## Schedule of Topics

Please bring your laptop, charger, mouse, and textbook with you to each class.

		Presentation of Graphical and Technical	
1-Feb	1	Information	
6-Feb	2	Getting Started with AutoCad	
8-Feb	3	AutoCAD Fundamentals	
13-Feb	4	Basic Object Construction Tools	
15-Feb	5	Geometric Construction and Editing Tools	
20-Feb	6	Object Properties and Organization	
22-Feb	7	Orthographics Views	
27-Feb	8	Floor Plans	
29-Feb	9	Dimensioning and Notes	
12-Mar	10	Templates and Plotting	
14-Mar	11	Parametric Drawing Tools	
19-Mar	12	Auxiliary Views, Editing with Grips	
21-Mar	13	Assembly Drawings and Blocks	
26-Mar	14	Stadium Mapping project assignments	
28-Mar	15	Stadium Mapping projects work day	
2-Apr	16	Creating and Drawing on Orthophotos	
4-Apr	17	Introduction to AutoCad Civil 3D	
9-Apr	18	Introduction to AutoCad Civil 3D (cont.)	
11-Apr	19	Stadium Map project presentations	

This class will be held in Conference Room B at Rice-Eccles Stadium. Enter in through the Gate C lobby, check in with the receptionist who will get you checked in and access to the classroom.

Please bring your laptop, charger, mouse, and textbook with you to each class.

From <<u>https://webmail.eng.utah.edu/?\_task=mail&\_caps=pdf%3D1%2Cflash%3D0%2Ctiff%3D0%2Cwebp%3D1%2Cpgpmime%</u> 3D0&\_uid=18&\_mbox=University&\_action=show>

## Learning Objectives & Assignment - Lecture 1

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#### Learning Objectives

- 1. Know the vocabulary of CADD (Computer Aided Drawing and Design)
- 2. Identify the applications of Civil Engineering Drawings.
- 3. Describe the education and qualifications required to be a civil drafter.
- 4. Identify professional civil engineering and civil drafting organizations.
- 5. Define terms and elements related to maps and civil drafting.
- 6. Identify a variety of map types.
- 7. Describe the design and drafting process
- 8. Explain the purpose and provide examples of drafting standards.
- 9. Discuss workplace ethics.

## Vocabulary of CADD

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#### **Useful Vocabulary**

**Civil engineering** Surveying **Civil drafting** Two-dimensional (2-D) Three-dimensional (3-D) Geomatics Consulting engineering Computer-aided design and drafting (CADD) Geographic information systems (GIS) Professional engineer (PE) Manual drawing Map Charts Elevation

Cartography Cartographer Border Title block Legend Key Scale Physical map Political map Photogrammetric map Photogrammetry Aerial photographs Topographic map Contour line

## Vocabulary Related to Civil Engineering Drafting

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Surveying - Surveying or land surveying is the technique, profession, and science of determining the terrestrial or three-dimensional positions of points and the distances and angles between them. A land **surveying** professional is called a

land surveyor. From <<u>https://www.google.co.kr/search?q=surveying&rlz=1C1SQJL\_enUS822US822</u> &oq=surveying&aqs=chrome..69i57j0l2j69i61j0l2.2423j0j8&sourceid=chrome&ie=UTF-8>

Two-dimensional (2-D) - A drawing done in two dimensions.

Three-dimensional (3-D) - A three dimensional drawing or model.

Geomatics - is defined in the <u>ISO/TC 211</u> series of standards as the "<u>discipline</u> concerned with the collection, distribution, storage, analysis, processing, presentation of <u>geographic data or geographic information</u>".<sup>[1]</sup> Under another definition it "consists of products, services and tools involved in the collection, integration and management of geographic data".<sup>[2]</sup> It includes geomatics engineering (and <u>surveying engineering</u>) and is related to geospatial science (also geospatial engineering and geospatial technology). From <<u>https://en.wikipedia.org/wiki/Geomatics</u>>

