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Final Report

EVALUATION OF THE CANADA-ONTARIO INFRASTRUCTURE WORKS PROGRAM— EXTENSION

Prepared for

Industry Canada

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Appendices

Executive Summary

Industry Canada, on behalf of the Federal-Provincial Management Committee, commissioned KPMG Consulting LLC to conduct an evaluation of the Canada-Ontario Infrastructure Works Program Extension (COIW2). This report evaluates the impact that the COIW2 program has had in Ontario. It sets out general program impacts, and then highlights benefits that sprang from specific COIW2 projects. It also highlights lessons learned during the planning and implementation of specific COIW2 projects.

Study Objectives

This report evaluates the impact the COIW2 program has had in Ontario. It uses quantitative and qualitative information to assess a number of impacts including:

- job creation capacity and enhancement of local economic competitiveness;[1]
- raising infrastructure to community standards, codes and by-laws;
- incrementality and/or accelerated investment;[2]
- participation of local partners;
- enhanced local productivity and private sector investment;
- enhanced environmental quality and sustainability; and
- distribution of program benefits within the Province.

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1 The definition of "job creation" applied in this study includes short-term, seasonal, or long-term employment. It also includes full-time or part-time employment (including gainful employment based on hourly, daily, weekly, monthly, or annual compensation/salaries). This is consistent with Statistics Canada employment definitions. The COIW2 projects were intended to create immediate short-term jobs.

2 To be eligible for funding, COIW2 projects must represent incremental and/or accelerated investment; that is, a project planned for the future must be brought forward by at least one year. Incremental investment is a key factor that may influence net employment creation and related economic impacts.

The report evaluates these impacts for a cross-section of projects in each of the following strategic priority areas: roads and highways, capital projects in universities and colleges, capital projects for health care facilities and water and sewer work.

Approach

KPMG designed a two-pronged approach for this report: general program analysis and case study analysis. First, a program profile that details COIW2's rationale, objectives and intended results was prepared. Then a detailed, program-wide analysis was done that considers data that relates to the program in general. This program analysis provided a macro view of program impacts, and raised issues that are highlighted in project case studies.

Second, in consultation with officials at Industry Canada, the study team selected 14 projects as the basis for 10 case studies:

Strategic Priority	Project Title	Location
Roads & Highways	Highway 89/Honda Arterial Road	Alliston
	Highway 50	Bolton
	Agrium Road	Kapuskasing
	Highway 401/Mavis Road Interchange	Mississauga
	Highway 31	Winchester
Universities and Colleges	Queen's University	Kingston
	Algonquin College	Ottawa
Health Care	Macassa Lodge	Hamilton
	District Community Health Centre	Merrickville
Municipal	Storm Sewer	Hawkesbury
	Road Upgrading	Sudbury
	District Cooling Water System	Toronto
	Glen Road Bridge	Toronto
	Reconstruction of 9 Roads	Toronto

Ten case studies: Ministry of Transportation (roads and highways); Queen's University; Algonquin College; Macassa Lodge; Merrickville District Community Health Centre;

City of Sudbury; Town of Hawkesbury; Toronto District Cooling Water System, Toronto Glen Road Bridge and Reconstruction of 9 Toronto Roads. These case studies reflect both the diversity of regions in Ontario and the range of strategic priorities identified for COIW2. The case studies also vary in size and scope, and reflect the four types of infrastructure projects (roads/bridges, education facilities, healthcare facilities and water/sewage) as well as strategic priority areas eligible for COIW2 funding.

Case studies are windows into the real impact the program is having and, when compared against each other against a background of general program results, highlight lessons learned from COIW2 projects in general.

Program-wide Profile

COIW2 versus COIW1

Program scope:COIW1 was a much larger program than was COIW2. While the federal government contributed $713 million towards Ontario infrastructure projects between April 1, 1994 and March 31, 1997, the federal government also contributed $152 million to such projects between April 1, 1997 and March 31, 2000. As a result, the original COIW program supported a much larger number of projects. While federal COIW support declined by 369% between COIW1 and COIW2, the number of projects, supported with these funds declined by 290%. In addition, the average federal contribution per project decreased by 20% between COIW1 and COIW2.

Project scope: Not only did program fundamentals change in the transition from COIW1 to COIW2 – so too did the thrust of projects supported by COIW funds. While COIW1 supported general infrastructure projects on a local, per-capita needs basis, COIW2 targeted specific strategic priority areas and set out a selection formula based on local selection of priority projects.

COIW1 funds supported a broader range of infrastructure improvement projects than did COIW2 funds. The nature of projects supported, however, did not change in the transition from COIW1 to COIW2. Instead, COIW2 funds supported a more narrow range of infrastructure projects. As per its strategic priority areas, COIW2 did not support any cultural, recreational, municipal building or other related engineering projects. All COIW2 projects focused on roads/bridges, educational and health facilities/buildings, and water/sewage.

COIW2 program-wide funding

Funding allocation: The highest proportion of COIW2 funds were committed to projects that fit within the municipal strategic priority area (39%). Health care was the second-most funded strategic priority area (30%), followed by roads and

highways (18%). Education related projects received the smallest share of COIW2 funds (13%).

Not only did COIW2 set out four strategic priority areas, but four types of infrastructure projects qualified for COIW2 funds. Project types are generally representative of the strategic priority areas – roads/bridges, education facilities, water/sewage, roads and highways, health care and municipal projects.

COIW2 general project fundamentals

Strategic priority areas: COIW2 funds helped support 1,282 infrastructure projects in the province of Ontario. The majority of the projects (92%) were municipal projects. Roads and highways, education and health projects comprised the other 8% of projects. Projects within the municipal strategic priority area garnered 39% of federal funds set aside for COIW2 projects. 30% of federal funds supported healthcare related projects.

Funding fundamentals: The ten most heavily funded COIW2 projects received almost 37% of the total federal contribution; five of these took place in the Greater Toronto Area (GTA). Of the total $40,009,846 federal COIW2 investment made in GTA, these five large projects made up $26,954,337 of this investment. In other words, 69% of the government's COIW2 investment in the GTA (17% of its total COIW2 investment) went into five of the 48 projects undertaken in the city.

Yet, despite this concentration of large-scale infrastructure projects in GTA, there is no evidence that large projects were unfairly undertaken in major urban centres. For example, an upgrade of the Haliburton Highlands Health Centre and a road reconstruction in New Tecumseth represent major projects in relatively small towns. It is also interesting to note that at least one project from each strategic priority area was among the top ten most heavily federally funded COIW2 projects.

Strategic Priority Analysis

Roads and highways: The roads and highways strategic priority area encompassed projects under the jurisdiction of the MTO. This strategic priority area included 46 projects to which the federal government contributed $27,645,586 or 18% of the federal share. The five largest MTO projects were given a 42% share of the federal contribution to this priority; the five smallest projects only received a 0.5% share of this contribution.

An analysis of the five largest and five smallest MTO projects suggests that these projects were generally well distributed across Ontario. For example, the Agrium Road project and the New Liskeard water main took place in Northern Ontario; the Crowe River Bridge and the Highway 7 projects took place in Eastern Ontario. The other large/small MTO projects took place in Southern/Southwest Ontario. Assuming that a similar trend defines other MTO projects, it would appear that the

COIW2 roads and highways strategic priority area managed to distribute program benefits throughout the province.

Education: The education strategic priority area focused on facility upgrades in provincial colleges and universities. Other educational facilities were not eligible to receive COIW2 funds. The strategic priority area included 45 projects to which the federal government contributed $19,332,649 or 13% of the federal share. The 5 largest education facility upgrade projects received 35% of the federal contribution to the priority area; the 5 smallest projects received 5.2% of this contribution.

An analysis of the five largest and five smallest education projects suggests that these projects were generally well distributed across Ontario. Nippissing University and Algoma University College are both in Northern Ontario; the University of Western Ontario is in South Western Ontario; Queen's University and the University of Ottawa represent Eastern Ontario, and, finally, the Greater Toronto area is well represented. Yet, there was some unevenness in the distribution of COIW2 funds between universities and colleges. The five largest federal education investments went into the province's top universities; four of the five smallest investments went into community colleges.

Health Care: The healthcare strategic priority area focused on health-related facility upgrades. It is interesting to note that infrastructure upgrades did not occur primarily within provincial hospitals, but within other health-related facilities such as district clinics and old-age homes. This strategic priority area included 11 projects to which the federal government contributed $44,999,994 or 30% of the federal share. The five largest health-related projects received 84.7% of the federal contribution to this priority; the five smallest projects only received 8.6% of this contribution. In other words, the balance of health-related projects received 15.3% of federal funds invested in healthcare infrastructure projects.

An analysis of the five largest and five smallest Health Care projects suggests that these projects were fairly distributed throughout the province. Seven of the 11 projects were either in the Greater Toronto Area or in Southern Ontario. Three of the projects were in Eastern Ontario, and only one, the Thessalon Hospital, the smallest of the healthcare projects, was in Northern Ontario.

Municipal: For COIW2, municipal projects dealt with water, sewage, road and bridge infrastructure upgrades. The strategic priority area included 1,180 projects to which the federal government contributed $59,941,017 or 38% of the federal share. The 5 largest municipal projects were given a 19% share of the federal contribution to the priority area, the share of the federal contribution to the 5 smallest infrastructure projects is relatively small at less than 1%. It is interesting to note that while the five largest projects were in urban areas the five smallest projects were in rural areas or small towns.

Individual project analysis

Job creation: One of the primary objectives of the COIW2 program was to create jobs. According to Treasury Board and Industry Canada records, COIW2 projects created, across Canada, approximately 7,420 short-term jobs (296,800 person-weeks employment). The majority of these jobs were in the construction industry. On average, for Canada as a whole, each COIW2 infrastructure project created 3,745 person-weeks of short-term employment.

Project costs: An analysis of estimated and actual project costs for case-study projects reveals that the 14 case study projects garnered $25,770,591 in federal funds (17% of federal COIW2 funds). On average, these projects received $1,840,756 from the federal government; the federal share of project costs ranged from $44,084 to $6,333,333 per project.

On average, actual project costs increased by approximately 8.48% from estimated costs, the federal share of project costs only increased by 2.55%. While the federal government intended to assume 32% of proposed costs, the government only assumed 30% of actual case study project costs. As a result, in addition to assuming their own share of additional project costs, provincial and local authorities also had to assume $1,499,791 in costs.

Benefits (Case Studies)

Economic Benefits

Short-term jobs: By their very nature, all of the infrastructure projects included in this report's case studies, and indeed all COIW2 projects, created short-term jobs. The number of short-term jobs created, however, varied depending on the scope of work associated with the project. For example, while the Highway 401/Mavis Road interchange project created 10,400 person-weeks employment, the construction of a storm sewer in Hawkesbury only created 37 person-weeks employment.

Skill development: Admittedly, short-term jobs are not always considered a major economic benefit. Nevertheless, the jobs did provide employment opportunities that further exposed workers to the construction industry and that, in some cases, broadened the skill base of workers involved. This skill-building component of short-term construction jobs can have a significant impact as it makes workers more marketable and can help them secure employment in the longer term.

For example, the construction of the district water-cooling system in Toronto exposed workers to innovative water-cooling technology. Tradesmen gained experience in various aspects of utility and absorption equipment installation;

professionals improved their knowledge of the technology by designing and implementing the project. Since the district water cooling project is oriented towards using resources (i.e., Lake Ontario) more efficiently, the skills workers developed during the project stand to make them more competitive on other sustainable development projects.

Education oriented projects also resulted in the development of new skills. Both the Queen's University facility upgrade and the Algonquin College facility upgrade improved the capacity of these institutions to develop the skills of their students. The upgrade of the Queen's University ergonomics research lab has helped ensure the continuance of the ergonomics program, a program that is training students to apply/transfer their knowledge/skills to industry. The Algonquin upgrade included an extension to the College's network cable infrastructure. This extension has made information technology services more widely available to students and has increased the College's ability to deliver training electronically.

Job-creation capacity: Along a similar vein, the COIW2 program has also, in certain instances, increased Ontario's capacity to create jobs. At least one case-study project under each of the four COIW2 strategic priority areas created (or has the potential to create) a long-term job. The Agrium road upgrade helped make it feasible for Agrium Inc. to build a phosphate mine, a project that has resulted in the creation of approximately 100 full-time positions for at least 20 years. Likewise, the rebuilding of the Merrickville district community health centre resulted in the creation of three full-time positions; the construction of the district water cooling system resulted in the hiring of two full-time employees to monitor and control the system. Finally, on the education side, while neither project directly created long-term jobs, enrollment at Algonquin College has since increased, suggesting that the College might hire more staff in the near future.

Increased competitiveness: Linked to the COIW2 program objective of increasing Ontario's capacity to create jobs is the objective of increasing the province's competitiveness. Case-study projects helped make Ontario more competitive in a variety of ways. First, any road/highway (municipal or provincial) project that contributes to a modern, efficient and safe transportation network for existing and potential industrial, commercial and residential users stands to enhance economic competitiveness. Improved road conditions reduce maintenance demands and free up money for other projects. Infrastructure projects also tend to make roads safer, and while safety is primarily a social benefit it also has economic impacts such as reduced stress on health and other facilities.

Second, under the healthcare strategic priority area, Macassa Lodge anticipates a significant increase in preferred accommodation (private and semi-private rooms) revenue as a result of the marketability of the resident rooms following renovations. Infrastructure improvements will also result in an increase in membership to their outreach programs. As these programs are fee-based, an increased membership

means greater revenue for the lodge. This increased revenue should help make the lodge a more attractive, and thus more competitive, facility.

And finally, third, the district water cooling system project stands to improve competitiveness within the City of Toronto. Many of Enwave's (the company that manages the system) customers are public sector institutions and government. The nature of a district system means that the more customers the system serves the greater the potential for efficiency-related, system-wide savings; an extension of the distribution network translates into cost-savings that benefit all its customers. Furthermore, improved district cooling services stand to reduce overhead, operating and maintenance costs in customer buildings. As building owners save money, theoretically, occupancy costs can decrease. This in turn stands to make Metropolitan Toronto more competitive in terms of attracting public and private sector tenants, thus growing the local tax base.

Indirect injections: Linked to the notion of increasing Ontario's competitiveness is the notion of injecting money in the province's economy. Certain COIW2 projects have contributed to increasing the economic viability of their regions. The new health centre in Merrickville should, at the very least, maintain, and may increase, the number of senior citizens in the town, and might encourage/stimulate private industry to invest in the Township. As the population of an area increases, so too does its potential for increased prosperity – new people create a need for new investment.

The Agrium mine is expected to generate an additional $24-$30 million in new investment in the Kapuskasing area. Already, the mine's existence has necessitated the upgrading and maintenance of the region's rail lines, thus indirectly creating 25 to 30 short- and long-term jobs. By creating jobs and injecting capital into the area, the mine is reducing social security dependence and is increasing the purchasing power of the newly employed. With more disposable income available in the community, existing businesses stand to become more viable and opportunities may exist for new businesses to open. Ultimately, this investment, spurred on in part by the Agrium Road, will have an indirect, but significant economic benefit in the region.

Incrementality: Project officials for all COIW2 projects considered for this report were able to justify their projects by means of the incremental criterion. Just how incremental each project really was, however, depends on the nature of the project. Four of the five roads and highways projects (Agrium road excepted) were incremental in that the Province recognized that the project involved necessary infrastructure renewal, but that without COIW2 funds the Ontario Ministry of Transportation could not accommodate the project in its base budget. The City of Sudbury used a similar rationale to justify its road upgrading project, as did the City of Toronto to justify its reconstruction of nine roads and its reconstruction of Glen Road bridge projects.

Project authorities for education and healthcare projects took a broader view of the incremental criterion. While education renewal projects were in the institutions strategic plans, they were not on the Ontario Ministry of Colleges and Training's project list. These projects were incremental in that without COIW2 funds the institutions would have had to raise the funds themselves. Regarding healthcare projects, neither the renovation of Macassa Lodge nor the rebuilding of the Merrickville District Community Health Centre (MDCHC) would have proceeded without COIW2 funds. In each case, the facility itself was responsible for raising the necessary funds – neither facility felt capable of mounting a capital campaign to support infrastructure renewal.

Social Benefits

Standards, codes and by-laws: One of the objectives of the COIW2 program was to raise infrastructure to meet community standards, codes and by-laws. Accordingly, a key social benefit that resulted from COIW2 funding was that portions of Ontario's infrastructure that previously did not meet standards now meet or exceed relevant standards. Education and healthcare projects brought ventilation, heating and air-conditioning systems up to standard in renovated buildings; all road, highway or bridge renewal projects were completed in accordance with provincial standards. Likewise, municipal projects brought infrastructure up to standard – during the district cooling water project, all tunnels and pipes were constructed in accordance with current safety and construction standards; the construction of the storm sewer in Hawkesbury raised the standard of water flow and pressure in the surrounding area to that in other municipalities.

Accessibility: Linked to the issue of bringing infrastructure up to community standards is the issue of accessibility. A number of the projects considered in this report's case studies made relevant infrastructure more accessible. The Algonquin College facility upgrade included the installation of an elevator; the Queen's University upgrade included the construction of accessible washrooms at the School of Physical Health. Likewise, while the original MDCHC was multi-storied and not wheelchair accessible, the new facility is on a single floor and is accessible throughout. Even road repair projects, like the Sudbury road resurfacing project, by repairing sidewalks and creating sloped curbs, have made relevant city roads more accessible to disabled citizens.

Safety: Another community benefit that resulted from COIW2 funding was improved safety. In particular, all road resurfacing and bridge repair projects increased safety in their respective communities. Examples of safety improvements include:

- installation of traffic lights;
- inclusion of turning lanes;

- widening of roads;
- improvement of sidewalks; and
- installation of modern signs.

While safety benefits are not always as tangible as other identified program benefits (it is difficult to predict accurately how many fewer collisions are occurring at an intersection), project authorities interviewed for many road/highway/bridge projects cited safety as the major benefit that resulted from COIW2 funding.

