CAPE COUNCIL FOR ACCESS TO THE PROFESSION OF ENGINEERING

SKILLS COMMENSURATE ENGINEERING ACCESS PROJECT

Survey Report

February 23, 2008

CAPE has just completed its Skills Commensurate Engineering Opportunities survey. The information collected has been analyzed and compiled in this report. This includes engineering skills, educational levels and experience required by employers compared with the skills of immigrants with engineering backgrounds in order to assess the potential for them to enter the non-licensed engineering-workplace in Ontario.

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Skills Commensurate Engineering Access Project – Survey Report
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SKILLS COMMENSURATE ENGINEERING ACCESS PROJECT – SURVEY REPORT

Index

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EXEUCTIVE SUMMARY

In recent years Canadian immigration has undergone some rapid, large-scale changes. Consequently immigrants who have arrived in Canada in the last two decades are more numerous, possess higher skills and credentials, and are more concentrated in certain occupational groups and countries than in previous decades. A significant proportion of these skilled immigrants have been struggling to get licensed and the majority of them are unable to convert their foreign qualifications into jobs commensurate with their education and training.

In 2005 CAPE brought to the fore the fact that out of a total Ontario engineering workforce of over 220,000 who held university degrees in engineering only 66,653 were professionally licensed. The Skills Commensurate Engineering Access project initiated by CAPE Council for Access to the Profession of Engineering is a community action research project that was initiated in 2006. This Project aims to create greater understanding of the nature of engineering occupations that those not opting to become licensed are holding in Ontario. This research project is funded by Human Resources and Skills Development through Labour Market Partnerships and in-kind contribution by CAPE.

The focus of the research was on:

1. Types of skills-commensurate occupations of interest to those with engineering backgrounds
2. Skills and competencies required for these occupations
3. Employers hiring these occupations
4. Skills and competencies of immigrants with engineering backgrounds in comparison with those required for the skills commensurate occupations identified above
5. Organizations offering language, technology-based upgrading and employment supports to this group of newcomers

A survey to compile information about engineering skills, educational levels and experience required by employers compared with the skills of immigrants with engineering backgrounds in order to assess the potential for them to enter the non-licensed engineering-workplace in Ontario was carried out under this project. The background and results of this survey are presented in this report which comprises of the following five sections:

1. Introduction
2. Survey of Immigrants with Engineering Backgrounds
3. Employers Hiring for Skills Commensurate Occupations in Ontario
4. Skills Commensurate Occupations for Engineers
5. Matching IEB Sample to Skills Commensurate Occupations

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1 INTRODUCTION

Skills Commensurate Engineering Access (SCEA) is a community action research project that aims to increase the access of immigrants with engineering backgrounds to skills commensurate occupations, which are defined as those occupations that do not require the applicant to hold a professional engineering license yet are placed firmly within the engineering discipline.

CAPE first brought to the fore the fact that out of a total Ontario engineering workforce of over 220,000 who held university degrees in engineering only 66,653 (including some retirees) were professionally licensed in 2005. In other words, using the most conservative estimates, only about 30% of the total engineering workforce in Ontario is currently licensed. As stated by Patrick J. Quinn, President of Professional Engineers Ontario (PEO), Canadian engineering graduates are opting not to become licensed as professional engineers at the rate of four to one.[1] Therefore, research seems to show that a great majority of engineering occupations do not require a professional engineering license.

The Skills Commensurate Engineering Access Project is thus rooted in creating a greater understanding of the nature of engineering occupations that non-licensed engineers are working in so that access to these occupations by immigrants with engineering backgrounds is increased. Through the SCEA project, CAPE has compiled information about the engineering skills, educational levels and experience required by employers hiring for non-licensed engineering jobs compared with the skills of immigrants with engineering backgrounds.

1.1 IEB OUTREACH METHODOLOGY

An initial environmental scan of the community of immigrants with engineering backgrounds in Ontario showed that the main entry and contact points for this community comprised of:

- Ethno-cultural associations
- Immigrant settlement services
- Employment-based events for IEBs
- Direct contact with the IEBs themselves

Our sample is drawn from all these sources and its spatial outreach includes all of Ontario.

1.2 DATA METHODOLOGY

The survey was carried out in two phases. The first phase (n=277) involved a general survey to ensure effective outreach and develop a general profile of immigrants with engineering backgrounds comprising of the following information:

- Countries of origin
- Academic background
- Engineering speciality
- Length of work experience
- Employment status
- Length of stay in Canada

The second phase captured the detailed skills and competencies data of immigrants with engineering backgrounds through a detailed survey using CAPE's in-house engineering portfolio builder.

[1] Patrick J. Quinn, PEO. Engineering Dimensions May /June 2006, The big picture, President's Message, pg 3

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1.3 SURVEY APPROACH

In order to understand skills commensurate occupations, initial steps were taken to develop a classification index to define occupations requiring engineering education and experience. Table 1 below presents the occupations classification adopted for SCEA.

Table 1.1: Engineering Occupations Classification Index

NOC	PEO	SCEA
1. Civil Engineers	1. Agricultural/ Biosystems/ Bioresource/ Food Engineering	1. Agriculture and forestry
2. Mechanical Engineers	2. Biomedical/Biochemical Engineering	2. Aerospace/ Avionics/Aeronautical
3. Electrical and Electronics Engineers	3. Building Engineering	3. Biomedical/Biochemical
4. Chemical Engineers	4. Chemical Engineering	4. Chemical
5. Industrial and Manufacturing Engineers	5. Civil Engineering	5. Civil (infrastructure and building)
6. Metallurgical and Materials Engineers	6. Computer Engineering	6. Computer
7. Mining Engineers	7. Electrical Engineering	7. Electrical/Electronic
8. Geological Engineers	8. Engineering Physics	8. Management
9. Petroleum Engineers	9. Environmental Engineering	9. Environmental
10. Aerospace Engineers	10. Forest Engineering	10. Geological
11. Computer Engineers (Except Software Engineers and Designers)	11. Geological Engineering	11. Industrial/Manufacturing/Production
12. Other Professional Engineers, n.e.c.	12. Geomatics Engineering	12. Integrated
	13. Industrial Engineering	13. Marine/Ocean/Naval
	14. Marine Engineering	14. Materials and metallurgical
	15. Mechanical Engineering	15. Mechanical
	16. Metallurgical Engineering	16. Mining/Minerals
	17. Mining and Mineral Processing Engineering	17. Nuclear
	18. Naval Architectural Engineering	18. Petroleum/Oil and Gas
	19. Petroleum Engineering	19. Software
	20. Software Engineering	20. Systems
	21. Structural Engineering	21. Textile

1.4 SURVEY COMPONENTS

Once the classification was complete, several additional steps were taken to understand both the demand side (applicant profiles, education, experience and competencies) and supply side (occupations, employers and support providers) of skills commensurate engineering occupations. The survey components included:

SECTION 2: A preliminary survey of immigrants with engineering backgrounds to develop a general profile of their engineering backgrounds based on the classifications contained in Table 1.

SECTION 3: Data on skills commensurate occupations for engineers, the employers involved, the educational, experiential and function skills required for those positions and the upgrading recommended for successful applicants.

SECTION 4: Data on employers hiring for these skills commensurate occupations and the other relevant supports (employment, language, education etc.) that they provide.