Consulting engineering - Consulting engineering is a professional service that provides independent expertise in engineering, science and related areas to governments, industries, developers and construction firms. From <a href="http://www.engineeringlegacies.com/Whatls.php">http://www.engineeringlegacies.com/Whatls.php</a>

Computer-aided design and drafting (CADD) - CAD, or computer-aided design and drafting(CADD), is technology for design and technical documentation, which replaces manual drafting with an automated process. If you're a designer, drafter, architect, or engineer, you've probably used 2D or 3DCAD programs such as AutoCAD or AutoCAD LT software. From <<u>https://www.google.co.kr/search?hl=en-KR&authuser=0&rlz=</u>1C1SQJL\_enUS822US822&ei=PmIrXPPhJYmNlwTPwoLYBw&q=computer+aided+design+and+drafting+%28cadd%29 &oq=computer+aided+design+and+d&gs\_l=psy-ab.1.2.0I10.14639.18620..23496...1.0.0.314.2762.0j14j3j1.....0...1.gws-wiz.....0i71j0i22i30j0i67.AYLra55yUew>

## Vocabulary Related to Civil Engineering Drafting

Thursday, January 25, 2024 1:48 PM

Geographic information systems (GIS) - geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations.<sup>[112]</sup> GIS (more commonly GIScience) sometimes refers to geographic information science (GIScience), the science underlying geographic concepts, applications, and systems. From <a href="https://en.wikipedia.org/wiki/Geographic information system">https://en.wikipedia.org/wiki/Geographic information system</a>

Professional engineer (PE) - A Professional Engineer (PE) is an engineer licensed by a state board of registration to practice engineering. From <<u>https://www.google.co.kr/search?hl=en-KR&authuser=0</u> &rlz=1C1SQL\_enUS822US822&ei=yWIrXPG0De-ymAXKpluADg&q=professional+engineer&oq=professional+engineer&gs\_l=psyab.3.0110.1336.5999.6793...0.0.1.321.3080.5j16j1j1.....0...1.gws-wiz....0.0i71j0i67.95QgrKFmGLQ>

Manual drawing - A drawing done by hand with pencil or pen.

Map - A spatial representation of data, usually done in 2D.

Elevation - The elevation of a geographic location is its height above or below a fixed reference point, most commonly a reference geoid, a mathematical model of the Earth's sea level as an equipotential gravitational surface (see Geodetic datum § Vertical

datum) From <<u>https://www.google.co.kr/search?hl=en-KR&authuser=0&rlz=1C1SQJL\_enUS822US822</u> <u>&ei=R2prXLe3IOW4mAXXpYqoAg&q=elevation&oq=elevation&gs\_l=psy-</u> ab.3..0i67l2j0l8.74011.77663..77951...0.0..0.116.1135.2j9.....0...1.gws-wiz....0..0i71.Q-UnQXtApMs>

Cartography - is the study and practice of making <u>maps</u>. Combining <u>science</u>, <u>aesthetics</u>, and technique, cartography builds on the premise that reality can be modeled in ways that communicate spatial information effectively. From <<u>https://en.wikipedia.org/wiki/Cartography</u>>

Cartographer - A person that studies cartography

Border - The bounding line around a drawing.

Title block - A title block is a template for a sheet and generally includes a border for the page and information about the design firm, such as its name, address, and logo. The title block can also display information about the project, client, and individual sheets, including issue dates and revision information. From <<u>https://knowledge.autodesk.com/support/revit-lt/learn-explore/caas/CloudHelp/cloudhelp/2019/ENU/RevitLT-DocumentPresent/files/GUID-647C7077-BF9E-45EE-9E14-3614AD974998-htm.html</u>

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Quadrangle map - In geology or geography, the word "quadrangle" usually refers to a United States Geological Survey (USGS) 7.5-minute quadrangle map, which are usually named after a local physiographic feature. The shorthand "quad" is also used, especially with the name of the map; for example, "the Ranger Creek, Texas quad map". These maps are one-quarter of the older 15-minute series. On a quadrangle map, the north and south limits of the quadrangle are not straight lines, but are actually curved to match Earth's lines of <u>latitude</u> on the standard projection. The east and west limits are usually not parallel as they match Earth's lines of <u>longitude</u>. In the United States, a 7.5 minute quadrangle map covers an area of 49 to 70 square miles (130 to 180 km<sup>2</sup>).<sup>[1]</sup>

