A walk through the City of Edmonton

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Integrated Infrastructure and Engineering Services, City of Edmonton

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Abstract

As an industry placement through the WISEST Summer Research Program, an opportunity was provided to work with the City of Edmonton in an exploration of careers in engineering and architecture. The focus and scope of this placement was mainly centred around the Integrated Infrastructure and Engineering Services at the City. Through shadowing multidisciplinary engineers, technologists and architects, experience in both administrative and more hands-on work was gained. Some career pathways that were explored include materials engineering, geotechnical engineering, facilities (structural, mechanical and electrical) engineering, environmental engineering, geomatics engineering, and architecture. Throughout the duration of the program, information about the different roles and their collaboration with each other was gathered. Instead of performing research in labs, absorption of information was conducted mainly through means of observation. The City of Edmonton provided opportunities to attend various site visits, building and lab tours, and even to meetings in downtown. Tasks such as reviewing reports and drawings, attending meetings, and sitting in on business calls, all demonstrated the administrative nature of engineering and architecture. On the other hand, the more hands-on aspects of engineering were also emphasised through tasks such as assisting with field work, on-site testing, sample collecting, and data logging. With Integrated Infrastructure Services (IIS), the collaborative and interconnected nature of these careers were displayed, as each branch worked in conjunction with each other. The role of each different type of engineering and architecture is further defined in sequential order of the stages that leads to the life cycle of a construction project. This shows the direct results of each career field in contributing to the development, progression and completion of a project.

Key words:
Geotechnical Engineering, Geomatics Engineering, Construction, Surveying, Structural Engineering, Materials Engineering, Electrical Engineering, Mechanical Engineering, Environmental Engineering, Civil Engineering, City of Edmonton, Infrastructure, Architecture, Integrated Infrastructure Services, Facilities Engineering

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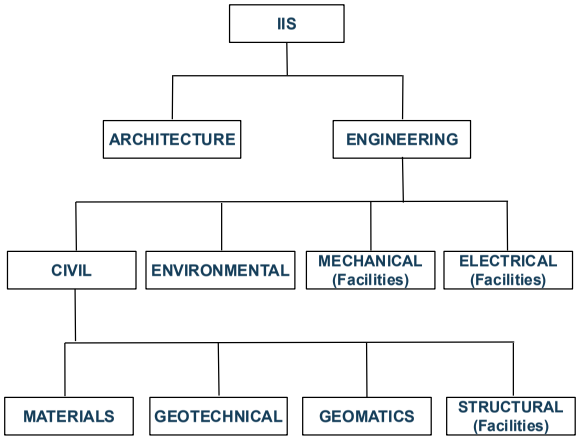
Integrated Infrastructure Services (IIS)



- All branches collaborate together to carry out projects for the City of Edmonton (COE).

Strategy:
- A project proposal and business case is made.
- The land/property is purchased, and funding for the project is approved.

Concept:
- This stage is concerned with the project's feasibility, risks, budget and schedule.
- Environmental engineers may conduct an Environmental Impact Assessment (EIA), to evaluate environmental consequences that may result from the project.
- Geotechnical studies are conducted to evaluate the content and stability of the soil.
- Geomatics is involved through surveying, and determining land elevations.

Design:
- Architects and engineers work on drawings and specifications for the project.
- The structure needs to meet specific standards, and must comply to codes.

Build:
- Construction occurs, requiring procurement of materials, equipment and labour.
- Surveyors define boundary lines, and ensure foundations/surfaces are at proper elevations.
- Materials engineers do testing to check the quality of the materials being used.
- Environmental monitoring may also take place to check noise and vibration levels.

Operate:
- Operation and maintenance of the structure relies on all the different groups involved.

Figure 1.0 The general stages of a construction project.

Materials Engineering

Figure 2.0 A technologist in the asphalt lab sieving and weighing aggregate.

- Quality assurance labs includes the density lab, binder lab, concrete lab and asphalt lab [see *Fig. 2.0*]. Testing at the labs ensure contractors are working with materials that meet standards.
- Research and development also take place to monitor the quality and performance of new materials and processes. This helps determine whether or not they should be used for projects.
- Engineers review designs done by consultants, for example mix designs, pavement designs, road designs, etc.

Geotechnical Engineering

- Geotechnical engineers are concerned with soil mechanics, stability and quality.
- Prior to construction, geotechnical investigations are conducted to determine the composition of the soil. Lab testing is done on samples obtained through borehole drilling.
- Geotechnical engineers and technologists continuously monitor landslide and erosion sites using special instruments, such as a slope inclinometer [see *Fig. 3.0*]. Monitoring helps determine when repairs and rehabilitation are needed for slope stabilisation, erosion control, etc.
- Geotechnical engineers also review studies and repair designs done by consultants.

Figure 3.0 A technologist taking slope inclinometer (SI) measurements.

Facilities Engineering

- Facilities engineering includes structural, mechanical, and electrical engineering.
- These engineers are involved in the design phase, and later maintenance of structures.
- This group ensures that structures are built properly to code, and that they are able to provide necessary utilities.
- They are concerned with the life safety and serviceability of structures.
- At the COE, larger projects require the work of consultants, and COE engineers review their work. Smaller projects can be done in-house.

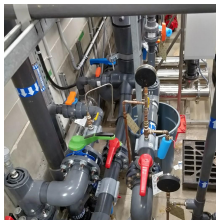


Figure 4.0 The mechanical room at the Borden Natural Swimming Pool.

Environmental Engineering

Figure 5.0 A technologist monitoring vibrations near a construction site.

- Technologists perform noise and vibration monitoring near construction sites to ensure that levels adhere to bylaws [see *Fig. 5.0*]. Monitoring helps determine whether the COE is liable for damage or disruption in residential areas.
- Snowmelt monitoring is done to measure contaminants, ensuring amounts comply to bylaws.
- Engineers work to evaluate and develop strategies for land reclamation and remediation of Contaminated Sites.
- Environmental Site Assessments (ESAs) are done at contaminated/potentially contaminated sites, to determine whether remediation is required/what type of remediation is required.
- Environmental Impact Assessments (EIAs) are done prior to a project's construction, and analyse the consequences the project has on the environment.

Geomatics Engineering

- Land surveyors work with many different instruments and technologies to help determine and mark the exact locations, boundaries, surface and subsurface features of construction sites.
- A major part of land surveying involves measuring land elevations, and mapping them out with computer programs for construction and design use.

Architecture

- Architectural services is a branch under Facility Planning and Design.
- A lead architect hired for a specific project is referred to as the prime consultant, or "prime". The "prime" recruits engineering sub-consultants to work on the project.
- Architects work with engineers to ensure that structures are not only safe and functional, but also aesthetically pleasing.

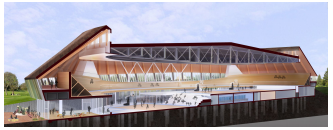


Figure 6.0 A computer generated rendering of the new Coronation Recreation Centre.

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