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SECTION 5: Skills commensurate occupations for engineers identified through detailed research which lead to the identification of several clusters of employers offering different jobs within each cluster, each requiring different skill sets.

SECTION 6: Matching the immigrant with engineering background sample to the skills commensurate occupations identified in section 5 and establishing the level to which the sample matched the different skills and competencies required.

2 SURVEY OF IMMIGRANTS WITH ENGINEERING BACKGROUNDS

423 immigrants with engineering backgrounds were surveyed in total. 277 participated in the general survey (below) and 146 participated in the detailed skills survey reported later.

Table 2.1: Country of Origin

Country	No. of Members	Percentage
India	47	16.97
China	27	9.75
Pakistan	26	9.39
Iran	21	7.58
Canada	14	5.05
Iraq	13	4.69
Philippines	11	3.97
Bangladesh	9	3.25
Romania	9	3.25
Sri Lanka	9	3.25
Venezuela	9	3.25
Colombia	7	2.53
Mexico	7	2.53
Russian Federation	7	2.53
Syrian Arab Republic	7	2.53
Egypt	6	2.17
Lebanon	4	1.44
Albania	3	1.08
Israel	3	1.08
Jordan	3	1.08
Peru	3	1.08
Chile	2	0.72
Cuba	2	0.72
Jamaica	2	0.72
Macedonia, The Former Yugoslav Republic of	2	0.72
Nigeria	2	0.72
Taiwan	2	0.72
Turkey	2	0.72
United Kingdom	2	0.72
Brazil	1	0.36
Bulgaria	1	0.36
France	1	0.36
Guatemala	1	0.36
Indonesia	1	0.36
Kazakhstan	1	0.36
Latvia	1	0.36

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Poland	1	0.36
Singapore	1	0.36
Slovakia (Slovak Republic)	1	0.36
South Africa	1	0.36
Sudan	1	0.36
Tanzania, United Republic of	1	0.36
Trinidad and Tobago	1	0.36
Vietnam	1	0.36
Yugoslavia	1	0.36

Participants in this survey originated from 45 countries with India and China being the leading source countries.

Table 2.2: Classification Based on SCEA Index

Engineering Field/Industry	No. of Members	Percentage
Electrical and Electronics Engineering	53	19.13%
Civil Engineering	51	18.41%
Mechanical Engineering	45	16.25%
Engineering Managers	42	15.16%
Industrial and Manufacturing Engineering	42	15.16%
Chemical Engineering	15	5.42%
Computer Engineering (Except Software Engineering)	15	5.42%
Software Engineering	15	5.42%
Aerospace Engineering	11	3.97%
Engineering Officers, Water Transport	9	3.25%
Petroleum Engineering	7	2.53%
Geological Engineering	4	1.44%
Metallurgical and Materials Engineering	4	1.44%
Mining Engineering	4	1.44%
Railway and Yard Locomotive Engineering	3	1.08%
Other Engineering	20	7.22%
Electrical and Electronics Engineering Technologists and Technicians	12	4.33%
Mechanical Engineering Technologists and Technicians	10	3.61%
Industrial Engineering and Manufacturing Technologists and Technicians	8	2.89%
Civil Engineering Technologists and Technicians	6	2.17%
Engineering Inspectors and Regulatory Officers	5	1.81%
Stationary Engineering and Auxiliary Equipment Operators	2	0.72%

According to the SCEA classification index, 85% of the sample can be classified as engineers, 12.5% as technicians and technologists and 2.5% as tradespersons.

Table 2.3: Education Profile

Degree	No. of Members	Percentage
Post-Doctoral	1	0.36%
Ph.D	3	1.08%
Masters	70	25.27%
Bachelor	163	58.84%
Diploma	12	4.33%
Others	28	10.11%

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This table shows that nearly 27% of the participants had completed graduate studies, which is considerably higher than the average population.

Table 2.4: Experience Profile

Less or Equal to 10	139
Between 11 to 20	94
Between 21 to 30	40
Greater Than 30	4

This table shows that 50% of immigrants with engineering backgrounds had more than a decade of engineering experience.

Table 2.5: Employment Status

Length of residency in Ontario	**No. of Members (Percentage)**			
	Not working	**Working in Professional Engineering field**	**Working, but in another field**	**Sub-total**
Less Than 1 Year	90 (32.49%)	9 (3.25%)	12 (4.33%)	111 (40.07%)
Between 1 and 2 Years	23 (8.30%)	3 (1.08%)	11 (3.97%)	37 (13.36%)
Between 2 and 3 Years	18 (6.50%)	2 (0.72%)	11 (3.97%)	31 (11.19%)
Greater Than 3 Years	59 (21.30%)	13 (4.69%)	26 (9.38%)	98 (35.37%)
Total	**190 (68.59%)**	**27 (9.75%)**	**60 (21.66%)**	**277 (100.00%**

According to the survey, 68.5% of the sample was not working and less than 10% were working in the engineering profession.

3 EMPLOYERS HIRING FOR SKILLS COMMENSURATE OCCUPATIONS IN ONTARIO

The following tables showcase the name and location of employers hiring for skills commensurate occupations identified under the SCEA project. Some of these employers also offer educational and/or employment support to IEBs. These are detailed where applicable.

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Table 3.1: Universities (Detailed information)

Name	Location	Educational Support for IEBs
Brock University	St. Catherine	-
University of Ottawa	Ottawa	Graduate (postgraduate) studies
Carleton University	Ottawa	Graduate (postgraduate) studies
Lakehead University	Thunder Bay	Environmental engineering graduate
Laurentian University	Sudbury	Chemical, Mechanical and Mining Engineering
McMaster University	Hamilton	Multi-disciplinary engineering studies
Nipissing University	North Bay	-
Queen's University	Kingston	Policy research
Royal Military College	Kingston	-
Ryerson University	Toronto	Graduate studies (engineering, Engineering management) Immigration research and studies , bridging program for engineers
Trent University	Peterborough	-
University of Guelph	Guelph	Biological and Nanotechnology engineering
University of Ontario Institute of Technology	Oshawa	Mechanical, automotive and nuclear engineering –graduate studies
University of Toronto	Toronto	Graduate (postgraduate) studies and professional development
University of Waterloo	Waterloo	Graduate (postgraduate) studies and Nanotechnology -engineering
University of Western Ontario	London	Graduate (postgraduate) studies and integrated engineering (emerging interdisciplinary technologies)
University of Windsor	Windsor	Graduate (postgraduate) studies (civil and environmental only)
Wilfrid Laurier University	Waterloo	-
York University	North York	Space Engineering

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Table 3.2: Community Colleges (Detailed information)