From <<u>https://en.wikipedia.org/wiki/Quadrangle (geography)</u>>

Geologic map - A geologic map or geological map is a special-purpose mapmade to show geological features. Rock units or geologic strata are shown by color or symbols to indicate where they are exposed at the surface.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822</u> &ei=KpBrXIDFIIexmAXBuqToDQ&q=geologic+map&oq=geologic+map&gs\_l=psyab.3..0l10.1797.8139..8403...4.0..0.150.3090.5j23.....0...1.gws-wiz....0.0i71j0i67j0i10.CP6U8kW97UY>

Military map - The vertical positions, or relief, are normally represented by contour lines on **military** topographic **maps**. On **maps** showing relief, the elevations and contours are measured from a specific vertical datum plane, usually mean sea level. From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822</u> &ei=gpBrXL3uOMi4mAWcrrPYBA&g=military+map&gs\_l=psy-

ab.3..0i67j0l9.38294.46135..46395..4.0..1.389.3281.0j9j4j3.....0...1.gws-wiz....0..0i71j0i10.W7HXKXz1NpE>

Terrain - terrain or relief (also topographical relief) involves the vertical and horizontal dimensions of land surface. The term bathymetry is used to describe underwater relief, while hypsometry studies terrain relative to sea level. The Latin word terra (the root of terrain) means "earth."

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&q=terrain&spell=1&sa=X&ved=</u> 0ahUKEwi45MuqhcfgAhWOyosBHTRIACYQBQgoKAA&biw=1536&bih=731>

Milliradian - A milliradian, often called a mil or mrad, is an SI derived unit for angular measurement which is defined as a thousandth of a radian (0.001 radian).

 From <</th>
 https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&biw=1536&bih=731

 &ei=BZFrXKqEJcOzmAWI47T4DQ&q=milliradian&oq=milliradian&gs\_l=psy 

 ab.3..0l10.59212.64749..65029...0.0..0.151.1922.3j14.....0...1.gws-wiz....0.0i71j0i67j0i10.RLmC843IMUc>

1:48 PM

Mil - A thousandth of an inch is a derived unit of length in an inch-based system of units. Equal to  $\frac{1}{1000}$  of an inch, it is normally referred to as a thou <u>/'0ac/</u>, a thousandth, or (particularly in the United States) a mil.

From <<u>https://en.wikipedia.org/wiki/Thousandth\_of\_an\_inch</u>>

Cadastral map - Cadastre is a technical term for a st of records showing the extent, value and ownership (or other basis for use or occupancy) of land. Strictly speaking, acadastre is a record of areas and values of land and of landholders that originally was compiled for purposes of taxation.

 From <</th>
 https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822

 &ei=spBrXPHIEIGUmAX8v4KIBg&q=cadestral+map&oq=cadestral+map&gs\_l=psy 

 ab.3..0i67l3j0i10j0i67j0i10l5.323880.330999..331286...0.0..0.307.3252.0j23j0j1.....0...1.gws-wiz....0..0i71j0.UCqS-aQ6gZg>

Hydrographic map - A hydrographic survey map is a type of topographic map, which is used to reveal the slopes and contours of land. Hydrographic maps are specially made to survey underwater land terrain. Such maps can be used to help in investigations, oceanography studies and naval services.

From <<u>http://www.libraryspot.com/know/map.htm</u>>

Engineering map - A map showing information that is essential for planning an engineering project or development. An engineering map is generally a large-scale map of a comparatively small area or of a route. It may be entirely the product of an engineering survey, or reliable information may be collected from various sources and delineated on a base map.

From <<u>https://definedterm.com/engineering\_map/115052</u>>

Site plan - A site plan is a landscape architectural plan, and a detailed engineering drawing of proposed improvements to a given lot. A site plan usually shows a building footprint, travelways, parking, drainage facilities, sanitary sewer lines, water lines, trails, lighting, and landscaping and garden elements.

