Learning Objectives & Assignment - Lecture 1

Sunday, January 8, 2023 1:48 PM

Learning Objectives

1. Define civil engineering and civil drafting.
2. Identify civil drafting employment opportunities.
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.

Reading Intro to Civil Drafting Technology.pdf (Folder File)

Assignment 1 - Individual

1. Make a sketch of infrastructure (current or conceptual) that is of interest to you. This can be a hand-drawn sketch or a computer-drawn sketch using tools such as MS Paint, MS Whiteboard, or other drawing programs of your choice **(100 points)**. Note that example sketches are given in this lecture

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

Turn this homework assignment into canvas using a jpeg or pdf format for grading.

Civil Engineering

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Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works such as residences, institutional buildings, roads, bridges, canals, dams, airports, sewerage systems, pipelines, and railways.[1][2] Civil engineering is traditionally broken into a number of sub-disciplines. It is considered the second-oldest engineering discipline after military engineering,[3] and it is defined to distinguish non-military engineering from military engineering.[4] Civil engineering takes place in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies.

From <https://en.wikipedia.org/wiki/Civil_engineering>

Civil Engineers design, build and operate the following common types of Infrastructure:

- Structures / Buildings / Homes
- Transportation Systems
- Communication Systems
- Water Supply and Treatment
- Stormwater Management
- Solid Waste Management Systems
- Energy Systems
- Conveyance Systems (pipelines, electrical transmission lines)

Common disciplines in Civil Engineering are:

- Structural Engineering
- Geotechnical Engineering
- Transportation Engineering
- Materials Engineering
- Water Resources Engineering
- Environmental Engineering

Introductory Materials

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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
Thematic 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 <https://www.google.co.kr/search?q=surveying&rlz=1C1SQJL_enUS822US822&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 ISO/TC 211 series of standards as the "discipline concerned with the collection, distribution, storage, analysis, processing, presentation of geographic data or geographic information".[1] Under another definition it "consists of products, services and tools involved in the collection, integration and management of geographic data".[2] It includes **geomatics engineering** (and surveying engineering) and is related to geospatial science (also geospatial engineering and geospatial technology). From <https://en.wikipedia.org/wiki/Geomatics>

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 <http://www.engineeringlegacies.com/WhatIs.php>

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 3D**CAD** programs such as AutoCAD or AutoCAD LT software. From <https://www.google.co.kr/search?hl=en-KR&authuser=0&rlz=1C1SQJL_enUS822US822&ei=PmlrXPPhJYmNlwTPwoLYBw&q=computer+aided+design+and+drafting+%28cadd%29&oq=computer+aided+design+and+d&gs_l=psy-ab.1.2.0l10.14639.18620..23496...1.0..0.314.2762.0j14j3j1.....0....1..gws-wiz.....0i71j0i22i30j0i67.AYLra55yUew>

Vocabulary Related to Civil Engineering Drafting

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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.[1][2] GIS (more commonly GIScience) sometimes refers to geographic information science (GIScience), the science underlying geographic concepts, applications, and systems. From <https://en.wikipedia.org/wiki/Geographic_information_system>

Professional engineer (PE) - A Professional Engineer (PE) is an engineer licensed by a state board of registration to practice engineering. From <https://www.google.co.kr/search?hl=en-KR&authuser=0&rlz=1C1SQJL_enUS822US822&ei=yWIrXPG0De-ymAXKpIuADg&q=professional+engineer&oq=professional+engineer&gs_l=psy-ab.3..0l10.1336.5999..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 <https://www.google.co.kr/search?hl=en-KR&authuser=0&rlz=1C1SQJL_enUS822US822&ei=R2prXLe3IOW4mAXXpYqoAg&q=elevation&oq=elevation&gs_l=psy-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 maps. Combining science, aesthetics, and technique, cartography builds on the premise that reality can be modeled in ways that communicate spatial information effectively. From <https://en.wikipedia.org/wiki/Cartography>

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 <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

Vocabulary Related to Civil Engineering Drafting (continued)

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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 latitude on the standard projection. The east and west limits are usually not parallel as they match Earth's lines of longitude. In the United States, a 7.5 minute quadrangle map covers an area of 49 to 70 square miles (130 to 180 km^2).[1]
From <https://en.wikipedia.org/wiki/Quadrangle_(geography)>

Geologic map - A **geologic map** or **geological map** is a special-purpose **map**made 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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=KpBrXIDFIIexmAXBuqToDQ&q=geologic+map&oq=geologic+map&gs_l=psy-ab.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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=gpBrXL3uOMi4mAWcrrPYBA&q=military+map&oq=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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&q=terrain&spell=1&sa=X&ved=0ahUKEwi45MuqhcfgAhWOyosBHTRlACYQBQgoKAA&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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&biw=1536&bih=731&ei=BZFrXKqEJcOzmAWl47T4DQ&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>

Vocabulary Related to Civil Engineering Drafting (continued)

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Mil - A **thousandth of an inch** is a derived unit of length in an inch-based system of units. Equal to $1/1000$ of an inch, it is normally referred to as a **thou** /ˈθaʊ/, a **thousandth**, or (particularly in the United States) a **mil**.
From <https://en.wikipedia.org/wiki/Thousandth_of_an_inch>

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, a**cadastre** is a record of areas and values of land and of landholders that originally was compiled for purposes of taxation.
From <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 <http://www.libraryspot.com/know/map.htm>

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 <https://definedterm.com/engineering_map/115052>

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 <https://www.google.co.kr/search?q=site+plan&rlz=1C1SQJL_enUS822US822&oq=site+plan&aqs=chrome..69i57j0l5.1911j0j8&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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=wJJrXKmCCKiHr7wP16ecgAM&q=plot+plan&oq=plot+plan&gs_l=psy-ab.3..0i67l2j0l8.47769.49829..50052...0.0..0.132.1039.0j9.....0....1..gws-wiz.....0..0i71.bTeJnO7TotE

Vocabulary Related to Civil Engineering Drafting (continued)

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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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=IZ5rXO7ZGOebmAXGxrzABA&q=definition+of+plot+land&oq=definition+of+plot+land&gs_l=psy-ab.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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=bZ5rXNHABOuAr7wPpuO-gAM&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_rXa4DZl0>

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=g5JrXNj3AoremAXSmq-gAg&q=subdivision&oq=subdivision&gs_l=psy-ab.3..0i67j0j0i67l7j0.1546.5362..5625...0.0..0.127.2416.2j20.....0....1..gws-wiz.....0..0i71.fIZmaXGlzLY>

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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=8p5rXPfjJfqUr7wPw9OnqA8&q=Infrastructure&oq=Infrastructure&gs_l=psy-ab.3..0i67j0l9.51559.59198..59344...0.0..0.187.2899.2j22.....0....1..gws-wiz.....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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=4Z9rXPq-BcW2mAXDkZ2QAg&q=planning+map+and+landuse&oq=planning+map+and+landuse&gs_l=psy-ab.3..33i21j33i160.137695.143141..143281...0.0..0.261.3367.1j19j4.....0....1..gws-wiz.....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 <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>

Vocabulary Related to Civil Engineering Drafting (continued)

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

Aeronautical chart - An **aeronautical chart** is a map designed to assist in navigation of aircraft, much as nautical charts do for watercraft, or a roadmap for drivers. Using these charts and other tools, pilots 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 radio frequencies and airspace boundaries. There are charts for all land masses on Earth, and long-distance charts for trans-oceanic travel.
From <https://en.wikipedia.org/wiki/Aeronautical_chart>

Digital elevation model (DEM) - is a 3D CG representation of a terrain's surface created from a terrain's **elevation** data.
From <https://www.google.co.kr/search?q=digital+elevation+model&rlz=1C1SQJL_enUS822US822&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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=0qJrXNDGBsj68gX89JeYBQ&q=digital+terrain+model&oq=digital+terrain+model&gs_l=psy-ab.3.3.0l10.8376.20099..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 <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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&ei=paJrXLfsG4za8wWp7ozwDg&q=remote+sensing&oq=remote+sensing&gs_l=psy-ab.3..0l10.40171.43600..43750...0.0..0.118.1502.2j12.....0....1..gws-wiz.....0..0i71j0i67.YBLRW1I08Pk>

Vocabulary Related to Civil Engineering Drafting (continued)

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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 <https://www.google.co.kr/search?q=cutting+plane+line&rlz=1C1SQJL_enUS822US822&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 <https://www.google.co.kr/search?q=typical+cross+section&rlz=1C1SQJL_enUS822US822&source=lnms&sa=X&ved=0ahUKEwjbkZvzmsfgAhVBxLwKHdjnArIQ_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 <https://www.google.co.kr/search?rlz=1C1SQJL_enUS822US822&biw=1536&bih=731&ei=PahrXMTmJKGmmAXeooywAQ&q=detail+drawing&oq=detail+drawing&gs_l=psy-ab.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=as-built+survey&aqs=chrome..69i57j0l5.5852j0j7&sourceid=chrome&ie=UTF-8>

As-built drawing
As-built
Standards
Code
Client
Specification
Standards checking
Ethics
Code of ethics
Intellectual property

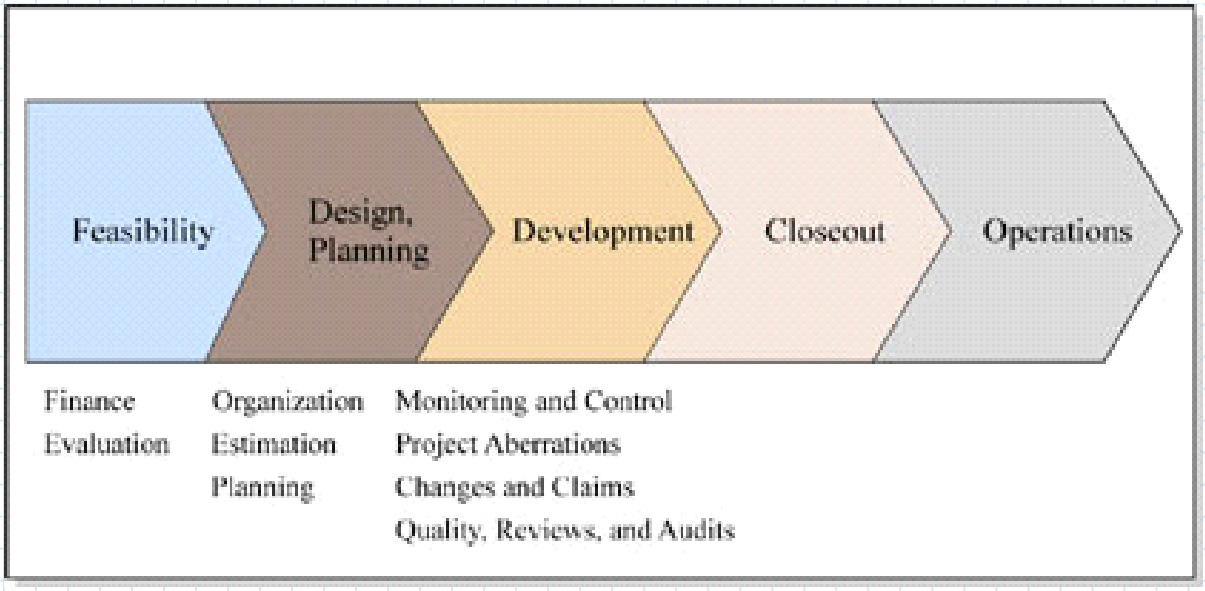
Civil Engineering Drawings

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.

Choi, Ying-Kit. Principles of Applied Civil Engineering Design: Producing Drawings, Specifications, and Cost Estimates for Heavy Civil Projects . American Society of Civil Engineers. Kindle Edition.



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.

Civil engineering is an extensive field. Therefore, civil drafters often create many different types of drawings for a variety of projects. Some civil engineering companies or agencies, especially consulting engineers, offer expertise in several areas. Other civil engineering firms specialize in certain aspects of civil engineering. The following is a list of some of the specialties in which civil engineering companies and agencies are involved:

- Agribusiness
- Construction observation
- Environmental studies
- Flood control
- Foundation work and soil analysis
- Hydrologic studies
- Irrigation and drainage
- Land and construction surveys
- Land planning and subdivision
- Map-making
- Municipal improvements
- Power plants
- Refuse disposal
- Sewage and water treatment
- Transportation

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

General Requirements for Engineering Drawings

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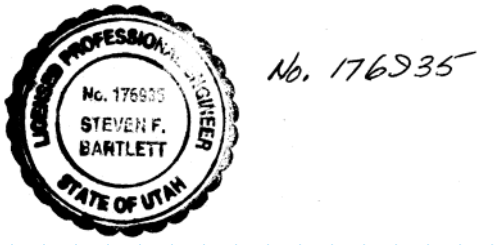
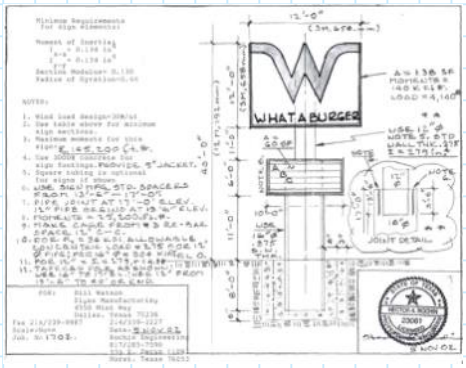
Civil engineering drawings - A civil engineering drawing is a type of technical drawing that shows information about grading, landscaping, buildings, structures, roadways, or other details and information to other engineers and contractors.

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 by professional engineer

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
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)

176935-2202 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

Elements - Title Block

Sunday, February 17, 2019 5:48 AM

Engineering firm hired to perform drafting services

Consultant or Design Engineer

Project Location

Owner

Project Number
File name of drawing
Drawing by (initials)
Checked by (Initials)
Copyright
Title

Sheet Number

Element - Legend

Sunday, February 17, 2019 5:48 AM

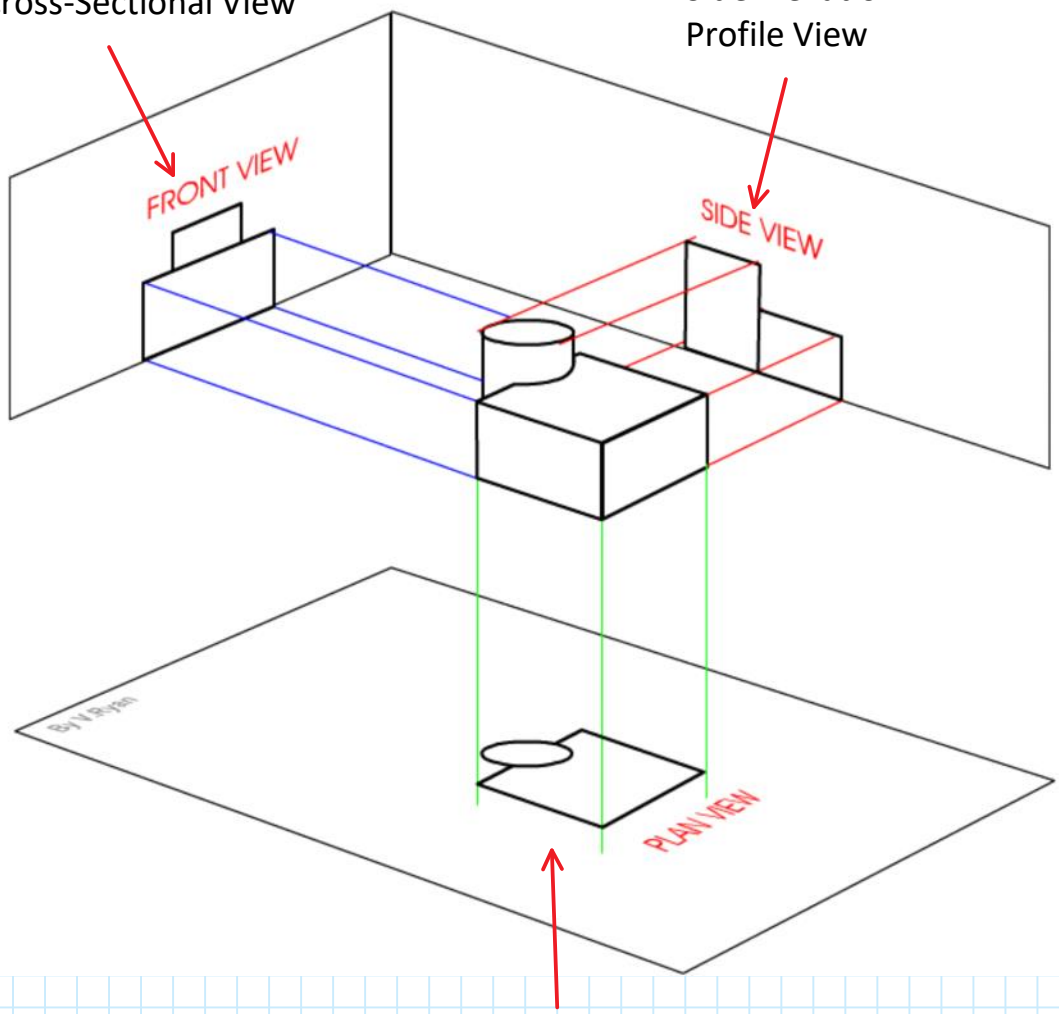
For maps - a legend of features is necessary

Views of Drawings

Sunday, February 17, 2019 5:48 AM

Front View
Front Elevation
Cross-Sectional View

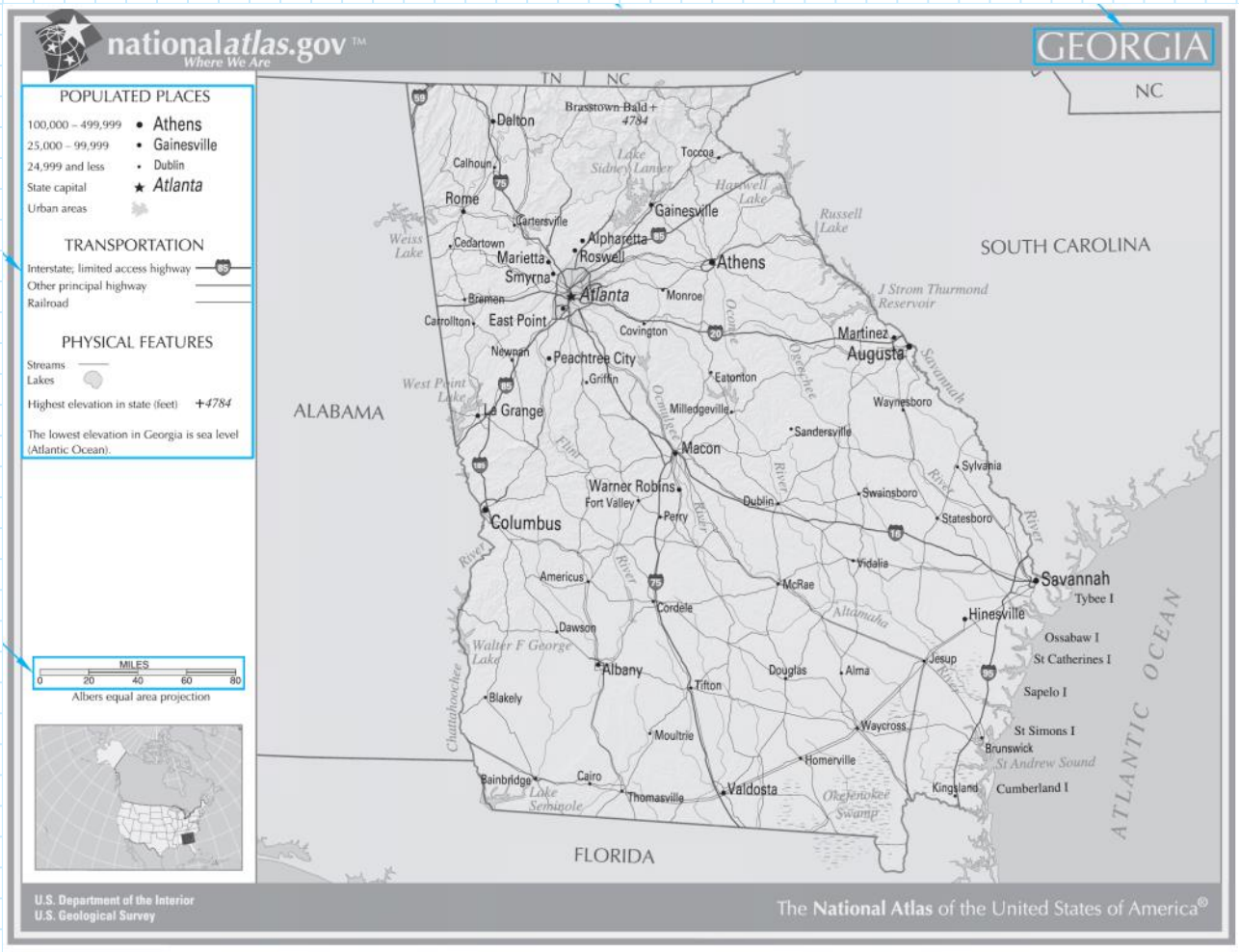
Side View
Side Elevation
Profile View



Plan View (drawings)
Map View (maps)