Name	Location	Educational Support for IEBs
1. Algonquin College of Applied Arts and Technology	Nepean	**Technologist** Computer Engineering , Biotechnology **Technician**: Construction, Electrical, Electro-mechanical and electronic engineering
2. Collège Boréal	Sudbury	**Technician** (French language) Civil, Electrical, IT, Fabrication, Environmental
3. Cambrian College of Applied Arts and Technology	Sudbury	**Technologist**: Automation, Chemical, Civil, Electrical, Geological, Power Engineering **Technician**: Automation, Civil, Industrial/ Mechanical and Power Engineering Electrical
4. Canadore College of Applied Arts and Technology	North Bay	**Technologist**: Computer Systems **Technician**: Computer Systems and Electrical
5. Centennial College	Toronto	**Technologist**: Biomedical Engineering, Biotechnology, Software Engineering, Mechanical, Environmental, Electro-Mechanical, Energy Systems , Electronics, Computer Engineering **Technician**: Biotechnology, Software Engineering, Mechanical, Environmental, Electro-Mechanical, Energy Systems , Electronics, Computer Systems
6. Conestoga College Institute of Technology and Advanced Learning	Kitchener	**Technologist**: Construction Engineering, Teletronics, Civil, Computer, Electrical, Electronics, Environmental, Mechanical Engineering **Technician** Civil, Computer, Electrical, Electronics, Environmental Mechanical Engineering **Others**: Advanced Manufacturing, Project and Facility Management, Woodworking, Welding
7. Durham College of Applied Arts and Technology	Oshawa	**Technologist**: Biomedical, Biotechnology, Chemical, Environmental, Electrical, Electronics, Industrial, Mechanical **Technician**: Electrical, Industrial, Mechanical, Power Engineering **Others**: Hoisting, Water Quality, Welder, Metal Fabricator
8. Fanshawe College of Applied Arts and Technology	London	**Technologist**: Biotechnology, Civil, Electrical, Electronic, Mechanical **Technician**: Electrical, Electronic, Mechanical **Other**: Manufacturing
9. George Brown College of Applied Arts and Technology	Toronto	**Technologist**: Computer Systems, HVAC, Manufacturing, Mechanical Engineering **Technician**: Computer Systems, Electro-Mechanical, HVAC, Mechanical Engineering **Other**: Construction Management, Manufacturing Management, Wireless networking
10. Georgian College of Applied Arts and Technology	Ontario	**Technologist**: Electrical, Marine **Technician**: Computer Systems, Mechanical **Other**: Computer Systems Security, Cyberspace Security
11. Humber College Institute of Technology and Advanced Learning	Toronto	**Technologist**: Industrial, Chemical, Civil, Computer, Electrical and Electro-Mechanical Engineering **Technician**: Mechanical, Industrial
12. Lambton College of Applied Arts and Technology	Sarnia	**Technologist**: Chemical, instrumentation and Control Engineering **Technician**: Chemical, Mechanical, Instrumentation and Control Engineering

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13. Loyalist College of Applied Arts and Technology	Belleville	**Technologist**: Biotechnology, Electrical, Environmental Engineering **Technician**: Chemical, Civil, Construction, Environmental, Electrical, Manufacturing, Mechanical **Other**: Survey Biotechnology, Broadcast
14. Mohawk College of Applied Arts and Technology	Hamilton	**Technologist**: Chemical, Civil, Electrical, Computer, Electronic, Industrial and Mechanical Engineering **Technician**: Building, Civil, Electronic, Instrumentation, Manufacturing, Mechanical and Power Engineering **Other**: GIS
15. Niagara College of Applied Arts and Technology	Welland	**Technologist**: Computer/Electrical/Electronics, Construction, Mechanical Engineering **Technician**: Computer/Electrical/Electronics, Construction, Mechanical Engineering **Others**: Photonics, Laser
16. Northern College of Applied Arts and Technology	Timmins	**Technologist**: Civil, Computer, Electrical **Technician**: Construction, Instrumentation , Electrical, Mining Engineering **Other**: Welding
17. Sault College of Applied Arts and Technology	Sault Ste. Marie	**Technologist**: Computer, Electrical Engineering **Technician**: Civil, Computer, Construction, Electrical and Mechanical Engineering **Other**: GIS
18. Seneca College of Applied Arts and Technology	North York	**Technologist**: Building Systems, Chemical, Civil Computer, Electronics Engineering **Technician**: Building Systems, Civil, Electronics, Mechanical Engineering **Other**: Biotechnology, Fire Protection Engineering
19. Sheridan College Institute of Technology and Advanced Learning	Oakville	**Technologist**: Chemical, Computer, Electromechanical, Electronics, Mechanical **Technician**: Chemical, Computer, Electromechanical, Electronic, Manufacturing, Mechanical Engineering **Other**: Environmental, Quality Assurance
20. St. Clair College of Applied Arts and Technology	Windsor	**Technologist**: Industrial, Civil, Electronics, Manufacturing, Mechanical Engineering **Technician**: Construction, Electronics, HVAC, Mechanical Engineering **Other**: Plastics, Entertainment
21. St. Lawrence College of Applied Arts and Technology	Kingston	**Technologist**: Civil, Instrumentation Engineering **Technician**: Electrical, Instrumentation and Mechanical Engineering **Other**: Energy Systems

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Table 3.3: Research Centres

Name	Location	Nature of Organization
1. The National Water Research Institute	Burlington	The National Water Research Institute (NWRI) is a Directorate of Environment Canada's Environmental Conservation Service. NWRI has two main centres: the larger at the Canada Centre for Inland Waters on the shores of the Great Lakes in Burlington, Ontario; the other at the National Hydrology Research Centre.
2. Natural Science and Engineering Research Council of Canada	Ottawa	The Natural Sciences and Engineering Research Council (NSERC) is Canada's national instrument for making strategic investments in training and research in natural sciences and engineering.
3. Environmental Systems Research Institute	Toronto	ESRI Canada Limited is a progressive and growing Canadian owned company with 15 offices across the country, delivering proven solutions based on leading GIS technology and professional service offerings.
4. National Research Council	Ottawa	The Government of Canada's premier organization for research and development.
5. The Canadian Environmental Assessment Agency	Ottawa	The Canadian Environmental Assessment Agency is a federal body that integrates Canada's environmental goals with its economic, social and cultural values.
6. Nanos Research	Toronto	The Communications Research Centre (CRC) is Canada's leading federal communications R&D lab.
7. 7. Canadian Standards Association	Mississauga	The Canadian Standards Association develops standards to address needs, such as enhancing public safety and health.

Table 3.4: Innovation Centres

Name	Location	Nature of Organization
1. Canada Foundation for Innovation	Ottawa	Government of Canada corporation to fund research infrastructure including state-of-the-art equipment, buildings, laboratories, and databases.
2. Ministry Of Research And Innovation	Toronto, Ontario	The Ministry of Research and Innovation focuses on innovation as the driver of growth across all sectors.
3. The Ontario Centers of Excellence	Ontario-wide	The Ontario Centres of Excellence is the pre-eminent research-to-commercialization vehicle in Ontario.
4. Agrifood Canada	Ottawa,	Information, research, technology, policies and programs for security of the food system, health of the environment and innovation for growth.
5. The Atlantic Canada Opportunities Agency	Moncton, New Brunswick	Aims to improve the economy of Atlantic Canadian communities through successful development of business and job opportunities.
6. Innovation in Canada	Canada-wide	Inventory of research, public input and links to government and private sector resources to turn your ideas into commercial reality.
7. The International Development Research Centre	Ottawa	Collaboration with researchers from developing world to build healthier, equitable, and prosperous societies.
8. Technology Partnership Canada	Ottawa	Provide funding support for strategic research and development, projects that will produce economic, social and environmental benefits to Canadians.
9. Cytec	New Jersey with world-wide locations	Global leader in product, chemistry and application areas ranging from mining chemicals to powder coating solutions for paints/coatings to advanced composites and high-performance film adhesives for aerospace applications.