From <<u>https://www.google.co.kr/search?q=site+plan&rlz=1C1SQJL\_enUS822US822&oq=site+plan&aqs=chrome..69i57j0l5.1911j0j8</u> &sourceid=chrome&ie=UTF-8>

Plot plan - A plot plan is an architecture, engineering, and/or landscape architecture plan drawing—diagram which shows the buildings, utility runs, and equipment layout, the position of roads, and other constructions of an existing or proposed project site at a defined scale. Plot plans are also known more commonly as site plans.

 
 From <</th>
 https://www.google.co.kr/search?rlz=1C1SQJL
 enUS822US822

 &ei=wJJrXKmCCKiHr7wP16ecgAM&q=plot+plan&oq=plot+plan&gs
 l=psyab.3..0i67l2j0l8.47769.49829.50052...0.0.132.1039.0j9....0...1.gws-wiz....0.0i71.bTeJnO7TotE

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Plot - In real estate, a lot or **plot** is a tract or parcel of **land** owned or meant to be owned by some owner(s). A lot is essentially considered a parcel of real property in some countries or immovable property (**meaning** practically the same thing) in other countries.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822</u> &ei=IZ5rXO7ZGOebmAXGxrzABA&q=definition+of+plot+land&oq=definition+of+plot+land&gs\_l=psyab.3..0i22i30.28563.39888..40158...3.0..0.205.3388.6j22j1.....0...1..gws-wiz....0..0i71j0i67j0j33i22i29i30j0i8i13i30.IUDdPHmYpt4>

Plat - In the United States, a plat is a map, drawn to scale, showing the divisions of a piece of land. United States General Land Office surveyors drafted township plats of Public Lands Surveys to show the distance and bearing between section corners, sometimes including topographic or vegetation information.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&ei=bZ5rXNHABOuAr7wPpuO-qAM&q=plat&oq=plat&gs\_l=psy-ab.3..0i67l6j0l4.53954.57239..57418...1.0..0.130.2573.4j20.....0...1..gws-wiz....0.0i71j0i22i30j0i8i13i30.KL\_rXa4DZI0></u>

# Subdivision - Subdivision is the act of dividing land into pieces that are easier to sell or otherwise develop, usually via a plat.

From <https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&ei=g5JrXNj3AoremAXSmqgAg&q=subdivision&oq=subdivision&gs\_l=psy-ab.3..0i67j0j0i67l7j0.1546.5362..5625...0.0..0.127.2416.2j20.....0...1..gwswiz....0..0i71.flZmaXGlzLY>

Infrastructure - Infrastructure refers to the fundamental facilities and systems serving a country, city, or other area, including the services and facilities necessary for its economy to function.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&ei=8p5rXPfjJfqUr7wPw9OnqA8</u> &q=Infrastructure&oq=Infrastructure&gs\_l=psy-ab.3..0i67j0l9.51559.59198..59344...0.0..0.187.2899.2j22.....0...1..gwswiz....0..0i71.GPuHpEUUaP4>

Planning map - Land-use planning means the scientific, aesthetic, and orderly disposition of land, resources, facilities and services with a view to securing the physical, economic and social efficiency, health and well-being of urban and rural communities. This information is often presented in maps

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&ei=4Z9rXPq-</u> BcW2mAXDkZ2QAg&q=planning+map+and+landuse&oq=planning+map+and+landuse&gs\_l=psyab.3..33i21j33i160.137695.143141..143281...0.0..0.261.3367.1j19j4.....0...1..gwswiz....0.0i71j0i67j0j0i10j0i22i30j33i22i29i30.juzmabAOMvE>

Zoning map - Zoning is the process of dividing land in a **municipality** into zones (e.g. residential, industrial) in which certain land uses are permitted or prohibited. In addition, the sizes, bulk, and placement of buildings may be regulated.