Reference Map

Sunday, February 17, 2019 5:48 AM



Physical Map

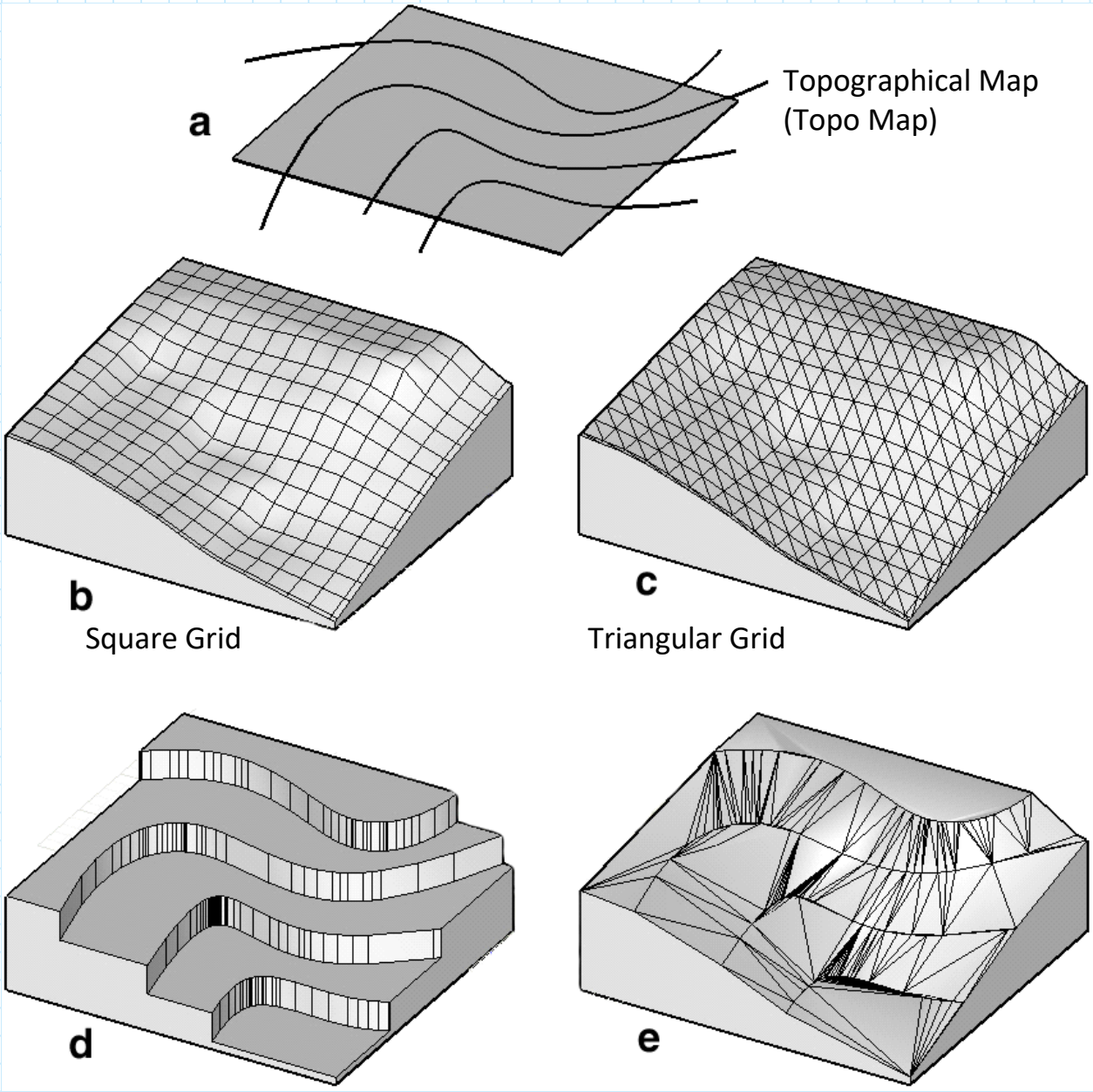
Sunday, February 17, 2019 5:48 AM

Photogrammetric Map

Sunday, February 17, 2019 5:48 AM

Terrain Models

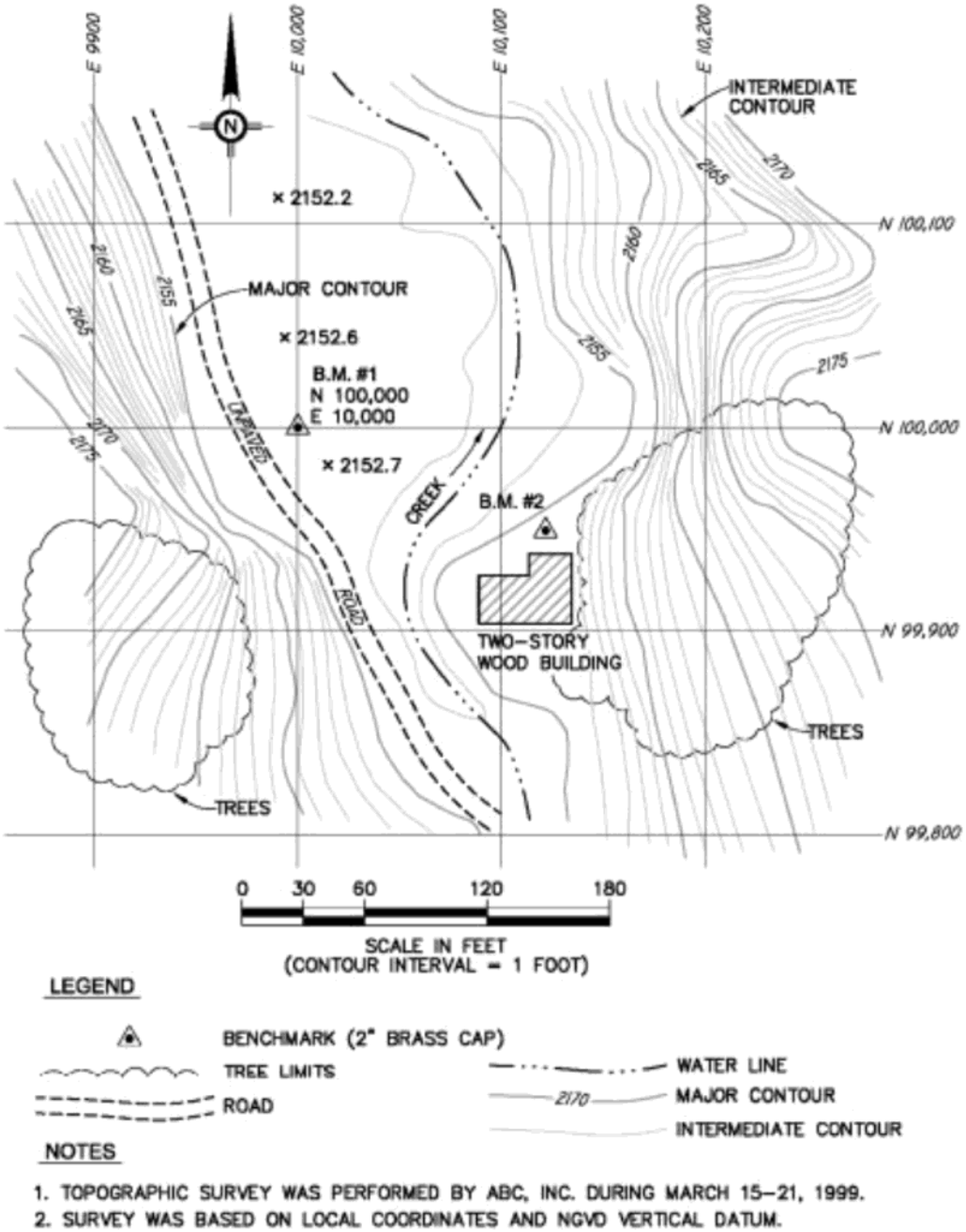
Sunday, February 17, 2019 5:48 AM



Terrain Models - Models of the earth or ground surface

Topographical Map

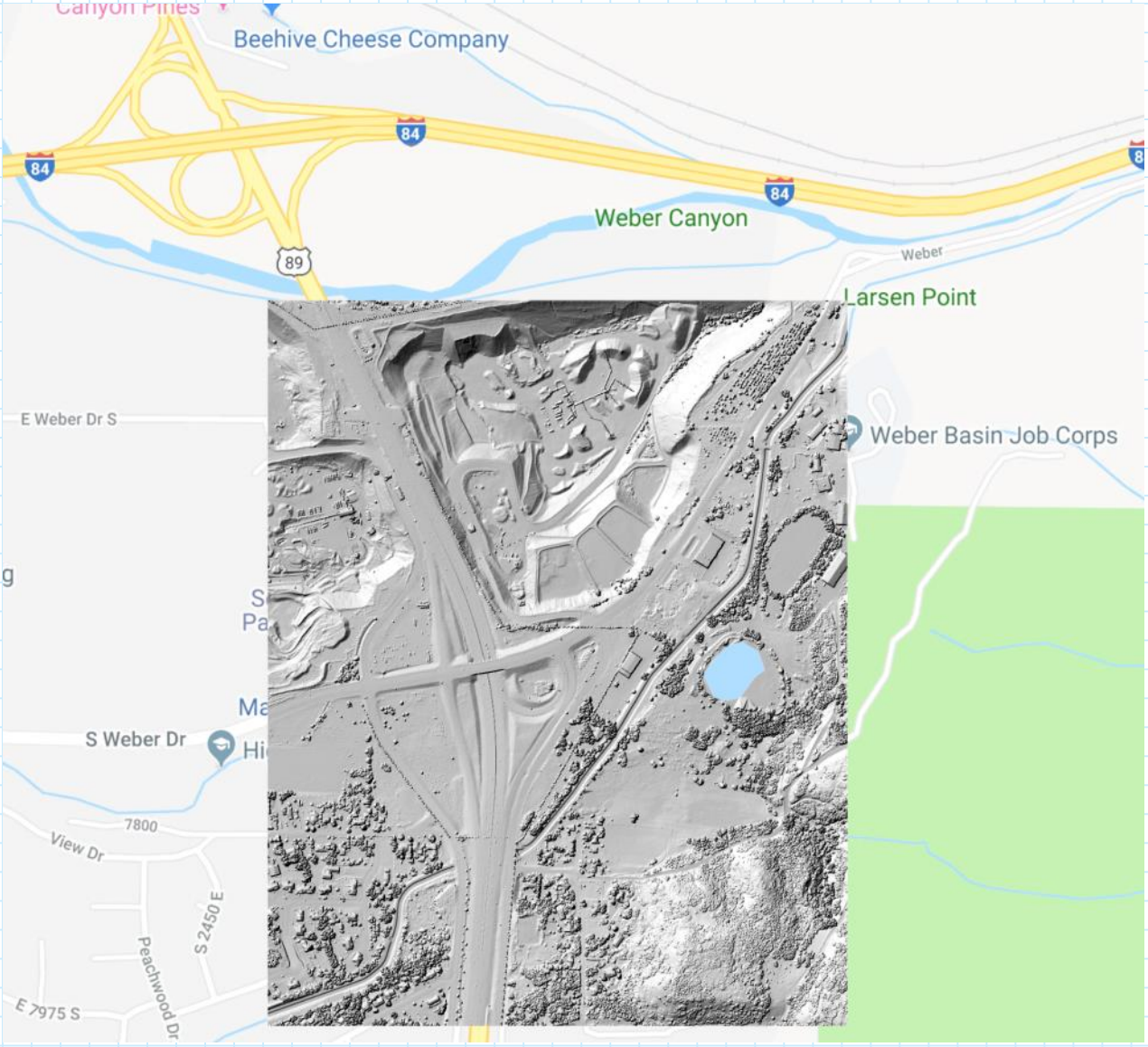
Sunday, February 17, 2019 5:48 AM



Topographical Maps - Showing elevation of land surface

LiDAR Terrain Map

Sunday, February 17, 2019 5:48 AM



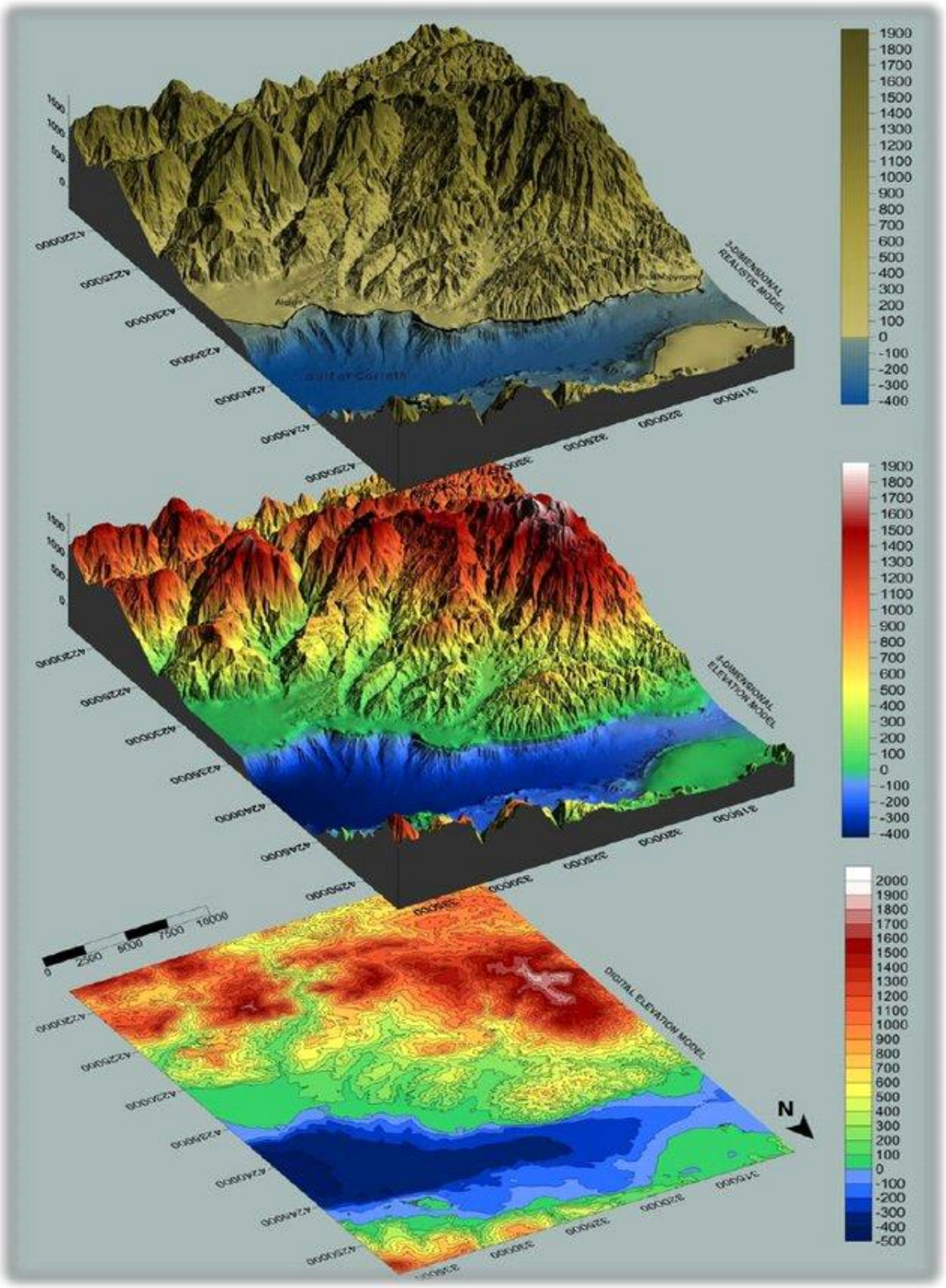
LiDAR (Light Detection and Ranging) Maps