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Table 3.5: Centres of Excellence

Name	Location	Nature of Organization
1. The Centre of Excellence for Communications and Information Technology	Ottawa and Toronto	The Centre of Excellence for Communications and Information Technology is focused on fostering innovation in this vital area for Ontario's prosperity.
2. The Centre of Excellence for Earth and Environmental Technologies	Toronto	This Centre of Excellence helps Ontario organizations compete by adopting innovative, environmentally responsible solutions.
3. The Centre of Excellence for Energy	Toronto	The Centre of Excellence for Energy was created in response to the significant challenges and opportunities posed by the current energy situation in Ontario. The Centre invests in cutting-edge collaborations between industry and colleges, universities and research hospitals.
4. The Centre of Excellence for Materials and Manufacturing	Toronto and Waterloo	The Centre of Excellence for Materials and Manufacturing addresses the future of the sector through investment in research partnerships that increase the competitiveness and productivity of Ontario businesses.
5. The Centre of Excellence for Photonics	Toronto and Ottawa	The Centre of Excellence for Photonics helps Ontario firms and organizations grow by finding innovative solutions for their challenges. Having everything to do with light, Photonics is a strategic technology making a significant impact on all industrial and healthcare sectors.

Table 3.6: Regional Councils and Municipalities

Name	Location	Nature of Organization
1. Durham Regional Council	Ajax, Brock, Clarington, Oshawa, Pickering, Whitby Scugog, Uxbridge and	Durham Regional Government serves eight area municipalities. It is the roads, water, and sewerage and sanitation undertaker.
2. Peel Regional Council	Caledon, Mississauga and Brampton	Peel Regional Government serves three area municipalities. It is the roads, water, and sewerage and sanitation undertaker for these.
3. Waterloo Regional council	Cambridge, Kitchener Waterloo, North Dumfries, Wellesley, Wilmot Woolwich	Three urban municipalities and four rural townships make up Waterloo Region Council which provides safe, secure and reliable road, water, wastewater and waste management
4. Halton Regional Council	Burlington, Halton Hills, Milton, Oakville	Four local municipalities make up Halton region Council which provides road, water, wastewater and waste management services for the region.
5. York Regional Council	Aurora, East, King, Gwillimbury, Georgina, Markham, Newmarket, Richmond Hill, Vaughan & Whitchurch-Stouffville	The Regional Municipality of York is made up of a confederation of nine municipalities**.** It plans and provides safe, secure and reliable road, water, wastewater and waste management services for the region.
6. Niagara Region	Fort Erie, Port Colborne, Grimsby, St. Catherine's, Lincoln, Thorold,Niagara Falls, Wainfleet, Pelham, Niagara-on-the-Lake, Welland ,West Lincoln,	Niagara, Regional Council is made up of 12 unique and distinct local municipalities. It plans and provides safe, secure and reliable road, water, wastewater and waste management services for the region.
7. Toronto Municipality	Etobicoke York, North York, Scarborough, Toronto and East York	Comprises 44 wards and four districts. The 1998 restructuring of Toronto's municipal government is one of the most ambitious undertakings in North America. 7 large municipalities combined, and municipal and provincial responsibilities were revamped, and property tax reformed.

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Conservation Authorities, of which there are 36 in Ontario, are local, watershed management agencies that deliver services and programs that protect and manage water and other natural resources in partnership with government, landowners and other organizations. Typical examples of the mandate, nature and scope of activities of these institutions are illustrated in the examples provided below:

Table 3.7: Conservation Authorities

Name	Location	Nature of Organization
1. Credit Valley Conservation	Mississauga	The work of Credit Valley Conservation requires a diverse range of skills in planning, ecology, water resources and water quality engineering, hydrogeology, forestry, biology, project management, monitoring, GIS, Information Technology, stewardship, parks and conservation land management, finance, human resources, communications and other areas.
2. Niagara Peninsula Conservation Authority	Welland	NPCA has overseen the construction of numerous water control structures in the watershed. In all, the NPCA manages and operates some 25 different water control structures in the watershed.
3. Lake Simcoe Region Conservation Authority	Newmarket	Provides leadership in the restoration and protection of the environmental health and quality of Lake Simcoe and its watershed with community, municipal and other government partners calling for a diverse range of skills.

10 plant and technology manufacturers and suppliers randomly selected from several directories included in the Toronto Construction Association Directory[2] were analyzed under this category. Examples of these employers include:

Table 3.8: Plant/Technology Manufacturers

Name	Location	Nature of Organization
1. Gordon R. Williams Corp.	Mississauga	Gordon R. Williams Corporation is Canada's fastest growing source of specialized climate conditioning products. Its services include project engineering and coordination.
2. Husky Injection Molding Systems Ltd.	Bolton	The world's largest brand name supplier of injection moulding equipment and services to the plastics industry.
3. Hydrogenics Corporation	Mississauga,	Hydrogenics Corporation is a global developer of clean energy solutions, advancing the Hydrogen Economy by commercializing hydrogen and fuel cell products.
4. Toyota Motor manufacturing Canada Inc	Cambridge	TCI is the exclusive Canadian distributor of Toyota and Lexus vehicles, and Toyota lift trucks.
5. CMC Electronics	Ottawa	Designs and produces leading electronics products for the aviation and global positioning markets.
6. Westburne Ruddy Electric,	Ontario-wide locations	Founded in the early 1950's as an electrical distributor and has evolved into the largest electrical solutions provider in Ontario.
7. Munters Corporation, Moisture	Mississauga ON	Munters is a global leader in energy efficient air treatment solutions and restoration services based on expertise in humidity and climate control technologies.

11 plant and technology rental and leasing companies were analyzed were analyzed under this category. Details of typical employers in this category include:

[2] Toronto Construction Association (2001), Annual Construction Industry Membership Directory

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Table 3.9: Plant/ Technology Rentals and Leasing

Name	Location	Nature of Organization
1. Hertz Equipment Rental	Ontario-wide	A leader in rental and sales of high-quality equipment. Product line includes small hand held tools to large earthmovers.
2. PERI Formwork Systems Inc.	Bolton	PERI is the biggest provider and manufacturer of formwork and scaffolding systems in the world.
3. RSC Equipment Rental	Gormley	RSC Equipment Rental serves thousands of customers in construction, industrial, petrochemical, governmental, and manufacturing businesses across the US and Canada.
4. Stephenson's Rental Services Inc.	Toronto	Leading construction equipment rental provider in Toronto and the surrounding areas.
5. Toromont Cat Power Systems	Concord	Utilizing Caterpillar engines, this is an industry leader supplying of Generators and Electric Power, rental generators, marine and industrial engines through customized engineering, packaging and design and build complete control and switchgear systems.