Community: A sampling of the COIW2 funded projects included in this report's case studies resulted in community specific benefits. Such benefits are generally not instrumental to the project's rationale, nor do they necessary fulfill COIW2 program objectives. Nevertheless, community benefits like those described below are often the benefits residents most closely identify with a particular project.

First, the Agrium Road project stands to have a social impact in the Kapuskasing area by facilitating access to recreational properties and activities. The upgraded road leads to Rufus Lake, a rich hunting and fishing ground. With improved access to these facilities, a greater number of people will be able to participate in recreational activities, a fact that stands to increase the quality of life of a portion of the community's population.

Second, renovations to the Douglas Library have allowed Queen's University to consolidate a number of libraries (science collection, applied science collection and music collection). This consolidation has enhanced the library's facilities, for the public (and students) can now access books and other library materials from one site, rather than attempting to locate this information from the various library branches scattered across campus. Centralizing these collections has also facilitated the work of the librarians who are now better able to assist the public in locating desired reading materials.

Third, the new MDCHC can now serve as a refuge for the community in case of emergencies and disasters (e.g., Ice Storm 1998) – it was built to withstand earthquakes and other disasters. The new building was constructed with exterior power terminals used to hook up portable generators for emergency power. Both the Municipal building and the Fire Hall have exterior power terminals and all three can work as an emergency response team to provide refuge for residents in times of crisis. Therefore, the MDCHC is a vital part of emergency planning for the community.

And finally, fourth, COIW2 funds enabled a variety of improvements to the quality of life of Macassa Lodge residents. Residents now reside in a safe, comfortable and modern living environment that offers larger, more private rooms. Furthermore,

landscaping and ancillary improvements have created more opportunities for residents to participate in and enjoy active and passive outdoor activities.

Environmental

Energy Efficiency: One of the objectives set out for the COIW2 program was enhanced environmental quality and sustainability. While the environmental benefits that occurred as a result of COIW2 funding are not as tangible as some of the above-mentioned benefits, certain environmental benefits are nevertheless worth noting. In particular, the Toronto-based district cooling project has resulted in major energy savings. For one thing, district cooling eliminates the use of CFC-based refrigerants, thereby improving the working environment of anyone who comes in direct contact with the system. District cooling, however, as a virtually non-mechanical process, uses up to 90% less energy than do conventional systems. Since this COIW2 supported project represents only one phase of a larger, more ambitious, cooling water project the potential exists for major emission reduction once the project is completed. Finally, the system relies on a naturally occurring and endlessly renewable thermal layer of lake water that is permanently just above freezing (4 degrees C), making it completely sustainable.

Facility-oriented infrastructure projects (i.e. education and healthcare projects) also resulted in increased energy efficiency. The major exhaust system at Macassa Lodge now has a heat-recovery capability that pre-heats and pre-cools the air that enters the building, reducing energy use and costs; the new MDCHC is equipped with efficient lighting, electrical and mechanical systems. On the education front, both the Algonquin College and Queen's University upgrades included repairs to leaking roofs and the replacement of old windows. These improvements have reduced heating costs thus making the facilities more energy efficient.

Lessons Learned

Project results: Most of the projects examined in this report proceeded according to plan. In general, project files reflect project results, and show that federal funds made up no more than one-third of project costs. Projects were generally completed on time, and where additional time was needed the circumstances underlying this were justified. Yet, for future infrastructure projects under other similar programs, responsible authorities might want to phase projects over a longer period of time to ensure that funds are available, and budgets allocated, to plan and complete projects within an appropriate time span.

Project timelines: Project authorities for the Macassa Lodge, MDCHC, Glen Road Bridge and Algonquin College infrastructure upgrades noted that they would have liked to see longer time frames for project implementation. These authorities noted that because it takes time to plan and arrange projects, and then to receive project approval,

and because of the seasonality of the Ontario construction season, it seems appropriate for infrastructure projects to span beyond two years.

This issue was particularly serious for larger projects – the larger a project, the more planning required and the more time needed for related construction. In particular, the Merrickville project, as a result of a forced six-month construction break, was potentially ineligible for COIW2 funds. Ultimately, it seems appropriate for Industry Canada and the Government of Ontario to extend timing guidelines for future infrastructure programs.

Communication: While most project authorities claimed that effective communication existed between all COIW2 partners, authorities for certain roads and highways projects suggest that Industry Canada and the Ontario Ministry of Transportation did not always communicate effectively during the course of COIW2 projects. There was a feeling among MTO employees that they were not aware of certain structural program changes that occurred in the transition from COIW1 to COIW2, and did not plan accordingly around these changes. Since COIW was a joint federal/provincial/municipal venture, it was imperative that information be effectively shared among all partners. There are opportunities to improve communications in future infrastructure programs involving partnerships between the different levels of government.

Process and design: Project authorities for the two healthcare projects and the project authority for the reconstruction of nine roads noted that there is room for program officials to improve COIW2 processes. The nine roads authority did not experience process setbacks, *per se*, but did find COIW2 related paperwork excessive, and experienced delays processing claims. Likewise, authorities for the Merrickville Health Centre project noted that they incurred late payment costs of approximately $1,500 as a result of delays in the COIW2 payment process. The Merrickville authorities also noted that they did not find that COIW2 applications clarified appropriate funding mechanisms for local partner contributions. As a result, there was some confusion as to whether or not the centre would manage to muster the necessary funds at the local level to qualify for federal COIW funds.

Private sector involvement: An objective of the COIW2 project was to involve the private sector in infrastructure renewal. One project included in this report's case studies, the Agrium Road project, actively engaged a private sector partner, i.e. Agrium Inc. On all accounts, this private sector involvement was deemed a success. Project authorities found working with Agrium a "pleasure", and are eager to explore similar public/private joint ventures in the future. It is important to note, however, that while it seemed logical for Agrium to participate in the road upgrade (the new road benefits Agrium Inc. above all), without the COIW program it might have been difficult to draw Agrium into the project, for the program defined a funding formula that equitably involved the private sector without over-burdening it. The Agrium project stands out as a good example of private sector involvement in COIW2 projects.

Local partner involvement: It seems, however, that local partners were generally effectively drawn into the COIW2 process. This issue of local partner participation was

particularly relevant for roads and highway projects under the jurisdiction of the Ontario Ministry of Transportation. Certain project authorities noted that, where appropriate, the MTO allowed municipalities to design and control infrastructure projects. Those municipalities drawn into project management (i.e., City of Mississauga and Town of Winchester) were also willing to assume a share of project costs. It seems that this hands-off approach contributed to the expediency and efficiency with which projects were completed. Municipalities do not believe that the MTO would have managed the projects as well as they did, and are encouraging the Province to continue to advocate a more laissez-faire project management style.

Strategic priority areas: Finally, some project authorities for municipally focused projects found the COIW2 program objectives too broad. Some officials suggested that future infrastructure programs similar to COIW2 should focus narrowly on "hard" infrastructure projects (i.e., the building of systems and infrastructures already in place) rather than on "soft" projects (i.e., the building of new infrastructure).

It is worth noting, however, that the majority of project authorities interviewed for case study projects felt that the identification of strategic priority areas was an effective way to approach and select infrastructure projects. In particular, road and highway authorities noted that without the introduction of strategic priority areas the projects under their jurisdiction would not have been eligible for program funds. Likewise, project authorities for each healthcare renewal project included in the case studies maintained that without the identification of strategic priority areas their projects would not have been eligible for COIW2 funding.

I Introduction

Industry Canada, on behalf of the Federal-Provincial Management Committee, commissioned KPMG Consulting LLC to conduct an evaluation of the Canada-Ontario Infrastructure Works Program Extension (COIW2). This introductory Chapter provides background information on COIW2 and outlines the evaluation's objectives, approach and methodology.

A. Background

In January 1994, the federal government and the government of Ontario signed the Canada-Ontario Infrastructure Works (COIW) Agreement. COIW was the Ontario component of the national Canada Infrastructure Works Program (CIWP), a $6 billion initiative that was shared equally between the federal, provincial and municipal governments, and that was meant to support local infrastructure projects between 1994 and 1997. CIWP, and component programs like COIW, was a response to two significant problems. First, it addressed a need for rapid job creation to accelerate economic recovery in Canada. Second, it addressed the need of municipalities to upgrade local infrastructure. The program also had a number of secondary objectives, including environmental improvement, the fostering of technological change, skills upgrading and the development of innovative methods of infrastructure provision.

In August 1996, the federal government and the government of Ontario signed an amending Agreement to the original COIW that extended project funding until March 31, 1999.

In May 1997 a second amending Agreement was signed. This amendment introduced the concept of strategic infrastructure priorities, and thus marked the beginning of the Canada-Ontario Infrastructure Works Program Extension (COIW2). While COIW2 has a narrower, strategic focus than did the original COIW, both programs renew or enhance Ontario's infrastructure and create short- and long-term jobs, promote a competitive and productive economy and accelerate economic recovery in the construction industry.

This evaluation focuses exclusively on COIW2 projects.

B. Study Objectives

The purpose of this study is to evaluate the impact of COIW2. The study uses quantitative and qualitative information to assess a number of impacts including:

- job creation capacity and enhancement;[1]
- raising infrastructure to community standards, codes and by-laws;
- incrementality and/or accelerated investment;[2]
- participation of local partners;
- enhanced local productivity and private sector investment;
- enhanced environmental quality and sustainability; and
- distribution of program benefits within the Province.

These impacts are evaluated for a cross-section of projects in each of the following strategic priority areas: roads and highways, capital projects in universities and colleges, capital projects for health care facilities and water and sewer work.

C. Approach

KPMG designed a two-pronged approach for this report: general program analysis and case study analysis. The rationale behind this approach is explained below.

General program analysis: The first prong of this approach, general program analysis, involved a survey of COIW2 in its entirety. By looking at the program in general, KPMG was able to build a program profile (Chapter II) that details COIW2's rationale, objectives and intended results. KPMG then prepared a detailed program-wide analysis (Chapter III) that considers data that relates to the program in general. This program analysis allowed KPMG to gain a macro view of program impacts, and raised issues that are highlighted in subsequent case studies.

Case study analysis: The second prong of this approach, case studies, involved the selection of 14 projects to be included in 10 case studies (the analysis of case studies is included in Appendix A of this report). The projects and case studies were selected in consultation with officials at Industry Canada, as follows:

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[1] The definition of "job creation" applied in this study includes short-term, seasonal, or long-term employment. It also includes full-time or part-time employment (including gainful employment based on hourly, daily, weekly, monthly, or annual compensation/salaries). This is consistent with Statistics Canada employment definitions. The COIW2 projects were intended to create immediate short-term jobs.

[2] To be eligible for funding, COIW2 projects must represent incremental and/or accelerated investment; that is, a project planned for the future must be brought forward by at least one year. Incremental investment is a key factor that may influence net employment creation and related economic impacts.

Strategic Priority	Project Title	Location
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Each case study begins with a description of the infrastructure improvements made possible by COIW2 funding. Case studies then evaluate the rationale behind selected infrastructure projects and assess resultant benefits. Finally, case studies outline lessons learned during the planning and implementation of COIW2 projects.

Case studies are windows into the real impact the program is having, and when compared against each other, and against a background of general program results, the highlight lessons learned from COIW2 projects in general.

D. Methodology

In order to carry out the approach described above, the project team undertook a series of key activities. Together, these activities (file, document and database review; stakeholder interviews; site visits; report writing) comprise the methodology behind this report. This section of the Introduction briefly describes these key activities.

File, document and database review: The first step in preparing this evaluation was a review of key files and documents. First, the project team consulted relevant documents related to the original COIW and to the original CIWP. These documents provided an overview of program goals and objectives, and helped put COIW2 in its proper context.

Project files for each of the above-listed case studies were reviewed. This file review ensured that before interviewing project authorities, the project team had an understanding of project expectations and progress. This file review also included an analysis of project impacts like job creation.

Finally, the project team searched Industry Canada's COIW2 database. Searching the database allowed extraction of information that proved useful for the detailed analysis of general program impacts found in Chapter III of this report.

Stakeholder interviews: Second, interviews with key COIW2 participants were conducted. These interviews took two forms. First, it involved interviews with COIW management on the general scope of the program. These interviews helped build the program profile found in Chapter II of this report, and helped corroborate database analysis found in Chapter III.

The project team also interviewed local project partners for each case study. These interviews allowed asking local contacts on the real impact of COIW2, and confirming project information included in project files. During these interviews, the project team requested, when appropriate, additional project information (i.e. before/after photographs, articles, and reports) that might substantiate the case study in question.

Site visits: The project team also visited a selection of case-study project sites. These site visits allowed the team to see first hand the results/impacts of COIW2 funding. These targeted site visits also meant that some of the above-mentioned interviews were done in person rather than over the phone.

Report writing: After completing the above-mentioned activities, the project team began writing this report. This report is a team effort – each member of the project team prepared a section of the report. In particular, team members followed case studies from beginning to end. As a result, the report contains a thorough and well considered analysis of each infrastructure project studied for this evaluation.

Ultimately, these activities led to the assessment of program outputs/impacts/effects and of program performance in key results areas. These activities also allowed the identification of lessons learned from COIW2 that may prove useful for subsequent programs similar to the Canada-Ontario Infrastructure Works Programs.

Caveats: The substantive body of this report is found within its eight case studies, each of which details benefits and lessons learned from a sampling of COIW2 infrastructure projects. Although the case studies are representative of COIW2 strategic priority areas and of Ontario's regional diversity, their limited number limits the comprehensiveness of the report's findings. While a program-wide survey, for example, might have resulted in more comprehensive findings, the case-study approach allowed for a deeper probing of actual project results, and ultimately resulted in a more focused, impacts based report.

II Program Profile

This Chapter of our report provides a profile of the Canada-Ontario Infrastructure Works Program Extension (COIW2). It begins by setting out the program's background, strategic priorities and objectives. It then outlines key program activities and outputs and sets out expected program impacts. Finally, the Chapter presents a logic model that delineates linkages between program objectives, activities, outputs and results.

A. Background

On December 22, 1993, the Federal government announced the creation of the Canada Infrastructure Works Program (CIWP), a $6 billion initiative shared equally between the federal, provincial and municipal governments. This program was meant to support local infrastructure projects between 1994 and 1997. CIWP was a response to two significant problems. First, it addressed a need for rapid job creation to accelerate economic recovery in Canada. Second, it addressed the need of municipalities to upgrade local infrastructure. The program also had a number of secondary objectives, including environmental improvement, the fostering of technological change, skills upgrading and the development of innovative methods of infrastructure provision.

In order to implement CIWP the federal government had to enter individual infrastructure agreements with each province. The Canada-Ontario Infrastructure Works (COIW) Program is the Ontario arm of CIWP.

1. Rationale

On 24 January 1994, the federal government and the government of Ontario signed the Canada-Ontario Infrastructure Program Agreement. The Agreement stated that there was a need to renew and enhance Canada's and Ontario's physical infrastructure, and that infrastructure investments could provide a competitive and productive economy, generate short- and long-term jobs and accelerate economic recovery. The Agreement also noted that infrastructure investments could enhance the quality of the environment. This original COIW Agreement covered the period between January 24, 1994 and 21 March 1997.

An August 1996 Amendment to this Agreement extended it for two years, i.e. until 31 March 1999. A third Amendment, this one signed on 1 May 1997, introduced the concept of strategic infrastructure priority areas, thus narrowing the scope and, to some extent, changing the objectives, of eligible COIW projects. This third Amendment ushered in COIW2, the thrust of this program profile, and indeed this evaluation. Finally, in December 1997, a fourth Amendment extended the timeframe of COIW2 until 31 March 2000 for certain projects.

2. Funding

Before negotiating the COIW Agreement with the Province of Ontario, or with any other Canadian province, the federal government devised a formula for determining each province's share of federal funds. It is important to remember that from the inception of CIWP federal funds comprise only one-third of program funding. Provinces and municipalities/local partners are responsible for the other two-thirds of project funds and for additional project costs, e.g. purchase of property.

The allocation formula devised for COIW1 was based on an average of population and unemployment. In 1994, with 37.14% of Canada's population and 35.47% of the country's unemployed, Ontario qualified for 36.3% of federal COIW funds. This percentage worked out to $722.37 million for the first three years of COIW funding (i.e. 1 April 1994 – 31 March 1997). For COIW2, the federal government pledged funds of $153.02 million per year.

3. Program allocation

The original Canada-Ontario Infrastructure Works Agreement used a two-tier allocation formula to distribute infrastructure projects equitably across the province. The formula classed provincial municipalities as either upper or lower tier. An upper-tier municipality's share of COIW funding was based on population ratios; a lower-tier municipality's share was based on capital expenditure and taxation ratios.

For COIW2, the Ontario government partially moved away from this per capita allocation formula towards a formula based on local selection of priority projects. Specifically, the Province maintained that substantial COIW2 funding would be:

- assigned to projects identified by, and cost shared with, municipal governments;
- allocated on a per-capita basis to projects that municipalities identified as projects consistent with provincial priorities;
- allocated on the basis of needs that municipalities and other local partners had already identified.

Ultimately, approved projects would reflect Ontario's priorities of transportation, education, health care and water and sewer projects, while also supporting economic development and local needs. Furthermore, under COIW2, while the federal government remained responsible for one third of project costs, in cases where no suitable local partner existed (many roads and highways projects, for example) the province could assume two thirds of project costs. COIW2 also encouraged the participation of local partners other than municipal governments. These shifts in program/funding allocation are what differentiate the original COIW from COIW2. The revised allocation criteria guided the selection of projects in the Canada-Ontario partnership for COIW2.

B. Program Description

COIW2 has a narrower, targeted focus than did the original COIW. Where COIW defined infrastructure projects broadly, COIW2 takes a "targeted investment" approach. COIW2 emphasizes the rehabilitation and repair of public facilities that are deemed essential to the future health and prosperity of Ontario communities. The program identifies the following strategic priorities for project funding:

- road and highway infrastructure;
- capital projects in universities and colleges and infrastructure to support new private sector investment;
- capital projects for health care facilities; and
- water and sewer infrastructure.