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

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

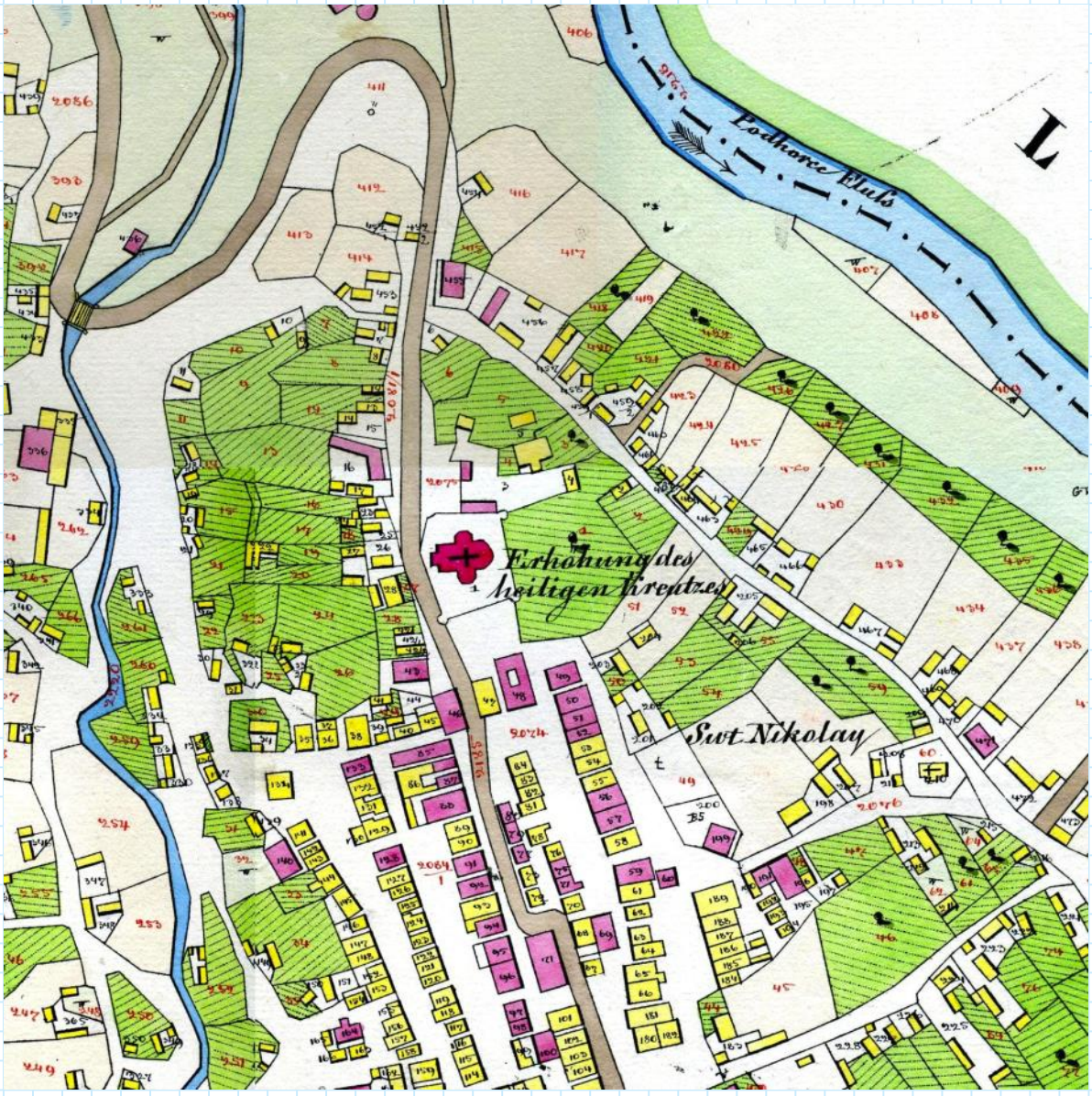
3D Digital Elevation Model

Sunday, February 17, 2019 5:48 AM



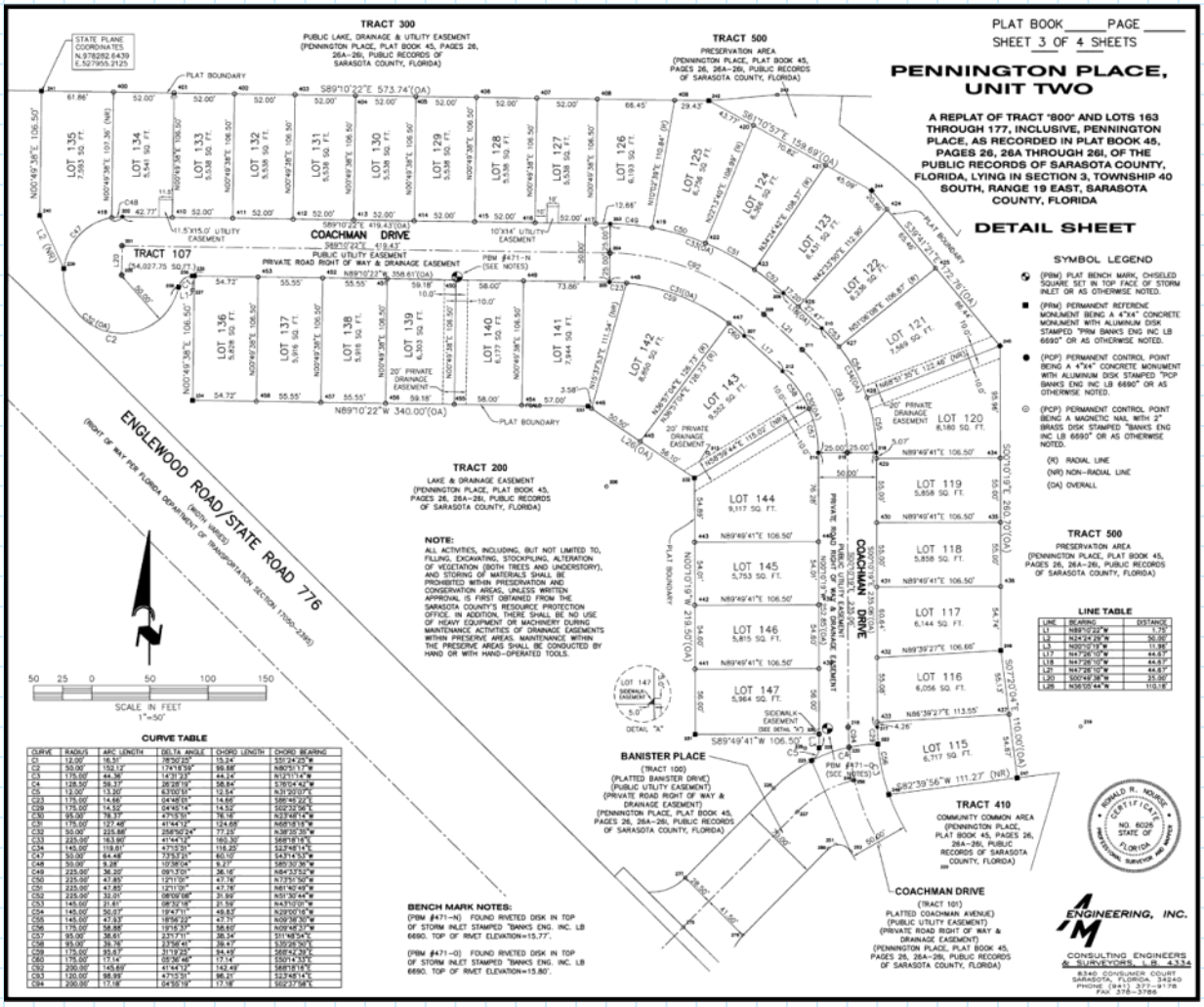
Cadastral Map

Sunday, February 17, 2019 5:48 AM



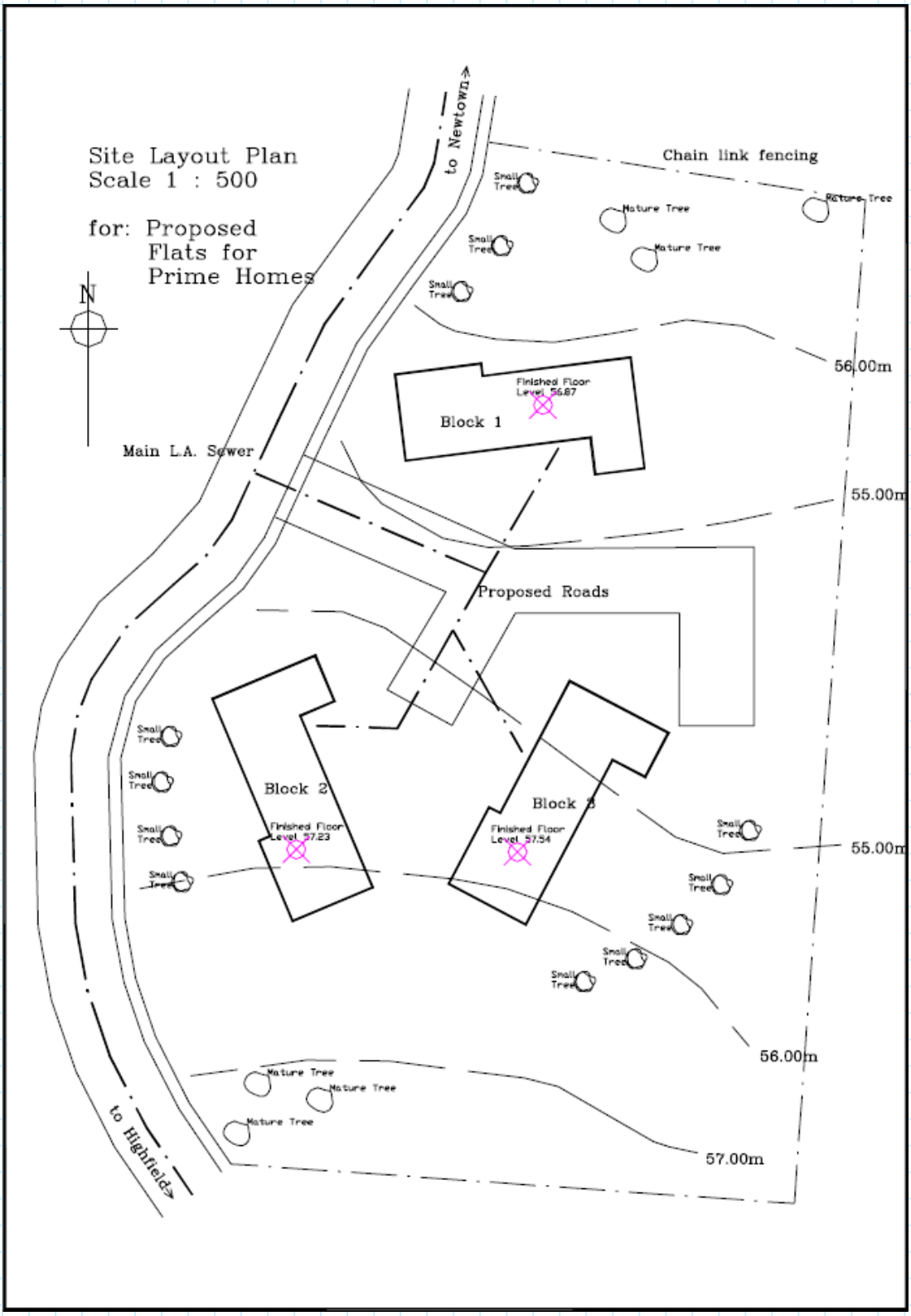
Subdivision Plat

Sunday, February 17, 2019 5:48 AM



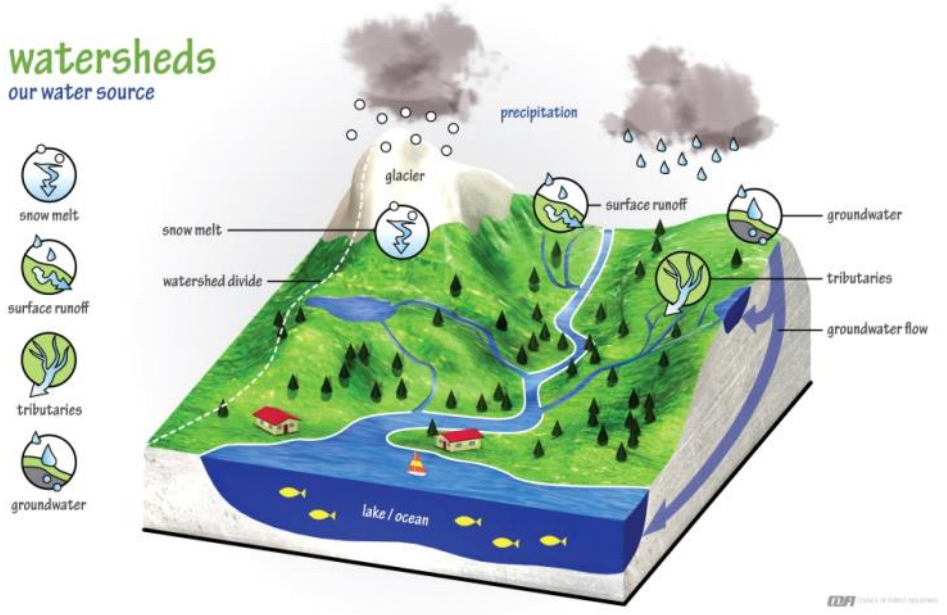
Site Plan for Residential Homes

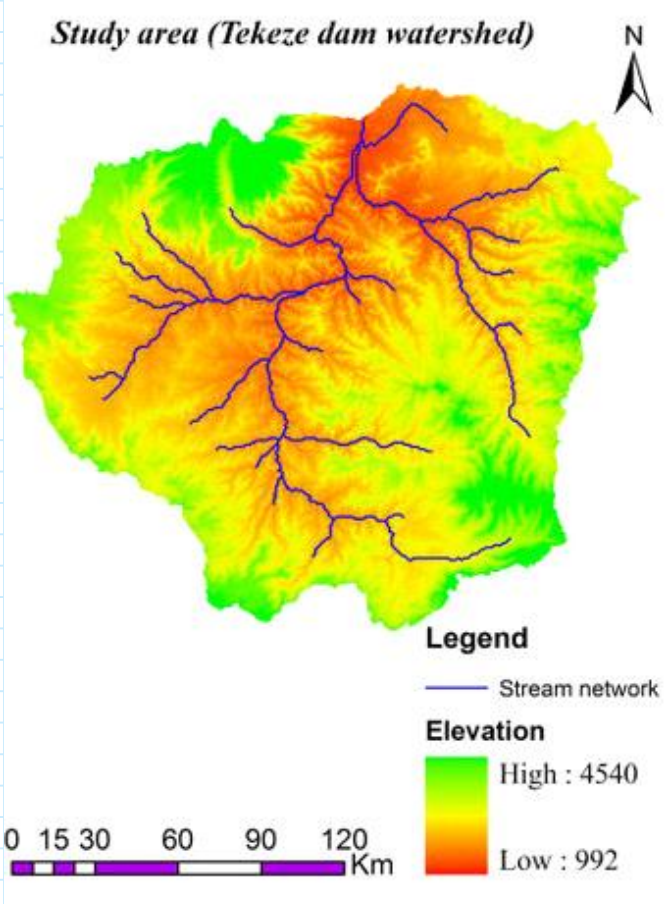
Sunday, February 17, 2019 5:48 AM



Watershed Map

Sunday, February 17, 2019 5:48 AM





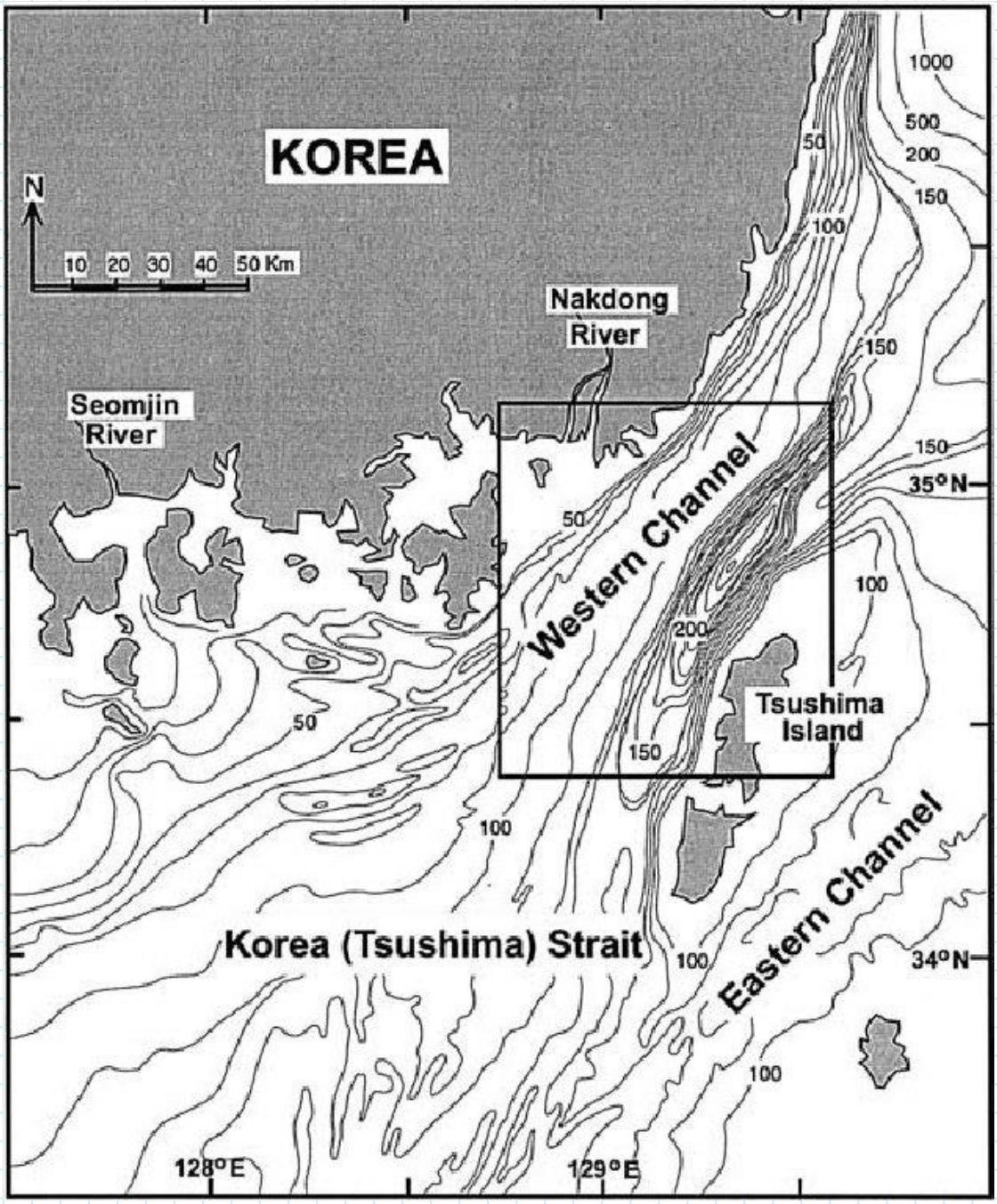
Watershed Maps and Models

Hyrdrographic Map

Sunday, February 17, 2019 5:48 AM

Bathymetry Maps

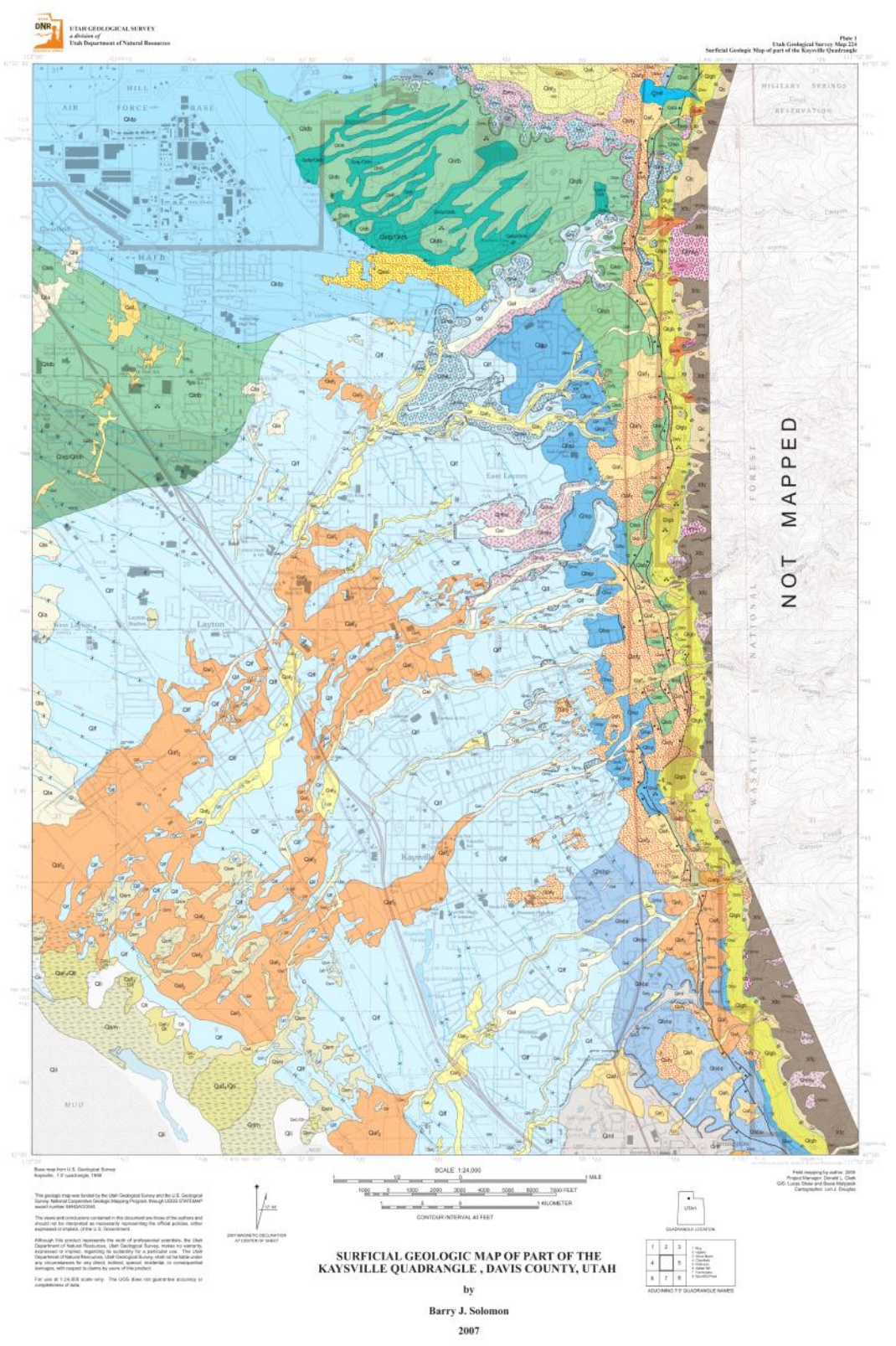
Sunday, February 17, 2019 5:48 AM



Bathymetry Maps (Example of depth to bottom of channel for the Korea Strait - Southeastern Coastline