49 plant, materials and technology suppliers were randomly selected from several directories included in the Toronto Construction Association Directory[3] and analyzed under this category. Examples of these employers include:

Table 3.10: Plant/Technology/Materials Suppliers

Name	Location	Nature of Organization
1. ECS - Electrical Cable Supply	Mississauga	ECS is a National distributor of Electrical, Electronic, and Communications Cabling & Connectivity Solutions.
2. Texcan	Brampton	One of Canada's largest wire, cable, and data communication distributors Texcan has been supplying solutions for power distribution, control, industrial automation, premise wiring, automotive and networking applications.
3. Thaler Metal Industries Inc.	Mississauga	Thaler Metal Industries Ltd. is one of North America's largest companies in the roofing specialities business and designer and manufacturer of roof penetration protection products
4. Commercial Roll Formed Products Ltd.	Brampton	A well-established company with a reputation for manufacturing top quality roll-formed products. Roll forming is a metal forming process used to create shapes of uniform cross section.
5. GE Consumer & Industrial	Oakville	Innovative technologies to deliver comfort, convenience, and electrical protection and control in more than 150 countries.
6. Thomas & Betts Limited	Mississauga	Thomas & Betts is a leading designer and manufacturer of connectors and components for electrical and communication markets. Thomas & Betts Canada Ltd. was founded in 1928 to serve the unique requirements of the Canadian market.
7. Beaver Valley Stone Limited	Thornhill	Beaver Valley Stone's facility occupies nearly half a million square feet of outdoor space packed full of natural stone and concrete products for landscaping, home & garden needs.
8. Everest Supply Inc.	Mississauga	A leading supplier of commercial building products serving the construction market in Ontario and throughout Canada.

8 property management and social housing employers were randomly selected from several directories included in the Toronto Construction Association Directory[4] and analyzed under this category. Typical Examples of these employers include:

[3] Toronto Construction Association (2001), Annual Construction Industry Membership Directory and B
[4] Toronto Construction Association (2001), Annual Construction Industry Membership Directory and B

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Table 3.11 Property Management and Social Housing

Name	Location	Nature of Organization
1. Bentall Retail Services	Mississauga	Bentall Investment Management (formerly Penreal Capital Management) is our independently governed management arm that oversees our clients' real estate investments.
2. Altus Helyar Cost Consulting	Toronto	Altus Group is Canada's leading provider of independent real estate consulting and advisory services.
3. Mayhew	Thornhill	Mayhew has been transforming workspaces for optimal performance for many of Canada's largest and fastest growing companies by assessing their plans for growth, expansion, consolidation, or other changes, and quantify real estate implications based on these.
4. Canada Mortgage and Housing Corporation (CMHC)	Toronto	Canada Mortgage and Housing Corporation (CMHC) is Canada's national housing agency.
5. Social Housing Services Corporation	Toronto	SHSC delivers value-added services that empower housing providers to develop safe and affordable homes and vibrant communities. They use their expertise to offer programs in energy and water management, investment, insurance, natural gas purchasing and research.
6. Toronto Community Housing Corporation	Toronto	Toronto Community Housing is the largest social housing provider in Canada and the second largest in North America.

Table 3.12 Public Sector (Government)

Name	Location	Nature of Organization
1. Ministry of Training, Colleges and Universities	Toronto	Employment and Training Division
2. Ministry of Government and Consumer Services	Peterborough	Part of the supply chain management organization within Ontario Shared Services, Ministry of Government and Consumer Services
3. Ministry of Municipal Affairs and Housing	Toronto	Organizational Effectiveness Branch
4. Ministry of the Environment	Toronto	Safe Drinking Water Branch
5. Ontario Clean Water Agency	Orangeville	Management and General

Table 3.13: Software Developers

Name	Location	Nature of Organization
1. Logic Software, Inc.	Toronto	A rapidly growing custom development and software outsourcing company.
2. Microsoft	worldwide	Microsoft is an extremely dynamic company with innovative technologies, products, and initiatives emerging constantly.
3. ES3	Toronto	A custom software development company specializing in web-based applications focusing on Broadband Solutions. ES3 is composed of an innovative team of Senior Architects, Engineers, Designers and Quality Assurance Analysts who are all highly experienced in their field.

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Table 3.14 Others (Emerging)

Name	Location	Nature of Organization
1. Research in Motion Ltd.	Waterloo	World leader in the mobile communications market.
2. Jacques Whitford Ltd.	Markham, Waterloo	Consulting engineering firm focusing on pollution control.
3. Novopharm Ltd.	Scarborough, Stouffville	One of the world's largest generic pharmaceutical companies.

Tale 3.15: Distribution of Employers Postings

Employer Category	Number of Employers	Number of Postings
1. Universities	19	25
2. Community Colleges	20	11
3. Research Centers	7	
4. Innovation Centers	9	20
5. Centres of Excellence	5	3
6. Regional Councils (Municipalities)	7(54)	34
7. Conservation Authorities	36	09
8. Plant/Technology Manufacturers	10	08
9. Plant/Technology Rentals and Leasing	11	
10. Plant/Technology/Materials Suppliers	49	07
11. Property Management and Social Housing	8	12
12. Public Sector (Government)	25	10
13. Software Companies	10	17
14. Others		09

4 SKILLS COMMENSURATE OCCUPATIONS FOR ENGINEERS

Through detailed research, we were able to identify that there are several clusters of employers and several different occupations within each cluster as identified in tables (4.1-4.7) below. The indicators used to capture educational skills include the degree/designation obtained and the length of the course. In terms of experience requirements, the length of years and the functional skills required (and the respondent's experience of them) are used as indicators. For language skills, the indicators used are the number of years of instruction in the English/French language (through primary, secondary, post-secondary education).

However, our survey also detailed additional skill sets that are increasingly important in identifying the suitability of an applicant for skills commensurate engineering occupations. These derive from recognition in the engineering profession as it heads into the knowledge framework, that greater emphasis is needed on non-academic and non-technical skills such as interactions and relationship building, knowledge acquisition and sharing. These have generally been termed as 'soft skills' focusing on communications. A detailed investigation of this term reveals that not only does no singular definition exist but that the range of definitions extend beyond communications to include personal development, acquisition and sharing of information leading to actionable knowledge.

Under the SCEA project, we have tried to capture these through the categorization of 'Soft Skills' and 'Technical Skills'. Soft skills a include Communication, Consultation, Interpersonal, Leadership, Listening, Motivation, Presentation, Problem solving, Public Speaking and Report writing. These skills are required for interaction and relationship building. The 'Technical Skills' include specific technical as opposed to functional abilities, as well as the abilities to take responsibility, provide leadership and guidance, where applicable.

