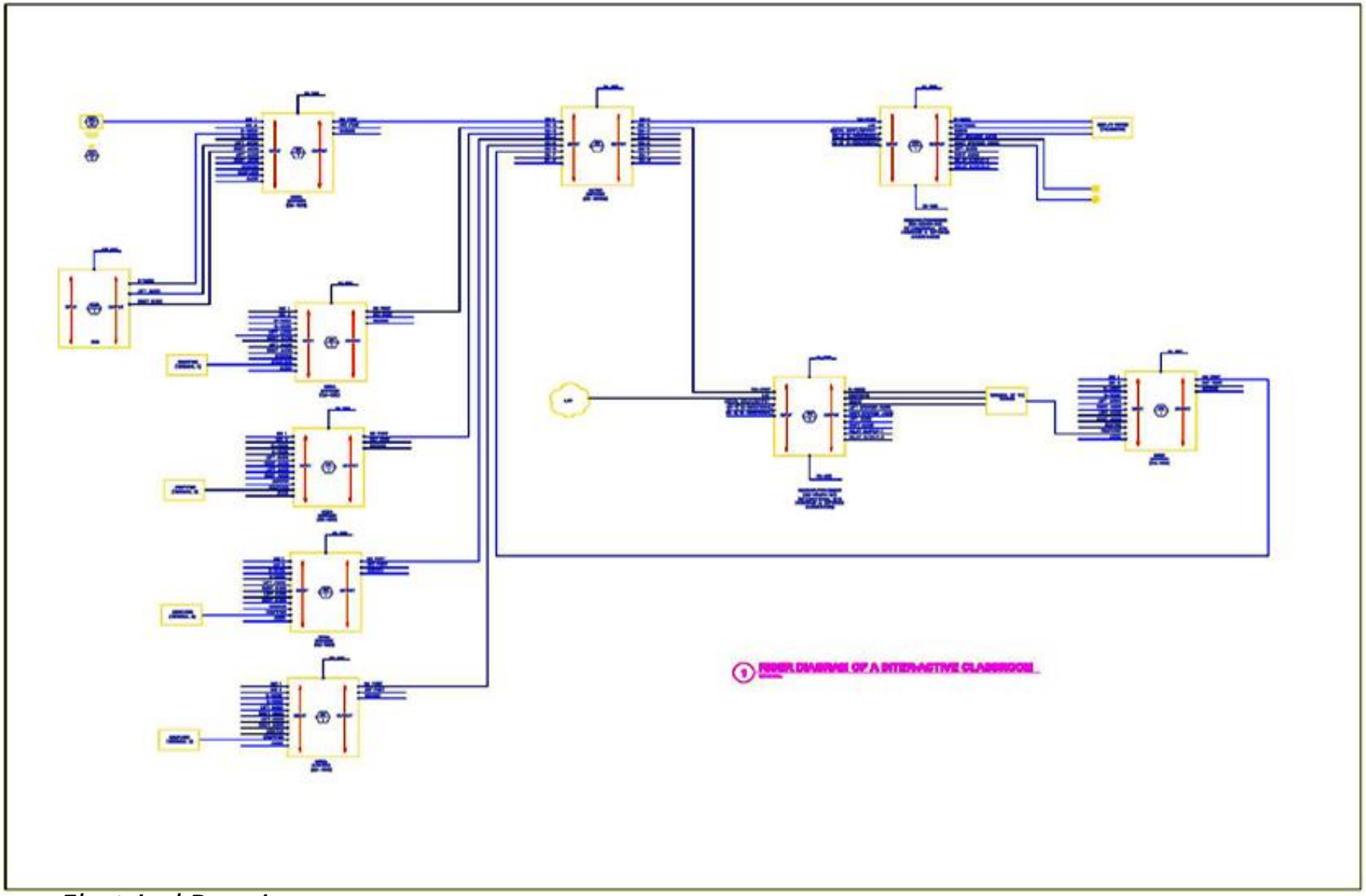


(c) Preferred Sectional View

Mechanical Drawing



Electrical Drawing



Electrical Drawing

Course Outline

- Introduction to Engineering Drawing
- Development and Concept of True Shapes – Cubical/ Rectangular/ Complex
- Isometric Drawing
- Orthographic Drawing
- Plan, Elevation and Section
- Introduction to Lettering, Numbering and Heading
- Plane Geometry
- Wiring