While COIW2 projects must fit into these strategic priority areas, they must also address local needs and concerns and must be chosen in accordance with the funding allocation criteria outlined above.

C. Objectives

The COIW2 agreement, however, also laid out a series of objectives that proposed projects had to meet in order to qualify for COIW2 funding. Project objectives are listed below.

- increase Ontario's long-term competitiveness and job creation capacity;
- improve local infrastructure by bringing it up to community standards, codes and by laws;
- achieve incrementality and/or acceleration of investment, and active participation of local partners;
- enhance local productivity and private sector investment;
- enhance environmental quality and sustainability; and
- distribute program benefits equitably within the Province.

In order to qualify for COIW2 funding, a project had to meet the first three objectives: increase competitiveness, improve local infrastructure and have positive incremental effects. In particular, a project had to illustrate accelerated or incremental investment, i.e. COIW2 funds had to move up the project's start date by at least one year. By upgrading local infrastructure, the program sought to enhance the province's capacity to create jobs

in the long-term and ultimately, to help create a supporting environment which made Ontario, and Canada, competitive.

D. Activities

COIW2 projects involved a number of activities that lead to outputs and impacts. Impacts are generally expected to correspond with the objectives laid out above. Before considering these impacts, however, it is useful to consider the activities connected to COIW2 funding as well as resultant outputs.

Project Application: In order to qualify for COIW2 funds, relevant authorities must approve a project's scope and ensure that it meets program objectives. Project applications are made in three ways. First, municipalities apply for transportation and water and sewage infrastructure projects based on a funding amount determined by a modified per capita allocation. Second, in the case of community health projects and provincial and private sector transportation projects, the Province nominates acceptable projects. And third, colleges and universities apply for funding based on specified funding amounts determined on the basis of Ministry of Education and Training capital distribution models.

Project Approval: Appropriate provincial line ministries, in consultation with other ministries, review and assess project proposals (i.e. perform due diligence) to ensure that projects meet program criteria. In order for the province to approve a project it must be consistent with provincial capital planning practices, guidelines and overall infrastructure development plans. Projects must also be structured in such a way that ensures that the owners of capital works will be able to cover any additional operating costs.

Once the provincial line ministry selects appropriate projects it forwards them to the Provincial Co-Chair of the Management Committee, who informs the Federal Co-Chair of selection nominations. Before federal funding is approved, however, Industry Canada conducts its own project review and analysis, and conducts an environmental assessment. This environmental assessment, conducted in accordance with the Canadian Environmental Assessment Act (CEAA), is meant to ensure that projects will not adversely affect the (social or natural) environment. Meanwhile, IC notifies local MPs that an application is moving forward. MPs are given seven days to express any concerns they have regarding the proposed project.

Communications: Once the project is approved, the Communications Sub-Committee, composed of one federal and one provincial representative, ensures that COIW2 communications are in line with "Public Information Protocol". In other words, the committee communicates with applicants, MPs and MPPs, the media and the public, in both official languages, and through words and symbols that give equal recognition to Canada, Ontario and the participating municipal government, that the project is moving forward.

E. Outputs

Agreement: The first tangible project output is the project's official approval. Once the federal government officially approves a nominated project, the Federal Co-Chair formally informs the Provincial Co-Chair. The Management Committee then issues a letter of approval, and the Province and the local partner sign an agreement. This agreement includes a project description and covers financial arrangements and payment provisions, eligible costs, financial reporting, audit and inspection provisions, public information requirements, and other project details such as project implementation and timelines.

Implementation: Once the project is approved, the local partner can implement it. In order to receive federal funds, however, local partners must periodically submit claim forms to the Province for eligible costs that have been incurred and paid. The Province reviews the claims, makes any necessary queries or adjustments and forwards a claim to Industry Canada for the federal share.

Ceremonies: For projects involving significant infrastructure alterations/additions, the Program Management Committee, on the recommendation of the Communications Sub-Committee, may organize project launching or official opening ceremonies. Federal and provincial communications staff work closely with local partners to coordinate these events.

Signs/Plaques: Temporary project signs (to be removed within 90 days of project completion) are erected at all sites and facilities where there is significant, visible capital activity. These bilingual signs are to be in prominent locations and are meant to credit both federal and provincial involvement and, if the local partner wishes, local involvement. In addition, the Management Committee, based on Communications Sub-Committee recommendations, may issue permanent bilingual plaques. Again, these plaques are expected to reflect federal, provincial and (if desired by the local partner) local involvement.

F. Impacts

Project authorities expect that COIW2 will have immediate, intermediate and ultimate impacts. This section outlines the scope of these expected impacts.

1. Immediate Impacts

Job Creation: COIW2 projects are intended to create immediate short-term jobs during the 1997 and 1998 construction seasons. [1]

[1] The definition of "job creation" applied in this study includes short-term, seasonal, or long-term employment. It also includes full-time or part-time employment (including gainful employment based on

Active participation of local partners: Local partners should contribute up to one-third of project costs and must participate actively in project implementation.

Incrementality and/or accelerated investment: To be eligible for funding, COIW2 projects must represent incremental and/or accelerated investment; that is, a project planned for the future must be brought forward by at least one year. Incremental investment is a key factor that may influence net employment creation and related economic impacts.

Public awareness of COIW2 projects and the contribution of each level of government: COIW2 communications are intended to make the public aware of the projects and of the contribution of each level of government – federal, provincial and municipal.

Public awareness of positive examples of cooperation among three levels of government: COIW2 projects are intended to serve as positive examples of the federal, provincial and local levels of government working cooperatively.

2. Intermediate Impacts

Improved infrastructure: COIW2 is designed to create, rehabilitate and repair public infrastructure in the areas of transportation systems, community health care facilities, college and university facilities and water and sewage facilities. Projects aimed specifically at replacing or upgrading existing infrastructure must bring this infrastructure up to community standards, codes and by-laws.

Enhanced local productivity and private sector investment: COIW2 projects are intended to attract private sector investment (to assist with the local partner's share of the costs) and to lead to reduced costs or increased productivity of local businesses.

Enhanced environmental quality and sustainability: COIW2 provides funds for some infrastructure projects that are directly aimed at positively affecting the environment. Environmental enhancements may include: improving community health; contributing to the conservation of resources; or employing technology to reduce or prevent adverse environmental impacts or effect system repairs/improvements. The environmental assessment conducted at the project application stage should also contribute to environmental quality by preventing detrimental environmental impacts.

Distribution of program benefits within the province: COIW2 Program benefits are to be distributed equitably throughout Ontario to achieve a "regional balance". Funds are distributed to municipalities based on a modified per capita allocation.

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hourly, daily, weekly, monthly, or annual compensation/salaries). This is consistent with Statistics Canada employment definitions.

3. Ultimate Impacts

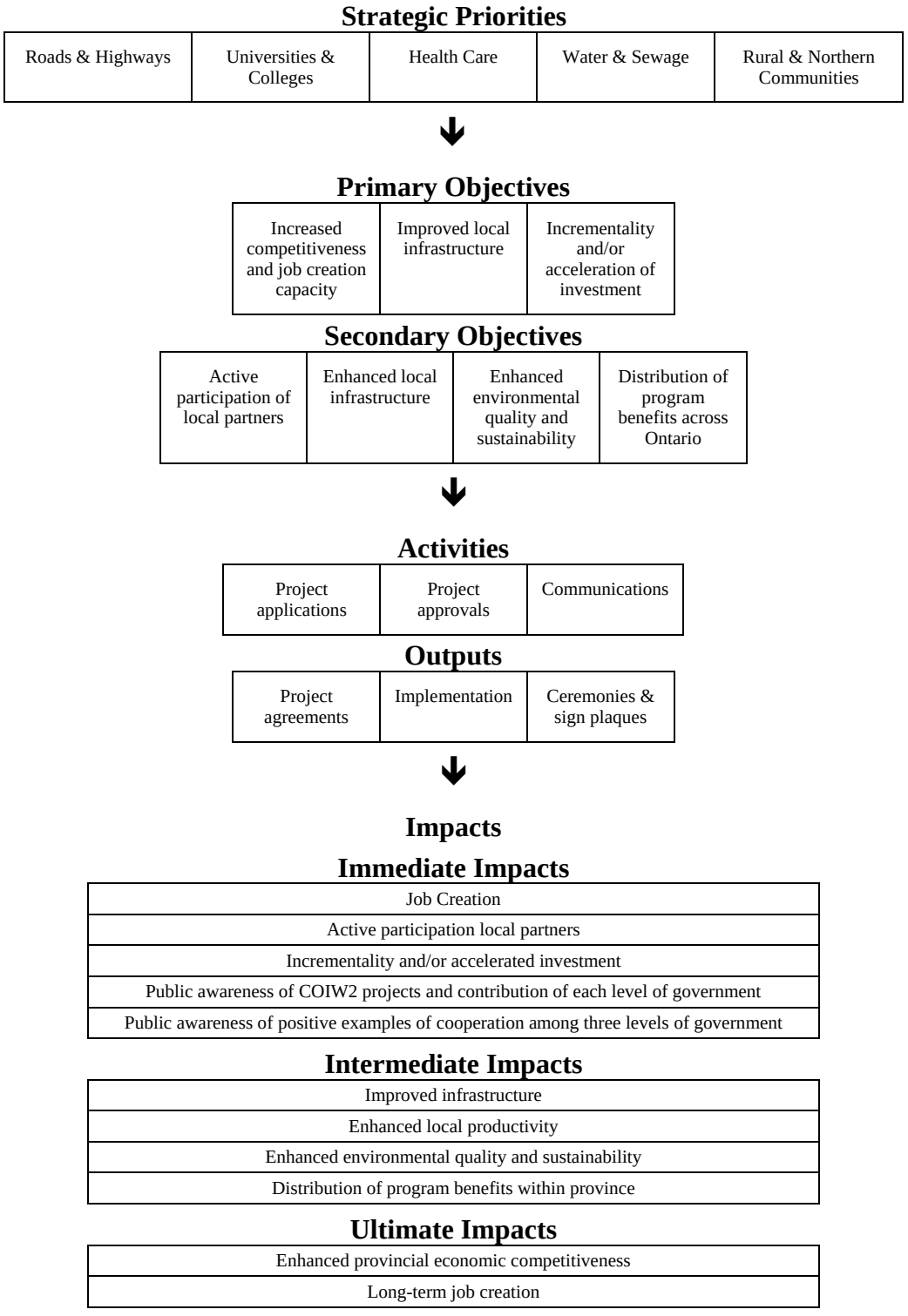
Enhanced provincial economic competitiveness: Ultimately, COIW2 projects are intended to contribute to Ontario and Canada's long-term economic competitiveness. Long term impacts could include a range of economic benefits, i.e. reducing the costs or increasing the productivity of business, improving business opportunities; providing new economic opportunities, attracting investment, improving accessibility or removing barriers for skilled persons or improving the pricing of public services.

Long-term job creation: COIW2 projects are also expected to have indirect long-term employment impacts. Projects may result in employment for suppliers of construction products or for firms that benefit from infrastructure improvements. Projects may also have induced employment impacts, i.e. employment resulting from the spending of newly employed persons or from the profits of suppliers from government revenues. In turn, any increased employment would result in reduced dependence on public income support such as Employment Insurance and social assistance.

G. Program Logic Model

Exhibit II-1 provides an outline of the COIW2 program objectives, and the related activities, outputs and expected impacts. The relationships between the objectives and anticipated results (outputs and impacts) are rationally connected, and can be logically expected to produce the desired outcomes. The evaluation study that follows provides evidence that indeed the program has produced desired results as expressed in the program's objectives.

Exhibit II-1: Program logic model



III Program-wide Analysis

This chapter evaluates the COIW2 program in general. Appendix A provides the detailed case study analysis. Comparisons are made based on data available in COIW2 project files, and on sample data extracted from the COIW2 database. Some comparisons are made between COIW2 and the original COIW, in an attempt to understand how COIW2 impacts stand to differ from earlier COIW project impacts. The chapter continues by looking at and analyzing the make-up and impacts of COIW2 projects. Finally, it analyzes the quantifiable impacts of the projects included in the case studies that follow in Appendix A. In essence, this chapter is a macro-analysis of COIW2 that sets out some of the issues that underlie specific case studies.

A. COIW2 Compared to COIW1

This section of the chapter makes comparisons between COIW2 and COIW1 as a means to understand some of the differences between the programs. More specifically, as the exhibits below show, the section shows that while COIW2 had a more targeted focus than did COIW1, COIW1 was better funded and had a wider impact than has COIW2.

1. Program reach

An analysis of the numbers that support COIW1 and COIW2 shows that the two programs have had a very different reach. Exhibit III-1 presents a general view of some of these differences.

Exhibit III-1: Program fundamentals

	COIW1	***COIW2***
Number of projects funded	5,006	1,282
Total federal funding	$ 713,000,000	$ 151,925,081
Average federal funding per project	$ 142,500	$ 118,506

As the exhibit above shows, COIW1 was a much larger program than was COIW2. While the federal government contributed $713 million towards Ontario infrastructure projects between 1 April 1994 and 31 March 1997, the federal government only contributed $152 million to such projects between 1 April 1997 and 31 March 2000. (It is interesting to note that the federal government actually pledged $153,020,000 for COIW2, and as at the time of this study had actually spent $151,925,081 of this amount.) The original COIW program supported a much larger number of projects than did COIW2. The average federal contribution per project decreased by 20% between COIW1 and COIW2.

2. Infrastructure project areas

Not only did program fundamentals change in the transition from COIW1 to COIW2 – so too did the thrust of projects supported by COIW funds. As explained in Chapter II of this report, the nature of projects supported by the program changed after 1 April 1997 – the date when COIW2 began. While COIW1 supported general infrastructure projects on a local, per-capita need basis, COIW2 targeted specific strategic priority areas (roads and highways, education, health care and water and sewage) and set out a selection formula based on local selection of priority projects.

As Exhibits III-2 and III-3 show, exhibits that set out the types of infrastructure projects supported during both COIW1 and COIW2, the introduction of these strategic priority areas and a reliance on the local selection formula changed the reach and focus of the COIW program.

Exhibit III-2: % COIW1 funds per type of infrastructure project

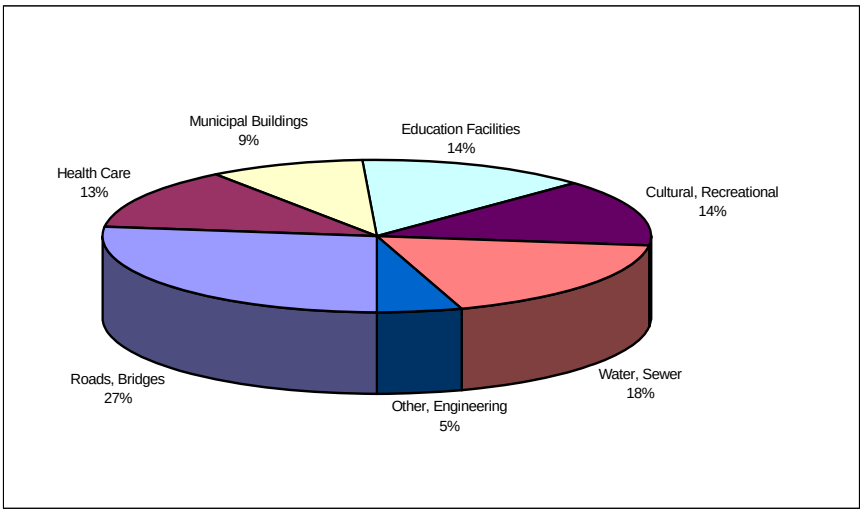
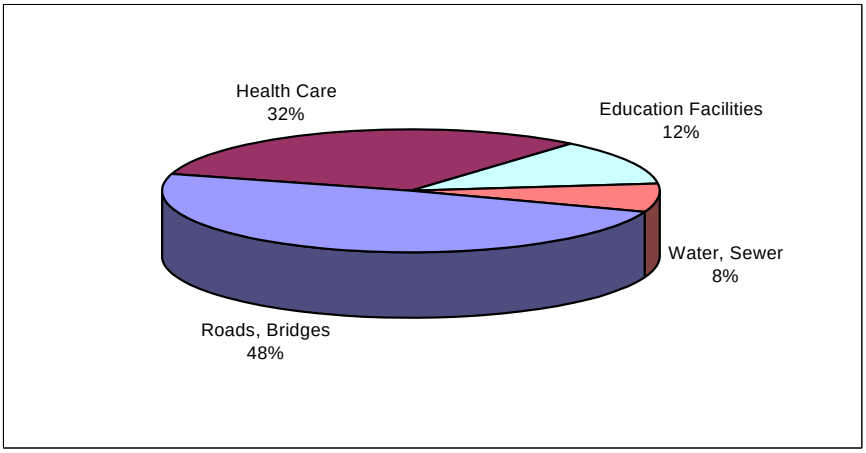


Exhibit III-3: % COIW2 funds per type of infrastructure project



While the above exhibits show that COIW1 funds supported a broader range of infrastructure improvement projects than did COIW2 funds, the nature of projects supported did not change in the transition from COIW1 to COIW2. Instead, COIW2 funds supported a more narrow range of infrastructure projects. As per its strategic priority areas, COIW2 did not support any cultural, recreational, municipal building or other engineering projects. All COIW2 projects focused on roads/bridges, educational facilities, other buildings or water/sewage. These types of projects are consistent with the strategic priority areas set out for COIW2 – other buildings encompass, in large part, repairs/upgrades to provincial healthcare facilities.

