CIVIL ENGINEERING PROGRAM FACILITIES

In January 2010, the Department of Civil & Environmental Engineering moved into the new Engineering Building (ENB). It is a two-story building with 90,000 ft^2 of floor space, housing two departments - the other is the Department of Electrical & Computer Engineering. The Department of Civil & Environmental Engineering mostly occupies the first floor. A front view of the building is shown in Figure 7-1. The plan of the first floor is given in Figure 7-2. The details of offices, classrooms, and laboratories are presented in the following subsections. Phase II Section was added to the ENB in 2016 to accommodate two more programs – Computer Science and Industrial Technology.

Figure 7-1. Front view of the new Engineering Building

A. Offices, Classrooms and Laboratories

A.1. Offices

The faculty office complex for the Department of Civil & Environmental Engineering, as shown in Figure 7-2, is located on the southeast wing of the first floor of the Engineering Building with a total space of 4,248 ft^2. The Department Chair's office is 258 ft^2, the secretary/reception area 404 ft^2, the Conference Room 409 ft^2, the files/supplies storage room 222 ft^2, and the office work resource area 336 ft^2. There are eight full-time faculty offices with an average floor area of 160 ft^2 and one part-time faculty office of 310 ft^2. The offices are equipped with Internet (both cable and wireless) access, xerox, computers, printers, and furniture. The Conference Room has audio-visual equipment for presentations and audio/video teleconferences. In addition, there is a student lounge (1,020 ft^2) and a faculty lounge (810 ft^2) across the lobby from the Civil Engineering office complex.