Lecture Plan

Evaluation

Lecture 1

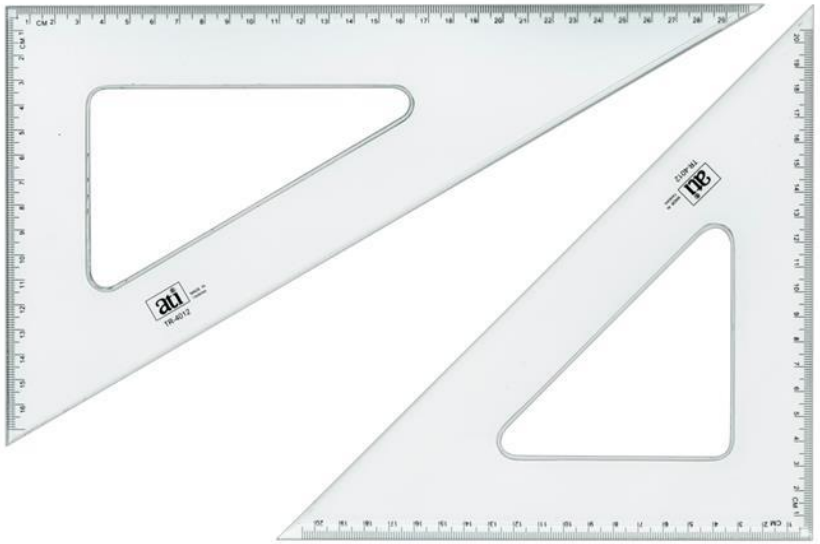
Basics of Engineering Drawing

- Drawing Instruments
- Lines and Lettering
- Scales and Dimensioning
- Title Block
- Formatting and Composition
- Plane Geometry/ Geometric Construction

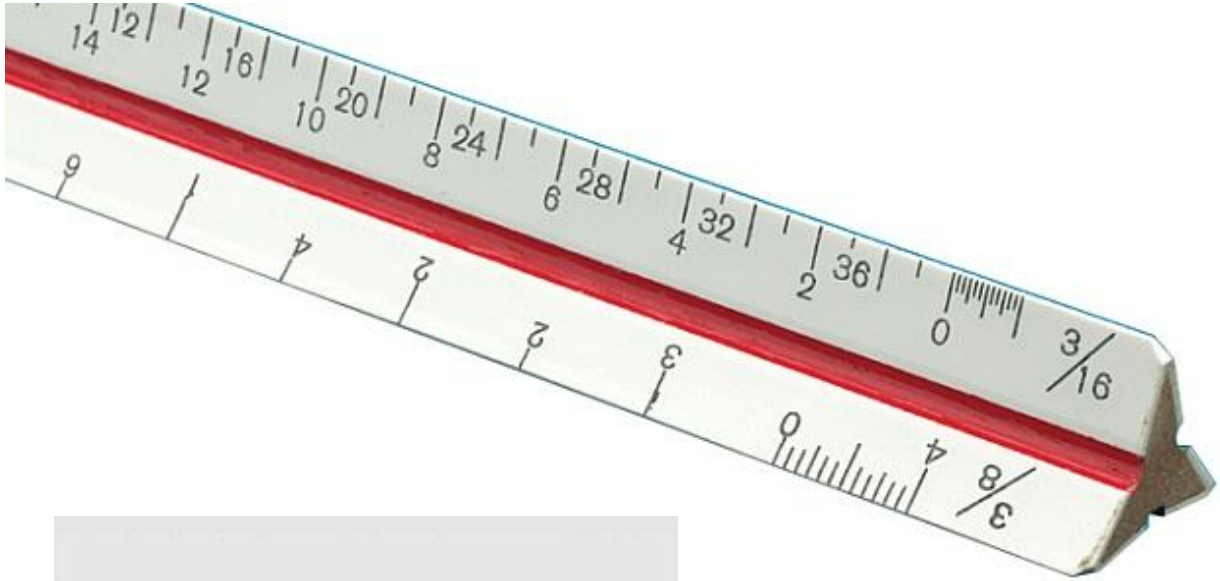
Drawing Instruments

Drawing Board
Drawing Papers/ **Tracing Papers**
45 and 30-60 Set Squares
T- square
Scales
Triangular Scale
Protractors
Irregular or French Curves
Flexible Curves
Drawing pins/Clips
Pencils/ Erasers **
Erasing shields
Instrument Box - Compass