Geologic Maps

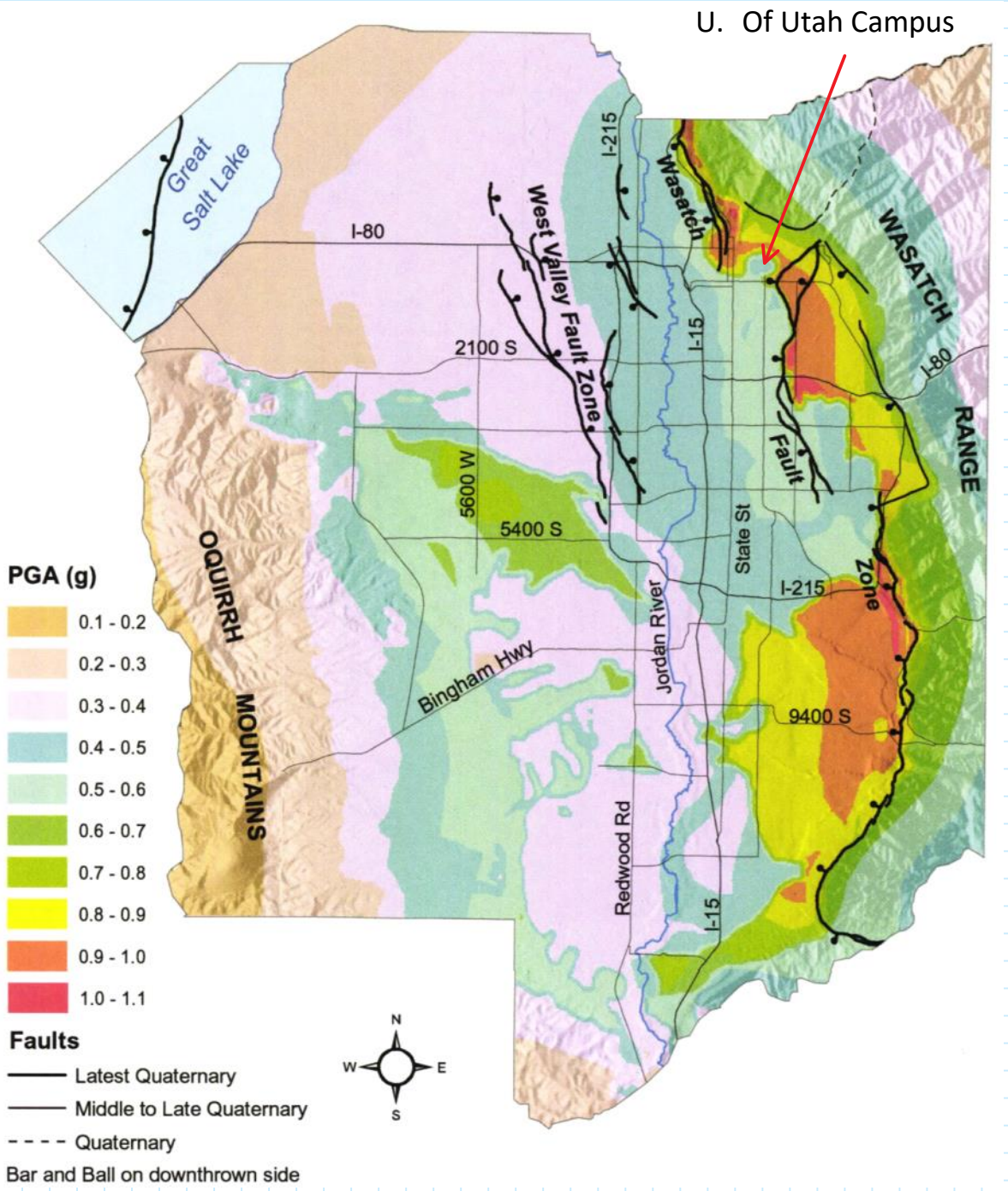
Sunday, February 17, 2019 5:48 AM



Geologic Map - Davis County, Utah, USA

Earthquake Hazard Maps - Pga and Faults

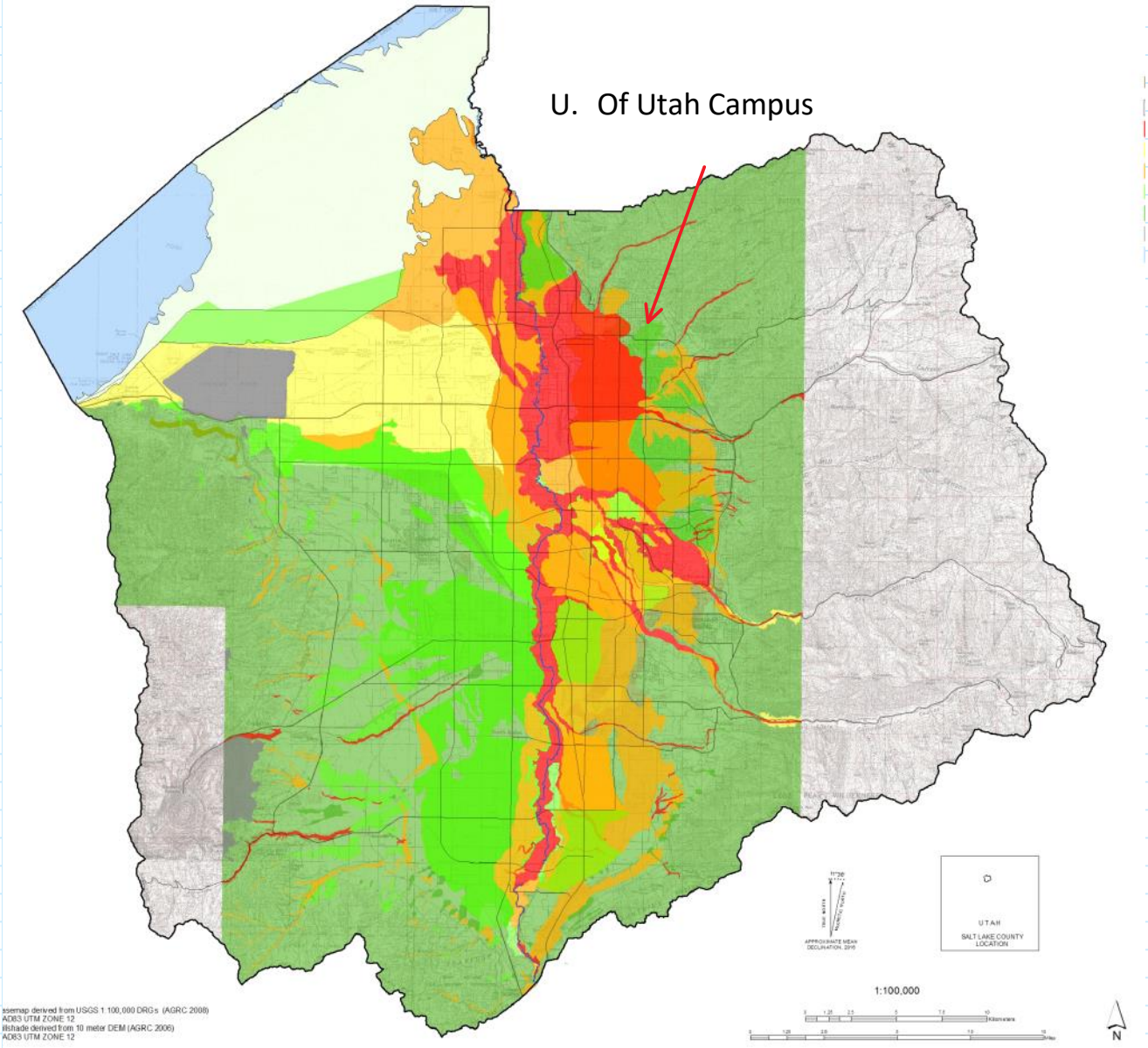
Sunday, February 17, 2019 5:48 AM



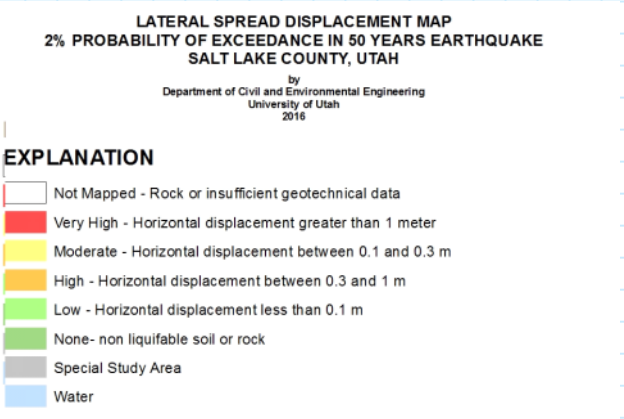
Earthquake Hazard Maps - Earthquake Shaking or Strong Ground Motion - pga is peak ground acceleration in g (gravitational constant) (Salt Lake Valley, Utah).

Earthquake Hazard Maps - Liquefaction

Sunday, February 17, 2019 5:48 AM

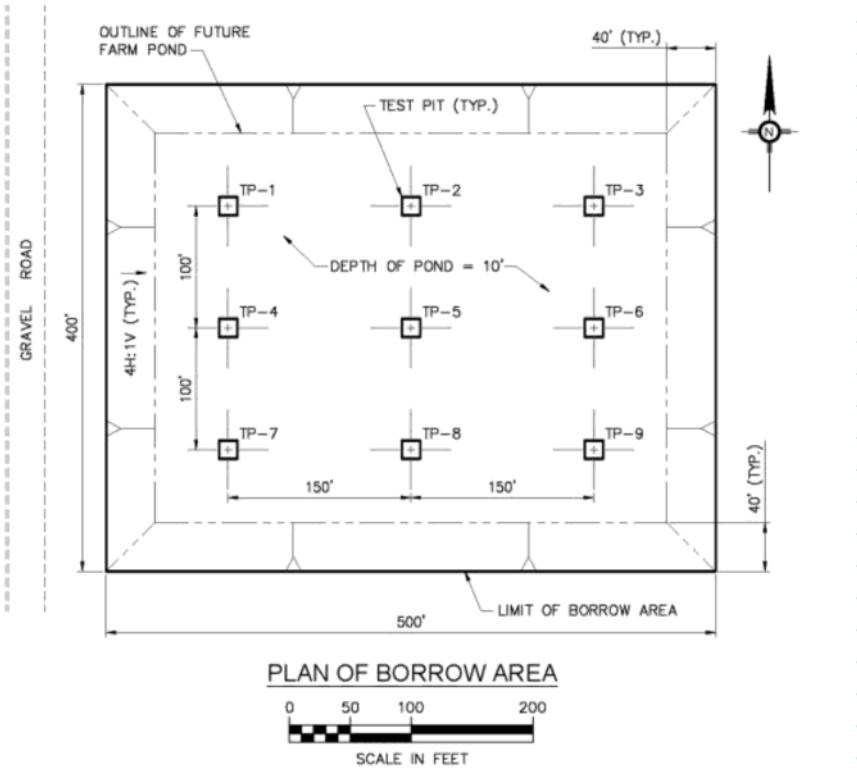


Earthquake Hazard Maps - Liquefaction

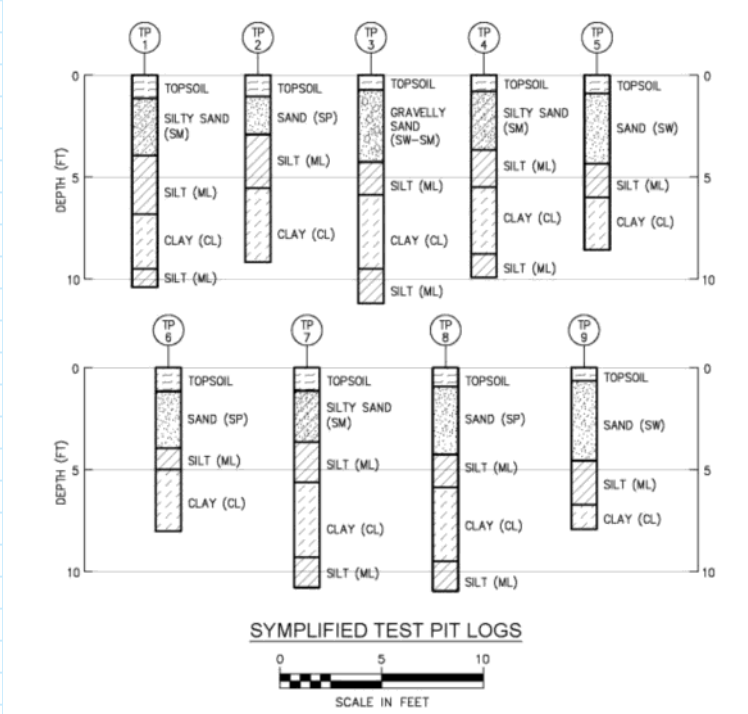


Geotechnical Drawings - Borehole Location and Soil Logs

Sunday, February 17, 2019 5:48 AM



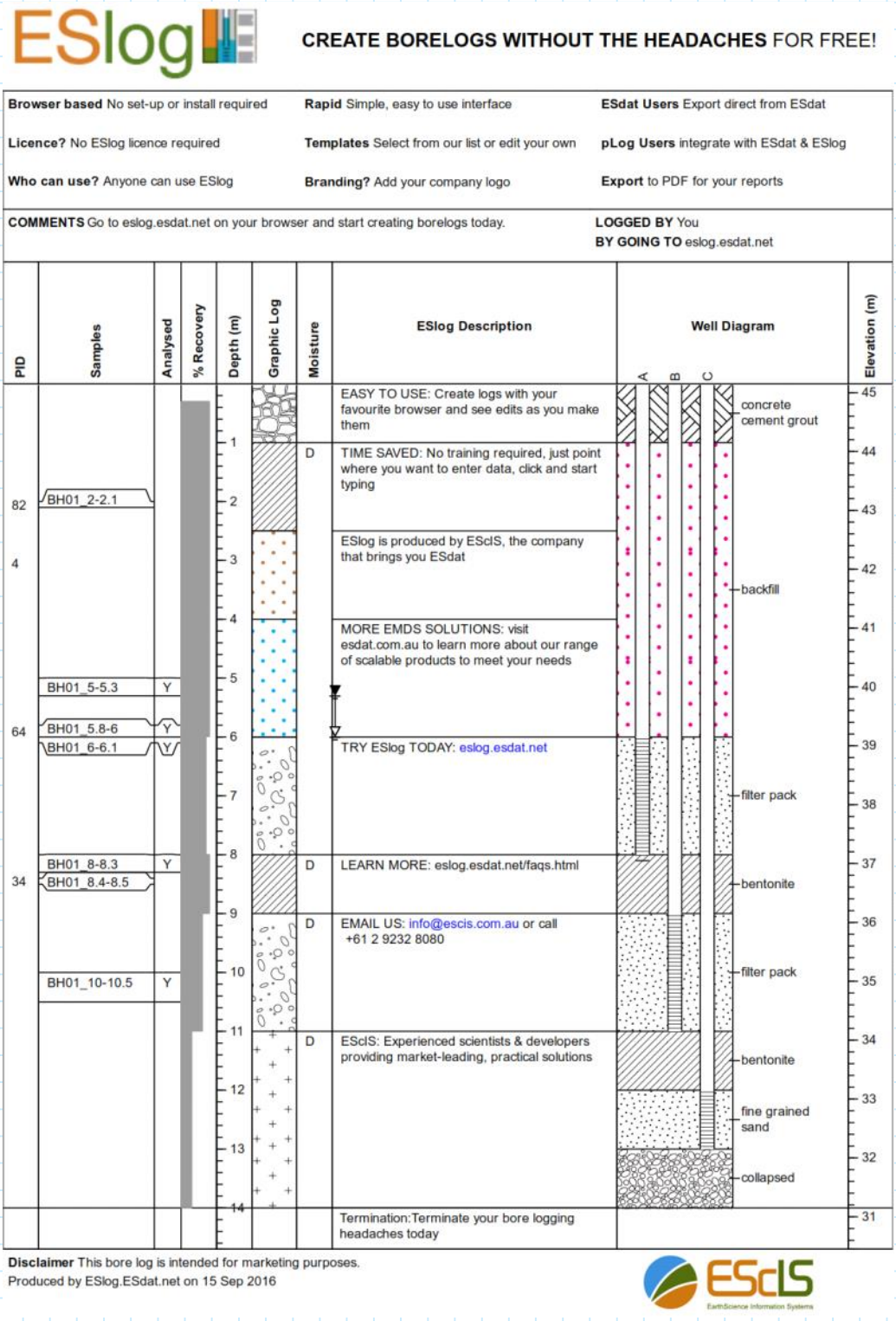
Geotechnical Investigation - Plan View of Borehole Locations



Geotechnical Investigation - Soil logs of soil type found in test pits

Geotechnical Borehole Log

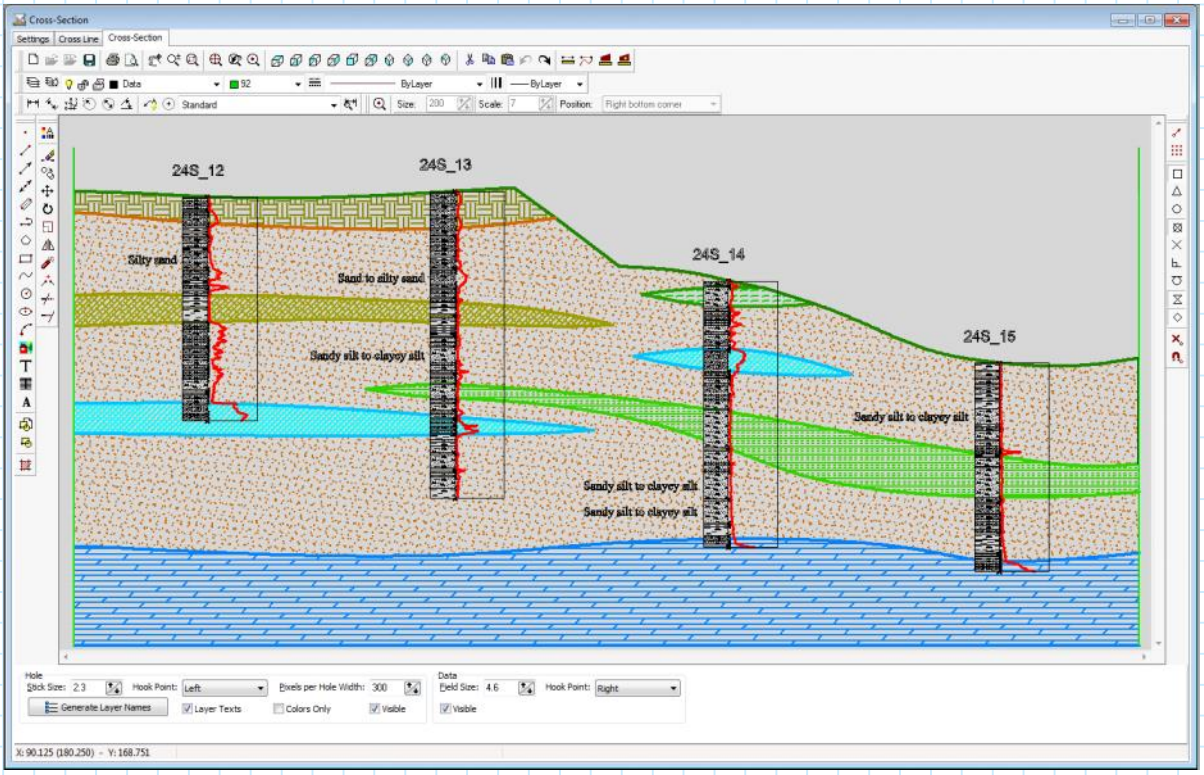
Sunday, February 17, 2019 5:48 AM



Geotechnical Soil Borehole Log - Shows the soil type and layer in the subsurface

Geotechnical Cross-Section

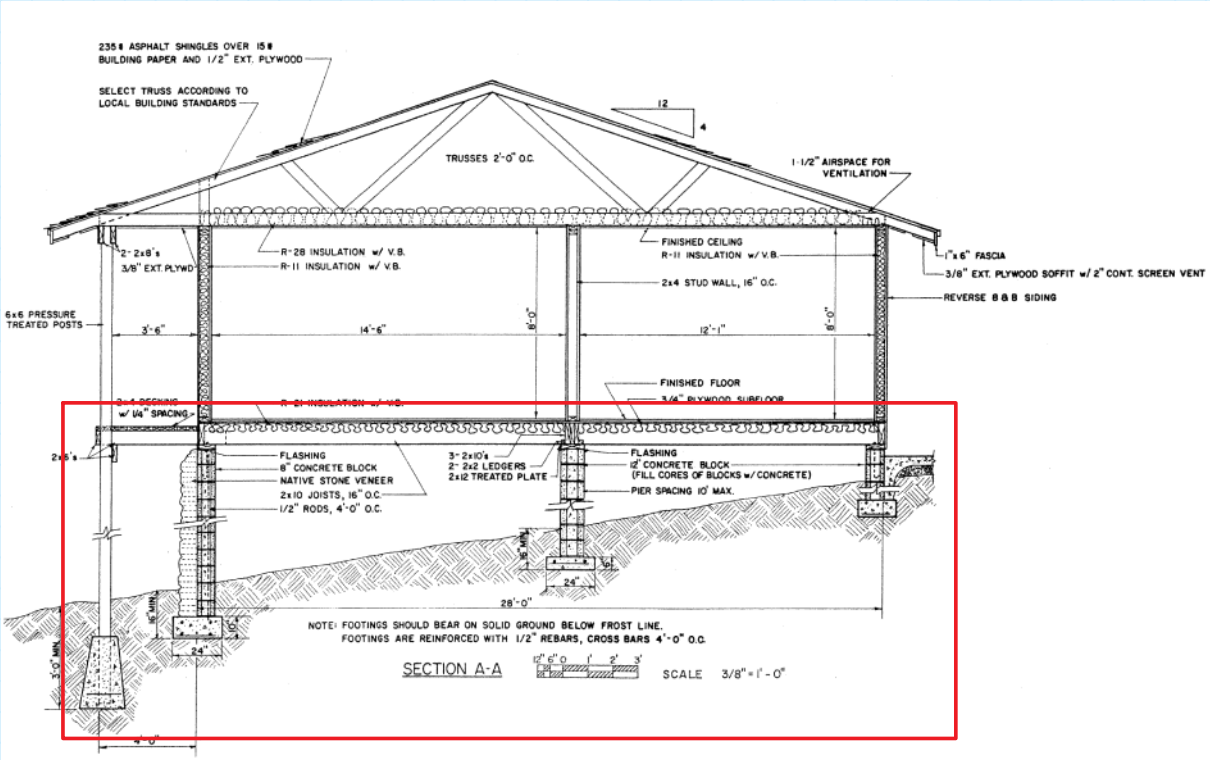
Sunday, February 17, 2019 5:48 AM



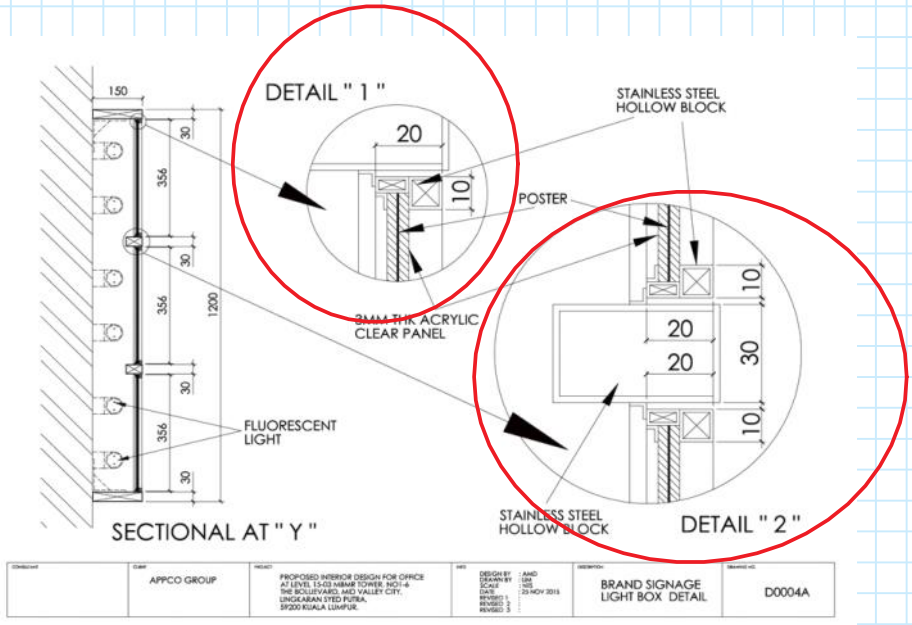
Geotechnical Engineering Cross-Section of Foundation Soil Layers

Foundation Design and Detail Map

Sunday, February 17, 2019 5:48 AM



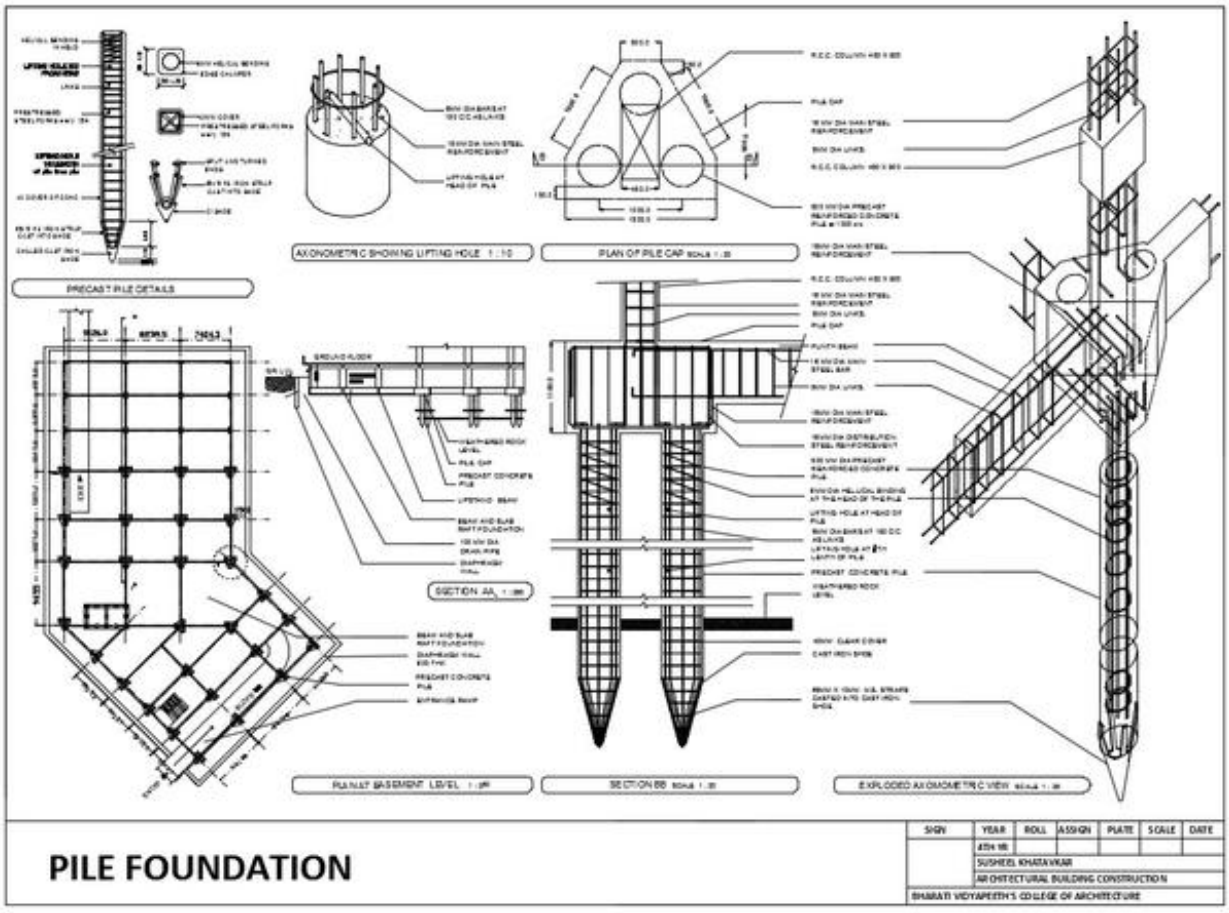
Foundation Design Drawing - Shows the location of the building footings and how the building is supported by the underlying ground or rock.