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
1. Academic / Teaching	Universities	Masters Degree or Higher	2-7 Years Post-Doctoral	10 years instruction in English (French)	• Research • Specialization	• Interpersonal • Presentation • Problem solving • Public speaking • Report writing	• Data collection/analysis • Delegates work • Develops new concept, philosophy, standard or policy • Engineering studies • Engineering techniques/methods • Independent analysis • Independent studies • Recognised as a specialist
2. Academic / Teaching	Community Colleges	Masters Degree or Higher	7 or more years	10 years instruction in English (French)	• Experience in process design, production and manufacturing	• Communication • Presentation	• Code, standards and specifications • New and basic concept design
3. Research and Development	Universities; Innovation Centres	Post-graduate Degree in Engineering or Related Discipline	Over Two Years industrial/research Experience	4 years instruction in English (French)	• Research / Postgraduate Studies • Product, process or service design	• Communication • Presentation • Report writing	• Data collection and analysis • Development of new products, processes or service and computing devices • Design simulations • Developed new and basic concepts • High level of analytical and creative thinking • Conceptualized new applications • Original, ingenious approach to practical, technical and economic problems • Used new methods or procedures of production

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
4. Research	Universities, NGOs	Bachelors Degree	2 years	4 years instruction in English (French)	• Researcher • Product, process or service specialization	• Communication • Consultation	• Data collection and analysis • Developed new and basic concepts • Established objectives and basic operating policy • High level of analytical and creative thinking • Independent analysis • Recognized expert on product/process/service
5. Research And Technical Officers; Research And Technology Advisors	Research Centres	Bachelors Degree In Engineering or Technology	5-10 Years Practical Experience	10 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Consultation • Interpersonal • Presentation • Problem solving • Report writing	• Engineering authority • Data collection and analysis • Developed of new products, processes or service • Developed new concepts • Developed philosophy, standard or policy, new resources, products, processes or methods • High level of analytical and creative thinking • Independent analysis • Recognized consultative authority, development or research • Recognized expert on product/process/service • Senior specialist in a particular field

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
6. Management Facility Manager, Asset Manager, Infrastructure Manager	Universities, Community Colleges and Other Institutions	Bachelors Degree In Engineering or Technology	5-10 Years Practical Experience	4 years instruction in English (French)	• Infrastructure Management • Total Management	• Communication • Interpersonal • Problem solving	• Employers representative • Analysed customer needs • Applied environmental legislation • Carried total responsibility • Commercial advise • Coordinated and delegated work • Established objectives and basic operating policy • Identified problems • Implemented and managed • Participated in management and cross-functional meetings • Project management activities • Tracked and reported problems • Worked independently

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
7. Research Project Or Program Manager Or Coordinator	Research Centres	Bachelors Degree In Natural Sciences Or Engineering	2 years Research/industry Experience	4 years instruction in English (French)	• Research • Specialization • Management	• Communication • Consultation • Interpersonal • Presentation	• Execution and planning of projects • Total responsibility • Coordination cost control • Managed capital expenditure on projects • Managed sophisticated engineering controls/maintenance systems • Monitored progress and costs • Organized and scheduled project activities • Participated in management and cross-functional meetings • Planned and organized work methods and procedures • Planned work efforts, assigned and coordinated work of technical staff • Planned, organized and developed design applied research • Progress reporting • Project management activities • Provided technical and management direction • Worked independently

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
8. Consultant	Universities, Community Colleges And Other Research Institutions	Post Graduate Degree in Engineering or Related Subject	10 years industrial experience	10 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Consultation • Interpersonal • Presentation • Problem solving • Report writing	• Engineering authority • Execution and planning • Carried total responsibility • Documentation • Economic/financial appraisal of product/process/service • Engineering studies • Independent analysis • Managed capital expenditure, monitored budgets and progress • Organized and scheduled all phases of a major project • Participated in management and cross-functional meetings • Progress reporting • Project management activities • Recognized consultative authority, expert or specialist on product, process, service, field of engineering or research

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
9. Technology Transfer	Universities; Innovation Centres	Bachelors Degree	7 years or more	4 years instruction in English (French)	• Product, process or service • Customer Service • Control • Execution • Technology Suppliers and Manufacturers	• Communication • Consultation • Interpersonal • Problem solving	• Analysed and defined customer needs • Assigned customers • Carried out negotiations • Commercial advise • Documentation • Economic/financial appraisal of product/process/service • Established as well as prospective customers • Identified and analyzed new markets • Kept up with technological developments in chosen field • Provided consulting services • Sold identified products to established customers • Sold major and new products • Worked independently
10. Safety Specialists	Research Institutions And Centres	Bachelors Degree in Engineering or Science	2 years Industry Specific	4 years instruction in English (French)	• Standard Safety practices for manufacturing • Process • Production • Environmental safety	• Communication • Presentation • Problem solving	• Identified health and environmental problems • Trained technical support staff, installers and others • Workplace Safety
11. Quality Assurance Specialists	Research Institutions And Centres	Bachelors Degree in Engineering or Science	2 years Experience	4 years instruction in English (French)	• Quality assurance	• Communication • Interpersonal • Presentation • Report writing	• Guide, coach, train and direct other staff • Quality control • Recommend modification and remediation

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Table 4.1: Universities, Community Colleges, Research & Development and Innovation Centres							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
12. Business Development Director, Manager, Associate	The Ontario Centres Of Excellence	Minimum of a Bachelors Degree in Engineering, Applied Science or Business	3-10 Years Industrial Experience	4 years instruction in English (French)	• Sales and Marketing	• Communication • Consultation • Presentation	• Analyse customer needs, negotiations • Consultation with customers • Customer training • Economic/ financial appraisal of product/ process/ service • Sold identified products to established customers • Sold major and new products • Sound project management knowledge • Technical assistance

Table 4.2: Municipalities, Conservation Authorities and Utilities							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
13. Systems Analyst	Municipality	University Degree In Engineering or IT	4 Years	4 years instruction in English (French)	• Complex computerised control • Information • Network Systems design and administration	• Communication • Consultation • Interpersonal • Presentation • Problem-solving	• Analyzed and assessed functional requirements of a network/system • Configured computer systems and networks • Set up system specifications, development and testing
14. Operations Manager	Municipality	University Degree in Specific Engineering Discipline	2-7 Years	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Presentation • Report writing • Problem solving	• Provides technical and administrative and support to subordinates and senior staff

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Table 4.2: Municipalities, Conservation Authorities and Utilities							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
15. Engineering Manager	Municipality	Engineering Degree	9-12 Years	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Presentation • Report writing • Problem solving	• Provides technical and administrative and support to subordinates and senior quality control • Guide, coach, train and direct other staff
16. Specifications Expert	Municipality	University Degree In Engineering	4 Years	10 years instruction in English (French)	• Design and documentation	• Communication • Report writing	• Code, standards and specifications • Documentation • Engineering techniques/methods • Identified requirements • Oversaw final design, specifications and documentation • Prepared reports, cost estimates and specifications
17. Systems Performance Analyst	Municipality	University Degree In Engineering	2 Years	4 years instruction in English (French)	• Complex computerised control systems • Infrastructure Design	• Communication • Consultation • Interpersonal • Problem solving • Report writing	• Assessed functional requirements of a network/system • Coordinated and integrated system • Documentation • Standards and compliance • Supervised performance of complex technical applications
18. Field Investigator	Municipality	2-3 Years Post-Secondary Education In Relevant Engineering Discipline	5 Years	4 years instruction in English (French)	• Environmental Quality Assurance	• Communication • Consultation • Report writing • Presentation	• Identified health and environmental problems • Identified requirements • Analysed environmental issues in depth • Applied environmental legislation • Environmental impact evaluation