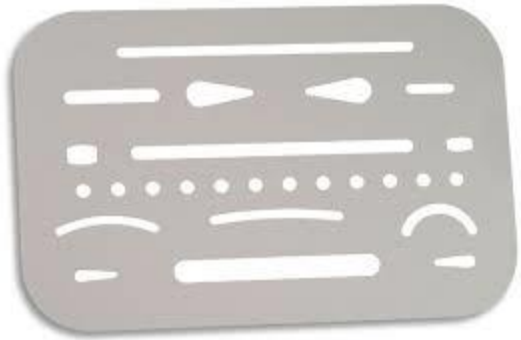
Drawing Instruments



Drawing Instruments



Drawing Instruments



Drawing Instruments

Drawing Instruments

For Class

Drawing Instruments

Lines

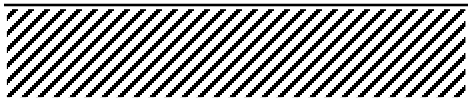
Very Important feature in drawing

Two Types:

Thick Line – 0.5 to 0.8 mm wide; [*use 0.5 lid*]
represents Visible line, Cutting plane line

Thin Line – 0.3 to 0.5 mm wide; [*use 0.3 lid*]
represents hidden line, center line, dimension line, reference line, section line

try to remember….

SI No	Types of Line	Usage
1	Visible Line/ object Line (thick)	to indicate all visible outlines of an object. It shows the shape of an object
2	Hidden Line/ Dashed Line (thin)	to represent the hidden edge of an object. It must begin and end with a dash touching the visible lines
3	Center Line (thin)	to show the center line
4	Extension Line and Dimension Line (thin) 	to show dimension of an object
5	Section Line (thin) 	to indicate the cut portion of an object
6	Cutting Plane Line (thick) 	to show the imaginary cutting of an object

Formatting of Drawing Sheet

1. Reference Grid –
   On the border of the drawing sheet, at least 10 mm width is drawn as reference grid along all the four edges.

2. Title Block – important feature as it gives all the information in the prepared drawing

Title Block

- Is drawn at the bottom right hand corner of the reference grid
- Should contain:
  - Name of Title of Drawing/ Heading
  - Drawing Number
  - Scale
  - North Sign
  - Legend/ Symbols
  - Initials with Date who prepared (person/ firm with logo)

try to remember….