 From <</th>
 https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822

 &ei=i59rXM\_GNKOvmAXHt72wAw&q=muncipality+Planning+map&oq=muncipality+Planning+map&gs\_l=psy 

 ab.3...17002.23746.24881...4.0..0.170.2101.1j17.....0...1.gws-wiz......0i71j0i7i30j0i8i7i30j0i13i30j0i8i13i30j0i13.RQtg4gx2Yjo>

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Nautical chart - A nautical chart is a graphic representation of a sea area and adjacent coastal regions. Depending on the <u>scale</u> of the chart, it may show depths of water and heights of land (<u>topographic map</u>), natural features of the seabed, details of the coastline, navigational hazards, locations of natural and human-made aids to <u>navigation</u>, information on <u>tides</u> and <u>currents</u>, local details of the <u>Earth's magnetic field</u>, and human-made structures such as <u>harbours</u>, buildings and bridges.

From <<u>https://en.wikipedia.org/wiki/Nautical\_chart</u>>

Aeronautical chart - An aeronautical chart is a map designed to assist in <u>navigation</u> of <u>aircraft</u>, much as <u>nautical charts</u> do for watercraft, or a <u>roadmap</u> for drivers. Using these charts and other tools, <u>pilots</u> are able to determine their position, safe altitude, best route to a destination, navigation aids along the way, alternative landing areas in case of an in-flight emergency, and other useful information such as <u>radio</u> frequencies and <u>airspace</u> boundaries. There are charts for all land masses on Earth, and long-distance charts for trans-oceanic travel. From <<u>https://en.wikipedia.org/wiki/Aeronautical\_chart</u>>

**Digital elevation model (DEM)** - is a 3D CG representation of a terrain's surface created from a terrain's **elevation** data.

From <<u>https://www.google.co.kr/search?q=digital+elevation+model&rlz=1C1SQJL\_enUS822US822</u> &oq=digital+elevation+model&aqs=chrome..69i57j0l5.7413j0j8&sourceid=chrome&ie=UTF-8>

Digital terrain model (DTM) - is a DEM in which terrain data has been further enhanced with breaklines, creating greater accuracy as it contains additional information defining terrain in areas where Lidar data alone is unable to do the job effectively. From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enU5822U5822&ei=</u>

<u>0qJrXNDGBsj68gX89JeYBQ&q=digital+terrain+model&oq=digital+terrain+model&gs\_l=psy-</u> ab.3.3.0I10.8376.20099..20304...6.0..0.158.4323.10j30.....0....1.gws-wiz....0..0i71j0i67j0i10.2ZZYpmkC4zE>

Digital surface model (DSM) - represents the MSL elevations of the reflective surfaces of trees, buildings, and other features elevated above the "Bare Earth". Digital Surface Model (DSM) In short: digital surface model represents the earth's surface and includes all objects on it.

 From <</th>
 https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&ei=

 5KFrXOKYH9CFr7wPw72jgAM&q=digital+surface+model&oq=digital+surface+model&gs\_l=psy 

 ab.3..0l10.127784.136405..136623...9.0..0.113.3587.20j16.....0...1..gws-wiz....0..0i71j0i67.EBGl8REA2jU>

Remote sensing - is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance from the targeted area. Special cameras collect remotely **sensed** images of the Earth, which help researchers "sense" things about the Earth.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822</u> &ei=paJrXLfsG4za8wWp7ozwDg&q=remote+sensing&oq=remote+sensing&gs\_l=psyab.3..0I10.40171.43600..43750...0.0..0.118.1502.2j12.....0...1.gws-wiz....0..0i71j0i67.YBLRW1I08Pk>

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Cutting-plane line - are thick lines that run through the center of the object that the interior wants to provide an interior view of. Two perpendicular lines with arrows showing in which direction the interior of the object should be viewed are drawn at the end of the line.