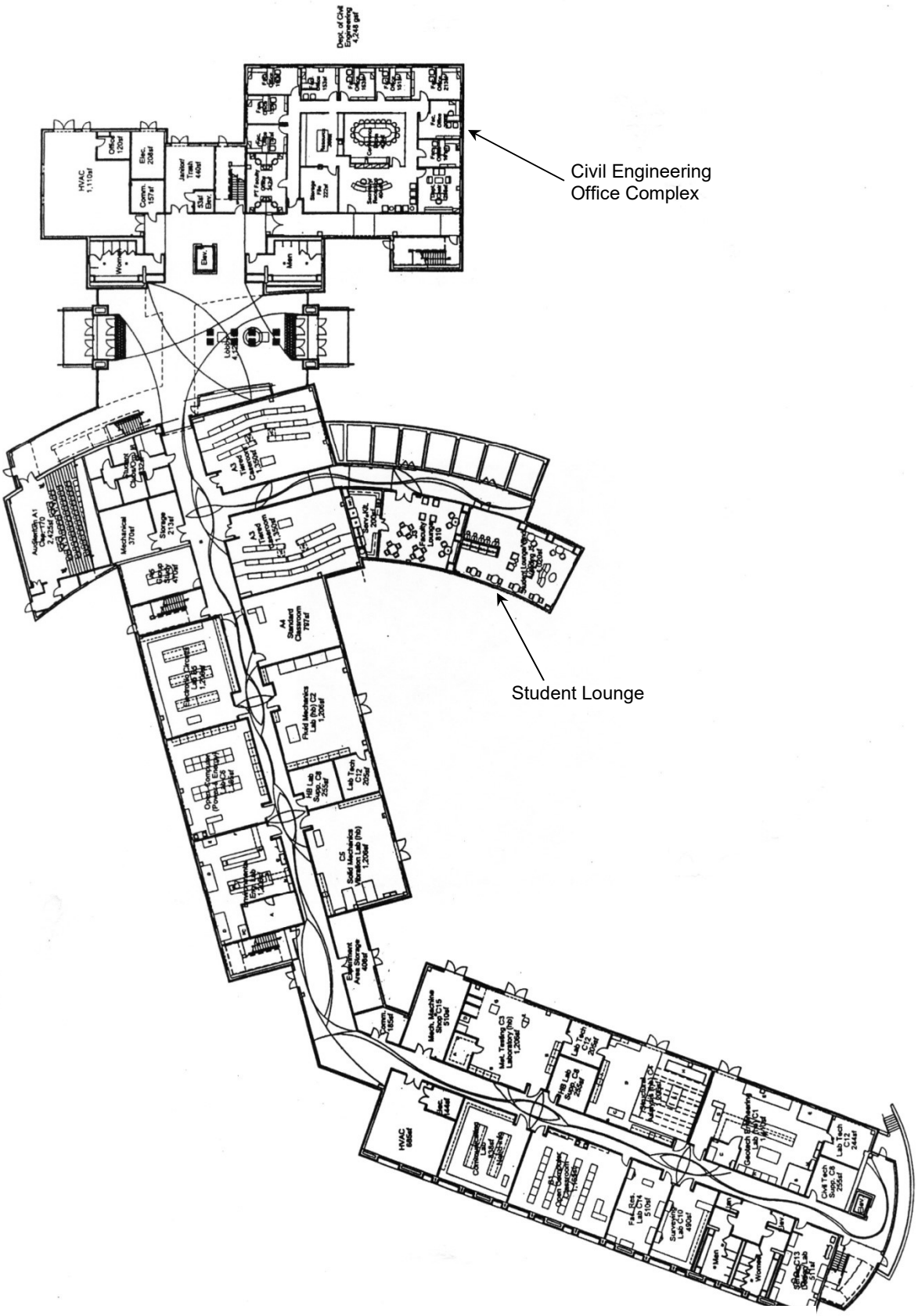


Figure 7-2. Engineering Building first floor plan

A.2. Classrooms

CIV 201 Engineering Graphics and CIV 451 Computer Methods in Civil Engineering are taught in the Open Computer Lab (ENB 119), and laboratory courses are taught in the various laboratories where sufficient lecturing area is available. For lecture courses, there are two tiered classrooms (1,350 ft^2 each), one standard classroom (797 ft^2), and one large, tiered instruction hall (2,425 ft^2). All classrooms are equipped with white board, projector, and Newline display which is connected to the Internet and can be used for lecturing, showing videos, and making presentations.

A.3. Laboratory Facilities

Eleven state-of-the-art laboratories in the Engineering Building are dedicated to the Civil Engineering Program for teaching and research. They are briefly described below. The major pieces of equipment housed in these laboratories are listed in Appendix C.

Environmental Engineering Laboratory (ENB 111)

The Environmental Engineering Laboratory is on the first floor with a floor space of 1,206 ft^2. It has benches and workstations with power outlets, compressed air and vacuum nozzles, sinks, a fume hood, chemical storage cabinets, a flammable storage cabinet, a corrosives storage cabinet, a safety shower and eyewash station, a UV disinfection chamber, and Internet access (both cable and wireless). The laboratory features three state-of-the-art instruments used for environmental sample analysis: the inductively coupled plasma optical emission spectrometry (ICP-OES) (Shimadzu, ICPE 9000), the gas chromatography-mass spectrometry (GC/MS) (Agilent Technologies, 7890A/5975C), and the dispersive X-ray spectroscopy (EDX) (Shimadzu, DX-720). The ICP-OES can analyze multiple trace elements in a small volume of liquid sample; the GC/MS can analyze most volatile and semi-volatile organics in liquid environmental samples; and the EDX can analyze elements and compounds in solid samples. These are highly automated instruments with data acquisition and analysis capability. The CIVL 340 Environmental Engineering Laboratory is conducted in this lab. Graduate students' thesis/dissertation research and other scholarly activities are also performed here.

Hydraulics Laboratory (ENB 108)

This is a high-bay lab that occupies 1206 ft^2 and stretches from the first floor to the ceiling of the second floor with an interior clearance of 30 ft. The lab contains approximately 28 linear ft of usable lab bench space. The available utilities consist of compressed air vacuum and water. The laboratory has ample storage cabinets and shelves. The lab is equipped with Hydrostatic Bench, Hydraulics

Bench, Bernoulli's Theorem Demonstration Apparatus, Osborne Reynolds' Demonstration Apparatus, Impact of a Jet Apparatus, Hydrostatic Pressure Apparatus, Losses in Pipes and Fittings Apparatus, Network of Pipes Apparatus, Pump Test Set (Series/Parallel), Hydraulic Channel, Drainage/Seepage Tank Demonstrator, and Advanced Hydrology Study System. Nine new computers were added to this lab in 2023 to replace the old ones. Hydrological and Hydraulic modeling software applications are installed on the computers.