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

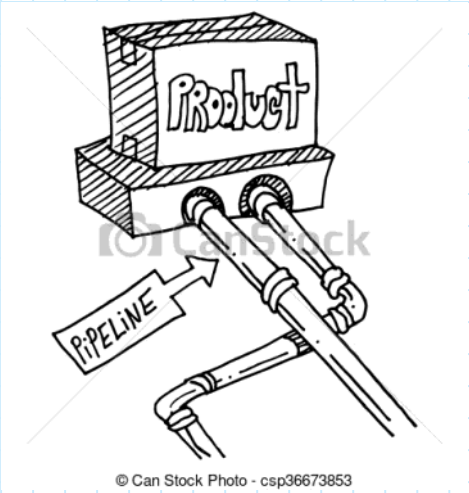
Pile Foundation Detail

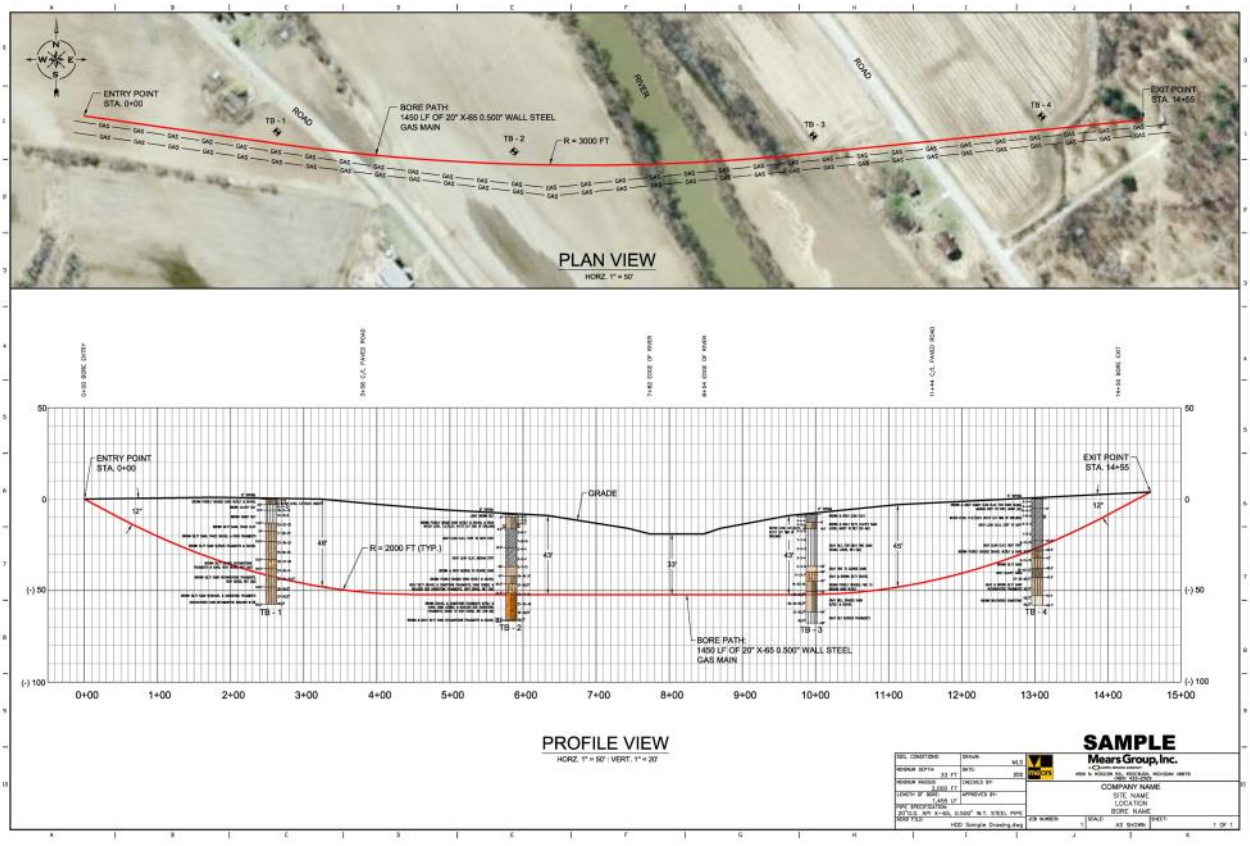
Sunday, February 17, 2019 5:48 AM



Pipeline Alignment Plan and Profile Views

Sunday, February 17, 2019 5:48 AM

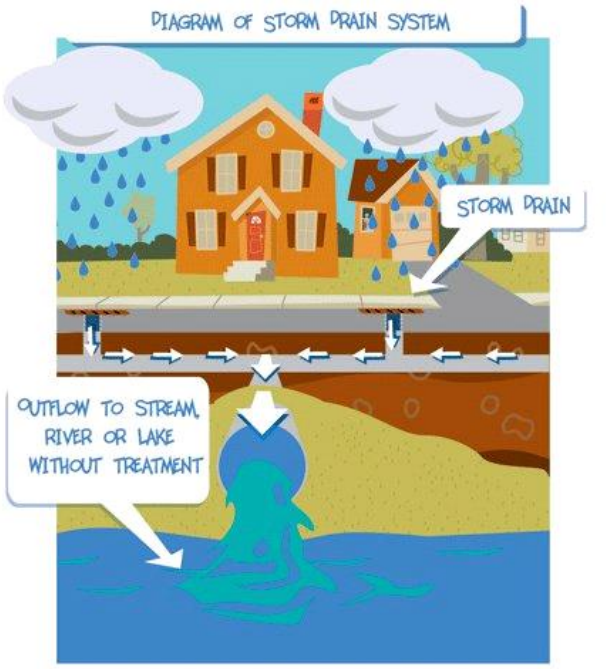


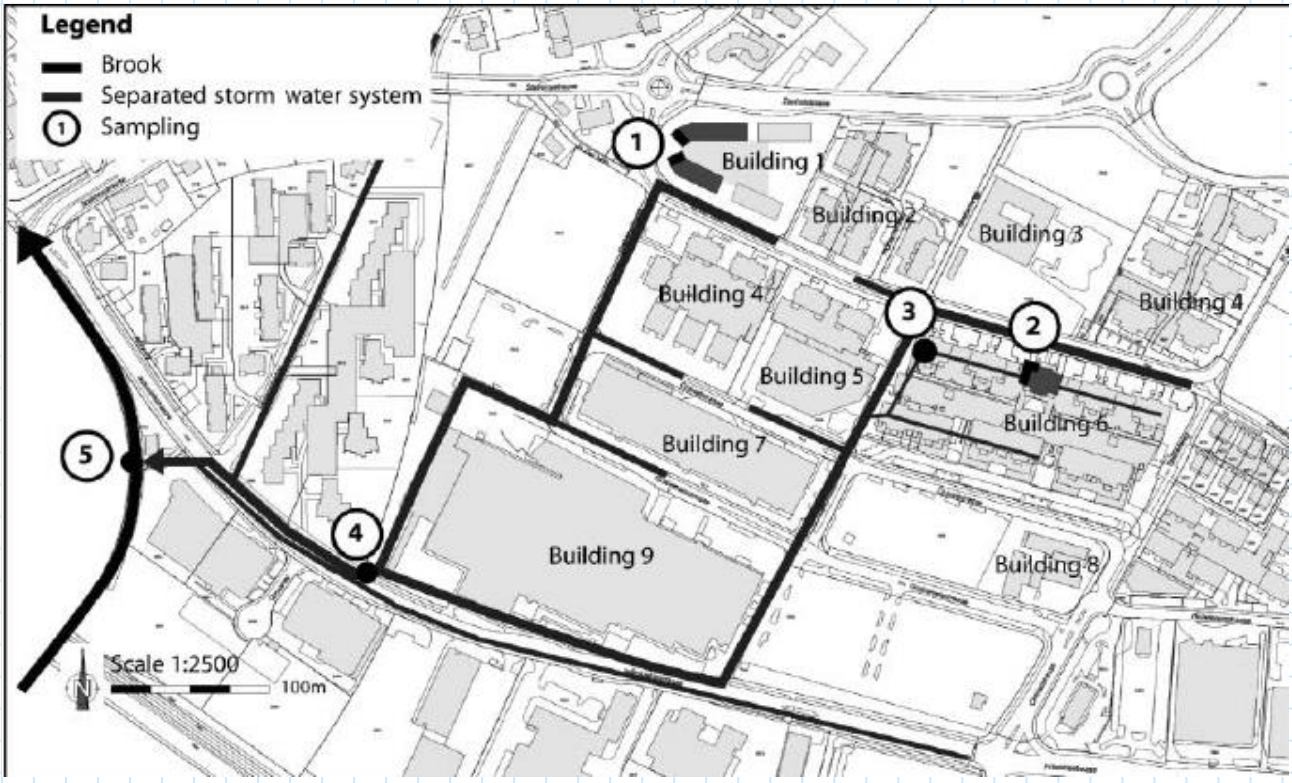


Pipeline Drawings - Plan and Profile View

Stormwater Drainage Plan View

Sunday, February 17, 2019 5:48 AM



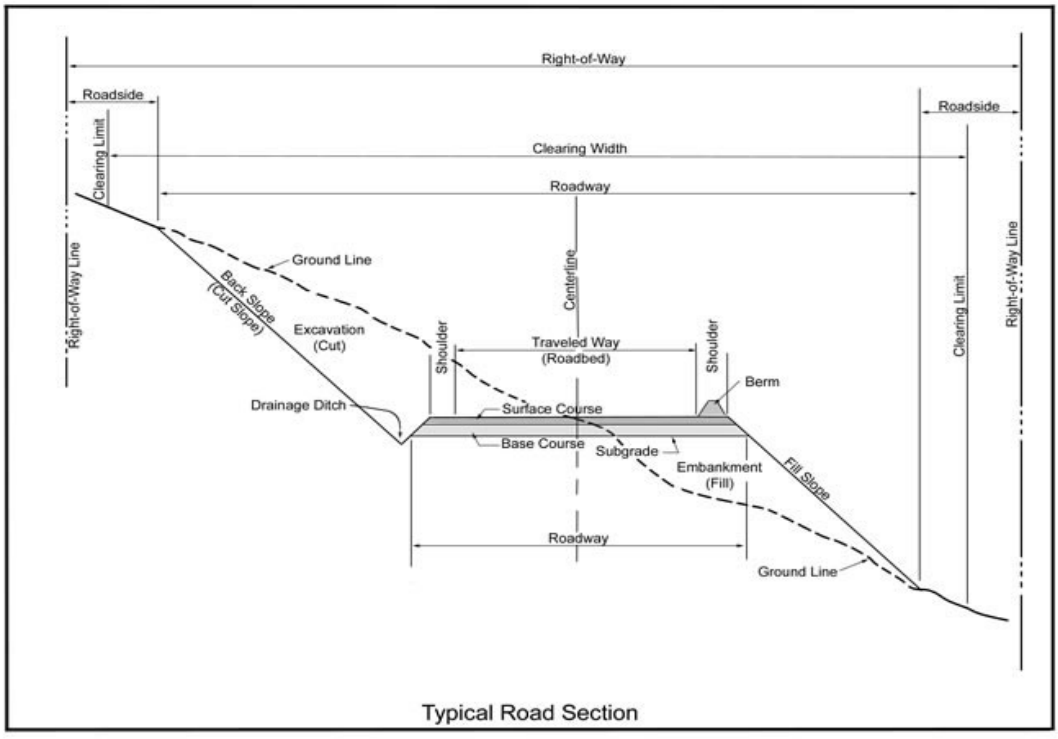


Stormwater Drainage Drawings - Plan View

Highway Drawings

Sunday, February 17, 2019 5:48 AM

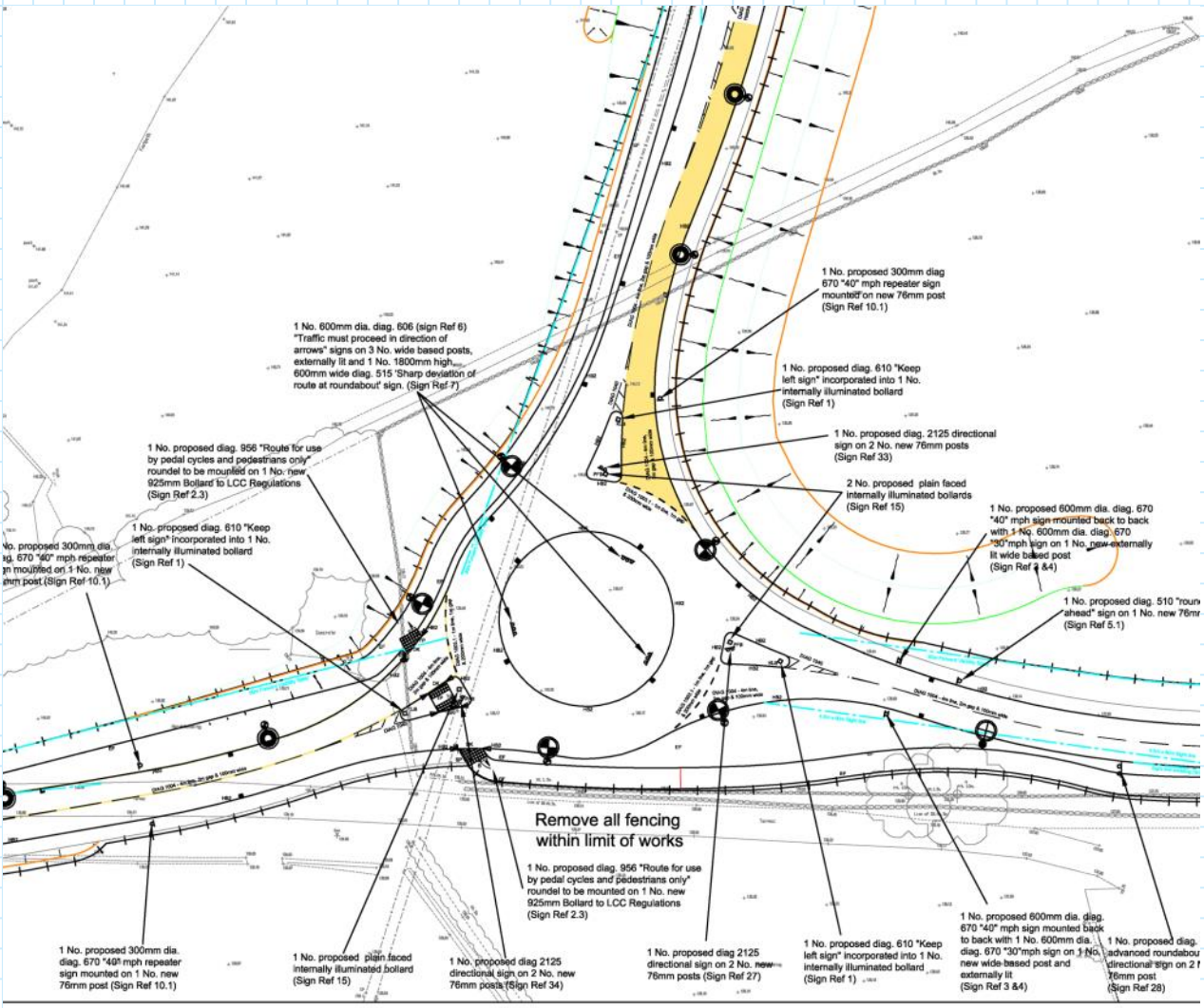
Highway Plan View Drawing



Highway Cross-Sectional View Drawing

Highway Intersection Plan View

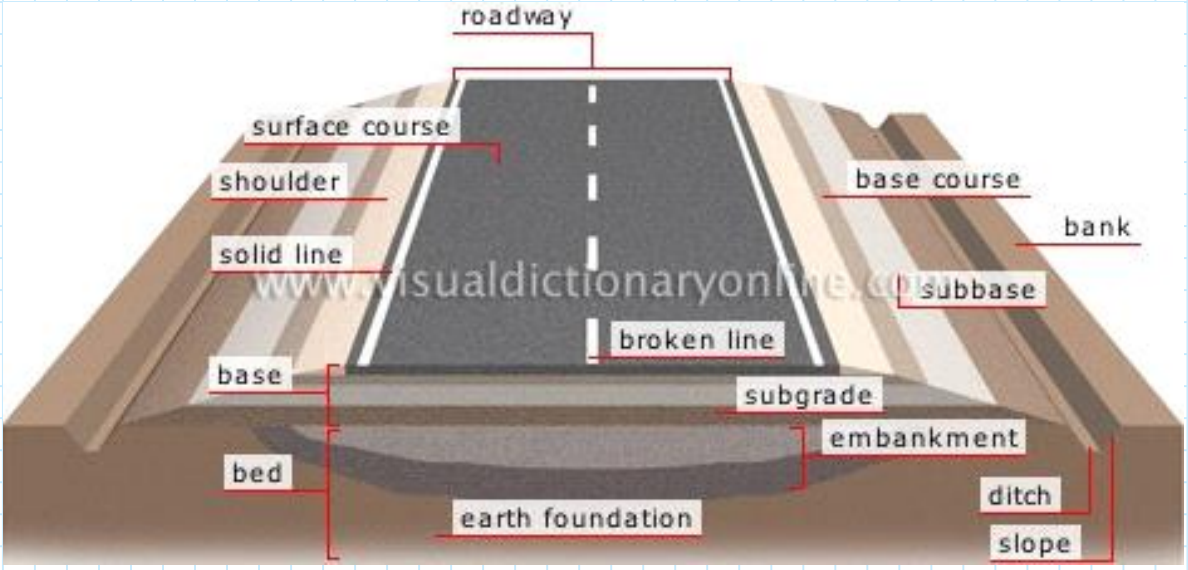
Sunday, February 17, 2019 5:48 AM



Highway Layout or Plan View Drawing of Highway Interchange

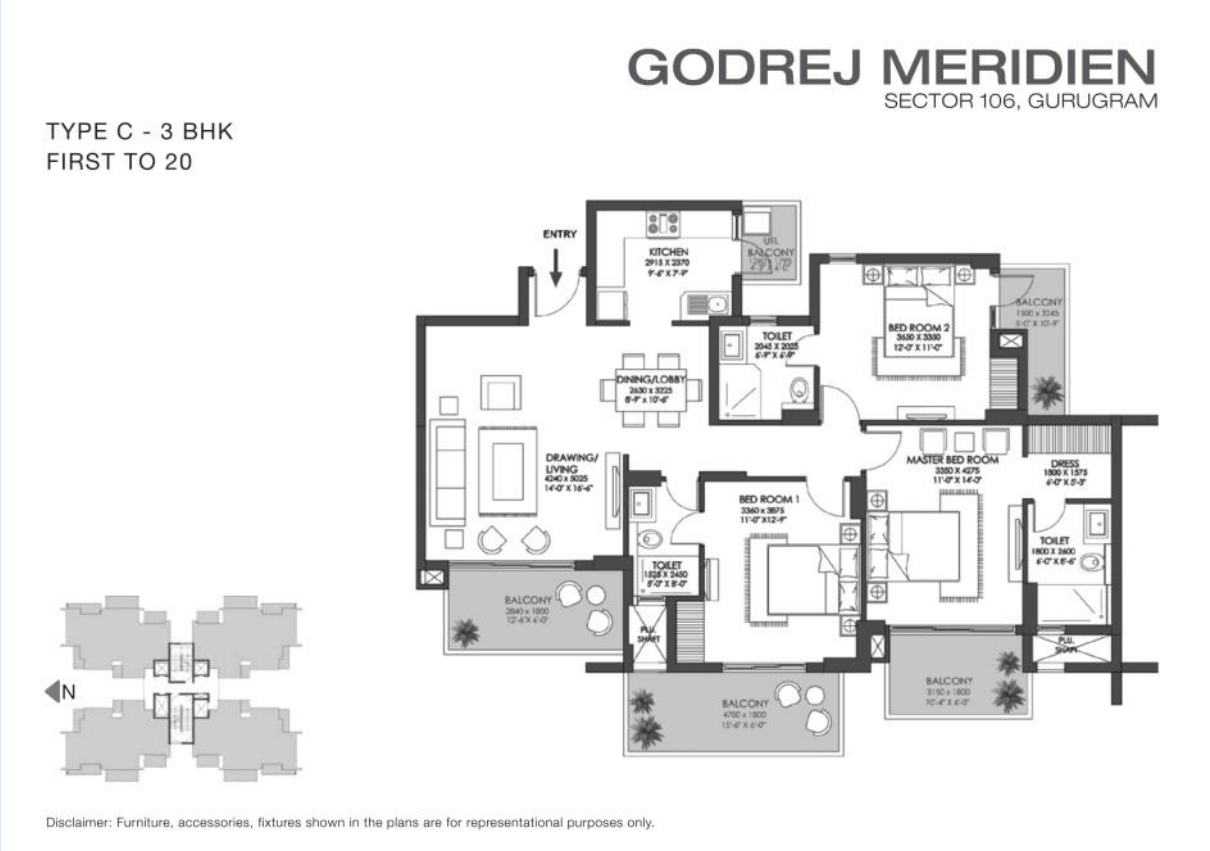
Roadway Cross-section

Sunday, February 17, 2019 5:48 AM



Floor Plan

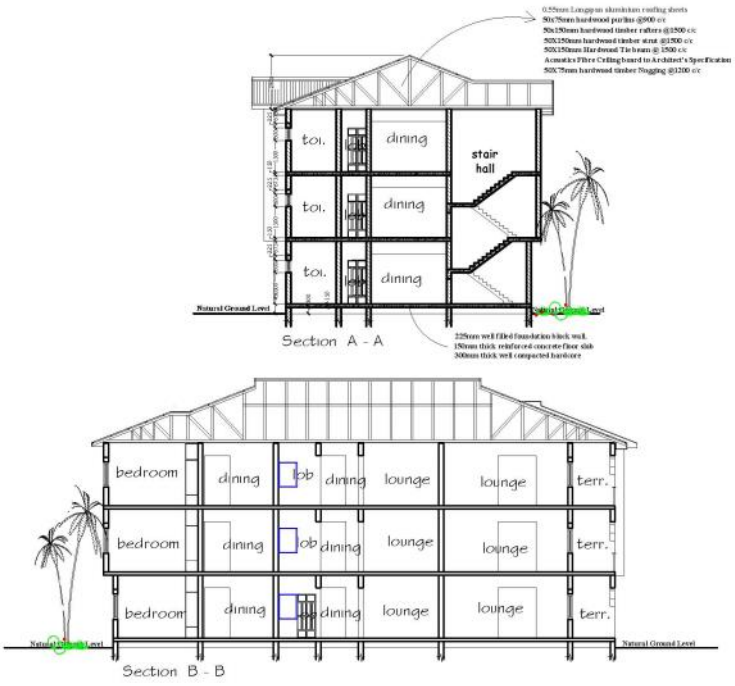
Sunday, February 17, 2019 5:48 AM

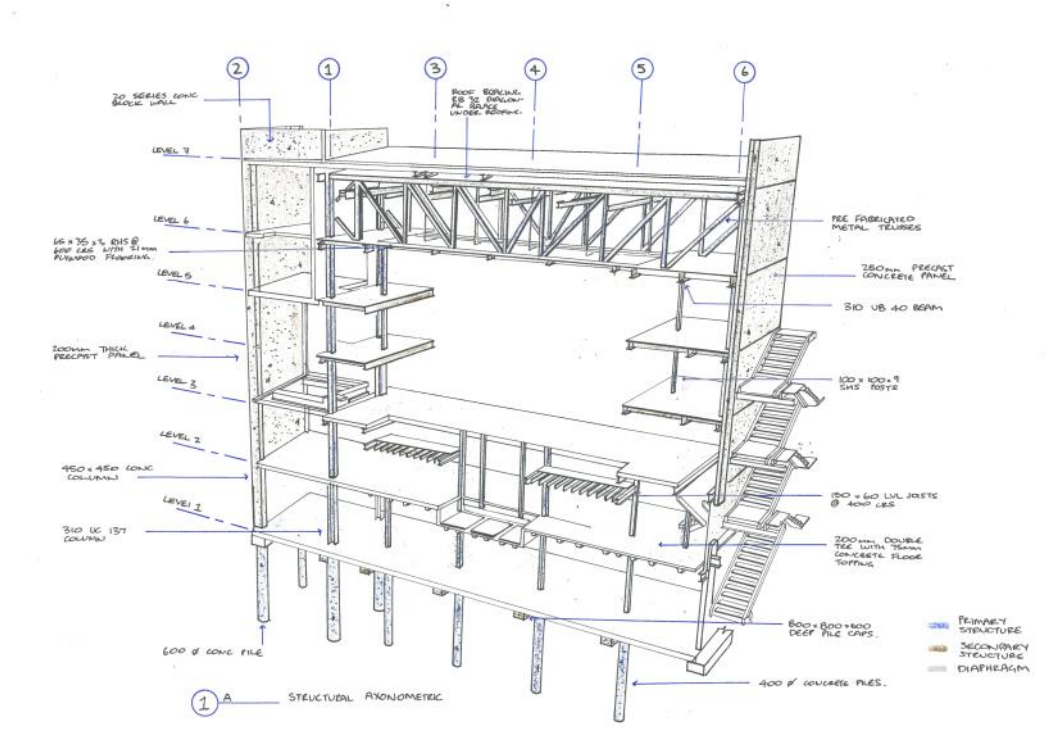


Floor Plan - Shows location and size of rooms, walls and internal contents.