This is not saying that COIW1 did not fund the types of projects that were eligible for COIW2 funding, but rather that the emphasis placed on each type of project changed between COIW1 and COIW2. Only educational facilities maintained a similar share of COIW funds during each phase. The share of federal funds directed towards water and sewage projects declined by 10%; the share of federal funds directed to other buildings and to roads and bridges increased by approximately 20%. These shifts in funding allocation percentage illustrate the major difference between COIW1 and COIW2. COIW1 was a broad infrastructure program that supported a breadth of projects in a relatively equitable manner. COIW2, however, zeroed in on specific project types – 80% of funds supported road, bridge and other building projects, only 20% of funds supported water, sewage and education projects.

B. COIW2 Program-wide Funding

While the section above draws out the major differences between COIW1 and COIW2, this section quantifies the share of federal funds distributed within each of the four strategic priority areas.

First, it is interesting to note the breakdown of federal funds between COIW2 strategic priority areas. Exhibit III-4 breaks down the amount of federal funds distributed within each COIW2 strategic priority area; Exhibit III-5 breaks down these figures by allocation percentage.

Exhibit III-4: COIW2 funding allocation

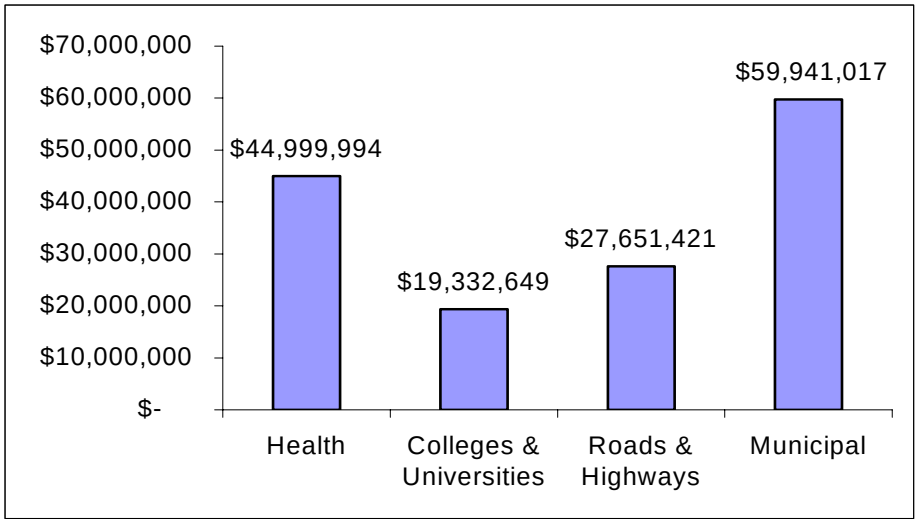
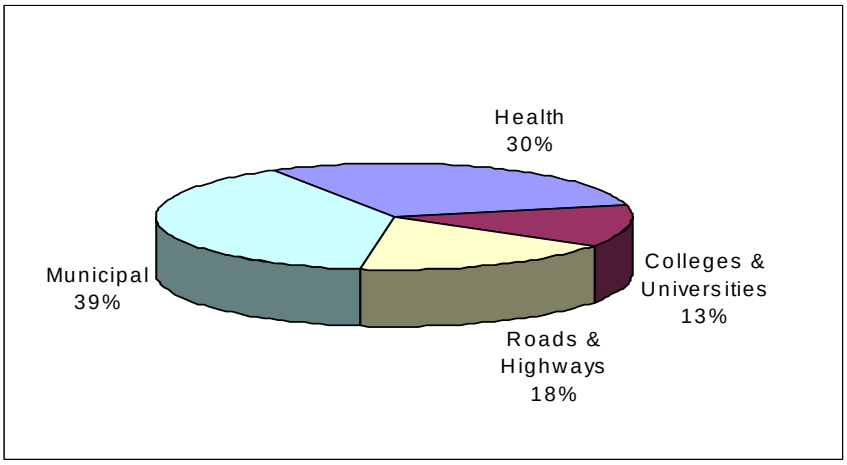


Exhibit III-5: COIW2 funding allocation percentages



As the above exhibits show, the highest proportion of COIW2 funds were committed to projects that fit within the municipal strategic priority area. Health care was the second-most funded strategic priority area, followed by roads and highways. Education related projects received the smallest share of COIW2 funds.

Second, it is interesting to compare federal allocation per project type with federal allocation per strategic priority area. As Exhibit III-6 shows, not only did COIW2 set out four strategic priority areas, but four types of infrastructure projects qualified for COIW2 funds. On the surface, project types are representative of strategic priority areas – roads/bridges, education facilities, other buildings, water/sewage versus roads and highways, education, health care and municipal. Yet, as the exhibit shows, there is not a direct correlation between all project types (columns) and strategic priority areas (rows).

Exhibit III-6: Type of infrastructure funded project versus funding allocation per strategic priority area

Project Type / Strategic Area	Roads & Bridges	Water & Sewer	Health Care Buildings	Education Facilities	% Total
Roads & Highways	18%				**18%**
Municipal	30%	8%	2%		**40%**
Health Care			29%		**29%**
Education			1%	12%	**13%**
% Total	**48%**	**8%**	**32%**	**12%**	100%

The above exhibit shows that there is almost a direct correlation between education facility projects and the education (universities and colleges) strategic priority area and between the health care strategic priority areas and health care buildings. The relationships between roads/bridges and roads and highways and between water/sewage and municipal, however, are not as obvious. The chart shows that while 48% of federal COIW2 funds supported infrastructure projects related to roads or bridges, only 18% of federal funds (or 36% of the funds committed to roads and highways) supported projects within the roads and highway strategic priority areas. Likewise, while municipal projects comprised 39% of federal COIW2 funds, only 8% of federal funds (or 20.5% of the funds spent within the municipal strategic priority area) were channeled into projects that upgraded water or sewage infrastructure.

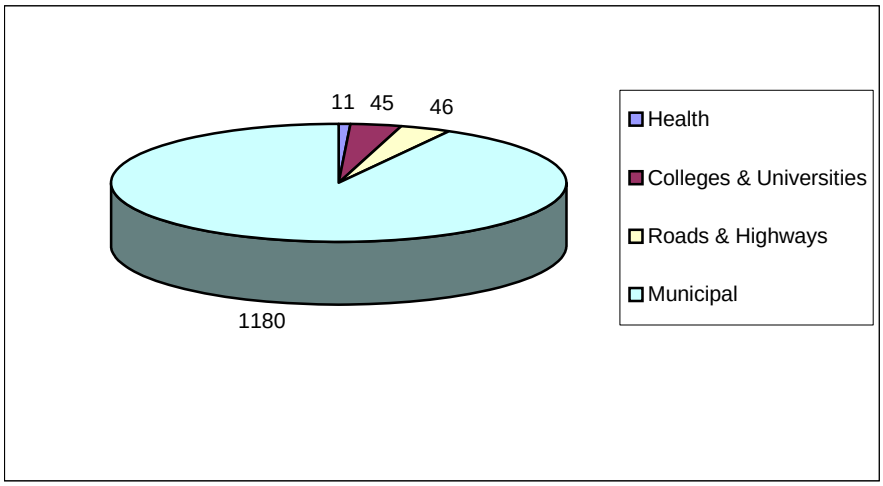
C. COIW2 General Project Fundamentals

While COIW2 projects can all be classified within one of the above-mentioned project types and within one of the above-mentioned strategic priority areas, projects varied in size and scope, even within their respective priority areas. This section of the chapter explores the nature of project costs, and provides a context from which to understand COIW2's ultimate impacts.

1. Strategic priority areas

COIW2 funds helped support 1,282 infrastructure projects in the province of Ontario. As Exhibit III-7 shows, the majority of the projects (92%) were municipal projects. Roads and highways, education and health projects comprised the other 8% of projects.

Exhibit III-7: Number of projects funded per strategic priority area



Nevertheless, as discussed earlier, projects within the municipal strategic priority area garnered only 39% of federal funds set aside for COIW2 project. Furthermore, while only 0.86% of COIW2 projects fit within the healthcare strategic priority, 30% of federal funds supported healthcare related projects. It is feasible to conclude that the scope and costs of projects varied considerably within these strategic priority areas.

Exhibit III-8 substantiates this conclusion. The exhibit sets out average federal contributions to project costs per strategic priority. It also sets out average federal contribution per COIW2 project.

Exhibit III-8: Average federal project contribution per strategic priority area

Strategic Priority Area	Average Federal Contribution to Project Costs
Roads & Highways	$ 601,118
Universities & Colleges	$ 429,614
Health Care	$ 4,090,909
Municipal	$ 50,616
Overall	$ 118,506

The exhibit shows that, on average, the federal government contributed $ 118,506 per infrastructure project funded under the COIW2 program. Health-related projects, however, received an average $4,090,909 from the federal government. Municipal projects generally only received on average $50,616 in federal funds. Roads and highways projects (i.e. those projects managed by the Ontario Ministry of Transportation (MTO)) received on average $601,118 from the federal government in COIW2 funds; projects related to education facility upgrades generally received on average $429,614 from the government.

2. Funding fundamentals

As the above numbers suggest, a balance of the five projects that received the most money from the federal government fall under the healthcare strategic priority area. The only non-health related project included in this list is a major reconstruction of arterial roads in the Greater Toronto Area. The chart below lists these projects in descending order of federal contribution.

Exhibit III-9: Largest Funded Projects

Location	Strategic Priority	Project	Federal Funding
Toronto	Health Care	Cummer Lodge Home for the Aged	$ 11,818,000
Kingston	Health Care	Providence Centre	$ 11,040,000
Toronto	Municipal	Reconstruction of 9 Roads	$ 6,333,333
Haliburton	Health Care	Haliburton Highlands Health Services	$ 6,236,589
Hamilton-Wentworth	Health Care	Macassa Lodge	$ 5,900,817
Mississauga	Roads and Highways	Hwy 401/Mavis Rd interchange	$ 3,400,000
St Catherine's	Health Care	Fairview Mennonite Home	$ 3,133,000
Toronto	Health Care	Sunnybrook Health Science Centre	$ 3,000,000
New Tecumseth	Roads and Highways	Reconstruction of 14th Street	$ 2,688,900
Toronto	Education	University of Toronto	$ 2,403,004
		Total	$ 55,953,643

The above chart is telling in that it is a window into the nature of ultimate COIW2 program impacts. First, the chart leads to the calculation that the ten most heavily funded COIW2 projects received almost 37% of the total federal contribution; 5 of these took place in the Greater Toronto Area (GTA). Since Toronto is the largest urban centre in Canada, the fact that the city won large-scale infrastructure projects is not surprising. The effect of this investment, however, must be put into perspective. In particular, of the total $ 40,009,846 federal COIW2 investment made in GTA, these five large projects made up $ 26,954,337 of this investment. In other words, 69% of the government's COIW2 investment in the GTA (17% of its total COIW2 investment) went into five of the 48 projects undertaken in the city.

Second, despite this concentration of large-scale infrastructure projects in GTA, there is no evidence that large projects were unfairly undertaken in major urban centres. In particular, the upgrade of the Haliburton Highlands Health Services and the road reconstruction in New Tecumseth represent major projects in relatively small towns. The other three large-scale projects occurred in small/medium sized Ontario cities (Kingston, Hamilton-Wentworth and St. Catherine's). Finally, while

it is interesting to note that none of these top ten projects took place in Northern Ontario, without an in-depth comparison to project applications and regional needs it is not possible to draw any implications from this observation.

Third, it is interesting to note that at least one project from each strategic priority area is included in the top ten most heavily federally funded COIW2 projects. Yet, of the eleven healthcare projects that received COIW2 funding, six are included in the above chart, making up 27% of the federal share. With such a large percentage of funds committed to a proportionately minute number of projects, one would expect that health-related projects would have a greater impact than some less expensive projects.

How much a project costs is not in itself an adequate measure of that project's impact. Project costs, however, do provide insight into project scope, which can then explain impacts. More expensive projects are generally larger in scope than smaller projects. As a result, they tend to create more short-term jobs and tend to use more construction materials than do small projects. These two factors have positive spin-off effects within the economy at large, increasing the project's overall short-term impact. Furthermore, a large, building-related project is more likely than a small municipal project to create long-term jobs.

Nevertheless, it is important to remember that one of the primary objectives of the COIW2 program is to improve local infrastructure by bringing it up to community standards. While small municipal projects like sewer and water main reconstruction are not expected to have the same type of economic impact as a facility upgrade, these projects do meet COIW2 objectives. By improving Ontario's infrastructure (an intermediate impact), these projects stand to make it possible for Ontario to remain competitive in the medium to long term. As the case studies that follow show, while larger projects tend to have more immediate, measurable impacts, small projects are also furthering COIW2 program objectives.

D. Strategic Priority Analysis

While the sections above clarify the overall nature of the COIW2 program, they do not focus on the nature of projects associated with each of the strategic priority areas. This section zeroes in on the specifics of large and small projects that occurred within each COIW2 strategic priority area in attempt to identify general program impacts associated with each strategic priority area.

1. Roads and Highways

The roads and highways strategic priority area encompassed projects under the jurisdiction of the MTO. As mentioned above, the strategic priority area included 46 projects to which the federal government contributed $27,645,586 or 18% of the federal share. The charts below list the five most and the five least expensive projects undertaken under this strategic priority area.

Largest MTO Projects

Location	Project Description	Federal Share
Mississauga	Hwy 401/Mavis Rd interchange	$ 3,400,000
New Tecumseth	Reconstruction of 14th St.	$ 2,688,900
Alliston	Widening Hwy 89	$ 2,200,750
Kapuskasing	Agrium – Upgrade access road from Kapuskasing	$ 1,666,666
Bolton	MTO – Widening Hwy 50	$ 1,626,667
	Total	$ 11,582,983

Smallest MTO Projects

Location	Project Description	Federal Share
Marmora	Rehabilitation of Crowe River bridge	$ 35,667
Tweed	Intersection upgrade Hwy 7/37	$ 32,667
Peterborough area	Intersection upgrade Hwy 7/38	$ 32,333
Port Carling (Muskoka)	Upgrade to industrial park	$ 26,666
New Liskeard	Construction of watermain	$ 13,333
	Total	$ 140,666

The charts above are windows into the impacts associated with infrastructure projects undertaken under the roads and highways strategic priority area. First, the charts lead to the calculation that while the 5 largest MTO projects were given a 42% share of the federal contribution to the priority area, the 5 smallest projects only received a 0.5% share of this contribution. These numbers suggest that MTO projects varied in scope. As a result, as discussed above, while all of the projects invariably improved infrastructure standards, more expensive projects generally had larger impacts, not least because they created a greater number of short-term jobs.

The charts, however, also provide insight into the distribution of MTO projects throughout Ontario. The above sample suggests that projects were spread throughout Ontario. For example, the Agrium Road project and the New Liskeard watermain took place in Northern Ontario; the Crowe River Bridge and the Highway 7 projects took place in Eastern Ontario. The other MTO projects included in the charts took place in Southern/South West Ontario. Assuming that a similar trend defines other MTO projects, it would appear that the COIW2 roads and highways strategic priority area managed to distribute program benefits throughout the province.

2. Education

The education strategic priority area focused on facility upgrades in provincial colleges and universities. Other educational facilities were not eligible to receive COIW2 funds. As mentioned above, the strategic priority area included 45 projects

to which the federal government contributed $19,332,649 or 13% of the federal share. The charts below list the five most and the five least expensive projects undertaken under this strategic priority area.

Largest Education Projects

Location	Project Description	Federal Share
Toronto	University of Toronto – Building and Systems Upgrade	$ 2,403,004
London	University of Western Ontario – Renovations to various buildings	$ 1,237,677
Toronto	York University – Renovations to campus	$ 1,210,439
Ottawa	University of Ottawa – Upgrade to MacDonald Hall	$ 1,002,670
Kingston	Queen's University – Upgrade to Douglas Library	$ 871,289
	Total	$ 6,725,079

Smallest Education Projects

Location	Project Description	Federal Share
North Bay	Nippissing University – upgrading to campus	$ 89,964
Toronto	Ontario College of Art & Design – Roof and ventilation renovation	$ 66,249
Windsor	College Des Grands Lacs – reconstruction of Windsor Hall	$ 65,991
Sault Ste. Marie	Algoma University College – reconstruction	$ 64,444
	Les Amis Du College Universitaire – exterior building upgrades	$ 64,444
	Total	$ 351,092

The charts above are windows into the impacts associated with infrastructure projects undertaken under the education strategic priority area. First, the charts lead to the calculation that the 5 largest education facility upgrade projects received 35% of the federal contribution to the priority area; the 5 smallest projects received 5.2% of this contribution. Without discounting the variance between average federal contribution to the largest and smallest education projects, it is interesting to note that this variance is the smallest of any of the COIW2 strategic priority area. This lesser variance suggests more consistency in educational facility project benefits.

Like in the roads and highways case, the above charts suggest that the benefits of education projects were distributed throughout Ontario. Nippissing University and Algoma University College are both in Northern Ontario; the University of Western Ontario is in South Western Ontario; Queen's University and the University of

Ottawa represent Eastern Ontario and, finally, the Greater Toronto area is well represented in the above sample.

Yet, the above charts suggest some discrepancy in distribution of COIW2 funds between universities and colleges. The five largest federal education investments went into the province's top universities; four of the five smallest investments went into less illustrious community colleges. Without further analysis it is difficult to draw concrete conclusions from the evidence above. Nevertheless, it is worth noting that just as it is important for benefits to be spread throughout the province, it is also important that these benefits extend into all types of facilities eligible for program funds.

3. Health Care

The healthcare strategic priority area focused on health-related facility upgrades. It is interesting to note that infrastructure upgrades did not occur within provincial hospitals, but within other health-related facilities such as district clinics and old-age homes. As mentioned above, the strategic priority area included 11 projects to which the federal government contributed $44,999,994 or 30% of the federal share. The charts below list the five most and the five least expensive projects undertaken under this strategic priority area. Only one health project, the Sunnybrook Health Science Centre upgrade – federal contribution $ 3,000,000, is not included in these charts.