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Table 4.2: Municipalities, Conservation Authorities and Utilities							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
19. Quality And Standards Coordinator	Municipality	University Degree In Engineering	3 Years	10 years instruction in English (French)	• Quality Assurance	• Communication • Consultation • Presentation	• Applied environmental legislation • Code, standards and specifications • Documentation • Environmental impact evaluation • Implemented quality assurance programs • Quality control • Standards and compliance • Utilized quality tools to achieve/maintain objective standards
20. Control Systems Specialist	Municipality	2-3 Years Post-Secondary Education In Relevant Engineering Discipline	2 Years	4 years instruction in English (French)	• Complex Computerised Information • Quality Assurance	• Communication • Problem solving • Presentation	• Cost control • Design information control systems • Control experiments, instrumentation & control • Environmental control programs • Quality control • Staffing budgets and controls • Standards and compliance • Technical control
21. Resource Planning	Conservation Authority, Municipalities	University Degree In Engineering	4-7 Years Post Graduation Experience	10 years instruction in English (French)	• Management	• Communication • Consultation • Report writing • Presentation	• Analysed environmental issues • Documentation • Economic/ financial appraisal • Environmental impact evaluation • Oversaw financial and economic analysis • Prepared feasibility study • Project management activities

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Table 4.2: Municipalities, Conservation Authorities and Utilities							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
22. Environmental Protection	Conservation Authority	University Degree	2 Years	4 years instruction in English (French)	• Environment	• Communication • Consultation • Presentation	• Analysed environmental issues • Documentation • Environmental impact evaluation • Identified health and environmental problems, environmental control programs, remedial policies • Standards and compliance • Utilized quality tools to achieve/ maintain objective standards

Table 4.3: Plant, Technology and Materials Manufacture, Rentals and Leasing							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
23. Project Manager	Manufacturer	University Degree In Engineering	Over 10 Years Industry / Technology Specific Experience	4 years instruction in English (French)	• Management • Principal Responsibility • Control • Execution	• Communication • Presentation • Report writing • Consultation • Leadership	• Mature engineering knowledge in execution and planning of projects • Cost control • Executed, coordinated and expedited engineering jobs • Analytical and creative • Implementation and management of capital expenditure • Controls/maintenance systems • Deadlines, management and cross-functional meetings • Organized work methods and procedures • Planned, directed and coordinated major projects • Progress reporting • Technical and management direction • Short and long range planning • Efficient planning • Independent
24. Project Engineer	Manufacturer	University Degree In Engineering	Over 10 Years High Technology Experience	4 years instruction in English (French)	• Large Manufacturing • Production • Total Management	• Communication • Presentation • Report writing • Consultation • Leadership	• Managed two or more units of total production of distinct product • New or revised design • Met deadlines • Monitored budgets and progress • Monitored progress and costs • New construction or conversion of existing processes, systems or structures • Managed sophisticated engineering controls/maintenance systems

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Table 4.3: Plant, Technology and Materials Manufacture, Rentals and Leasing							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
25. Manufacturing Engineer	Manufacturer	University Degree In Engineering	4-7 Years	4 years instruction in English (French)	• Large Manufacturing • Production • Total Management	• Communication • Presentation • Report writing • Consultation • Leadership	• Engineered manufacturing process • Engineering techniques/methods • Directed operation of complex continuous process • Devised economic and efficient ways to achieve objectives • Directed application of complex design tools or methods
26. Production And Maintenance Engineer	Manufacturer	University Degree In Engineering	3 Years	4 years instruction in English (French)	• Large Manufacturing • Production • Total Management • Quality Assurance	• Communication • Presentation • Report writing • Consultation • Leadership	• Engineered manufacturing process • Engineering techniques/methods • Directed operation of complex continuous process • Devised economic and efficient ways to achieve objectives • Directed application of complex design tools or methods • Quality control • Made independent decisions on work methods and procedures
27. Manufacture/ Assembly Specialist	Manufacturer	University Degree In Engineering	2 or More Years	4 years instruction in English (French)	• Large Manufacturing • Production • Total Management • Quality Assurance	• Communication • Presentation • Report writing • Consultation • Leadership	• Engineered manufacturing process • Engineering techniques/methods • Directed operation of complex continuous process • Directed application of complex design tools or methods • Made independent decisions on work methods and procedures • Instrumentation and control • Computer applications • Monitored progress and costs

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Table 4.3: Plant, Technology and Materials Manufacture, Rentals and Leasing							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
28. Process Planner	Manufacturer	Engineering Degree Preferred	10 Years	4 years instruction in English (French)	• Large Manufacturing • Plant or Process Production	• Communication • Presentation • Report writing • Consultation • Leadership	• Engineered manufacturing process • Engineering techniques/ methods • Directed application of complex design tools or methods • Planned and organized work methods and procedures • Planned work efforts • Provided technical and management direction • Put together efficient project teams
29. Proposals Specialist	Suppliers	Engineering Degree Preferred	Over 4 Years	10 years instruction in English (French)	• Sales and Marketing • Customer needs	• Communication • Presentation • Report writing • Consultation • Leadership	• Engineered manufacturing process • Engineering techniques/methods • Consultation with customers • Commercial advise • Carry out negotiation • Cost Estimation • Trained technical support staff, installers and others
30. Plant And Technology Installers	Suppliers	Engineering Degree Preferred	5 Year	4 years instruction in English (French)	• Project Execution • Total Management	• Communication • Presentation • Report writing • Consultation • Leadership	• Trained technical support staff, installers and others • Site and material testing • Sound project management knowledge • Specifications and Drawings • Standards and compliance • Technical Advisor • Technical Assistance • Used new methods or procedures of production • Utilized quality tools to achieve/maintain objective standards

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Table 4.4: Property Management and Social Housing							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
31. Building Services Coordinator	Property Managers	Engineering Degree Preferred	2 Years Customer Service	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Interpersonal • Leadership • Problem Solving • Report Writing	• Guide, coach, train and direct other staff • Carry total responsibility • Coordinate different projects and activities • Workplace safety • Broad assignments • Work independently
32. Building Operator	Property Managers	2-3 Years Post Secondary Engineering Education	2 years	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Interpersonal • Problem Solving • Report Writing	• Guide, coach, train and direct other staff • Carry total responsibility • Coordinate different portions of engineering project • Duties assigned • Workplace safety • Broad assignments • Worked independently
33. General Manager	Property Managers	2-3 Years Post Secondary Engineering Education	7-10 Years	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Interpersonal • Leadership • Problem Solving • Report Writing	• Guide, coach, train and direct other staff • Carry total responsibility • Coordinate different portions of engineering project • Duties assigned • Workplace safety • Broad assignments • Worked independently • Monitored progress and costs • Monitored budgets and progress

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Table 4.4: Property Management and Social Housing							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
34. Senior Operations Advisor	Social Housing	Post Secondary Engineering Education (Bachelors)	7 years	4 years instruction in English (French)	• Direction • Management • Principal Responsibility	• Communication • Interpersonal • Leadership • Problem Solving • Report Writing	• Guide, coach, train and direct other staff • Carry total responsibility • Coordinate different portions of engineering project • Duties assigned • Workplace safety • Broad assignments • Worked independently • Monitored progress and costs • Monitored budgets and progress

Table 4.5: Public Sector (Government)							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
35. Procurement Adviser	Ontario Government	2-3 Years Post Secondary Engineering Education	10 years or more	10 years instruction in English (French)	• Customer Needs • Knowledge of manufacturers, suppliers, materials, equipments and technology suppliers	• Communication • Interpersonal • Problem solving	• Negotiations • Cost estimation • Documentation • Economic/ financial appraisal of product/ process/ service/ equipment and acquisition • Standards and compliance