Structural Frame Drawings

Sunday, February 17, 2019 5:48 AM

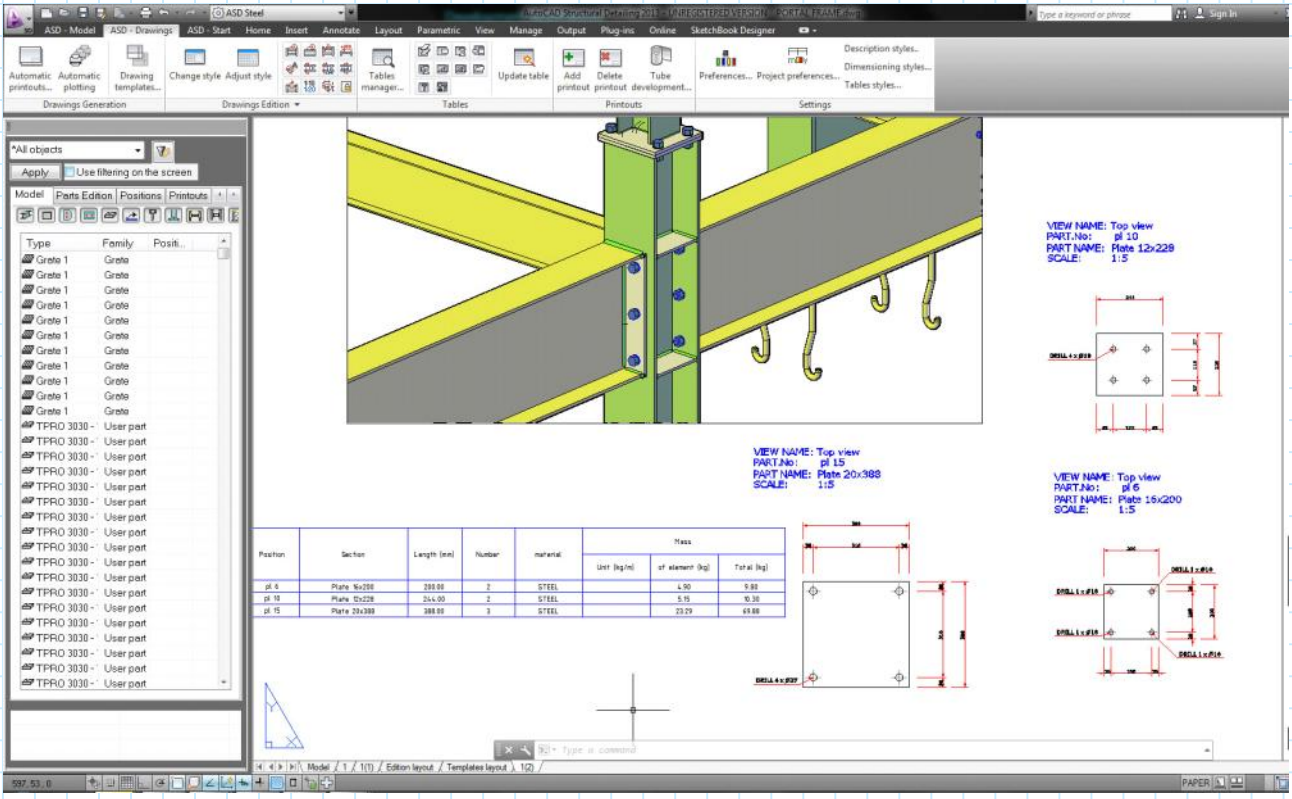




Structural Drawing of Building Frame - Shows the location of column, beams and building support features

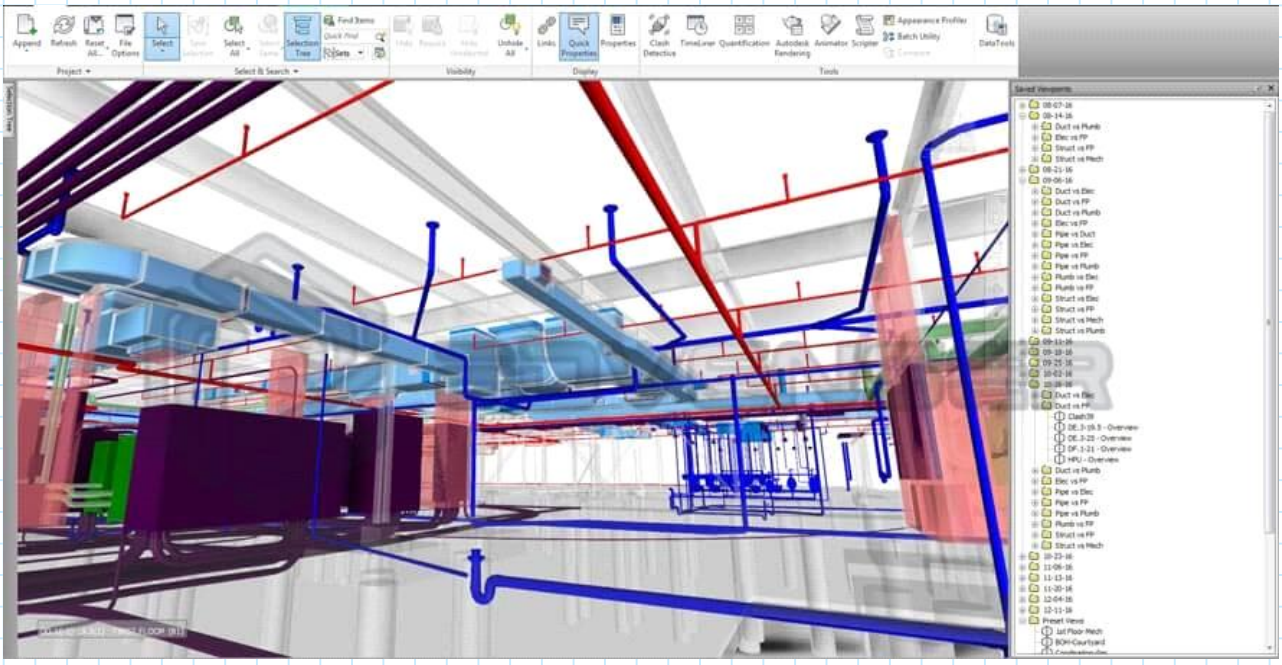
Structural Detail

Sunday, February 17, 2019 5:48 AM

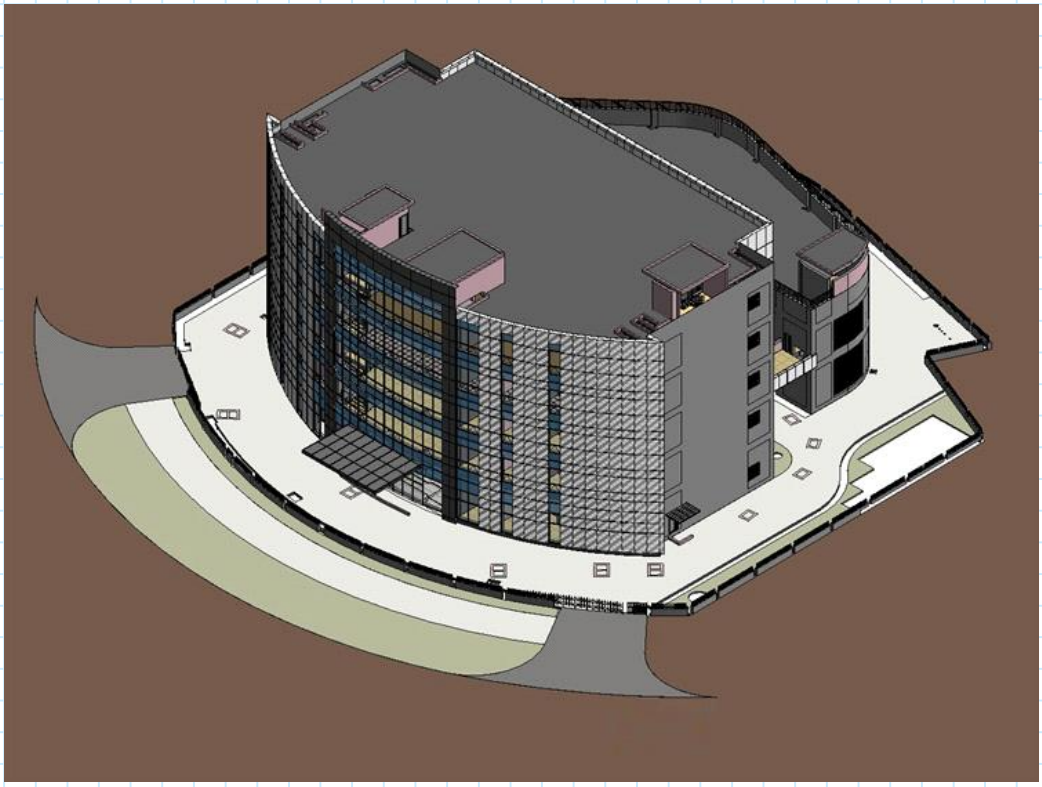


BIM Models

Sunday, February 17, 2019 5:48 AM



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

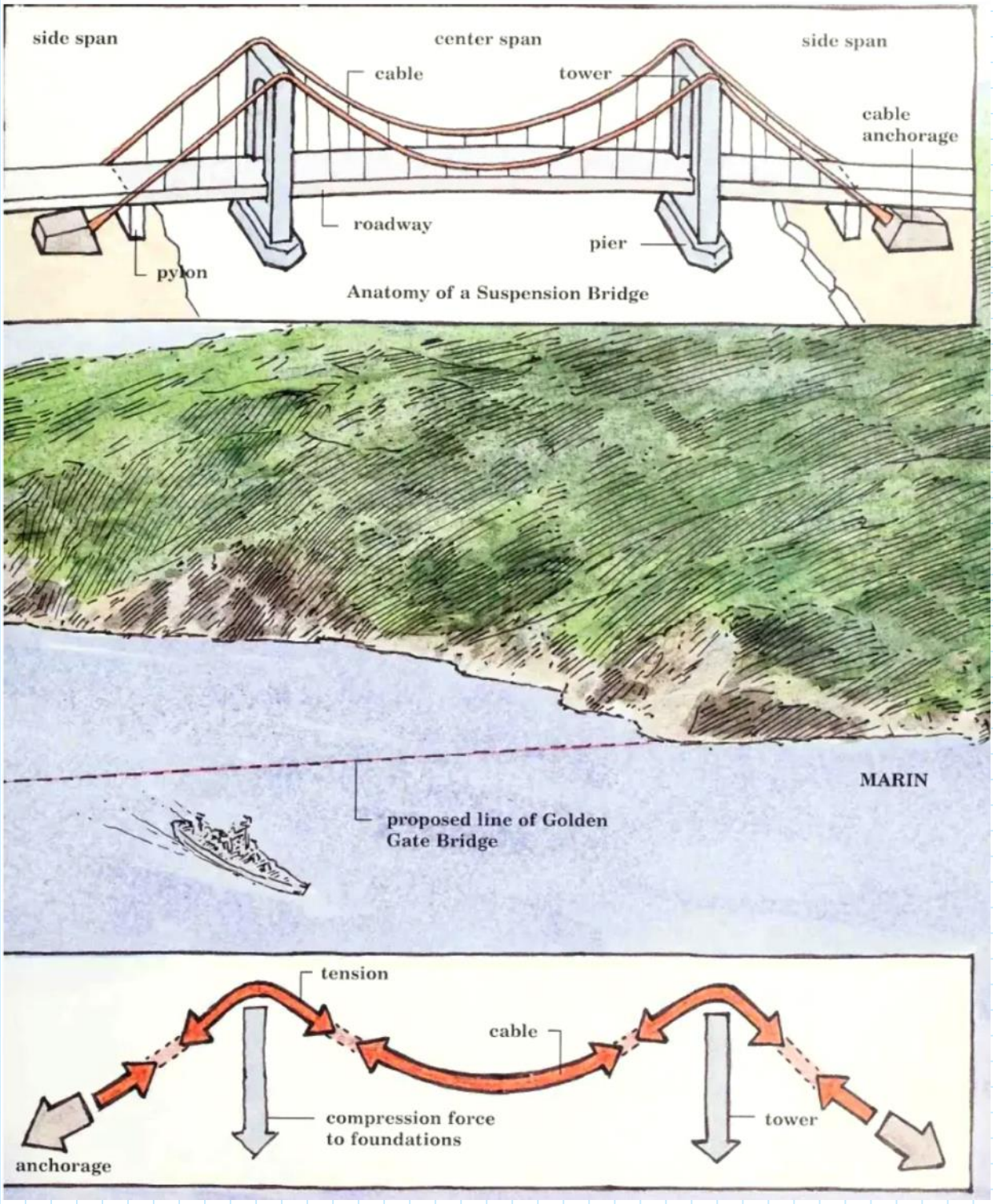
Note: The sketches can be hand drawn or done using a sketch tool (MS paint, MS Whiteboard, MS OneNote, etc.)

The Powerful Effects of Drawing on Learning

Sketch Examples

Wednesday, January 4, 2023 1:03 PM

Type, Situation and Location

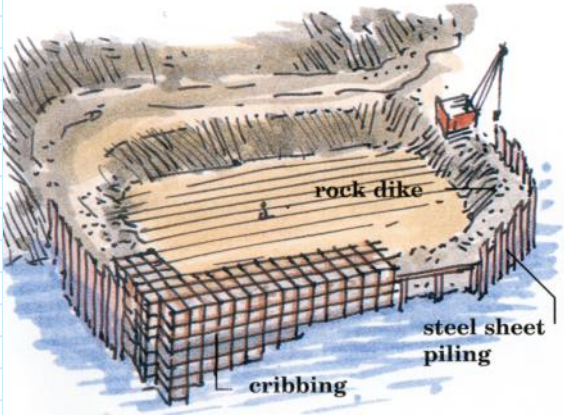


Building Big Paperback – May 10, 2004

by David Macaulay (Author)

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

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.

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Building Big Paperback – May 10, 2004

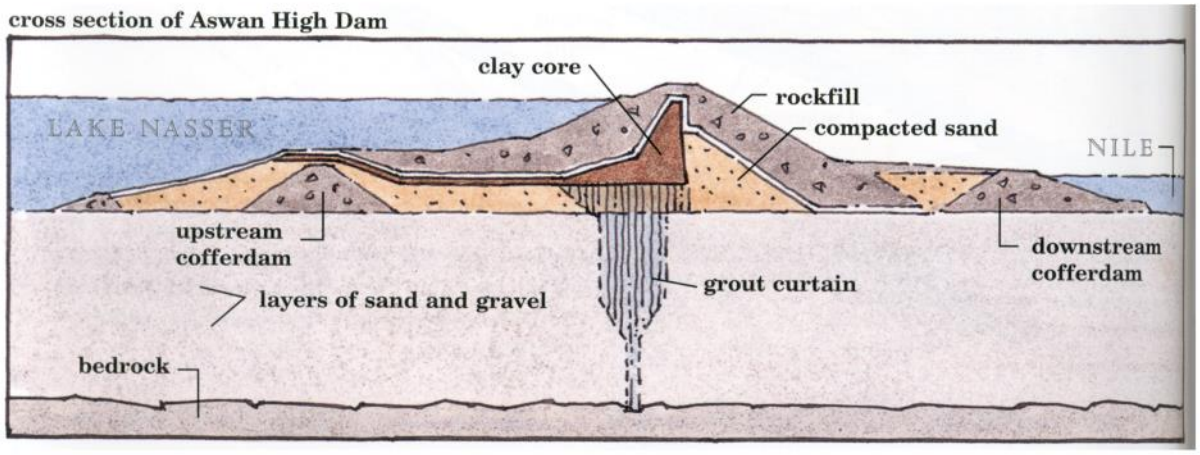
by David Macaulay (Author)

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

Sketch Examples (cont.)

