CCE 201
Engineering Graphics and Design
Largest Hydroelectric Dam
Beautiful Bridge
Complex transportation system
Longest Aqueduct
Longest Bridge

Tallest Bridge

Artistic Structure

Traversing Highway
What do they all have in common?

Amazing **communication & coordination**

Built by **Construction** Engineers

Required Multi Disciplinary teams

Cost **millions** of dollars

Designed by **Civil** Engineers

Used **Engineering** drawings

Project planning and management
The future you...
designing & building our future built environment

- **Civil Engineer**: Deal with the design, construction, and maintenance of physical and natural built environment.

- **Construction Engineer**: Involved with planning and management of the construction of structures, such as buildings, bridges, roads, airports, etc.

**Both engineers use Engineering Drawings:**
- Visualizing Designs
- Precise Language for Communicating
- Planning and Constructing Structures
- Conducting analyses
Can you imagine building this bridge without engineering plans?

World’s tallest bridge - Paris
Computer Aided Drawing and Drafting (CADD)

AutoCAD – Autodesk
Autodesk has a large number of products:
  • AutoCAD
  • Revit (BIM): Architecture, Structure, MEP
  • Civil 3D

Microstation – Bently Systems. (ODOT uses)
SolidWorks – SolidWorks Corp (mechanical)

Each discipline has its own suite of programs:
architecture, mechanical, electrical, surveying, civil and construction engineering
Conventions and Standards: 
American National Standard Institute (ANSI)

**Drawing Conventions:**
commonly accepted practices, rules, or methods (e.g., dashed line for hidden feature)

**Standards:** set of rules that govern how technical drawings are represented (e.g., ANSI standards)
## Table 1.1 ANSI Standard Sheet Sizes

<table>
<thead>
<tr>
<th>Metric (mm)</th>
<th>U.S. Standard</th>
<th>Architectural</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4 210 × 297</td>
<td>A-Size 8.5” × 11”</td>
<td>9” × 12”</td>
</tr>
<tr>
<td>A3 297 × 412</td>
<td>B-Size 11” × 17”</td>
<td>12” × 18”</td>
</tr>
<tr>
<td>A2 420 × 524</td>
<td>C-Size 17” × 22”</td>
<td>18” × 24”</td>
</tr>
<tr>
<td>A1 594 × 841</td>
<td>D-Size 22” × 34”</td>
<td>24” × 36”</td>
</tr>
<tr>
<td>A0 841 × 1189</td>
<td>E-Size 34” × 44”</td>
<td>36” × 48”</td>
</tr>
</tbody>
</table>

Custom Printed Engineering & Drafting Decal Appliques

Have the convenience of placing your logo, title blocks, etc., wherever you want them on your drawings or documents. Working from your camera-ready artwork, we can custom print decal appliques that let you position these elements as you see fit. Minimum order: packet of 100 appliques. For information and pricing, please contact the Contract and Bid Department at Alvin & Company headquarters in Connecticut.
Alphabet of lines
Alphabet of lines (con’t)

- CENTER – THIN: \( \frac{1}{16} \) to \( \frac{1}{8} \) = 0.3 mm
- SHORT BREAK LINE – THICK: \( \frac{1}{16} \) to \( \frac{1}{8} \) = 0.6 mm
- LONG BREAK LINE – THIN: \( \frac{1}{32} \) to \( \frac{1}{8} \) = 0.3 mm
- DIMENSION & EXTENSION LINE – THIN: \( \frac{1}{32} \) to \( \frac{1}{8} \) = 0.3 mm
- SECTION LINE – THIN: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.3 mm
- PHANTOM LINE – THIN: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.3 mm
- STITCH LINE – THIN: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.3 mm
- STITCH LINE – THIN: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.3 mm
- VISIBLE LINE – THICK: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.6 mm
- HIDDEN LINE – THIN: \( \frac{1}{32} \) to \( \frac{1}{8} \) = 0.3 mm
- CUTTING PLANE LINE – THICK: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.6 mm
- CUTTING PLANE LINE – THICK: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.6 mm
- CHAIN LINE – THICK: \( \frac{1}{16} \) to \( \frac{1}{4} \) = 0.6 mm
- SYMMETRY LINE

THICK: 0.6 mm
THIN: 0.3 mm
Alphabet of lines (con’t): AutoCAD

- **AutoCAD® Linetypes**
- For this class we use Imperial Line Types or non-ISO lines
- **ACAD ISO lines are metric**
  We do not use ISO Lines Types
Engineer Scale

- *Engineer scales* have the following dimensional relationships:
- When using the engineer scale, you must multiply the value you identify by 10

Scales: 10, 20, 30, 40, 50, and 60

<table>
<thead>
<tr>
<th>1 inch = 10 feet</th>
<th>1 inch = 40 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch = 20 feet</td>
<td>1 inch = 50 feet</td>
</tr>
<tr>
<td>1 inch = 30 feet</td>
<td>1 inch = 60 feet</td>
</tr>
</tbody>
</table>
Architect Scale

- *Architect scales* use fractions and have the following dimensional relationships:

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>3/16</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>1/8</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>1/4</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>3/8</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>1/2</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>1 inch</td>
<td>= 1 foot</td>
</tr>
<tr>
<td>1½ inches</td>
<td>= 1 foot</td>
</tr>
</tbody>
</table>