Largest Health Care Projects

Location	Project Description	Federal Share
Toronto	Cummer Lodge Home	$ 11,818,000
Kingston	Providence Centre	$ 11,040,000
Haliburton	Haliburton Highlands Health Centre	$ 6,236,589
Hamilton-Wentworth	Macassa Lodge	$ 5,900,817
St. Catherine's	Fairview Mennonite Home	$ 3,133,000
	Total	$ 38,128,406

Smallest Health Care Projects

Location	Project Description	Federal Share
Orillia	Orillia Soldiers' Memorial Hospital	$ 1,219,215
Toronto	Mon Sheong Home for the Aged	$ 1,093,333
Sarnia	North Lambton Community Health Centre	$ 617,833
Merrickville	Merrickville District Community Health Centre	$ 473,350
Thessalon	Thessalon Hospital	$ 467,857

(Georgian Bay)		
	Total	$ 3,871,588

The charts above are windows into the impacts associated with infrastructure projects undertaken under the healthcare strategic priority area. First, the charts lead to the calculation that while the 5 largest health-related projects received 84.7% of the federal contribution to the priority area, the 5 smallest projects only received 8.6% of this contribution. In other words, the balance of health-related projects received 15.3% of federal funds invested in healthcare infrastructure projects.

Unlike projects encompassed under other COIW2 strategic priority areas, because COIW2 funds only supported 11 healthcare projects, it is possible to gain a more accurate view of the impacts associated with these projects. For one thing, as the numbers discussed in the paragraph above show, these projects ranged in scale. While the federal government invested $ 11,818,000 in the Cummer Lodge Home, the government only invested $ 467,857 in the Thessalon hospital. These differences in scale, however, only marginally affect the overall impact of these health-related projects. For instance, economic issues aside (more expensive projects create more jobs and use more materials), the social benefits associated with healthcare projects, regardless of project size, stand to be considerable. Any project that increases access and quality of healthcare will have a positive, and often quantifiable, impact.

As a result of the generally positive social benefits associated with health-related investments, the more interesting question concerns the distribution of projects throughout the province. First, it is important to note that COIW2 health-related projects seem fairly distributed throughout the province. Considering the population differences between urban and rural Ontario it seems natural that a larger investment would be made in urban facilities. There is an issue, however, regarding the distribution of projects throughout Ontario. Seven of the 11 projects are either in the Greater Toronto Area or in Southern Ontario. Three of the projects are in Eastern Ontario, and only one, the Thessalon Hospital, the smallest of the healthcare projects, is in Northern Ontario. Despite the fact that one would expect a lesser proportion of investment in rural districts, it nevertheless seems unbalanced for only one health-related project to have occurred in Northern Ontario.

4. Municipal

For COIW2, municipal projects dealt with water, sewage, road and bridge infrastructure upgrades. As mentioned above, the strategic priority area included 1,180 projects to which the federal government contributed $59,941,017 or 38% of the federal share. The charts below list the five most and the five least expensive projects undertaken under this strategic priority area.

Largest Municipal Projects

Location	Project Description	Federal Share
Toronto	Reconstruction of 9 Roads	$ 6,333,333
Ottawa	Resurfacing of 15 Sections of Road	$ 1,516,667
Toronto	District Cooling Water System Expansion	$ 1,333,334
Toronto	Reconstruction of pavements, sidewalks, and various streets	$ 1,288,515
Peel	Resurfacing Hwy 7, from Hwy 50 to 410	$ 890,490
	Total	$ 11,362,339

Smallest Municipal Projects

Location	Project Description	Federal Share
Tilley	Upgrading of roads	$ 584
Kenora	Upgrading various roads (Kenora Rainy River)	$ 500
Erie Beach	Drain repair on Towada Blvd	$ 454
Highgate (SW)	Gravel street rehabilitation	$ 404
Faraday (SW)	Resurfacing Lower Faraday Rd	$ 100
	Total	$ 2,042

The charts above provide insight into the infrastructure projects undertaken under the municipal strategic priority area. The charts lead to the calculation that the 5 largest municipal projects were given a 19% share of the federal contribution to the priority area. The share of the federal contribution to the 5 smallest infrastructure projects is too small to be significant. While the charts only capture 1% of municipal projects, they nevertheless illustrate the breadth and scope of municipal projects funded in part through the COIW2 program. As with projects under the roads and highways strategic priority areas, while all municipal projects invariably improved infrastructure standards, more expensive projects generally had larger impacts, not least because they created a greater number of short-term jobs. It is also likely that the overall impact of municipal projects is generally greater than that of other strategic priority areas, basically because of the large number of these projects, making up 92% of all COIW2 projects.

While it is difficult to draw conclusions about the distribution of municipal projects from such a small sample, as provided in the Tables above, it is nevertheless interesting to note that while the five largest projects were in urban areas the five smallest projects were in rural areas or small towns.

E. Individual Project Analysis

This final section of the chapter looks at costs and job creation numbers related to the fourteen infrastructure projects included in the report's case studies. As explained in Chapter I, case study projects vary in size and scope and represent each of the four strategic priority areas – in other words, they are representative of the COIW2 program in general.

Before reading this section, however, it is important to understand that the section is not meant to extrapolate on project rationales or impacts. Instead, it provides an overall picture of project results in an attempt to provide context for reading the case studies that follow.

1. Job creation

One of the primary objectives of the COIW2 program was to create short- and long-term jobs. According to Treasury Board and Industry Canada records, COIW2 projects created, across Canada, approximately 7,420 short-term jobs (296,800 person-weeks employment). The majority of these jobs were in the construction industry. While it is not clear how many long-term jobs COIW2 created, it is possible to approximate the number of long-term jobs created by projects included in this report's case studies. The chart below explores short- and long-term job creation figures for these projects.

Exhibit III-10: Jobs created through case study projects

	Estimated Jobs (proposals)		Actual Jobs (Final report)	
Project	Person-weeks	Long-term (per year)	Person-weeks	Long-term (per year)
MTO – Honda Arterial Road, Alliston	6,125	-	6,125*	-
MTO – Hwy 50, Bolton	3,094	-	3,500	-
MTO – Agrium Road, Kapuskasing	300	100	300*	2,000
MTO – Hwy 401/Mavis Road, Mississauga	10,400	-	10,400*	-
MTO – Hwy 31, Winchester	2,033	-	2,033*	-
Algonquin College, Ottawa	1,073	-	1,070	-
Queen's University, Kingston	650	-	650	-
Macassa Lodge, Hamilton-Wentworth	9,520	-	9,520*	-
Merrickville Community Health Centre, Merrickville	1,133	3	1,133*	3-7
Storm Sewer, Hawkesbury	37	-	98	-
Upgrading of 13 City Streets, Sudbury	253.2	-	275	-
District Cooling Water System, Toronto	1,140	2	1,987	2
Glen Road Bridge, Toronto	450	-	450	-
9 Roads, Toronto	14,820	-	14,896	-
Average	3645		3745	
Total	51,028	105	52,437	2,005

* Actual person-weeks assumed to be similar to the estimated figure since the final report was not available, or the data was not reported

As the above chart shows, on average COIW2 infrastructure projects created 3,745 person-weeks of short-term employment. It is important to understand, however, that the short-term jobs creation numbers recorded in COIW2 project files reflect the StatsCan job creation formula. This formula is based on investment levels – it does not necessarily reflect actual job creation numbers. As a result, the above-recorded numbers are only approximate.

The long-term job creation numbers reported in the chart are somewhat misleading for only 3 of the 14 projects are reported to have created long-term jobs, and only one project (Agrium) is reported to have created a meaningful number of long-term jobs. Yet, as can be surmised, the two health care projects included in the case studies did create long-term jobs.

2. Project costs

It is interesting to compare proposed versus actual project costs for COIW2 infrastructure projects. Such a comparison reflects the accuracy of project planning, and reflects whether or not the federal share kept pace with actual project costs. The chart below records such costs, and provides insight into funding issues linked to COIW2.

Exhibit III-11: Case study project costs

	Proposed Costs		Actual Costs	
Project	Total Project Costs	Federal Share	Total Project Costs	Federal Share
MTO – Honda Arterial Road, Alliston	$6,774,409	$2,200,750	$7,376,950	$2,200,756
MTO – Hwy 50, Bolton	$3,500,000	$1,166,667	$3,783,018	$1,265,333
MTO – Agrium Road, Kapuskasing	$5,010,000	$1,670,000	$5,044,200	$1,670,000
MTO – Hwy 401/Mavis Road, Mississauga	$10,200,000	$3,400,000	$11,500,000	$3,400,000
MTO – Hwy 31, Winchester	$2,325,000	$775,000	$3,344,119	$1,001,333
Algonquin College, Ottawa	$1,303,402	$434,402	$1,305,424	$434,441
Queen's University, Kingston	$2,613,857	$871,286	$2,613,867	$871,289
Macassa Lodge, Hamilton-Wentworth	$20,000,000	$5,666,667	$20,000,000	$5,900,817
Merrickville Community Health Centre, Merrickville	$1,215,000	$405,000	$1,420,381	$473,350
Upgrading of 13 City Streets, Sudbury	$ 740,381	$246,794	$ 740,513	$246,794
Storm Sewer, Hawkesbury	$77,000	$25,997	$132,331	$44,084
District Cooling Water System, Toronto	$4,000,000	$1,333,333	$7,073,866	$1,333,334
9 Roads, Toronto	$19,000,000	$6,333,333	$19,098,097	$6,333,333

Glen Road Bridge, Toronto	$ 1,800,000	$ 600,000	$ 1,787,180	$ 595,727
Average	$ 5,611,360	$ 1,794,944	$ 6,087,139	$ 1,840,756
Total	$ 78,559,049	$ 25,129,229	$ 85,219,946	$ 25,770,591

Before analyzing the information included in the above chart, it is important to note that the average federal contribution to case study projects far exceeds average federal contribution to COIW2 infrastructure projects as a whole. Instead of seeing this discrepancy as an inaccurate picture of COIW2 costs, it is important to remember that case studies reflect COIW2 strategic priorities – they are not a random sample of COIW2 projects. Nevertheless, the impacts identified in the case studies must be seen in the context of the overall program. In particular, while small municipal projects do not have as tangible an impact as do large healthcare projects, the volume and breadth of these small projects increases the magnitude of their impacts.

The above chart, however, does allow for a degree of interesting project analysis. As seen in Exhibit III-10, the 14 case study projects garnered $25,770,591 in federal funds (17% of federal COIW2 funds). On average, these projects received $1,840,756 from the federal government; the federal share of project costs ranged from $44,084 to $6,333,333.

The chart also points to funding trends. First, it shows that while total project costs increased by 8.48%, the federal share of project costs only increased by 2.55%; while the federal government intended to assume 32% of proposed costs, the government only assumed 30% of actual case study project costs. As a result, in addition to assuming their own share of additional project costs, provincial and local authorities also had to assume an additional $1,499,791 in costs. While this number on the whole does not appear all that significant, it becomes more significant when one considers that total project costs increased substantially during the course of 7 of the 14 case study projects, and that the federal share of costs only increased noticeably in 4 of these 7 cases.

Appendix A

Case Studies

This Appendix presents the analysis for the following ten case studies:

A. **Roads and Highways** – *Ministry of Transportation*

B. **Education** – *Queen's University, Kingston*

C. **Education** – *Algonquin College, Ottawa*

D. **Health Care** – *Macassa Lodge, Hamilton-Wentworth*

E. **Health Care** – *District Community Health Centre, Merrickville*

F. **Municipal** – *Road Upgrading, Sudbury*

G. **Municipal** – *Storm Sewer, Hawkesbury*

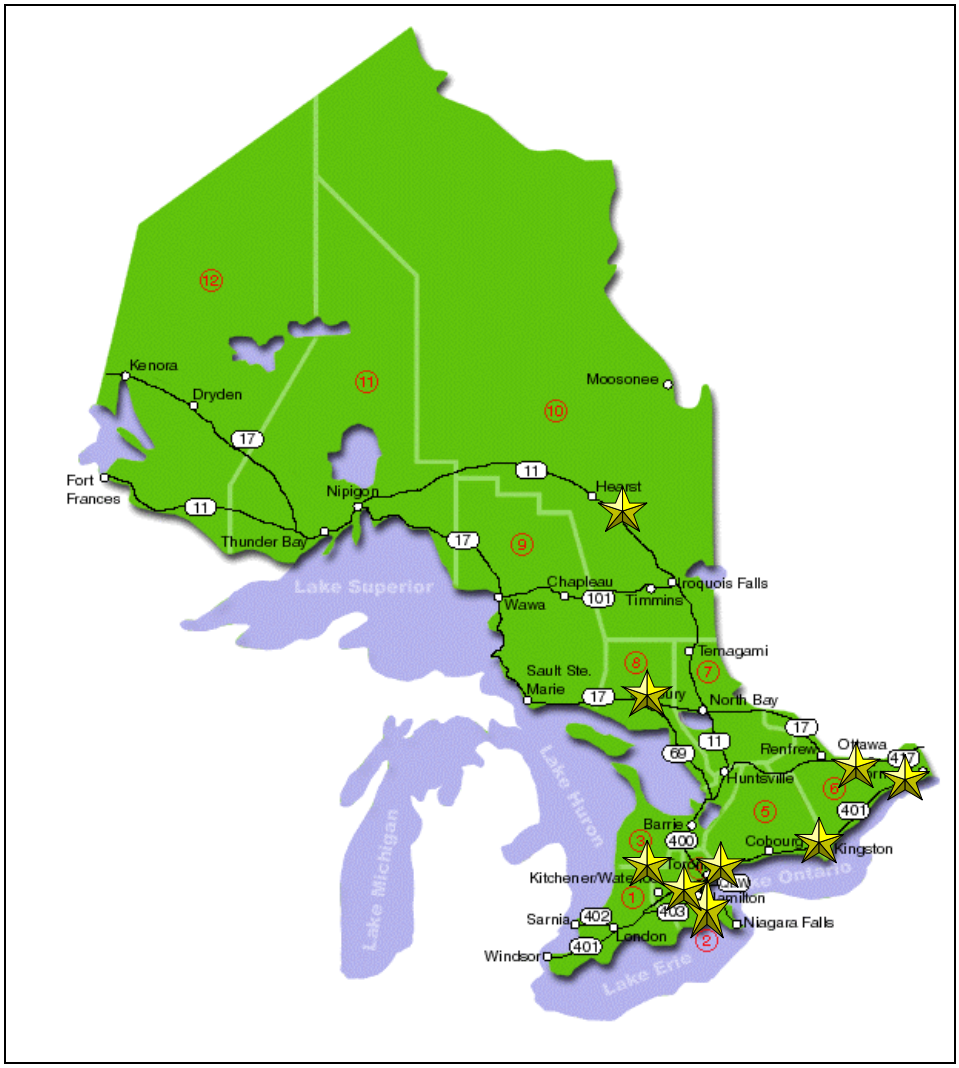
H. **Municipal** – *District Cooling Water System Expansion, Toronto*

I. **Municipal** – *Glen Road Bridge Reconstruction, Toronto*

J. **Municipal** – *Reconstruction of Nine Roads, Toronto*

These case studies reflect both the strategic priority areas set out for COIW2 and the diversity of regions in Ontario. Exhibit IV-I illustrates the dispersion of this sample of case studies across Ontario – stars represent approximate locations of the infrastructure renewal projects examined in this report's case studies.

Exhibit IV-1
Location of Case Studies



As the above exhibit shows, case studies are spread across Ontario, allowing them to provide a window into the impacts and results COIW2 projects are having throughout the province.

Each case study is structured in a similar way. Cases begin by profiling and rationalizing relevant projects. They continue by assessing project impacts and by outlining lessons learned during the course of the projects. When reading the studies it is important to understand that benefits and lessons learned relate narrowly to the case in hand and not necessarily to COIW2 in general.

A. Roads and Highways

This case study focuses on infrastructure projects undertaken under the roads and highways strategic priority area identified for COIW2. The purpose of this priority area was to channel COIW funds towards the upgrading of highways and roads under the jurisdiction of the Ontario Ministry of Transportation (MTO). The MTO undertook 46 COIW2 projects. This case study focuses on the following 5 of these projects:

- **Honda Arterial Road** – *Alliston*
- **Highway 50** – *Bolton*
- **Agrium Road** – *Kapuskasing*
- **Highway 401/Mavis Road Interchange** – *Mississauga*
- **Highway 31** – *Winchester*

The case study begins by profiling each of the above projects. It then assesses their rationale and discusses whether or not they were truly incremental. The case study continues by looking at project impacts and, finally, outlines lessons learned. While the first two sections of the case study focus on each project individually, the last two sections deal with the projects in a more general way. Conclusions apply to the roads and highways strategic priority area more than to a specific infrastructure project.

1. Profile

This section of the case study outlines the nature of the project at hand, establishes when project work occurred and states project costs, highlighting the federal, or COIW2, portion of funding. Each project is profiled individually in an attempt to make clear the differing nature of roads and highways infrastructure projects.

a) Honda Arterial Road

The Honda Arterial Road project, a project that took place between June 1997 and November 1998, involved the widening of Highway 89 both to the east and west of the Community of Alliston in Southern Ontario. It also involved the widening of Highway 50 easterly to the east junction of County Road 10 over a span of 3.3 kilometres. The project entailed the following infrastructure improvements:

- Widening existing highway from two to four lanes;
- Reconstructing and resurfacing existing pavement;

- Drainage improvements;
- Updating all private and commercial entrances to current standards;
- Improving three major intersections; and
- Widening the Boyne River Bridge and extending the Spring Creek Culvert to accommodate road widening.