From <<u>https://www.google.co.kr/search?q=cutting+plane+line&rlz=1C1SQJL\_enU5822U5822</u> &oq=cutting+plane+line&aqs=chrome.0.0l6.2888j0j8&sourceid=chrome&ie=UTF-8>

Typical cross section - Construction requirements for roadways vary according to the capacity and level of service to be provided. Each roadway section must be individually analyzed and its cross section determined based on the volume and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

From <<u>https://www.google.co.kr/search?q=typical+cross+section&rlz=1C1SQJL\_enUS822US822&source=lnms&sa=X&ved=</u> OahUKEwjbkZvzmsfgAhVBxLwKHdjnArIQ\_AUICSgA&biw=1536&bih=731&dpr=2.5>

Detail drawing - provides a detailed description of the geometric form of a part of an object such as a building, bridge, tunnel, machine, plant, and so on. They tend to be large-scale drawings that show in detail parts that may be included in less detail on general arrangement drawings.

From <<u>https://www.google.co.kr/search?rlz=1C1SQJL\_enUS822US822&biw=1536&bih=731</u> &ei=PahrXMTmJKGmmAXeooywAQ&q=detail+drawing&oq=detail+drawing&gs\_l=psyab.3..0l10.11824.13257..13394...0.0..0.110.822.2j6.....0....1.gws-wiz......0i71j0i67.8c9VQ\_jwfDg>

As-built survey - are needed to record variations from original Engineering plans to what is actually **built**. As-built surveys are required by many agencies to prove the location of a structure at a point in time. Many agencies need the **as-built surveys** for the actual locations of underground improvements.

From <https://www.google.co.kr/search?q=as-built+survey&rlz=1C1SQJL\_enUS822US822&oq=asbuilt+survey&aqs=chrome..69i57j0l5.5852j0j7&sourceid=chrome&ie=UTF-8>

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Code of ethics						
ntellectual property						
© Steven F. Bartlett 2024						

## Application of Civil Engineering Drawings

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#### **Civil Engineering Drawings**

Heavy civil projects, such as highways, dams, and pipelines, are constructed using documents consisting of drawings, maps and specifications. The term plans is frequently used for construction drawings. Design drawings are graphical media that designers use to depict their concepts and communicate the design concept to the builder (contractor). A typical set of plans used in heavy civil construction projects may contain designs from different engineering disciplines. These multidisciplinary designs are divided into groups, such as civil drawings, structural drawings, mechanical drawings, electrical drawings, and architectural drawings.

Preparation of civil design drawings requires knowledge and training in engineering graphics, descriptive geometry, and topographic survey. Before the early 1980s, these drawings were done by hand by skilled drafters sitting at large drafting tables. The development of high-speed personal computers allows this design process to be performed using computer-aided drafting (CAD) software.

Heavy civil design projects are developed in phases, or levels. A typical chronological sequence of phase development includes the planning phase, the feasibility or conceptual phase, and the final design phase. Design drawings are developed during each phase. In general, the level of details contained in the drawings increases as the project advances to subsequent phases.





## **Civil Drafters**

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Civil drafters are employed by consulting engineering companies; local, state, and federal government agencies; manufactures of products and providers of services associated with civil engineering projects; and the military. Consulting engineering is an independent service that provides licensed and certified engineering for construction and related projects. Civil drafting job opportunities are available around the world; from rural communities to large cities.

(from Introduction to Civil Engineering Drafting Technology https://www.pearsonhighered.com/assets/samplechapter/0/1/3/4/0134436040.pdf)

University and College Certificates https://www.usu.edu/degrees-majors/engineering-drafting-and-designtechnology-certificate\_cc

#### Software Training and Certifications

The AutoCAD Certified User Examination is a performance-based exam. The examination is comprised of approximately 30 questions to be completed in 50 minutes. The test items will require you to use the AutoCAD software to perform specific tasks and then answer questions about the tasks. Performance-based testing is defined as testing by doing. This means you actually perform the given task then answer the questions regarding the task. Performance-based testing is widely accepted as a better way of ensuring the users have the skills needed, rather than just recalling information. For detailed information, visit http://www.autodesk.com/certification.

https://www.autodesk.com/certification/architecture-engineering-constructioncertification

## **General Requirements for Engineering Drawings**

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Civil engineering drawings - A civil engineering drawing is a type of technical drawing that shows information about grading, landscaping, buildings, structures, roadways, or other details and information to other engineers and contractors.