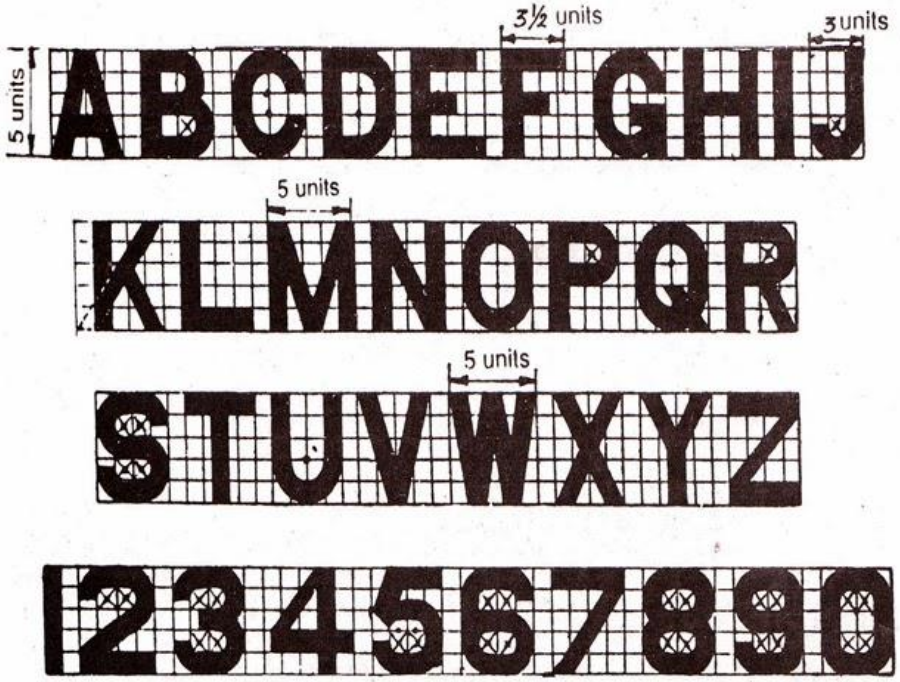
Lettering

Why Lettering is important?

- All lettering needs to be highly legible and uniform.
- Either Freehand or by templates

General Rules for Lettering:

- All letters should be written in CAPITAL
- Letters should be written as not to touch each other
- Letter should be upright from the bottom edge (except for dimensioning, in case)
- Spacing should be clear and equal
- Words should be spaced one letter width equal
- Only one style throughout the drawing


3½ units
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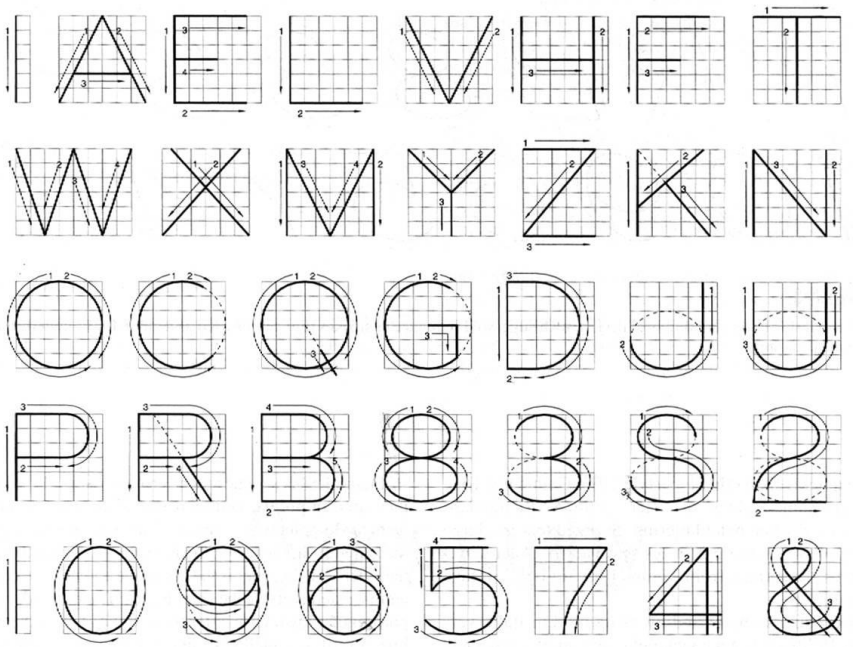


Lettering

Scales

Definition: Scale is the ratio of the linear dimension of an element in the drawing to the real liner dimension.

In technical drawing, it is common to show objects at reduced or enlarged scale

Reduced Scale – e.g. building plan, roads

Enlarged Scale – e.g. electronic component /microchip

e.g. I inch = 5 ft

Representative Fraction (R.F.)