Materials Testing Laboratory (ENB 118)

The Materials Testing Laboratory is a high-bay lab with a floor space of 1,206 ft^2 and an interior clearance of 30 ft. It has a five-ton overhead trolley crane to access all areas in the lab. There is a curing room with a stainless-steel liner and automatic humidity and temperature controls. There are bulk material storage bins for coarse and fine aggregates, benches with power outlets, compressed air and vacuum nozzles, sinks, a storage cabinet, a safety shower and eyewash and Internet access. The CIVL 421 Structures and Materials Laboratory is conducted in this lab. Typical experiments conducted in this lab include analysis of aggregates' specific gravity, moisture content, and absorption capacity, sieve analysis, and concrete mixing and slump tests. The construction of the concrete canoe by the ASCE Student Chapter for regional competition is also performed here each year.

Structural Analysis Laboratory (ENB 122)

This is also a high-bay lab with a floor space of 1,206 ft^2 and an interior clearance of 30 ft. It has a five-ton overhead trolley crane. The lab features a reaction wall (15' W x 10' H, 200 kips total at the highest point) and a reaction floor (20'x 27') with capacity 200 kips total and point loads of 100 kips at each hole for larger structural tests. The 55 Kips MTS 810 Material Testing System is also housed here. This lab has been used for teaching CIVL 421 Structures and Materials Lab. The students conduct tests on compressive strength of concrete, modulus of elasticity, rupture modulus of concrete, and structural member performance. The construction of the steel bridge for the ASCE Student Chapter regional competition each year is also carried out here.

Geotechnical Engineering Laboratory (ENB 124)

This is another high-bay lab with a floor space of 1,410 ft^2 and an interior clearance of 30 ft. It has the equipment necessary for performing all standard geotechnical tests such as soil index properties (specific gravity, grain size distribution, Atterberg limits, moisture content, and soil density), soil compaction, soil hydraulic conductivity, consolidation, and shear strength. The

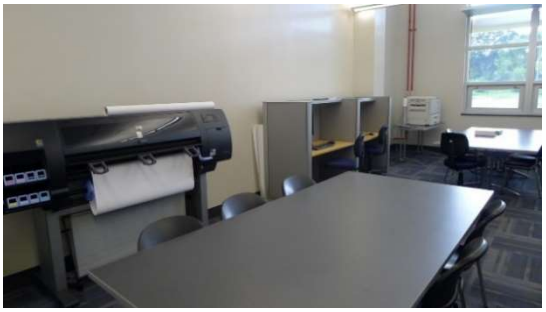
GeoTAC testing systems, including GeoJac, DigiFlow Pump, and Sigma1, can be used to conduct true-path triaxial shear strength tests, direct shear tests, consolidation tests, and unconfined compression tests. These highly automated instruments facilitate data acquisition and sophisticated data analysis. The CIVL 380 Geotechnical Engineering Laboratory is taught in this lab. Graduate students also use this lab to do their thesis research.

Traffic Engineering Laboratory (ENB 218)

The Traffic Engineering Laboratory is on the second floor of the Engineering Building with a floor space of 490 ft^2. It has benches with power outlets, Internet access (both cable and wireless), a laser printer, and a color plotter, and high performance computers for traffic simulations and high performance computations. It is used to support the teaching of CIV 390 Introduction to Transportation Engineering and CIV 431 Traffic Engineering. It is also used for research projects in the transportation field.

Senior Design Laboratory (ENB 127)

The Senior Design Lab is on the first floor with a floor space of 511 ft^2. It has eight computers and a large meeting table for seniors to do their Capstone design projects. The computers in the lab are loaded with design software packages such as AutoCAD, MicroStation, ArcGIS, and GEO-SLOPE. The lab also has color plotters for plotting full-scale design drawings. It is open to senior students who are taking the Capstone Design class (CIV 410/411).



Surveying Laboratory (ENB 123)

The Surveying Laboratory is on the first floor with a floor space of 490 ft^2. It is used to store the surveying equipment and tools and to prepare for the field surveying. The state-of-the-art surveying equipment and tools are available in this lab. The computers in the lab are used to process the survey data. The lab is used to teach CIVL 310 Engineering Surveying Laboratory.