Wednesday, January 4, 2023 1:03 PM

Aswan Dam
What about the core?



Building Big Paperback – May 10, 2004

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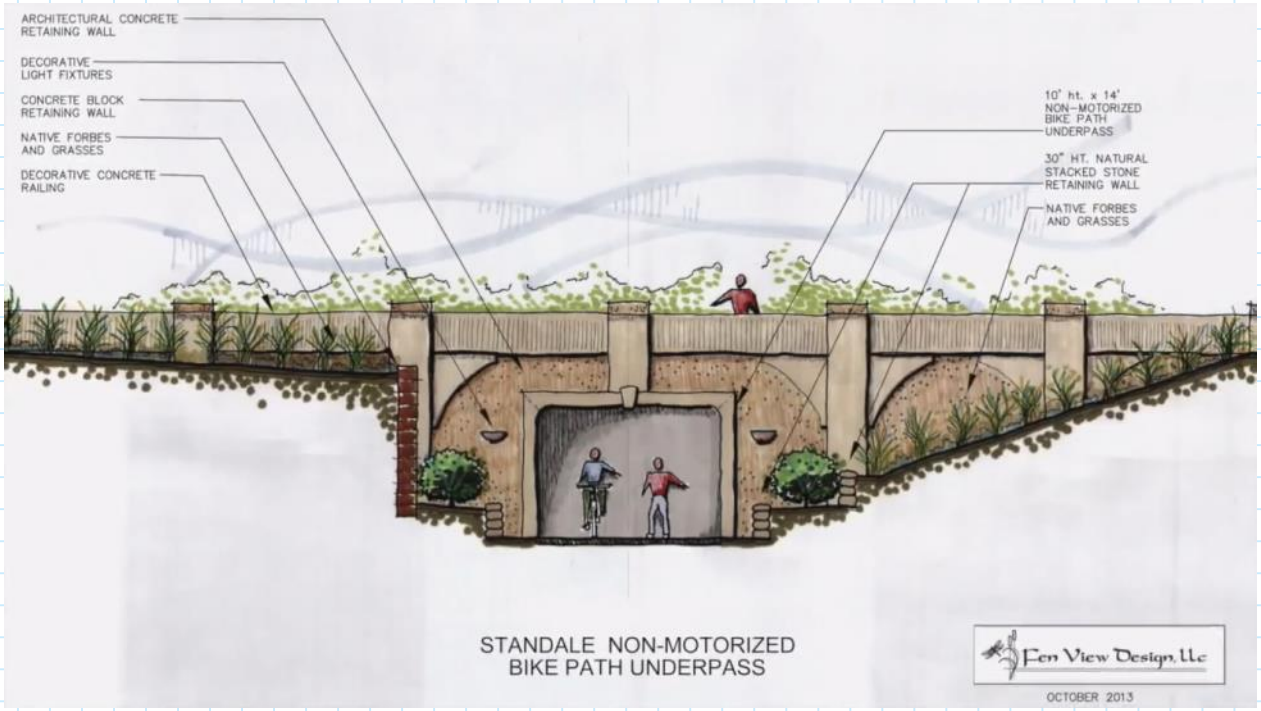
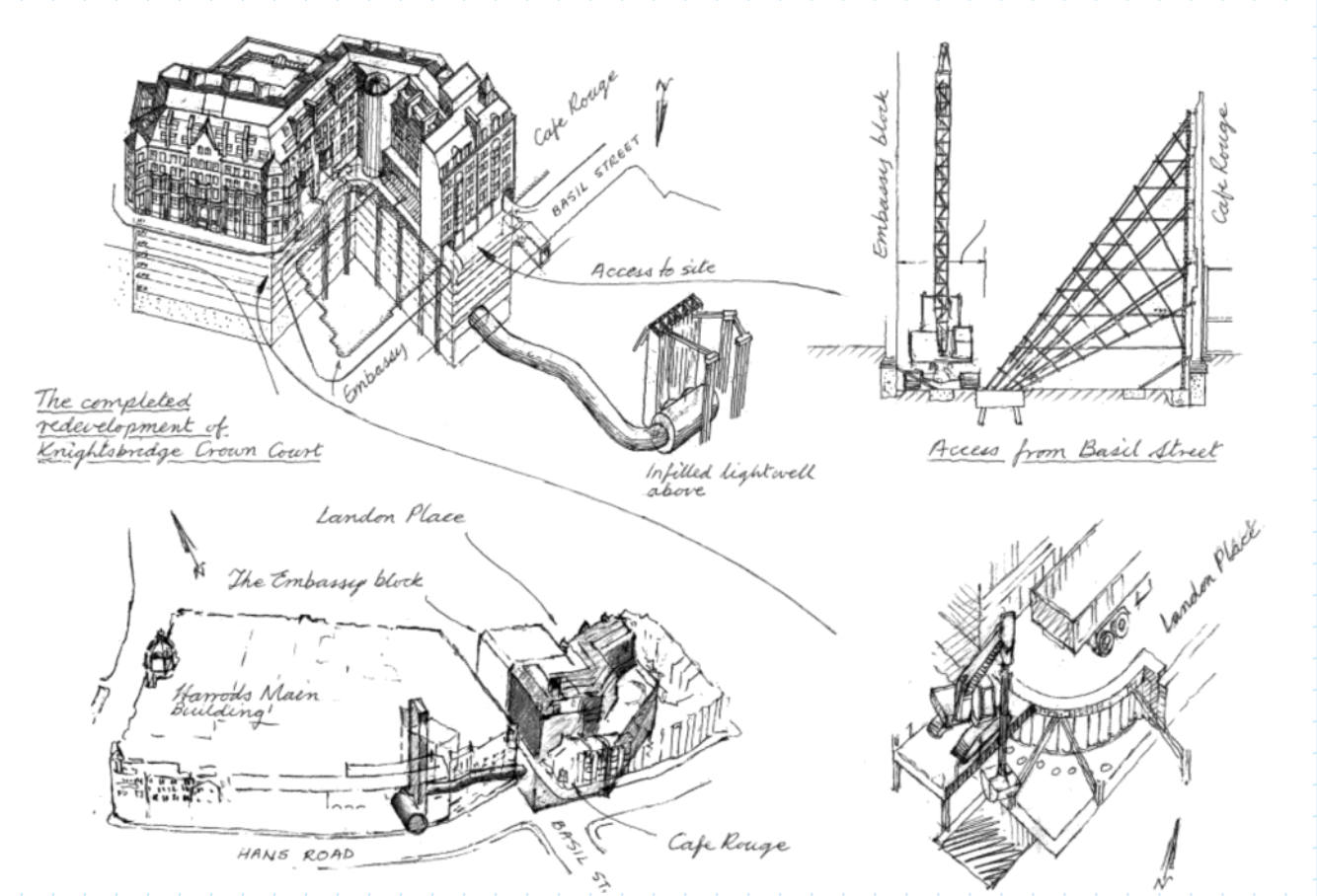
Sketch Examples (cont.)

Wednesday, January 4, 2023 1:03 PM



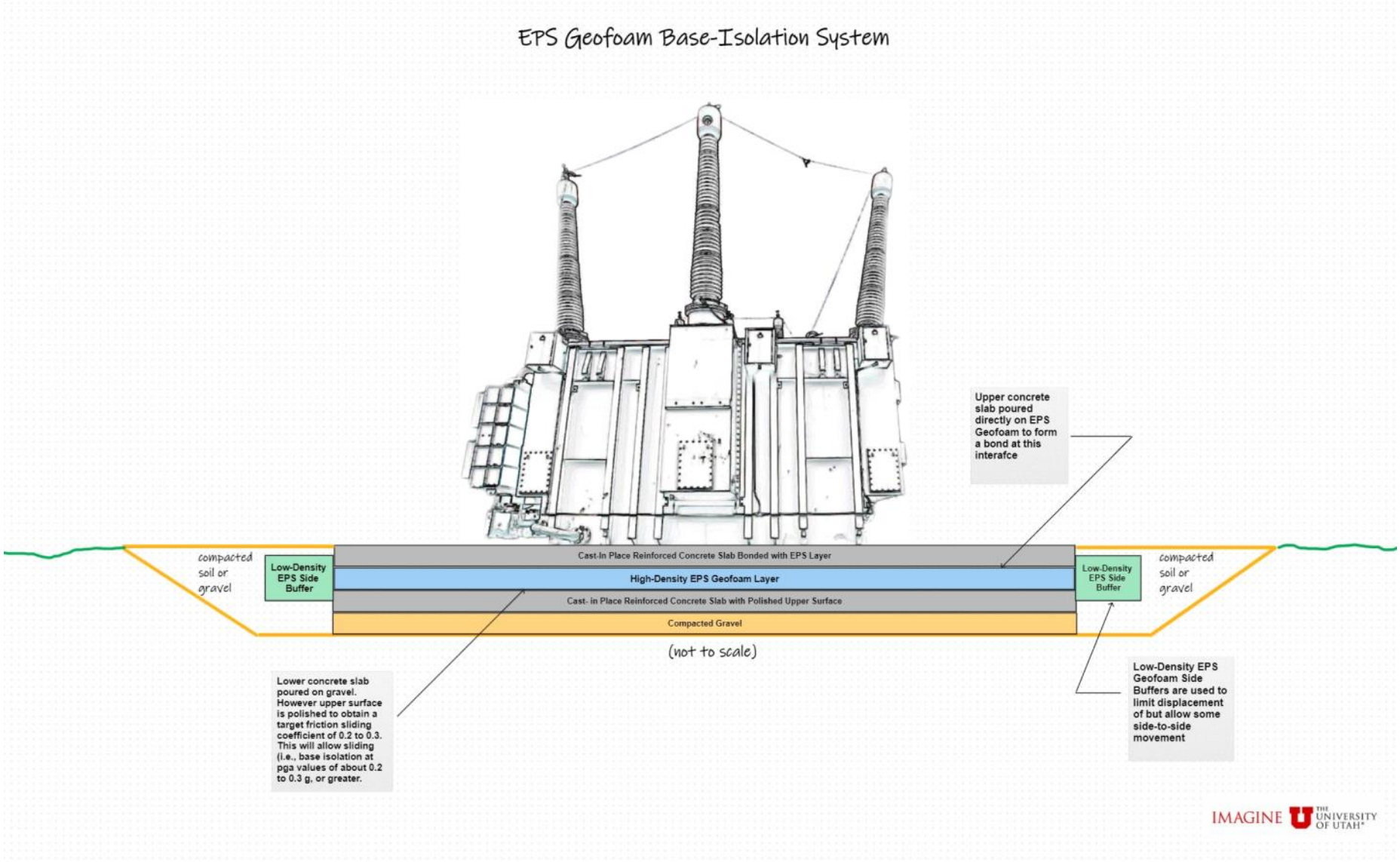
Sketch Examples (cont.)

Wednesday, January 4, 2023 1:03 PM



https://www.newcivilengineer.com/archive/the-gallery-sketches-from-50-years-of-engineering-03-06-2016/

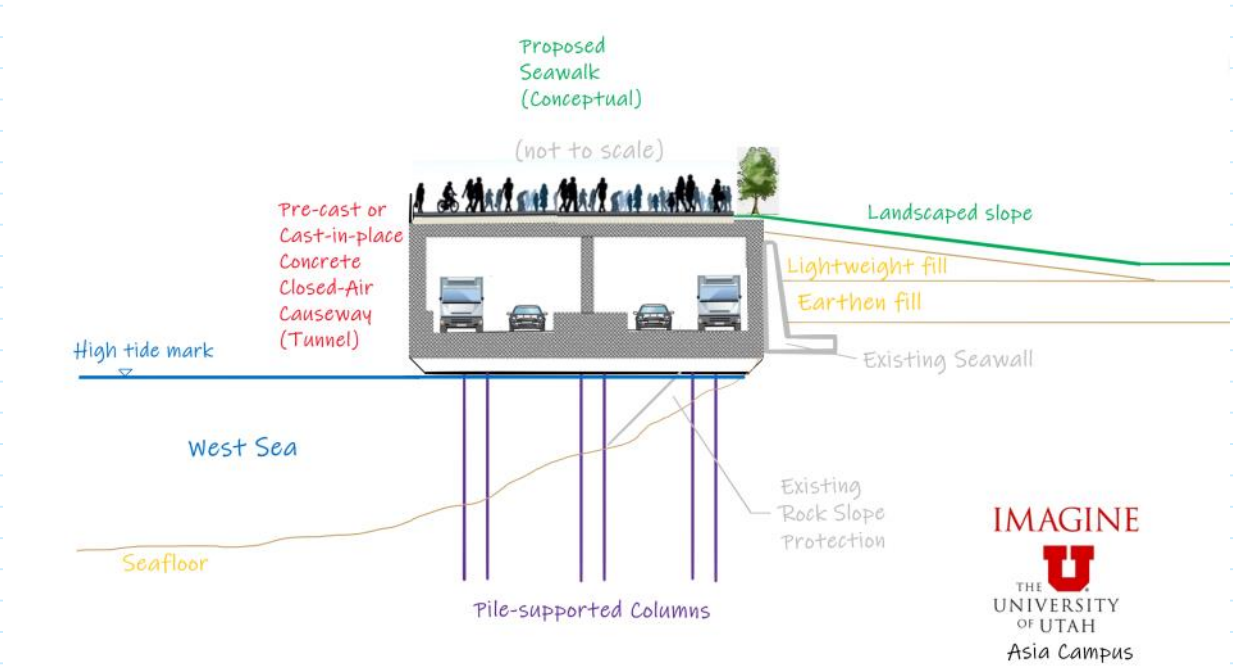
Sketches Examples (cont.)



Sketches Examples (cont.)

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.

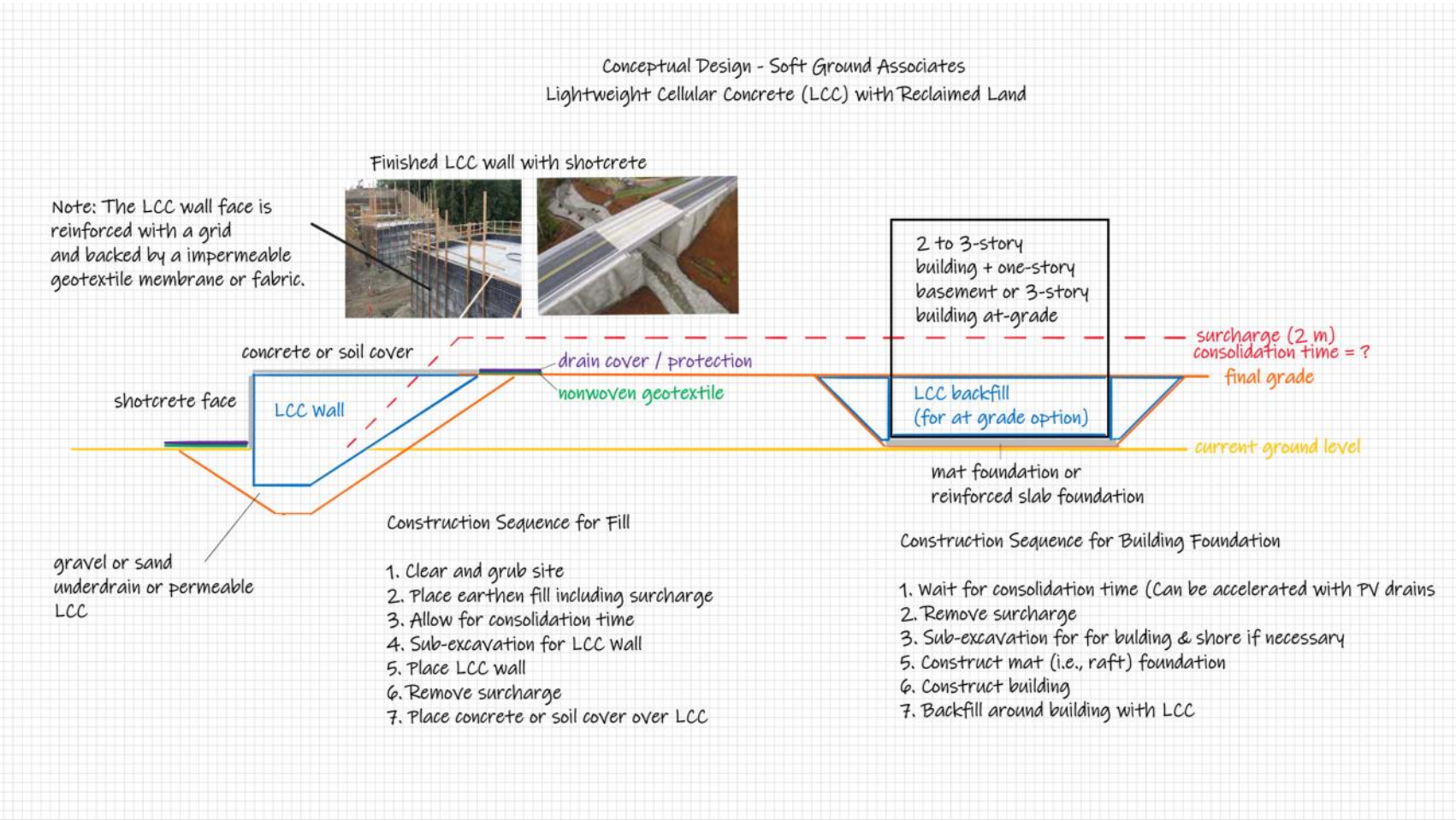


Seawalk Possibilites

Landscaped lope Possibilites

Sketches Examples (cont.)

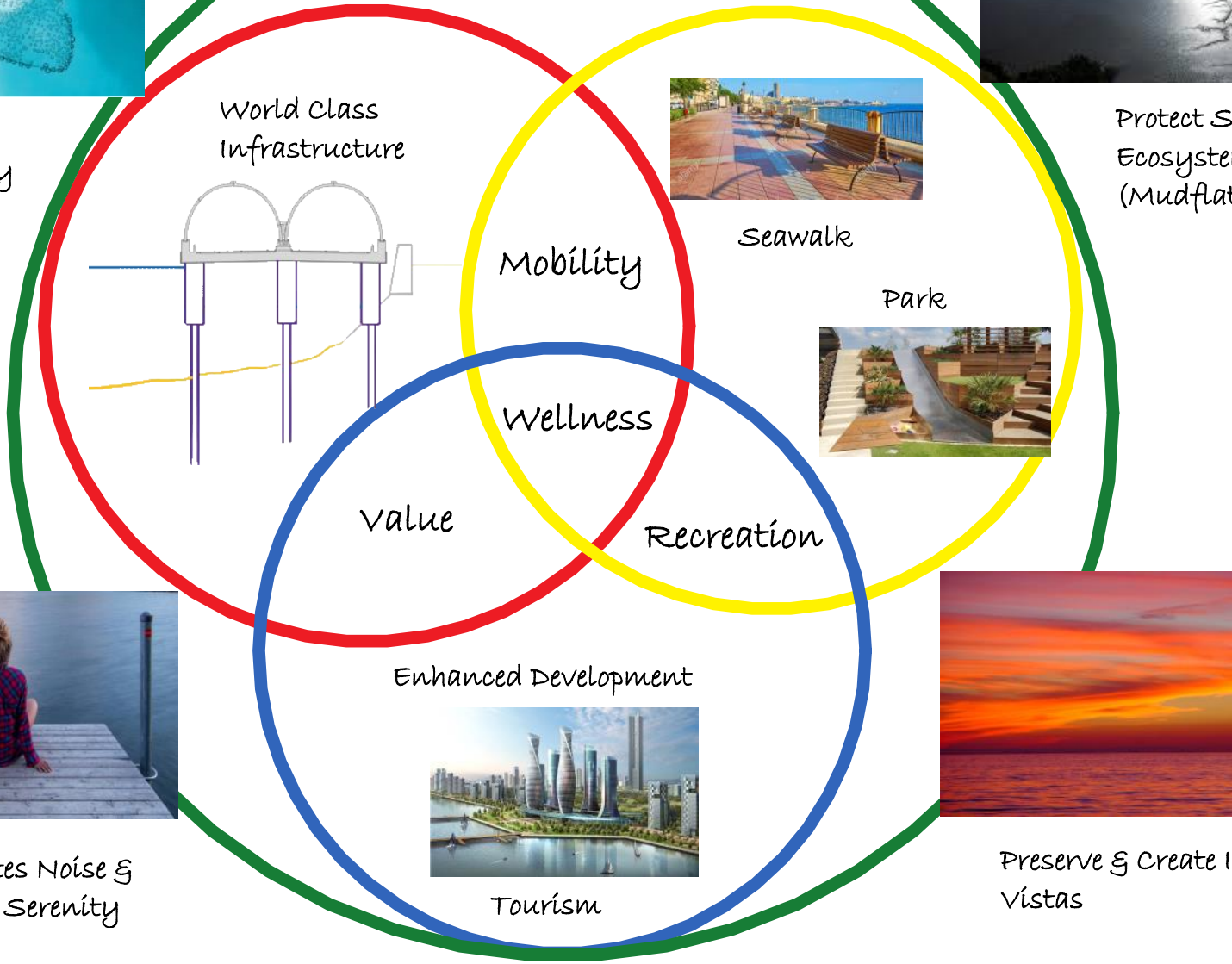
Tuesday, January 3, 2023 11:45 AM



Sketches Examples (cont.)