The ratio of the length on the drawing to the length of the actual object is called R.F

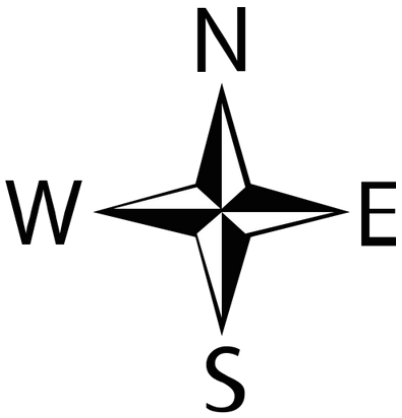
$$R.F. = \frac{length\ on\ the\ drawing}{length\ of\ the\ actual\ object}$$ *(both are in same units)*

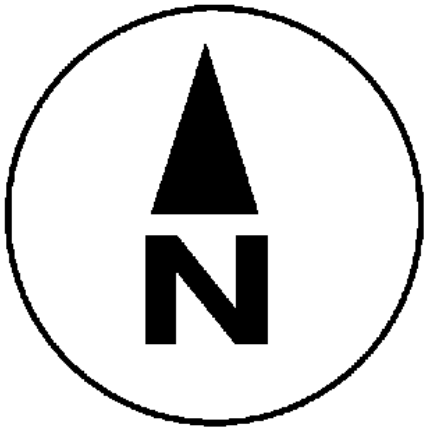
e.g. 1:2 (reduced scale) , 2:1(enlarged scale)

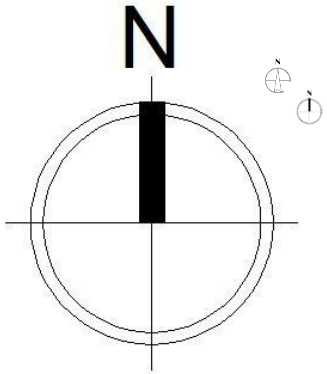
Commonly used general engineering drawing scales: 1:1, 1:2, 1:2.5, 1:10, 1:20, 1:50, 1:100, 1:200, 10:1, 5:1, 2:1

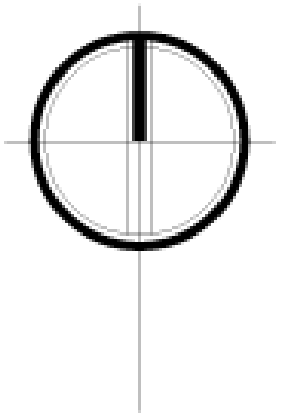
Civil Engineers and Architects use highly reduced scales as 1: 1000, 1:2000, …….

North Sign



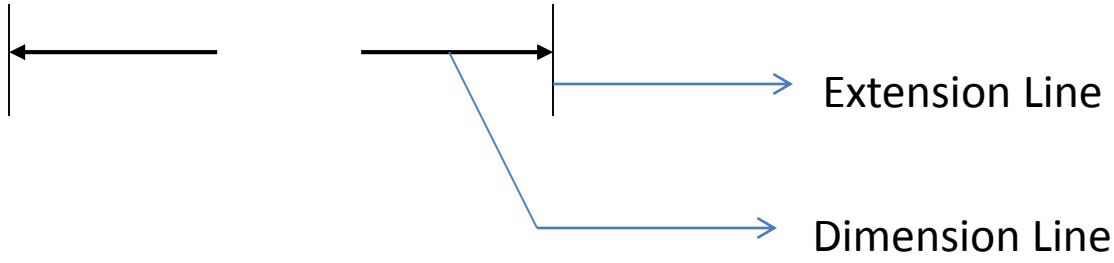






Dimensioning

Another important feature in Drawing as it gives the size description of an object



Dimensioning Principle

- This is must.
- Each dimension should be given only once
- Should be placed outside the views
- Should not cross the extension line
- Arrowhead not too big, wide or open (it should be solid)
- Dimension figures should be clear and staggered

Class Task 1

Formatting of Drawing Sheet

i. Provide Reference Grid
ii. Provide Title Block using lettering
iii. Draw the object using Line types
iv. Use Dimension

References

Texts:

- Civil Engineering Drawing by Gurucharan Singh & Subhash Chander
- Engineering Drawing by M.B. Shah & B.C. Rana
- Engineering drawing: with an introduction to AutoCAD by Dhananjay A Jolhe
- Fundamentals of engineering drawing by Cecil Jensen & Jay D. Helsel
- Fundamentals of AutoCAD by Steven B. Combs & Jay H. Zirbel

Suggested References:

Class lectures and reading materials provided by the Instructor.