Project authorities estimated that the project would cost $6,774,409, the federal contribution being $2,200,750. The MTO intended to assume the remaining $4,573,659 and estimated that an additional $172,409 would be added to project costs in order to purchase property.

b) Highway 50

The second MTO project under consideration is the resurfacing of Highway 50 (from 6.6 kilometres north of Bolton northerly to Highway 9) near Bolton, Ontario, a project that took place between June and October 1997. The project involved road resurfacing and required the reconstruction of a bridge. Specific infrastructure improvements included improvements to three intersections, clear lane markings and the creation of a truck climbing lane. It also entailed two structure rehabilitations over the Palgrave reservoir and over a tributary to the Humber River.

c) Agrium Road

An innovative MTO project was the rebuilding of the Agrium Road near Kapuskasing (Northern Ontario). Between July 1997 and June 1999 COIW funding made possible the upgrading of a 40 kilometre stretch of the Cargill Township Phosphate Resource Access Road. The road upgrade began at the Cargill Road juncture south west of Kapuskasing and ended at the Cargill Township Phosphate Resource.

Where this project differs from other road and highway projects is that it attracted private sector financing. As the section below shows, part of the rationale for upgrading the road was to facilitate the opening of a proposed Agrium Inc. (Agrium) phosphate mine. Agrium, founded in 1931, is a public company headquartered in Calgary Alberta. It is the largest North American producer of nitrogen fertilizers and a major producer of potash and phosphate fertilizers.

Agrium acquired the Cargill Phosphate Resource as a means to boost its phosphate supply. Without proper access to the site, however, it was not necessarily feasible for Agrium to develop the mine. Since the mine's opening was in the best interests of both Agrium and the community, it seemed reasonable for the private and public sectors to share upgrade costs. COIW2 outlined a formula that facilitated this cost sharing – project costs of

$5,010,00 were split evenly between the federal and provincial governments and Agrium Inc.

d) Highway 401/Mavis Road Interchange

COIW2 funding also made possible the construction of a new "Parclo A" interchange between Highway 401 and Mavis Road, an access road that connects to Highway 403 to the south, Highway 407 to the north and now to Highway 401. The project involved grading, drainage, pavement, bridge structure work, and the building of ramps and approaches. Project work took place between August 1997 and November 1999; costs of $10,200,000 were shared between the federal and provincial governments and the City of Mississauga – the federal government's share being $3,400,000.

e) Highway 31

The final project for this case study is the resurfacing of Highway 31 from Winchester Springs to the Regional Municipality of Ottawa Carlton boundary. The project was undertaken between July and October 1997. Essentially, the project involved bringing the road up to MTO standards. As such, it required the rebuilding of a road base, pavement repair, ditching work and 20 infrastructure improvements. While costs were estimated at $2,325,000, final approved costs were $3,004,410, the federal share being $1,001,333. The MTO and the Municipality of Winchester assumed the balance of project costs.

2. Rationale

While the section above describes the nature of work undertaken under the auspices of COIW2, this section provides a rationale for why each of the projects considered in this case was eligible for COIW2 funding. Again, each project is described separately as a means to highlight project differences.

a) Honda Arterial Road

Major industrial expansion in the town of New Tecumseth created a need to improve the municipal road, sewer and water infrastructure in the Community of Alliston. The rationale for the Honda Arterial Road project reflects both the area's industrial expansion and the need to bring a road up to community standards. Improved access to the new Honda van plant addressed deficiencies in:

- Capacity and level of service;
- Roadbed structures and riding surface; and
- Roadside drainage.

These infrastructure upgrades have improved access to the plant, and are playing a part in ensuring the plant remains an attractive place of employment, thus helping it remain economically viable.

b) Highway 50

Highway 50 was built in 1969 and had never been upgraded. Almost 30 years of use had resulted in frequent, moderate to severe crackings at the highway's centre-line edge and in several longitudinal wheel-track crackings. There was also moderate transverse cracking along the road; bridges over the Palgrave reservoir and a Humber River tributary were in need of repair. Poor road conditions were resulting in delays and were increasingly becoming a safety issue.

While there was no question that the project involved necessary infrastructure improvements, without COIW2 funding it could not be accommodated in the MTO's 1997-98 Base Budget. COIW2 funding allowed Ontario to proceed with this project in the 1997 construction year, rather than postpone it for an indefinite period of time.

c) Agrium Road

Agrium Inc. wanted to develop a phosphate mine near Kapuskasing, Ontario. Access into the proposed mine, however, was limited – the existing road was used primarily in the winter months by Spruce Falls Inc. for forest harvesting. It was maintained at that level of development and was not accessible year round.

Without an accessible road, it was not practical for Agrium to proceed with opening the phosphate mine. The mine promised long-term jobs for the community and promised to give the community a needed economic boost. Furthermore, the infrastructure upgrades promised to remove the physical barriers that were preventing the community from using the road year round.

While the Agrium mine could not feasibly open until the Cargill Township Phosphate Resource Access road was upgraded, the mine's opening was not contingent on COIW2 funding. Agrium had previously been relying on a mine in Togo, Africa for its supply of phosphate. A climbing American dollar and uncertainty about the African mine's stability prompted Agrium to seek a more stable, Canadian based phosphate supply. Once Agrium acquired the Cargill site, there was little doubt that the mine project would proceed.

COIW2 funding, however, accelerated road development and consequently sped up the opening of the phosphate open-pit mine.

d) Highway 401/Mavis Road Interchange

The rationale for building an interchange at Highway 401 and Mavis Road was to improve access to a major artery and, as a by-product, to improve

traffic flows on Highway 401. Previously, there was a five-mile gap between interchanges to the east and west of Mavis Road. This gap was considered "unacceptably large" for an urban community. The Mavis Road interchange has relieved these interchanges and, consequently, has reduced traffic congestion on the highway.

Furthermore, since Mavis Road already interchanged with Highways 403 and 407, the 401 interchange has made Mavis Road a practical transportation corridor, and is enhancing the community's potential for sustainable long-term growth.

The City of Mississauga had been trying to convince the Province to help finance an interchange at Highway 401 and Mavis Road for a long time. The Province recognized the interchange's value, but never managed to secure the necessary funds. The COIW program presented an opportunity to proceed with the project; without COIW funding it is unclear when, or if, the interchange would have been built.

e) Highway 31

Highway 31 was last resurfaced in 1978. In 19 years the road had undergone a great deal of wear; it no longer met MTO standards. In particular, the project involved bringing pavement width up to 7.5 metre standards and adding a 0.5 metre paved shoulder. The project was justified as a way to improve operational performance, increase safety and reduce maintenance costs.

While there was no question that the project involved necessary infrastructure improvements, without COIW2 funding it could not be accommodated in the Ministry's 1997-98 Base Budget. COIW2 funding allowed Ontario to proceed with this project in the 1997 construction year, rather than postpone it for an indefinite period of time.

3. Benefits

The projects described above have all brought, to varying degrees, economic, social and environmental benefits to their respective communities. This section of the case study explores these benefits, and draws general conclusions as to the impact road and highway infrastructure improvement projects are having.

a) Economic

Short-term jobs: By their very nature, all of the infrastructure projects included in this case study, and indeed all COIW2 projects, created short-term jobs. The number of short-term jobs created, however, varied depending of the scope of work associated with the project. For example, while the Mavis Road interchange project created 10,400 person weeks of employment, the Agrium Road project only created 2667 person weeks of employment. The

other three projects all created approximately 3500 person weeks of employment.

Skill development: While short-term jobs are not always considered a major economic benefit, the jobs did provide employment opportunities that further exposed workers to the construction industry and that, in some cases, broadened the skill base of workers involved. This skill building component of short-term construction jobs can in itself have a significant impact as it makes workers more marketable and can help them secure employment in the longer term.

Job-creation capacity: Only the Agrium project reported the creation of long-term employment. First, the road upgrade helped make it feasible for Agrium to build the mine. This mine-building construction project is creating approximately 150 full-time construction jobs over a two-year period. In turn, the mine will provide approximately 100 full-time positions for at least 20 years (if additional phosphate resources are discovered the mine could remain viable for an even longer period).

Indirect injections: The Agrium mine is expected to generate an additional $24-$30 million in new investment in the Kapuskasing area. Already, the mine's existence has necessitated the upgrading and maintenance of the region's rail lines, thus indirectly creating 25 to 30 short- and long-term jobs. By creating jobs and injecting capital into the area, the mine is reducing social security dependence and is increasing the purchasing power of the newly employed. With more disposable income available in the community, existing businesses stand to become more viable and opportunities may exist for new businesses to open. Ultimately, this investment, spurred on in part by the Agrium Road, will have an indirect, but significant economic benefit in the region.

Increased competitiveness: While the other projects considered in this case study do not stand to have as significant an economic impact as the Agrium Road, they nevertheless do stand to have an economic impact beyond creating short-term jobs. Any road/highway project that contributes to a modern, efficient and safe transportation network for existing and potential industrial, commercial and residential users stands to enhance economic competitiveness. For one thing, improved road conditions reduce maintenance demands and free up money for other projects. Infrastructure projects also tend to make roads safer, and while safety is primarily a social benefit it also has economic impacts such as reduced stress on health and other facilities.

Aside from the Agrium Road, the Mavis Road interchange stands to have the most significant economic impact. The area that stretches between Toronto and the US border is known as the golden horseshoe. Highway 401, the area's major artery, is the busiest stretch of highway in Canada. It is also a major trucking route. By improving access to Highway 401, truckers stand to reduce

their travel time. Reduced travel time will make them more profitable and more likely to meet just-on-time delivery deadlines.

b) Social

Safety: While the Honda Arterial Road, Highway 31 and Highway 50 projects did not have major economic impacts, these projects have all increased levels of safety in their respective communities. In particular, the two highway projects, by remodeling intersections, installing traffic lights at certain intersections, and adding turning lanes have improved safety by reducing the probability of collision. Project authorities identified safety as the major benefit resulting form each of these projects.

Reduced travel times: Social benefits identified for the Mavis Road interchange and the Honda Arterial Road involve reduced travel times – both projects have reduced delays on specific road stretches. The Mavis Road interchange has also resulted in a general redistribution of traffic. The interchange allows some travelers to exit/enter the highway nearer their destination/starting point thus reducing traffic flows along the 401.

Recreation: Finally, the Agrium Road project stands to have a social impact in the Kapuskasing area by facilitating access to recreational properties and activities. The upgraded road leads to Rufus Lake, a rich hunting and fishing ground. With improved access to these facilities, a greater number of people are able to participate in recreational activities, a fact that stands to increase the quality of life of a portion of the community's population.

c) Environmental

Energy efficiency: While the projects do not seem to have had a negative environmental impact on their respective communities, they are indirectly contributing to improved energy efficiency and air quality. A by-product of the reduced travel times and reduced delays discussed above is decreased fuel-emissions, which results in improved air quality. Admittedly, the rationale for undertaking the projects included in this case study did not focus on these environmental benefits. Nevertheless, particularly as climate change becomes a government-wide priority, any activity that portends to increase energy-efficiency and air quality is worthy of mention.

4. Lessons Learned

A variety of lessons were learned during the course of the projects that make up this case study. This section of the study identifies and elaborates on some of these lessons, and hopefully provides information that will help guide the course of the next national infrastructure works program.

Project planning: The projects included in this case study generally proceeded according to plan. Project files reflect project results, and show that federal funds made up no more than one-third of project costs. Projects were generally

completed on time, and where additional time was needed approval was readily given. None of the project authorities consulted identified any project management issues or concerns that impeded or hindered the progress of the road and highway projects included in this case study.

Nevertheless, project files show that most projects underestimated actual project costs. The federal share of project costs, however, was not always adjusted accordingly. For example, regarding the Honda Arterial road, the MTO assumed an additional $602,541 in project costs; the federal share remained constant at $2,200,750. Even when the federal share did increase to meet actual project costs [i.e., Highway 50 (Bolton) costs increased by $283,018, federal portion increased by $98,666], projects still came in over budget. A big part of the reason for this is that much of the work was prepared and planned on a very tight timeframe. One of the lessons learned in the COIW2 project is that project initiation and planning requires sufficient lead time to ensure that schedules and budgets are well planned. Unfortunately, the reality of tight program initiation and delivery did not always make enough lead time available for projects.

Accurate budgeting is a means of ensuring that funds are indeed available to complete a certain project. Despite the fact that the above-mentioned budget overruns did not trouble project authorities, good project management depends in part on staying within budget. Otherwise, however, the approach that underlay COIW2 projects seems an appropriate way to implement road and highway projects, and as long as roads and highways remain a strategic priority, this approach should continue to guide the course of infrastructure projects.

Communication: There is some indication that Industry Canada and the Ontario Ministry of Transportation did not always communicate effectively during the course of COIW2 projects. IC relied on the COIW Secretariat as its information conduit. There was a feeling among MTO employees interviewed that the Secretariat was not always in a position to pass along necessary pieces of information at the right time. As a result, the Ministry was not aware of certain structural program changes that occurred in the transition from COIW1 to COIW2, and did not plan accordingly around these changes. Since COIW is a joint federal/provincial/municipal venture, it is imperative that information is effectively shared with all partners – opportunities seem to exist to refine existing communication networks.

Private sector involvement: The Agrium Road project shows that it is possible to draw the private sector into road and highway infrastructure projects. As a P3 project (involving partnerships at all levels of government and the private sector) this project brought direct benefits not only to the Kapuskasing area but also to Agrium. It was only natural for Agrium to contribute to project costs. The COIW program, however, provided the vehicle that facilitated drawing Agrium into the project, for it defined a funding formula that equitably involved the private sector without over-burdening it.

Project authorities found working with Agrium a “pleasure”, and are eager to explore similar public/private joint ventures in the future. Industry Canada might

consider publicizing the Agrium project as a means to draw other private sector firms more effectively into road and highway, and indeed other infrastructure, projects.

Hands-off approach: Where appropriate, the MTO allowed municipalities to design and control infrastructure projects. Those municipalities drawn into project management (i.e., City of Mississauga and Town of Winchester) were also willing to assume a share of project costs. It seems that this "hands-off" approach contributed to the expediency and efficiency with which projects were completed. Municipal officials point to examples such as these to make a point that a "laissez-faire" project management style has benefits.

B. Queen's University, Kingston

1. Profile

Douglas Library is at the heart of the Queen's Campus, on the southeast corner of the intersection of Union Street and University Avenue. The library, which opened in 1924, is named in honour of James Douglas, Chancellor of Queen's from 1915 to 1918.

In 1989, the Queen's University Task Force on the Library of the 21st Century was formed. This Task Force envisaged the creation of two major library facilities and collections — one for the humanities and social sciences and one for the physical and applied sciences. This vision led to the design and building of the Stauffer Library (which opened in 1994) and renovations to the Douglas Library.

The Douglas Library renovation master plan was developed and approved in 1994/95. In 1997, a $10 million project was completed at Queen's University under the first phase of the Canada/Ontario Infrastructure Works program. This work led to the creation of a centralized Engineering and Science Library that improved library services. The renovations also led to more efficient use of space, improved access to library materials and other information, and upgrades to the electrical and mechanical systems.

a) COIW project overview

In July 1997, the University received funding through the 1997-98 Canada-Ontario Infrastructure program to undertake two projects: building renewals at Douglas Library, and enhancement of the Ergonomics Research Labs in the School of Physical Health Education. The cost for the projects was $2,613,867 — Douglas Library Renovation ($1,013,867) and Ergonomics Research Lab ($1,600,000). The eligible federal/provincial share was $1,742,578. The work for these two projects was to commence in July 1997 and be completed by March 1998. However, the projects were completed in March 1999.

Building enveloped renewals at Douglas Library: The work at the Douglas Library entailed the repairing of leaks in the tiered-slate roof. The different tiers were constructed in 1928 and in 1960, and required improvements. Funds were also used to re-open the third floor reading rooms in the 1923 and 1966 wings, repair the stone facade on the outside of the building, renovate two stairways, and window repairs and/or replacement. Overall, improvements to the exterior of the building were required to ensure the maintenance of this building located at the heart of the Queen's Campus.

Enhancement of the Ergonomics Research Labs in the School of Physical Health Education: Funds for this project were used to improve facilities at the ergonomics research laboratories at the School of Physical Health Education. The project entailed the creation of a lab in an area of the building that was unfinished. The work that was undertaken consisted of building partitions and fume hoods, laboratory casework and counters, as well as upgrading ventilation and air conditioning systems. Two of the rooms that were created met Health Canada Laboratory Bio-safety Guidelines. New, barrier-free washrooms were also built to meet ergonomics standards.

2. Rationale

This project would not have proceeded in 1997/98 without Canada/Ontario Infrastructure Works approval and support. The total Douglas Library renovation costs were estimated at $16-$17 million. By 1995, $12 million were secured through the active partnership of the COIW program, the Joseph S. Stauffer Foundation, Thomas W. Bain and family, the Class of Science '96, and other contributors to the Douglas Library. Without funding from COIW2, the renovations and retrofitting to the Douglas Library and the enhancement of the Ergonomics Research Labs would have had to be delayed. The university is still in the process of securing the additional funding for the completion of the second phase of the *Library of the 21st Century* project.

3. Benefits

Numerous benefits were realized from these two projects:

a) Economic

Employment: To complete these two infrastructure projects, 650 person-weeks of work were needed. These jobs were short-term and ended upon the completion of these projects.

Incrementality: The funding received from COIW2 permitted the two projects to be completed at an earlier date.

Economic efficiency: The Douglas Library has become more energy efficient with the replacement/repair of windows and the repair of the leaking roof. Prior to these renovations, the library was allocating additional resources towards heating the building and repairing fixtures or furnishings ruined by the leaking roof. However, the overall net energy savings have been offset by the recent addition of air conditioning to the Library.