Improved Air Quality

Protect Sensitive Ecosystems (Mudflats)



Seawalk

Park

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IMAGINE THE UNIVERSITY OF UTAH

Pedestrian Bridges - Examples

Tuesday, November 15, 2022 8:50 AM

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

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

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

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

https://www.designboom.com/architecture/rintala-eggertsson-architects-tintra-footbridge-voss-norway-06-13-2016/

https://americastransportationawards.org/new-york-state-department-of-transportation-assemblyman-herman-denny-farrell-pedestrian-bridge-at-151st-street/

Pedestrian Bridge - Central Park, Songdo, Incheon, Korea

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

https://structurae.net/en/structures/bridges/cable -stayed-bridges-with-curved-deck

https://www.commercialappeal.com/story/money/2017/03/14/university -memphis-plans-iconic-bridge/99163028/

https://www.ssab.com/en/brands-and-products/ssab-weathering/articles/ssab-weathering-steel-in-pedestrian-bridge-design-staying-strong-and-lasting-long

http://www.architecturepressrelease.com/winner -41st-street-bridge-chicago-il-cordogan-clark-associates-aecom/

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 <https://software.utah.edu/adobe.php>

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.)

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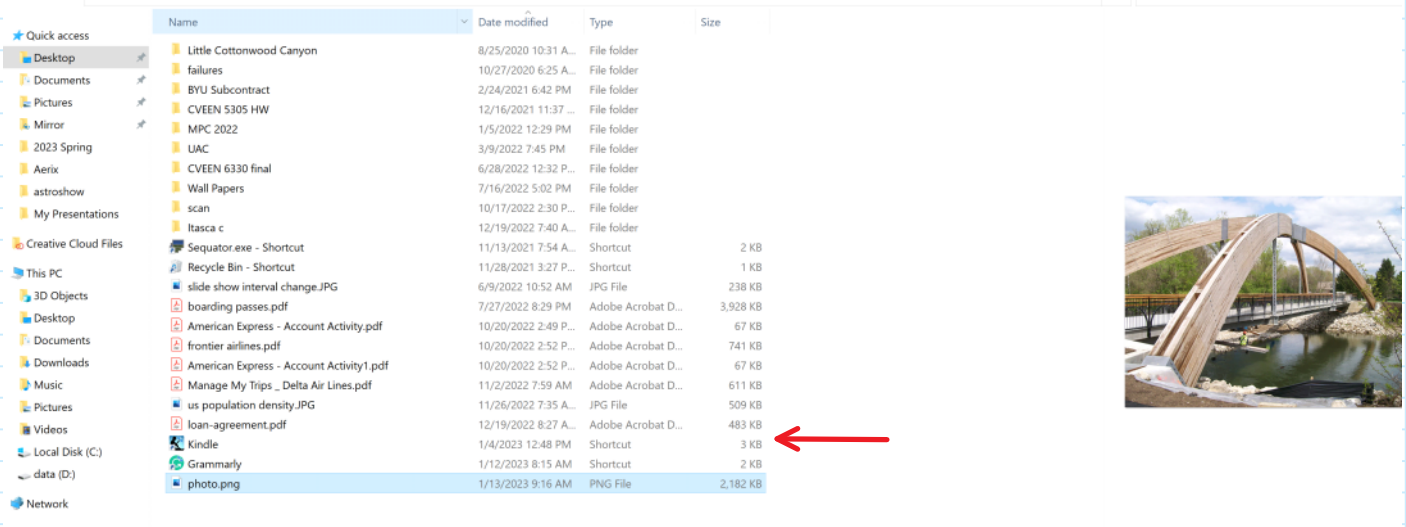
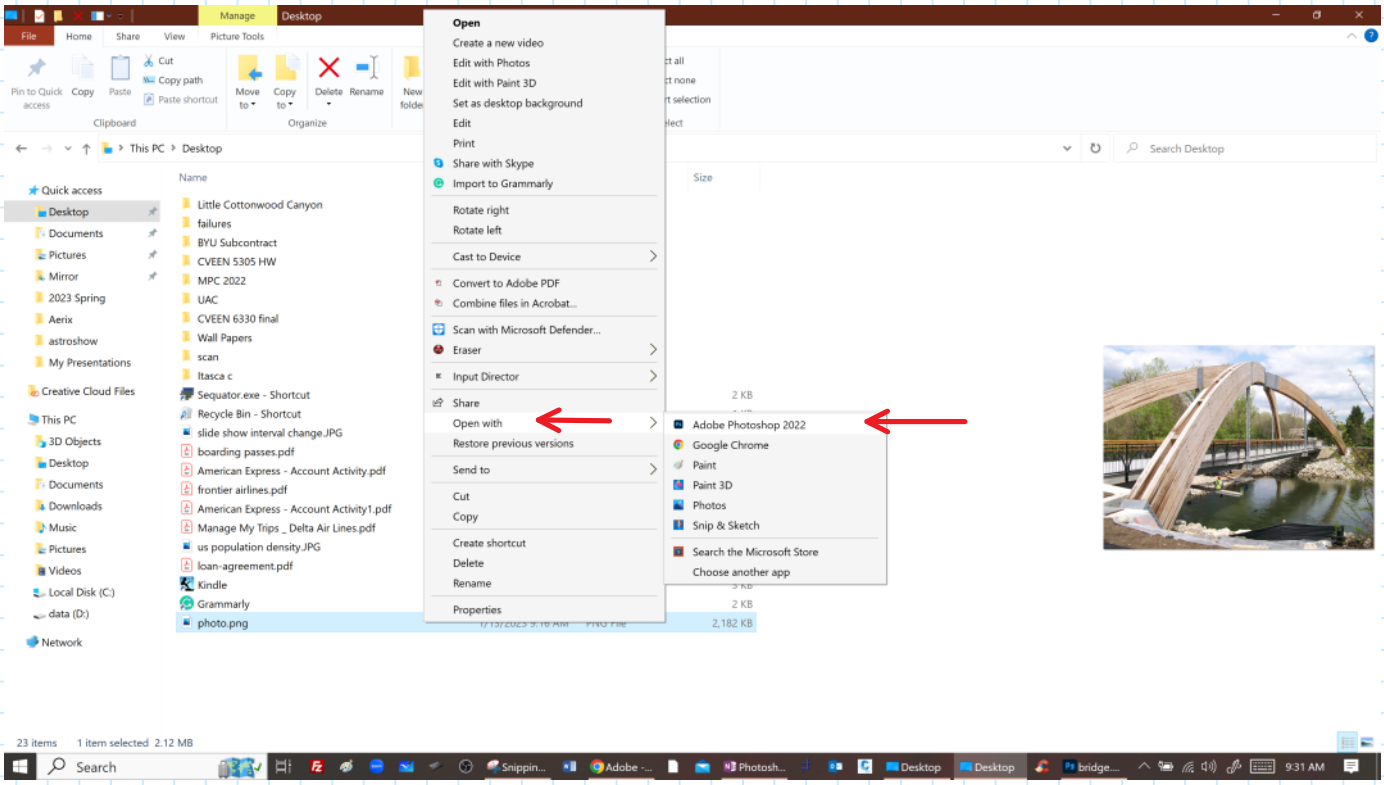
Step 3 - Open the photo.jpg file using the following process. a) select photo.jpg or photo.png using file explorer (see below). Once selected, right-click the mouse and select the *open with* and *Adobe Photoshop* to import the photo.





Photoshop - Making Line Sketches from Photos (cont.)

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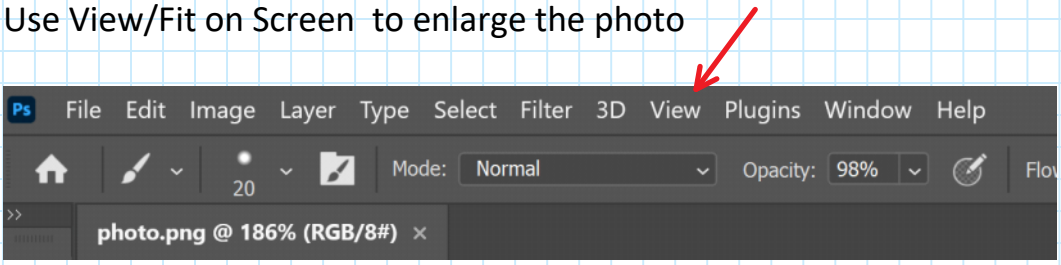
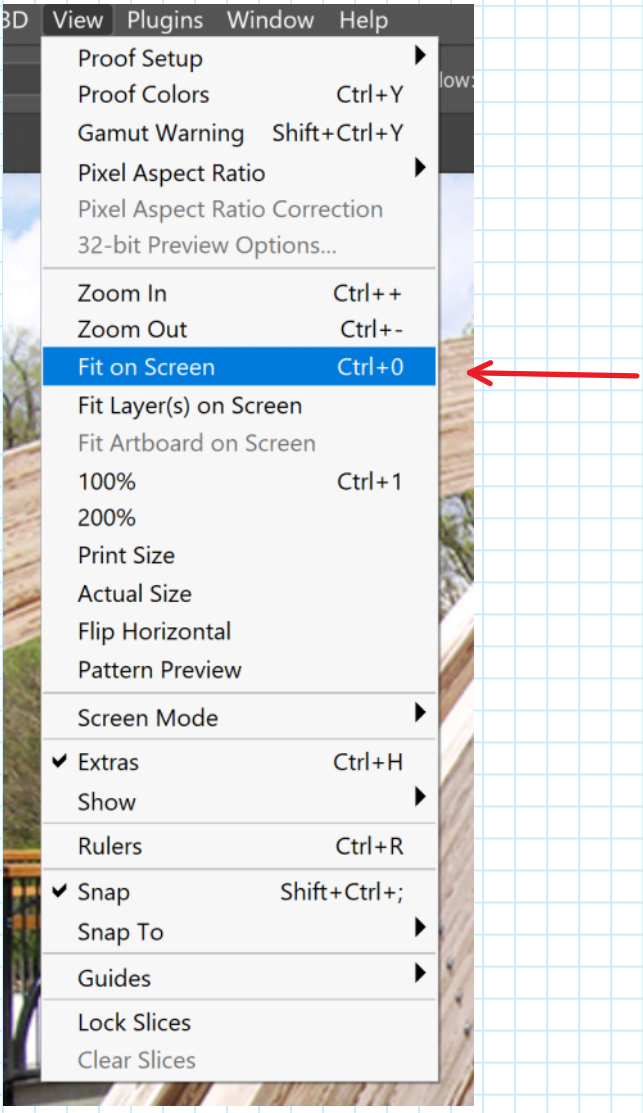
Step 4

Use View/Fit on Screen to enlarge the photo





Photoshop - Making Line Sketches from Photos (cont.)

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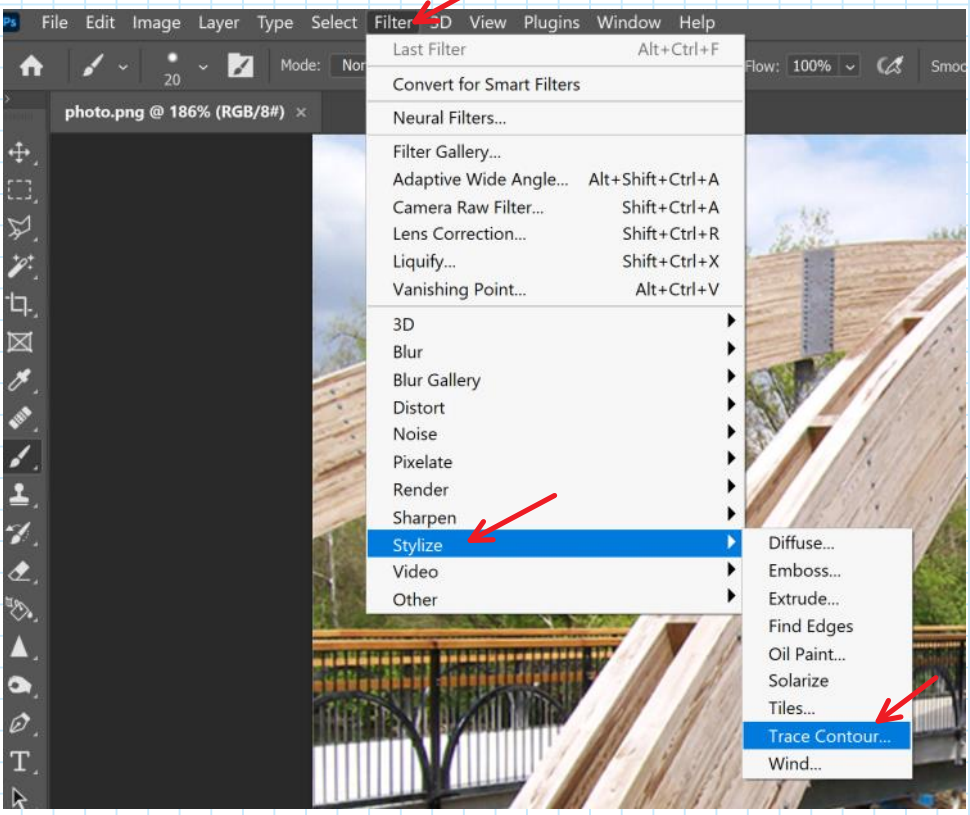
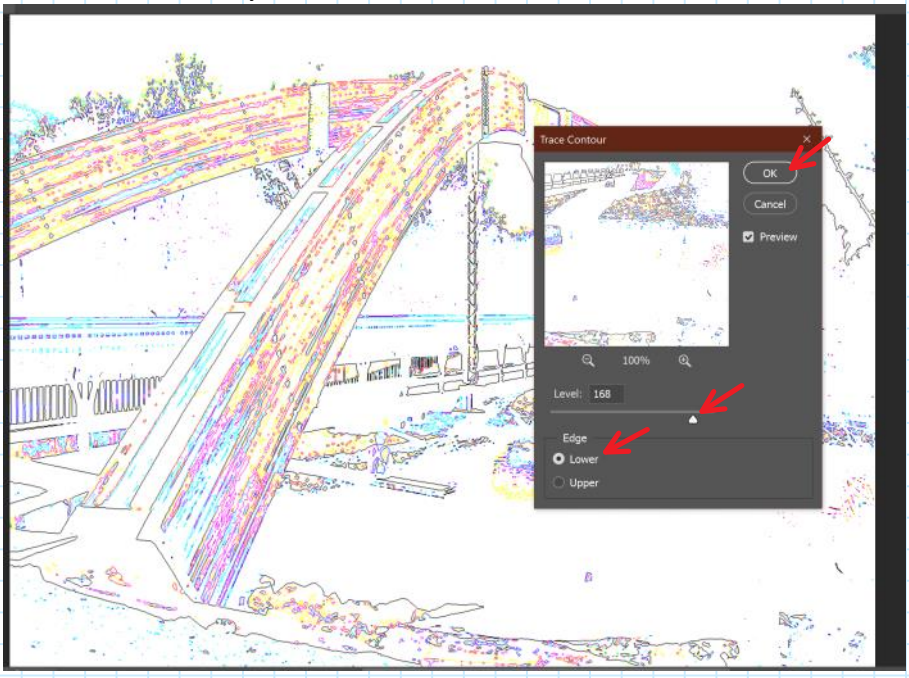
Step 5 Use the Filter/Stylize/Trace Contour feature to create the tracing of the image



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.)

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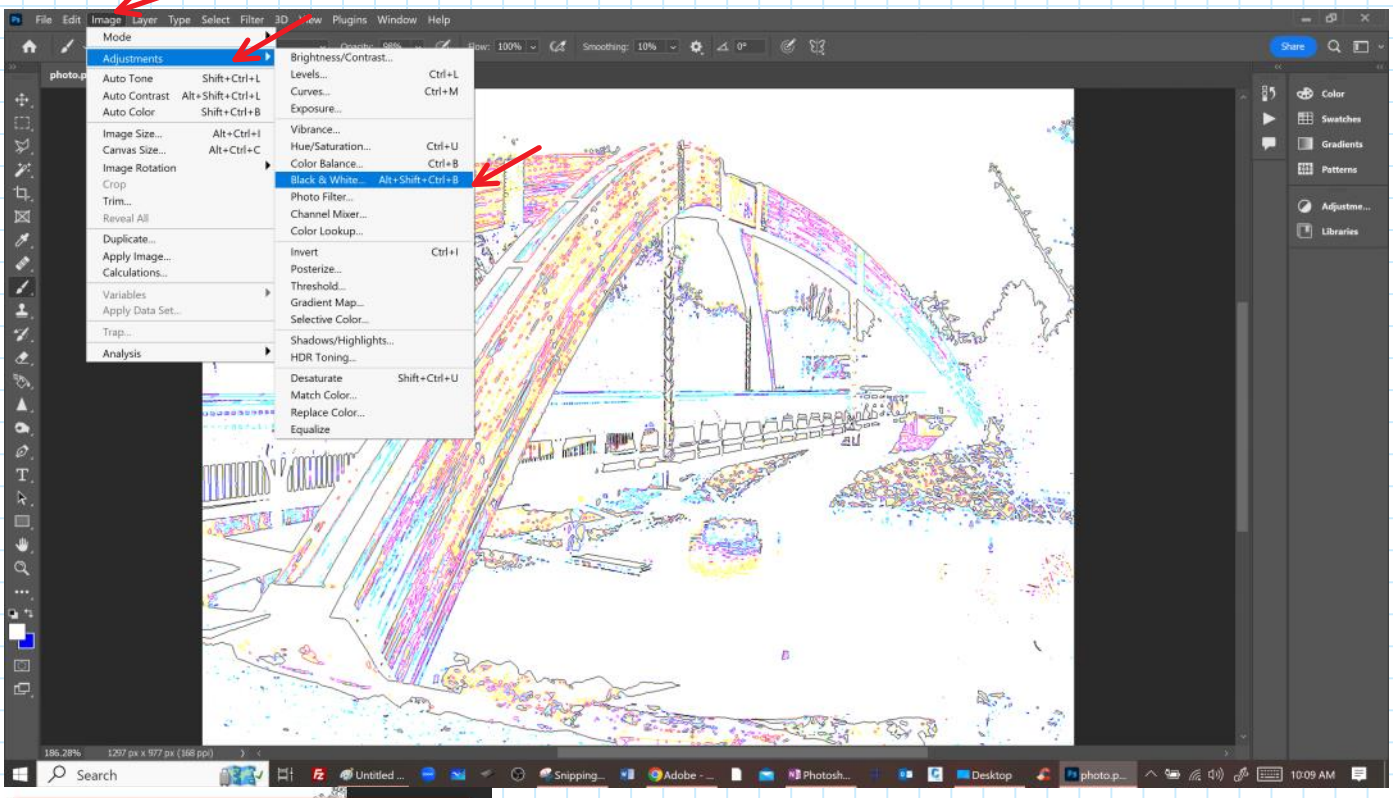
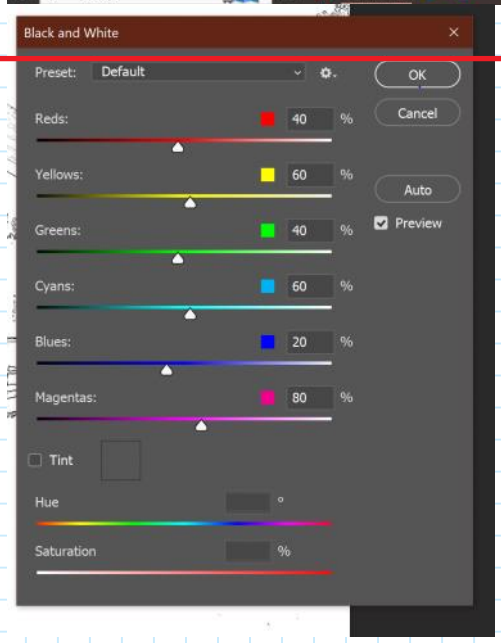
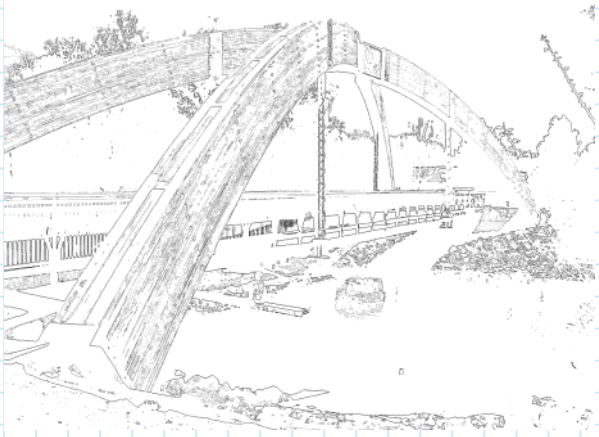
Step 7 - Convert the image to black and white using Image/Adjustment/Black and White. You can adjust the quality somewhat in the pop menu.







Step 8 - Save the image using File/Save a Copy/Save on Your Computer /

Enter a File name

Save as a jpg file