Open Computer Laboratory (ENB 119)

This lab has a floor space of 1,165 ft^2. It houses 60 computers for students to do homework and access the Internet. The computers are loaded with all the teaching software packages that the Department has so that the students can use them at all times. The lab is open all day long and a work-study student is on duty to provide computer assistance. The courses CIV 201 Engineering Graphics CIV 451 Computer Methods in Civil Engineering are taught in this lab. The built-in overhead data projector can be used by the instructor while the students use the computers that are there. Other classes that involve instructions on the use of professional software packages, such as CIV 432 Bridge Design are also occasionally taught in this lab to make use of computers for hands-on practice during lectures.

Vibration & Earthquake Engineering Laboratory (ENB 112)

The lab is on the first floor with a floor space of 1,206 ft^2. It has the capacity for the performance of soil dynamic and earthquake tests. The customized ELE Cyclic Triaxial Test equipment is one of the best in this category. It can be used to conduct soil dynamics and soil liquefaction studies. The Dynamic Cone Penetrometer with Trailer is a ready-to-go field instrument that can be used to measure the stiffness of pavement subgrades and soil foundations. Most of the equipment at the Geotechnical Engineering lab is automated and manufactured by GeoTAC testing systems, including GeoJac, DigiFlow Pump, and Sigma1, can be used to conduct true-path triaxial shear strength tests, direct shear tests, consolidation tests, and unconfined compression tests. The laboratory also has water and air pressure and is equipped with a Fredlund SWCC device, LABROS, and hyprop by Meter group to determine soil water characteristics curve. The earthquake engineering laboratory has customized ELE cyclic triaxial test equipment, which can run static and dynamic triaxial tests. The lab is equipped with ERI (Electrical Resistivity Imaging), MASW (Multichannel Analysis of Surface Waves), SASW (Spectral Analysis of Surface Waves), Drone with LiDAR, individual Drone, individual LiDAR, GPR (Ground Penetrating Radar), GNSS (Global Navigation Satellite Systems) equipment are used for field testing.

Nano Technology Laboratory (ENB 121)

The Nano-Technology Laboratory, with a floor space of 510 ft^2, is on the first floor. The laboratory is equipped with state-of-the-art equipment to teach nanotechnology and conduct research. It has the capability to analyze nano-scale properties of materials. The MTS Nanoindenter is used for hardness tests in nanoindentation, which is the primary method for

measuring and testing mechanical properties of very small amounts of matter. The Nano Universal Testing machine offers researchers a superior means of nanomechanical characterization. It utilizes a nanomechanical actuating transducer head to produce tensile force. It can measure the dynamic properties of materials via the dynamic range and strain-rate-sensitive materials and time-dependent response.

Electron Microscope Laboratory

The Electron Microscope Lab is located on the first floor of the John A. Peoples Building (JAP), Rooms 104 and 121. The lab is equipped with JEOL-1011 (TEM), JEOL-2100 PLUS (TEM), Quanta 200 (SEM), JSM IT-100(SEM) and TESCAN LYRA3(SEM). The lab, as a College Shared Lab, provides services to faculty, students and research scholars both internally and externally. The lab has two TEMs. One TEM is a JEOL-1011. It can achieve a resolution of 0.2 nm lattice with magnification of 50 to 1,000,000 under the accelerating voltage of 40 to 100 kV. The JEM-1011 is a compact high performance TEM with advanced features and functions. Its high contrast objective lens polepiece combines the highest possible contrast and brightness with optimum resolution. The other TEM is a JEOL-2100plus. It allows for improved analytical and diffraction capabilities due to high probe current. It is equipped with both double and single tilt specimen holders. It has a high-stability goniometer stage specifically tuned for high tilt tomographic applications. The resolution can be achieved to a level of 0.23 nm as point resolution and 0.14 nm as lattice resolution. Besides TEM, the lab also has three SEMs. The newest equipment, TESCAN LYRA3 is a state of art system combing a high-resolution FE-SEM column and a focused ion Beam (FIB). The instrument has a fully automatic stage. The instrument also has the capability of EDS for microanalysis. It has applications in imaging, preparing TEM samples, and 3D reconstructing of analyzed sample. Another is a Quanta 200, which provides the necessary environment to allow any sample data collection in a true “all in one” SEM high-vacuum, SEM low-vacuum, and ESEM system. The system allows moist/wet samples, hot or dirty specimens be examined in their natural states without any special preparation (such as drying or coating) that can mask or damage the structure to be viewed. Last but not least. The JEOL JSM-IT100 is a remarkably intuitive, high throughput microscope. It also has EDS capability. The equipment has an X, Y motorized stage.