Civil Engineering Drawings must be:

- Accurate
- Drawn to scale (can be used to obtain measurements)
- Dimensioned (shows dimensions of objects and features)
- Clear
- Complete
- Reviewed
- Certified

These drawings are legal documents and professional engineers originating these drawings certify that they are correct.







This is an example of an engineer's stamp that is used to certify drawings and other engineering documents. DIVISION OF OCCUPATIONAL & PROFESSIONAL LICENSING Certificate of License Renewal

176935-2202

Control Number: 176935-2202-20190213

RENEWAL DATE: 02/13/2019 EXPIRATION DATE: Wed Mar 31 2021 ISSUED TO: Steven Floyd Bartlett



REFERENCE NUMBER(S), CLASSIFICATION(S) & DETAILS(S)

**Professional Engineer** 

Please note that DOPL reserves the right to initiate action at any time against a licensee who did not meet the renewal/reinstatement requirements at the time this license was issued.

Professional Engineer License

## Drawing Standards & QA/QC

Thursday, January 25, 2024 1:48 PM

https://www.autodesk.com/autodesk-university/article/Developing-CAD-Standards-Complete-Guide

<u>https://www.linkedin.com/advice/0/what-most-important-tips-creating-2d-cad-</u> <u>drawings-wakac</u>

What are the most important tips Powered by AI and the LinkedIn community

1 Use the right software

© Steven F. Bartlett 2024

- 2 Follow the drawing standards
- 3 Use proper dimensioning and tolerancing
- 4 Check for errors and inconsistencies
- 5 Document and update your drawings
- 6 Test and validate your drawings

From <<u>https://www.linkedin.com/advice/0/what-most-important-tips-creating-2d-</u> cad-drawings-wakac>





For maps - a legend of features is necessary

Element - Legend



C





Disclaimer: Furniture, accessories, fixtures shown in the plans are for representational purposes only.

Floor Plan - Shows location and size of rooms, walls and internal contents.



## Photogrammetric Map

Sunday, February 17, 2019 5:48 AM





## Topographical Map

Sunday, February 17, 2019 5:48 AM





### LiDAR (Light Detection and Ranging) Maps

**Lidar** (also called **LIDAR**, **LiDAR**, and **LADAR**) is a <u>surveying</u> method that measures distance to a target by illuminating the target with <u>pulsed laser</u> light and measuring the reflected pulses with a sensor. Differences in laser return times and wavelengths can then be used to make digital <u>3-D representations</u> of the target.

From <<u>https://en.wikipedia.org/wiki/Lidar</u>>

Steven F. Bartlett, 2019

C

# 3D Digital Elevation Model

Sunday, February 17, 2019 5:48 AM











Foundation Design Drawing - Shows the location of the building footings and how the building is supported by the underlying ground or rock.



Detail Drawing - Shows more features and details associated a set of elements.





Stormwater Drainage Drawings - Plan View





Highway Plan View Drawing





C







BIM model (Building Information Modeling) - Show spatial location of building components and systems



## **General Requirements for Sketches**

Sunday, February 17, 2019 5:48 AM

Civil Engineering Sketches must be:

- Accurate (i.e., show all significant features)
- Proportioned approximately correctly but not drawn to scale
- Labeled (features should be labeled)
- Clear
- Neat

Note: The sketches can be hand drawn or done using a sketch tool (MS paint, MS Whiteboard, MS OneNote, etc.)

The Powerful Effects of Drawing on Learning





Wednesday, January 4, 2023 1:03 PM

# Golden Gate Bridge (Marin Pier)



Site of Marin Pier

- 1. Start rock dike (Coffer)
- 2. Crib dike part that is in water (timber box filled w/ rock and set in place).
- 3. Install sheet piling.
- 4. Pump area dry.
- 5. Construction foundation on rock surface exposed below water level.