The Ergonomics Research Group, which was established in 1986, has conducted numerous successful research projects. This group, which operates from the Ergonomics Research Labs in the School of Physical Health Education, has brought in over $3.5 million in research and service-based contracts since its inception. Improving the facilities at the Ergonomics

Research Labs has ensured that the Research Group has the necessary facilities to carry out its work.

b) Social

Community: The continued work at the Douglas Library has enabled eight Engineering and Science library branches, previously located in individual faculties and departments throughout the campus, to be consolidated into one Engineering/Science library in Douglas Library. As well, the Music Library and the Special Collections are now located on the second floor of the Douglas Library in a state-of-the-art facility known as the W.D. Jordan Special Collections and Music Library for study and research in a well-equipped and comfortable environment. The consolidation of various libraries (e.g., science collection, applied science collection and music collection) has enhanced the library facilities. The public can now access books and other library materials from one-site, rather than attempting to locate this information from the various library branches scattered across campus. Centralizing these collections has also facilitated the work of the librarians who are now better able to assist the public in locating the desired reading materials.

Re-opening third-floor reading rooms in the Douglas Library will also provide opportunities for the public to study and to review library materials. The addition of reading rooms has created a more functional learning environment for users of the library facilities.

The creation of research laboratories, in an unfinished area of the School of Physical Health Education, will enable the continuation of applied and basic research in the areas of ergonomics. The benefits of this research will ultimately improve community health. The Ergonomics Research Group, which operates from the Research Laboratories, has successfully transferred technology from university to industry. Improvements to the laboratories will ensure that this group can continue to conduct research and to transfer this knowledge to industry.

Standards, codes and by-laws: The Douglas Library did not meet all current building code standards as the building was built in 1924. Improvements to the ventilation within the Library, installation of fire alarms and the addition of air conditioning were required.

The construction of accessible washrooms at the School of Physical Health Education ensures that the laboratory is equipped to meet the needs of students with special access requirements.

4. Lessons learned

The information in project files reflects actual work undertaken. The funds provided via the COIW2 program have helped the University provide an environment that encourages academic excellence.

The project authority did not note any difficulty in applying/obtaining funds from COIW2. In fact, additional grants were received from COIW2 for Douglas Library improvements.

COIW2 funding has enabled the Queen's University Task Force on the Library of the 21st Century to successfully attract additional funding from other sources: the Joseph S. Stauffer Foundation, Thomas W. Bain and family, the Class of Science '96, and other contributors to the Douglas Library.

C. Algonquin College Facility Upgrades, Ottawa

1. Profile

The Algonquin College of Applied Arts and Technology is one of Eastern Ontario's largest community colleges. Algonquin College has approximately 11,000 full-time and 3,500 part-time students in over 100 different applied arts, trades and technology programs.

The institution is located on five distinct campuses in the National Capital Region—Perth, Pembroke, Woodroffe (Nepean), Rideau, and Kanata. Most of the campus facilities are well over 20 years old, with a number of buildings over 30 years old.

Due to the school's position as a community college, modern and efficient infrastructure is part of creating a learning environment that attracts students, retains staff, and serves the local citizens in the surrounding areas.

a) COIW work

Algonquin College applied for, and received, funding from the COIW2 program. The approved "Algonquin College Facilities Repair and Upgrade" project involved five separate infrastructure renewal activities. The application prescribed repair work in the magnitude of $ 1,303,402 (of which the Federal share was proposed at 33%, equaling $ 434,441).

Briefly, the project included the installation of an elevator, retrofitting a major 30 year-old building, retrofitting of existing teaching and lab space, extension to the network cable plant and major roof replacement work. The final cost of the project was almost on budget at $ 1,305,424.

b) Overview of activities

The major focus and purpose of the project was to provide better access to disabled students and staff, enhance teaching space, bring out-dated building systems up to code (heating, electrical, lighting, ventilation, etc.), and improve computer access to support technology training for the community.

To accomplish this purpose, teaching space was re-configured, telecommunications technology was updated and a network cable plant established, and major roof areas replaced.

The infrastructure work funded by COIW2 covered three campuses and numerous buildings, through five distinct activities:

- installing an elevator at Pembroke Campus;
- retrofitting three existing labs (lab space of 5,900 sq. ft.) at Perth and Woodroffe Campuses;
- retrofitting a 12,713 sq. ft. 30 year-old building ("F" Building) at the Woodroffe Campus including retrofitting systems, reconfiguring teaching space, and updating labs;
- major roof replacement and repair on numerous buildings covering nearly 50,000 sq. ft. at Woodroffe Campus; and
- extending network cable system/plant.

c) Breakdown of activities

Of the estimated $1.3M in work, the largest effort was retrofitting the lab space, as shown in the table below. Algonquin College funded the 1/3rd municipal portion of the COIW project from its operating budget.

Activity	Est. Costs	Percent
Elevator installation	$ 284,001	21.8%
Lab retrofitting	$ 443,400	34%
Refurbishing F Building	$ 268,650	20.6%
Major roof replacement	$ 227,350	17.4%
Network cable plant	$ 80,001	6.1%
	$1,303,402	100%

d) Infrastructure renewal activities

Further details on the infrastructure renewal work are provided below.

- **Installation of elevator at Pembroke Campus**—This activity was undertaken to provide accessibility to the second and third floors of this campus, which were previously inaccessible by disabled staff and students. In addition, the new elevator was installed to assist in the movement and sharing of training aids and teaching materials. This work included renovating the building to accommodate an elevator shaft.
- **Reconfigure and retrofit existing lab space at Perth and Woodroffe Campuses**—Three labs of approximately 5,900 sq. ft. were reconfigured and retrofitted to include updated energy efficient electrical, mechanical and lighting systems as well as updating and enhancing building finishes. Two of these labs provide increased accessibility to electronically delivered training and study in a refurbished modernized facility. The work in the remaining lab addressed issues of improper ventilation and safety systems in a trades shop (masonry lab) environment.

- **Retrofit and refurbish "F" Building**—The 30 year old "F" building on the Woodroffe Campus was upgraded. The building's systems were previously not up to code and the teaching environment was not optimally designed. The 12,713 sq. ft. facility was retrofitted to include new energy efficient lighting, adjustments to the mechanical and electrical systems, reconfiguration and updated lab environment. By conducting a major retrofit of the "F" building, the college was able to save on the continual costs for facility repairs.

- **Major roof replacement**—A major activity involved replacement of roofing on three buildings at the Woodroffe Campus: "F" Building (which was also retrofitted internally), the Cafeteria or "D" building (38,749 sq. ft), and Carpentry wing of "A" Building (7,800 sq. ft.). The "D" building roof was built-up bituminous, which was leaking over the food preparation area of the cafeteria, and "A" building roof was metal, which had rusted through. "A" building received a new vinyl roof which should last for over 25 years. "F" and "D" buildings had roof replacement involving new lower membrane, insulation, upper membrane and ballast construction.

  The roofs were leaking throughout the year and especially during the spring thaw. The leaking caused water damage, disrupted teaching, caused major inconveniences and created unsafe conditions for staff and students (i.e., due to electrical shock, slipping on wet floors, etc.)

- **Network cable infrastructure**—Due to the local community's demand for high-tech employees with advanced technology skills, Algonquin College has built numerous computer training classrooms, housing over 4,000 terminals. However, infrastructure rehabilitation work was required to provide an extension of the network cable plant to areas of campus and older buildings with stand-alone computer labs. The project provided a wider area of accessibility for the College community to information technology and electronically delivered training.

The work was proposed to commence May 1, 1997 and be completed by October 31, 1997. However, actual rehabilitation work started on July 1, 1997 and concluded on January 31, 1998.

2. Rationale

Algonquin College was facing numerous infrastructure challenges as the buildings were aging and the school was expanding. Namely:

- Budget constraints due to reduced government funding prevented major infrastructure projects from being funded from operating budgets.

- The building on Pembroke campus did not have an elevator for staff or students' use and one could not easily be built. A long-awaited and much-needed solution to the accessibility of the Pembroke Campus was needed.

- Old buildings on campuses had outdated mechanical, electrical, and lighting systems. Some of these systems were built in the 1960s and had reached the end, or surpassed their viable life-span. These systems were not up to code.

- Computer labs required additional ventilation and air conditioning to keep rooms at the proper temperature and to protect fragile computer components.

- By building computer labs to meet local industry needs, the labs required networking capabilities to optimize connectivity and Internet access. Cable infrastructure to provide wider accessibility to instructional and information technology for students and staff was needed.

- The oldest trades were generally in the oldest buildings with the oldest laboratory and teaching spaces. These needed upgrading to attract students into the trade programs.

The college had a rather large list of deferred infrastructure repair and maintenance projects totaling over $20M. Algonquin College could not fund large-scale maintenance through the operating budget, which is funded by provincial education transfers and student tuition. Therefore, the application to COIW2 specifically addressed the program requirement of incrementality.

a) Why COIW?

In general, repair and infrastructure renewal work was being delayed years due to a lack of funding for this specific work. With operational budgets further shrinking in the 90s due to government cutbacks, it made it more apparent that major repairs required outside funds or could not be accomplished. Repairs and upgrades would not have been scheduled for completion in 97/98 without COIW2 funding.

The projects proposed for the COIW2 funding were the priority cases on the deferred maintenance list at the time, and had all been deferred for numerous years. (The college did receive funding from COIW1 for work totaling $2.1M, which was applied to an addition of integrated media infrastructure.) The five proposed activities addressed some of the most critical deferred maintenance needs. The college undertook a priority setting process for facilities renewal requirements and coordinated with the provincial ministry.

Innovative funding for most of the infrastructure requirements was not feasible. The college can fund-raise from the private sector for training lab

equipment or teaching aids, but it is nearly impossible to raise money for a new roof, new lighting fixtures, or an elevator shaft.

b) Other issues

The base building systems are well over 20 years, and in some situations 30 years, old. Out-dated heating, lighting, air-conditioning and ventilation systems require large amounts of on-going and preventative maintenance and trouble shooting repair. In addition, their useful lives are/were coming to an end, necessitating a complete overhaul in some cases.

Widespread leaking in 30-year-old roofing made teaching, cafeteria and office space ineffective. At times, buckets would have to be strategically placed throughout the cafeteria, classrooms and teaching labs to collect water from rain and the annual spring thaw. Not only did this temporary solution provide an inconvenience, but it also created a safety hazard for both staff and students.

On the Pembroke campus, the 3-storey building did not have access to the upper 2 floors for handicapped or temporarily disabled students and staff. Arrangements had to be made to transfer classes to the 1st floor where the environment was not optimal. In addition, if an individual had broken their leg etc., classes would be temporarily re-assigned to the 1st floor, inconveniencing the staff and students.

Energy usage and costs were a concern to the college. Old systems had a large consumption of energy and were generally inefficient after 20-30 years of operations. Algonquin College wanted to invest in energy efficient lighting, electrical and mechanical systems. Low-energy lighting with parabolic reflectors would further result in better lighting conditions and less heat energy being radiated.

c) Environmental assessment

An Environmental Assessment Process Schedule 3 was completed (June 18/97) as part of the application. The project did not require a full assessment under CEAA, as it was a prescribed project pursuant to Exclusion List Regulations subsections 5.4 and 1.

A number of environmental considerations were raised including the potential for removal and proper storage on-site of old ballasts containing PCBs, and light retrofitting that may involve PCBs. The college employed a contractor certified in PCB related projects, who used an existing PCB storage unit, which is MOEE approved.

3. Benefits

Algonquin College and its surrounding community realized numerous benefits through the COIW2 project funding. These included:

a) Economic

Incrementality: Without the COIW2 funding, none of the five important infrastructure renewal activities would have been accomplished within the year. In fact, local representatives mentioned that it may have taken a couple of more years to find the money needed to conduct the repairs

By bringing the renewal work forward, the college ultimately addressed numerous concerns for safety, accessibility, quality of education and learning, and the environment in a more timely manner. By responding to these issues and challenges earlier, rather than later, Algonquin College is better positioned to support its students, staff and community.

Employment: An estimated 1,070 person-weeks of employment was created through the construction and repair work. No long-term jobs were created, however, making the school more attractive and increasing student enrollment should require more teachers and administrators. While this can not be readily measured, the college has increased enrollment since the infrastructure work began.

Of the construction jobs created by this project, the elevator work in Pembroke and the lab retrofitting in Perth contributed to direct employment within these smaller communities. In fact, approximately 44% of the $1.3M project occurred outside of Ottawa[1], leading to local benefit in the nearby two communities.

Skill development: Indirectly, the infrastructure work contributes to the College's ability to improve the local skill base, specifically in technology and computer skills. These skills are highly desired by high-tech companies, so with access to a local pool of trained, talented workers, the region is much more competitive.

b) Social

Accessibility: Installation of the elevator provided accessibility to the second and third floors of the campus, which were previously inaccessible by the disabled. A major benefit of the elevator on the Pembroke campus is that disabled and handicapped staff, students, and visitors can now access the entire building. Major contentions and complaints have been addressed and the elevator has reduced inconveniences for both able-bodied and disabled persons by reducing the need to move classes to the 1st floor, and by enabling teaching aids to be shared and transferred throughout the building.

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[1] *Pembroke elevator work was approximately 22% of the total project. Within the three lab retrofitting component, two labs were on the Perth campus, so roughly 2/3rds of the 34% of this component (22%) can be attributed to the small community.*

In fact, this improved access has contributed to a greatly increased use of the facility by various community groups and activities, including the United Way, Alcoholics Anonymous, etc.

Overall, by developing an improved learning environment on all campuses, Algonquin College has developed a better image, and can now attract more students and prevent them from leaving the area. In addition, the improvements can also assist in bringing in students from outside the area to study. While not measured, theoretically the infrastructure work has improved access and delivery of training, thereby enabling the local community to realize enhanced economic competitiveness.

Standards, codes and by-laws: The infrastructure renewal work on the outdated base building systems and utilities in "F" building and lab retrofitting allowed the college to bring the lighting, ventilation, electrical and other systems up to current building codes. The project brought lighting to current functional and energy efficient standards and improved mechanical systems to current ASHRAE standards. Teaching labs have had electrical drop cords installed to allow for improved flexibility in the set-up and safety of the laboratory.

In addition, by preventing further water leaks from the roofs, Algonquin College has eliminated the unsafe conditions for staff and students (i.e., due to electrical shock, slipping on wet floors, etc.) throughout the Woodroffe campus. As well, insulation used within the roof reconstruction was up to current standards for heat retention/reflection, which has helped to further reduce energy requirements.

Other benefits: The project improved opportunities related to computer access to information. The project improved the College's ability to support learning in a networked environment with a self-paced approach. The renewal also enhanced teaching through a more appropriate configuration of space. This draws and retains quality staff and students. Potentially, without the lab retrofitting, trade programs might not have been further offered.

The COIW2-funded initiative significantly upgraded aging infrastructure, which continues to move Algonquin College forward in providing learning/retraining opportunities to the High Tech capital of Canada.

c) Environment

Energy efficiency: By replacing aged systems, the college has become more environmentally friendly and energy efficient. While on-going operating costs have occurred due to elevator servicing and HVAC system maintenance, these costs are offset by reduced energy needs for lighting, etc.

Energy efficient lighting, electrical and mechanical systems are now being used, and a reduction is energy utilization has occurred. Cessation of roof leaks will preserve the building envelopes and improve learning conditions.

"These renovations provide a much improved learning environment which will benefit students, faculty and visitors to the college, while contributing to the economic development of the region."—Gary Guzzo, MPP, October 2, 1997

4. Lessons learned

The following are lessons learned from the "Algonquin College Facilities Repair and Upgrade" project:

Program Delivery: The project delivery process for this case study was found to be quite efficient. The relevant delivery forms examined were clear and user-friendly. The provincial authorities demonstrated that they had a good system for the COIW2 contribution process. The persons interviewed for this project indicated that they experienced good coordination within the normal communication, reporting and accounting relationship and channels.

Project timelines: Timing was a concern. Time frames need to be longer with at least 2 years to implement the project. Time is needed for the required design work and the seasonality of the construction industry.

Strategic priority areas: Easy to access funding, but many of the educational institutions felt more money should be available to upgrade educational facilities. Most schools are approaching the 30-year mark and require assistance for the large amount of maintenance needed.

D. Macassa Lodge Renovations, Hamilton-Wentworth

This case study focuses on infrastructure upgrades to Macassa Lodge, an old-age home in the Hamilton-Wentworth area, which were funded in part by COIW2 under its healthcare strategic priority area. The case study begins by profiling the nature of the Macassa Lodge project. It then assesses the project's rationale and discusses whether or not the project was truly incremental. The case study continues by looking at project impacts and, finally, by outlining lessons learned.

1. Profile

Macassa Lodge is an accredited, 270 bed, long-term care facility for the aged that is run by the Regional Municipality of Hamilton-Wentworth (RMHW) and that is jointly funded by the Ontario Ministry of Health and the RMHW. The lodge is committed to providing quality client-focused services and modern accommodation for seniors who require facility-based long-term care.

In March 1998 the lodge began phase I of a three-phase renovation project that was meant to upgrade and modernize its facility. This first phase involved renovations to the lodge's kitchen and the restructuring of one of its residential wings (D wing). In February 1995 the lodge began phase II of its facility upgrades. This project involved the redevelopment of another residential wing (A wing) and the upgrading of office space, the Chapel and of the day program area. Phase II qualified for $10.5 million COIW1 dollars.

In the spring of 1997, Macassa Lodge, in conjunction with the RMHW, applied for COIW2 funds as a means to help fund phase III, the final phase of their proposed renovation projects. The federal government approved the lodge's application in May 1998, and expects to contribute $ 5,900,817 to the $ 20,000,000 project.

Phase III of the Macassa Lodge infrastructure upgrade involved the rebuilding of two residential wings (B & C Wings) and renovations to another wing (E Wing). The project also involved landscaping and ancillary improvements to the lodge. Specific examples of infrastructure upgrades are listed below:

- Upgrading 162 C-Wing ward and semi-private rooms to private and semi-private rooms with en-suite bathrooms.

- Retrofitting of E-Wing to meet current Ministry of Health long-term care standards.

- Decentralizing and redesigning of resident dining rooms, lounges, activity rooms, and family/TV rooms as a means to increase resident comfort and access to privacy.

- Addition of new facilities, including a conference room for family and resident planning, a garbage chute room, and second and third floor balconies.