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Table 4.5: Public Sector (Government)							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
36. Municipal Adviser	Ontario Government	Bachelors degree in engineering	10 years or more	10 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Consultation • Leadership • Presentation • Report writing	• Act as engineering authority • Code, standards and specifications • Engineering techniques and methods • Advisory direction to highly qualified engineers • Provided consulting services • Provided technical and management direction • Oversaw feasibility studies • Oversaw site investigations engineering surveys • Oversaw final design, specifications and documentation • Oversaw financial and economic analysis
37. Program Support Officer	Ontario Government	2-3 Years Post Secondary Engineering Education	3 years or more	4 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Consultation • Leadership • Presentation • Report writing	• Engineering techniques and methods • Advisory direction to highly qualified engineers • Provided consulting services • Provided technical and management direction • Managed capital expenditure on projects • Monitored progress and costs • Monitored budgets and progress

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Table 4.6: Software Companies							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
38. Associate Consultant	Software	BS Or MS	2 Years	4 years instruction in English (French)	• Software development • Design product process or service	• Communication • Presentation • Report writing • Problem solving	• Act as engineering consultant • Member of design team • Design and development of computing devices • Design information control systems • Design software • Design program and commission
39. Technical Manager	Software	BA, BS Or MS	3 years min	4 years instruction in English (French)	• Software development • Project Control • Project Management	• Communication • Presentation • Report writing • Problem solving	• Act as engineering consultant • Member of design team • Design and development of computing devices • Design information control systems • Design software • Design program and commission • Project management • Product architecture, specifications and technology selection • Provided consulting services • Recognised as a specialist • Put together efficient project teams • Quality control • Provided technical and management direction

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Table 4.7: Other (Emerging)							
Type of Occupation	**Employer**	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
40. Nano-Electronics Engineer	Universities	Post Graduate Degree	2 Years	4 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Report writing	• Engineering techniques and methods • New and basic concept design • Engineering studies • Perform analysis • Original, ingenious approach to practical, technical problems
41. Micro/Nano Instrumentation Specialist	Universities	Post Graduate Degree	2 Years	4 years instruction in English (French)	• Complex Computerised Information • Quality Assurance	• Communication • Presentation • Report writing • Consultation	• Coordinated and integrated system • Design information • Control systems • Identified requirements • Instrumentation and control • Computer applications • Developed new and basic concepts • Directed application of complex design tools or methods
42. Nano-Biosystems Expert	Universities, Research Laboratories And Hospitals	Post Graduate Degree	2 Years	4 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Presentation • Report writing • Consultation	• Act as engineering authority • Developed new and basic concepts • Directed use of equipment and materials
43. Nano-Materials Specialist	Research Institutes	Post Graduate Degree	2 Years	4 years instruction in English (French)	• Authority Researcher or Specialist	• Communication • Presentation • Report writing • Consultation	• Engineering techniques and methods • New and basic concept design • Engineering studies • Perform analysis • Original, ingenious approach to practical, technical problems

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5 MATCHING IEB SAMPLE TO SKILLS COMMENSURATE OCCUPATIONS

Taking the sample size of the IEBs from the detailed survey (n=146) and then matching their skills and competencies with the different requirements of skills commensurate jobs gives us a more detailed understanding of what percentage of IEBs have which requisite skills. This helps us to establish actual not perceived gaps in skill sets within the population and highlights areas in which they are well skilled, and areas in which IEBs may require additional support as shown through the following tables (5.1-5.7). Table 5.3 combines tables that have been distinct in previous sections under the title Plant, Technology and Materials Manufacture, Rentals and Leasing.

Table 5.1: Universities, Community Colleges, Research & Development and Innovation Centres

Type of Occupation	Education	Experience	Language	Functional Skills	Soft Skills	Technical & Other Skills
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Academic / Teaching - Universities	32%	31%	5%	6%	6%	6%
Academic / Teaching - College	32%	31%	5%	6%	6%	5%
Research and Development	32%	31%	90%	10%	8%	10%
Research	95%	88%	90%	21%	19%	16%
Research and Technical Officers; Research and Technology Advisors	95%	26%	5%	4%	4%	3%
Management - Facility Manager, Asset Manager, Infrastructure Manager	95%	26%	90%	5%	5%	5%
Research Project or Program Manager or Coordinator	95%	88%	90%	22%	18%	21%
Consultant	95%	5%	5%	25%	23%	24%
Technology Transfer	95%	88%	90%	59%	29%	30%
Safety Specialists	95%	88%	90%	25%	23%	12%
Quality Assurance Specialists	95%	88%	90%	23%	23%	16%
Business Development Director, Manager, Associate	95%	88%	90%	14%	12%	11%

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Table 5.2: Municipalities, Conservation Authorities and Utilities						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Systems Analyst	95%	84%	90%	39%	38%	25%
Operations Manager	95%	31%	90%	17%	4%	5%
Engineering Manager	95%	64%	90%	23%	22%	21%
Specifications Expert	95%	84%	5%	39%	37%	30%
Systems Performance Analyst	95%	88%	90%	12%	12%	8%
Field Investigator	99%	83%	90%	7%	7%	4%
Quality and Standards Coordinator	95%	86%	5%	5%	5%	5%
Control Systems Specialist	99%	87%	90%	7%	5%	7%
Resource Planning	95%	84%	5%	24%	23%	18%
Environmental Protection	99%	88%	90%	4%	3%	3%

Table 5.3: Plant, Technology and Materials Manufacture, Rentals and Leasing						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Project Manager	95%	59%	90%	30%	29%	25%
Project Engineer	95%	59%	90%	24%	23%	13%
Manufacturing Engineer	95%	13%	90%	4%	3%	2%
Production and Maintenance Engineer	95%	86%	90%	32%	30%	19%
Manufacture / Assembly Specialist	95%	88%	90%	36%	34%	23%
Process Planner	95%	59%	90%	14%	14%	11%
Proposals Specialist	99%	87%	6%	4%	4%	3%
Plant and Technology Installers	99%	86%	90%	28%	27%	12%

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Table 5.4: Property Management and Social Housing						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Building Services Coordinator	99%	88%	90%	14%	14%	11%
Building Operator	99%	92%	90%	14%	14%	7.5 - 11.0%
General Manager	99%	77%	90%	29%	27%	24%
Senior Operations Advisor	95%	77%	90%	12%	11%	10%

Table 5.5: Public Sector (Government)						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Procurement Adviser	99%	77%	90%	12%	12%	10%
Municipal Adviser	99.3%	76.7%	90.0%	3.4%	3.4%	2.0%
Program Support Officer	99%	89%	90%	7%	7%	4%

Table 5.6: Software Companies						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Associate Consultant	95%	88%	90%	23%	23%	15%
Technical Manager	95%	86%	90%	18%	18%	12%

Table 5.7: Other (Emerging)						
Type of Occupation	**Education**	**Experience**	**Language**	**Functional Skills**	**Soft Skills**	**Technical & Other Skills**
Sample Size n=146	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**	**%Match**
Nano-Electronics Engineer	32%	88%	90%	9%	9%	8%
Micro/Nano Instrumentation Specialist	32%	88%	90%	9%	9%	8%
Nano-Biosystems Expert	32%	88%	90%	14%	14%	11%
Nano-Materials Specialist	32%	88%	90%	9%	9%	8%