OF | TAH

# Building Big Paperback – May 10, 2004

by David Macaulay (Author)

From <https://www.amazon.com/Building-Big-David-Macaulay/dp/0618465278>

Wednesday, January 4, 2023 1:03 PM

# Aswan Dam What about the core?



# Building Big Paperback – May 10, 2004

by David Macaulay (Author)

From <https://www.amazon.com/Building-Big-David-Macaulay/dp/0618465278>







Saturday, January 12, 2019 1:48 PM

In order to preserve the natural view and serenity in this coastal area, I propose that a closed-air causeway (tunnel) be considered. This would include a seawalk atop the causeway which could be used for a public walkway and park extension.



Tuesday, January 3, 2023 11:45 AM





# Pedestrian Bridges - Examples Tuesday, November 15, 2022 8:50 AM







http://www.genesisstructures.com/portfolio-items/oletangy-river-pedestrian-bridge/

19 Architecturally Epic Bridges You'd Want To Cross Again And Again



https://thornews.com/2012/02/22/leonardo-da-vincis-bridge-in-norway/

https://www.swedishwood.com/publications/wood-magazine/2018-3/s-shaped-bridge/



https://www.designb norway-06-13-2016/



s.org/new-york-state-department-of-transportation-edestrian-bridge-at-151st-street/





Pedestrian Bridge - Central Park, Songdo, Incheon, Korea https://www.arup.com/projects/new-songdo-city-central-park-and-canal













## Photoshop - Making Line Sketches from Photos

Friday, January 13, 2023 1:48 PM

The trace contour option in Adobe Photoshop can be used to convert a photograph to a line drawing.

Step 1 - Obtain Adobe Photoshop using the instruction found in this link below. To get started, download the Creative Cloud desktop application. This is where applications are launched and updated, and where you can manage and share any assets you've created and stored to the Cloud.

#### From <<u>https://software.utah.edu/adobe.php</u>>

Step 2 - Find the building, bridge, etc. that you want to use for creating the line drawing. I will be using the photograph shown below. Save the photo as a jpg or png file to your computer.



## Photoshop - Making Line Sketches from Photos (cont.)

Friday, January 13, 2023 1:48 PM

Step 3 - Open the photo.jpg file using the following process. a) select photo.jpg or photo.png using file explorer (see below). Once selected, right-click the mouse and select the <u>open with</u> and <u>Adobe Photoshop</u> to import the photo.





## Photoshop - Making Line Sketches from Photos (cont.)

Friday, January 13, 2023 1:48 PM

### Step 5 Use the Filter/Stylize/Trace Contour feature to create the tracing of the image

🔧 File Edit Image Layer Type Select F	ilter CD View Plugins Window Help	
A 🖌 V 🔹 🔽 Mode: Nor	Last Filter Alt+Ctrl+F	Flow: 100% - CA Smor
	Convert for Smart Filters	
photo.png @ 186% (RGB/8#) ×	Neural Filters	
	Filter Gallery     Adaptive Wide Angle     Alt+Shift+Ctrl+A       Camera Raw Filter     Shift+Ctrl+A       Lens Correction     Shift+Ctrl+R	State and
P.	Liquity Shift+Ctrl+X	
中,	Vanishing Point Alt+Ctrl+V	
	Blur	
- 1ª	Blur Gallery	
un	Distort	
7	Noise	Strate / YEARS
<b>†</b>	Render	All
- 📫	Sharpen	R STADAL
- V.	Stylize	Diffuse
- A	Video 🕨	Emboss
In Internet	Other 🕨	Extrude
		Find Edges
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	danis anderesterreter	Solarize
e Hite		Tiles
		Trace Contour
$T_{\star}$		Wind
k	11 11 - 11 11 11 11	1111

Step 6 - Use the pop-up menu to adjust the weight of the lines shown in the photo. Select OK when you are done



## Photoshop - Making Line Sketches from Photos (cont.)

Friday, January 13, 2023 1:48 PM

# Step 7 - Convert the image to black and white using Image/Adjustment/Black and White. You can adjust the quality somewhat in the pop menu.