- Removal of accessibility barriers for wheelchairs, walkers, etc…

- Installation of new mechanical, electrical, air handling, heating, air conditioning, and fire alarm systems.

2. Rationale

The rationale for proceeding with phase III of the Macassa Lodge Infrastructure upgrades was based on a desire to institute the highest possible principles of care for residents. Project authorities expect that lodge upgrades will help improve the quality of life, privacy and socialization of seniors in residence.

The lodge, however, also needed to be modernized. Many of the infrastructure upgrades undertaken under COIW2 helped bring the facility up to current standards. Facility inadequacies included:

- Neither C-Wing nor E-Wing had been renovated in forty years. Floor tiles were cracking and ceiling conduit ducts and piping were visible throughout the buildings.

- Many resident rooms were not properly insulated, and facility windows had to be replaced and lowered in order to meet OMH standards.

- C-Wing's ward and semi-private rooms had only limited living space and did not have en-suite bathrooms. Residents did not have adequate space for their personal belongings.

- Bathrooms throughout the facility needed new, larger bathtubs and showers.

- Heating, air handling, air conditioning and electrical systems had to be upgraded in order to meet provincial standards.

While the infrastructure upgrades outlined above were necessary in order to bring Macassa Lodge up to community standards, the project would not have gone ahead in 1998 without COIW2 funds. The federal and provincial governments each contributed a portion of phase I project costs (RMHW assumed the balance), but neither level of government guaranteed similar funding for subsequent renovations. COIW1 made phase II possible, and without COIW2 it is not clear when or if the region would have managed to complete planned renovations to Macassa Lodge.

3. Benefits

The Macassa Lodge project stands to have a variety of economic, social and environmental impacts within the Hamilton-Wentworth area. The benefits of these impacts are discussed below.

a) Economic

Employment: Phase III of the Macassa Lodge project created 293.8 short-term jobs during each of the 1998, 1999 and 2000 construction seasons. The majority of these jobs were in construction, but the project also created project planning, engineering (electrical, mechanical, architectural), and other jobs. 90% of construction jobs went to tradesmen in the RMHW – 10% of these jobs were created within the Greater Toronto Area. By securing the viability of Macassa Lodge the project is helping to secure existing long-term jobs.

Increased competitiveness: Macassa Lodge anticipates a significant increase in preferred accommodation (private and semi-private room) revenue as a result of the marketability of the resident rooms following renovations. The Lodge will maintain its present bed complement of 270 beds, but there will be some cost recovery resulting from the increase in preferred accommodations. Infrastructure improvement should also result in an increase in membership in the lodge's Seniors Day Program and other outreach programs. As these programs are fee based, an increased membership means greater revenue for the lodge. This increased revenue should help make the Lodge a more attractive, and thus more competitive, facility.

b) Social

Community: COIW2 funds are enabling a variety of improvements to the quality of life of residents at Macassa Lodge. Residents now reside in a safe, comfortable and modern living environment that offers larger, more private rooms. Before the upgrade project residents did not have en-suite washrooms – residents used communal washrooms located in the facility's corridors. The project also resulted in the upgrading of the facility's heating, air-handling and air-conditioning systems, making the lodge a more pleasant place of residence.

Landscaping and ancillary improvements are also improving the quality of life of lodge residents. By re-landscaping the facility's grounds, more opportunities exist for residents to participate in and enjoy active and passive outdoor activities (e.g. walking, stress reduction). Ancillary improvements are allowing more natural light to enter the facility, increasing the atmosphere within Macassa Lodge.

Accessibility: Macassa Lodge infrastructure upgrades included the removal of accessibility barriers for walkers and wheelchairs. Any facility for the aged should be accessible throughout. As a result of these upgrades the lodge now

complies with expectations regarding the quality of infrastructure in old-age homes.

Access related upgrades are having a dual impact within the lodge. First, by allowing more residents to move freely within the facility, Macassa staff have more time to attend to other tasks, making them more efficient. Second, the improved access is increasing the comfort and quality of life of many lodge residents.

Safety: Renovated units within Macassa Lodge are now equipped with new and/or updated door locking mechanisms, nurse call system that are monitored in the central nursing office, and other alarm and security features. These upgrades have made the lodge more secure, increasing the comfort level not only of lodge residents, but also of the extended families of resident.

c) Environmental

Energy efficiency: By installing energy efficient and environmentally friendly pollution-reducing technologies throughout Macassa Lodge, the project portends to have a positive environmental impact. For example, the lodge's major exhaust system now has a heat-recovery capability that pre-heats and pre-cools the air that enters the building, reducing energy use and costs. Furthermore, the heating, ventilation and air-conditioning systems installed are of a high standard and are more environmentally friendly than were the previous systems.

4. Lessons Learned

A variety of lessons were learned during the course of the Macassa Lodge project. These lessons are elaborated upon below.

Project planning and timing: A $20,000,000 project like the Macassa Lodge upgrade requires substantial planning to ensure that project implementation goes smoothly. While all projects need to be planned carefully, more is at stake with large projects. The larger the project, the more time it takes to plan it. As a result of the scope of the Macassa project, it was difficult for project authorities to comply with section 11.1 of the infrastructure agreement (the section does not allow for project delays). Project authorities believe that for future infrastructure works programs project timelines should be more flexible during both project planning and implementation phases.

Yet, it is worth noting that the payment claims process in place for COIW2 worked well during the implementation of the Macassa Lodge project. The six-week timeline for submitting claims was adequate, and seems an appropriate model to follow during subsequent phases of the COIW program.

Communication: The Federal Government, the Ontario Ministry of Health and the RMHW communicated openly during the course of the Macassa Lodge project. All three partners worked closely to ensure that all parties were informed on project

status. The strength of the federal/provincial/municipal partnership contributed to the success of the Macassa Lodge Project.

Local partner involvement: Rather than deal haphazardly with the RMHW, the region designated a full-time resource as key contact. This local contact was instrumental in project planning, and helped ensure the smooth implementation of project activities. Having an involved contact is an effective way to carry out large-scale infrastructure projects. This practice might be encouraged for similar large projects undertaken during future infrastructure works programs.

E. District Community Health Centre, Merrickville

This case study focuses on infrastructure upgrades to the Merrickville District Community Health Centre (MDCHC) that were funded in part by COIW2 under its healthcare strategic priority area. The case study begins by profiling the Merrickville Health Centre. It then assesses the rationale for upgrading health services in Merrickville and discusses whether or not the project was truly incremental. The case study continues by looking at project impacts and, finally, by outlining lessons learned during the course of the project that might help guide future infrastructure programs.

1. Profile

The Merrickville District Community Health Centre (MDCHC) provides medical, health and physiotherapy services to residents in the Merrickville-Wolford, Montague, Oxford-on-the-Rideau, Rideau Township, Augusta and Kitley area. The health centre is affiliated with the Smith Falls Hospital, and is committed to improving the quality of life of community residents by providing accessible, appropriate health services.

Before qualifying for COIW2 funding, the centre was finding it increasingly difficult to deliver a high-level of service to community residents. COIW2 allowed the centre to relocate to a new, one-story, 10,000 square foot facility (previous facility was only 3500-4000 square feet) that is now offering expanded programs and services. Examples of infrastructure upgrades within this new facility include:

- Modern plumbing, electrical, heating and ventilation systems;
- Improved access for the disabled; and
- Compliance with health facility standards.

The project that received COIW2 funds, however, was different in scope than the project that Merrickville first proposed. Originally, the MDCHC planned to upgrade its existing facility – it planned to renovate the 80 year old stone building in which part of its services were housed and to replace a 1972 addition with a new two-story building. However, in the course of project planning, and after the Village of Merrickville offered to give the centre a long-term lease (49 year) on a new site, Merrickville amended its COIW2 proposal so as to build a new centre.

This amended project had a variety of advantages over the original project. First, the new building was to be a one-story structure, thus facilitating wheelchair access throughout the centre. Second, since MDCHC retained the architect who designed a similar facility in North Lanark, it was possible to predict with a measure of accuracy construction costs and timelines and to reduce design time by 10 to 12

weeks. Finally, the MDCHC was apprehensive about renovating an old building – it was deemed more effective to install heating, ventilation and air conditioning in a new building than to upgrade existing systems.

The federal government approved the amended proposal on 29 April 1998. Construction began in the fall of 1998 and was completed in December 1999. In total, the project cost $1,215,000 of which the federal government contributed $473,350. The Ontario Ministry of Health and the MDCHC assumed the balance of project costs.

2. Rationale

In order to continue to meet community needs, the MDCHC had to upgrade and enlarge its facilities. Not only had the facility not been upgraded since 1972, but between 1992 and 1998 its patient volume increased by 43%. In order to manage this increase in clientele the centre needed another physician, nurse practitioner and medical secretary, but there was no space to house additional staff. As a result, the centre was not delivering health services in either an effective or efficient manner.

To compound these service delivery issues, the centre's infrastructure also needed to be repaired. A sampling of some of the infrastructure issues that justified the building of a new health centre in Merrickville is listed below.

- Overcrowded work areas;
- Building not meeting health and safety standards (difficult to keep clean, cluttered) and seen as a fire hazard;
- Lack of wheelchair accessibility;
- Leaking roof and windows;
- Poor traffic flows:
- Use of off-site facilities (i.e. trailers) for chiropody, foot care and physiotherapy services.

MDCHC first began addressing its need for infrastructure upgrades in 1995 when it prepared a Functional Program for the Ontario Ministry of Health under Capital Planning Funds. Despite reapplying to the MOH in 1997, the MOH failed to approve MDCHC's request for funds. As one of fifty-six Community Health Centres vying for these funds, it likely that MDCHC would not have received the funding to proceed with its facility upgrade for at least two or three years.

In 1997 the centre applied and received COIW2 funds. Without COIW2 funds the centre would not have managed to solve its operational problems and address its client service delivery issues with such expediency, justifying the project as incremental under the COIW2 criterion.

3. Benefits

The construction of a District Community Health Centre in Merrickville stands to have a variety of economic and social impacts in the Merrickville area. The benefits of these impacts are discussed below.

a) Economic

Employment: The construction of the health centre created approximately 1,133 person-weeks employment for tradesmen in Kempville, Lanark, Ottawa, Lanark, Smith Falls, and Merrickville. Most of these jobs were construction related, but the project also involved an architect, project manager and planner, technical assistants and engineers.

The project has also resulted in the creation of three full-time positions: physician, nurse practitioner and medical secretary. MDCHC is considering hiring four more full-time employees including a social worker and more administrative staff.

Indirect injections: Upgrading the quality of health services available in Merrickville stands to improve the town's economic viability. The new centre should, at the very least, maintain, and may increase, the number of senior citizens in the town, and might encourage/stimulate private industry to invest in the Township. As the population of an area increases, so too does its potential for increased prosperity, for new people create a need for new investment. If the town continues to grow, the centre may be in a position to expand further its services and staff, creating opportunities for even more long-term jobs within both the area and the centre.

b) Social

Standards, codes and by-laws: Unlike the original MDCHC, the new facility meets, and even exceeds, community standards, codes and by-laws set for health care facilities. The construction of the new facility has addressed all former safety and maintenance issues. The roof and windows no longer leak, there are proper facilities in which to sterilize equipment, and there no longer fire code violations within the MDCHC. Furthermore, the centre's heating, ventilation and air-conditioning systems are of a very high standard and are much more efficient than were the systems in the old facility. The facility's high standard is having a beneficial impact on the community's health, for it ensures that the facility is dispensing services not only efficiently, but also safely.

Accessibility: The original facility was multi-storied and not wheelchair accessible. The facility's inaccessibility was compounded by the fact that some services were being dispensed from trailers. It was inconvenient for some patients, mainly seniors, to access these services. Now that the health centre is housed on a single floor, which is completely wheelchair accessible, the facility is better able to meet community needs.

Community Service: The new facility can now serve as a refuge for the community in case of emergencies and disasters (e.g., Ice Storm 1998) – it was built to withstand earthquakes and other disasters. The new building was constructed with exterior power terminals used to hook up portable generators for emergency power. Both the Municipal building and the Fire Hall have exterior power terminals and all three can work as an emergency response team to provide refuge for residents in times of crisis. Therefore, the MDCHC is a vital part of emergency planning for the community.

4. Lessons Learned

A variety of lessons were learned during the course of the construction of the new District Community Health Centre in Merrickville. These lessons are elaborated upon below.

Process and design: MDCHC did not find that COIW2 applications sufficiently clarified appropriate funding mechanisms for local partner contributions. When MOH Community Health Branch proposed using COIW2 as a means to upgrade health services in Merrickville, MDCHC did not understand that its existing facility, or the equity from this facility, could not be used as collateral for the COIW2 project. As a result, MDCHC had to find alternative funding in order to fund its contribution of project costs. Ultimately, MDCHC financed its contribution partly by selling its former site and partly through a mortgage grant from the municipality.

It is important to note that since property cannot be used as funding collateral, the original project (i.e. renovation of old site) would not have been feasible. The Centre would have had to borrow 100% of its share of project costs – healthcare facilities in small towns like Merrickville often have limited fundraising capacities. The MDCHC would have appreciated more information from the federal and provincial governments on local partner funding options.

Project timelines: Section 11.1 of the Provincial Health Care Facility Infrastructure Agreement states that *"…time is of the essence in this Agreement and any dates or deadlines are to be strictly adhered to"*. In practice, however, the reality of the situation required flexibility, and the COIW2 program had to accommodate this by providing some leeway on timelines. While ultimately project authorities managed to resolve local issues that resulted in delays, MDCHC emphasized that longer program planning lead times would have provided for more efficient scheduling. It seems appropriate for Industry Canada and the Government of Ontario to consider relaxing timing guidelines for future infrastructure works projects (especially since in many instances, for good reasons, the tight timelines were not enforced anyway).

F. Road Upgrading, Sudbury

1. Profile

The City of Sudbury is located in northern Ontario. It is a dynamic and diversified community nestled in the midst of the beautiful Canadian Shield landscape that harbours some of the richest ore deposits in the world. Once a community totally dependent on nickel mining, Sudbury is now a progressive city serving a market of half a million people in Northern Ontario. Through an aggressive diversification plan, Sudbury has become a major centre for tourism, education, business and government, while also boasting unique amenities and specialized services.

a) COIW work

The City of Sudbury applied for, and received, funding from the COIW2 program for the "Sudbury Road Upgrading" project. This project involved asphalt resurfacing of 13 various City of Sudbury roads, as well as the replacement of deteriorated road components (i.e., storm sewer, asphalt, curb and gutter, and sidewalk) where required.

The proposed total project costs were $740,381, which required $246,794 from the Federal Government. The project finished less than $200 over budget.

b) Overview of the infrastructure work

The road resurfacing work consisted of spot repairs to existing infrastructure, replacing storm sewers, repairing curbs and gutters for better drainage, as well as rebuilding sidewalks and applying asphalt. The work required less effort than a complete road reconstruction, as the roadways did not yet have deteriorated sub-base pavement. The work completed included a range of upgrading efforts, including overlaying and minor improvement to grinding/milling and asphalt replacement.

The upgrades were completed on 13 different sections of urban roadways. The locations are shown in the table below.

Street	Location
Cochrane Street	Mathew to Mont Adam
Collins Drive	Balsam to Orford
Downland Avenue	Hawthorne to Lynnwood
Desloges Road	Richard Lake to east end
Hawthorne Drive	Hawthorne at Vine
John Street	Annie to Bayview
Logan Avenue	Quinn to Mary

Meadowside Avenue	Hudson to Brookfield
Pine Street	Eyre to Stanley
	Parkwood to Ethelbert
Shaughnessy Street	Brady to Vanhorne
Sunnyside Road	Hse. #532 to Hse. #442
Thomas Street	Notre Dame to west end
Torbay Road	in vicinity of Hse. #1835

The areas that received renewal work included collector roads with high traffic flows and bus routes as well as roads in built-up areas that had not been initially designed properly.

Due to the nature of the work (spot improvements of existing infrastructure) influx of funds from the private sector was not available.

The repair work was proposed to commence on June 30, 1997 and finish three months later on September 30, 1997. The actual infrastructure work did not start until September 22, 1997 and concluded just one month later on October 23, 1997.

2. Rationale

The City of Sudbury required the COIW2 funding to bring the needed construction work forward and to increase safety standards and remove physical barriers to accessibility. The resurfacing activities would not have proceeded at the same rate without the funding available through this program.

Sudbury currently has a backlog of road repair work. The annual operating budget for the city can only manage a small level of funding for infrastructure repairs. This translates into an average replacement frequency of approximately 220 years (vs. a required 60 years) and a repair/upgrading frequency of 50 years (vs. a required length of approximately 15 years) for all the roads. In addition, most of the roadways are rated “poor” on a 1 to 5 scale, with 5 being ‘poor’.

The municipality’s highest road responsibilities are the collector roads while the region manages the arterial roadways. In prioritizing the sections of road to include in the COIW2 funded project, levels of deterioration and the lack of previous repairs were taken into account.

A number of the road sections had deteriorated and posed a problem for motorists. For example, the Desloges Road is a road in a built-up area that used to be a seasonal cottage district. As the area built-up and the cottages became permanent residences, the traffic on the road increased to a constant usage. The road was not initially designed to current standards and therefore led to faster deterioration and poor driving conditions year round.

a) Environmental assessment

The application process ensured the City completed Schedule 3. This was done on June 13, 1997. There were no environmental issues with the application as the project occurred at 13 urban locations with no changes to road width or length, was within R.O.W., and was not near any waterways. The project did not require an EA as it was a prescribed project under subsection 15.

3. Benefits

The City of Sudbury and its citizens realized numerous benefits through the COIW2 project funding. These included:

a) Economic

Incrementality: This project would not have proceeded at the same rate without the funding available through this program. The resurfacing work was brought forward as the City did not have available operating funds in the current year to complete the necessary road renewal.

Employment: The project created direct employment for people in the area who work for the contractor and suppliers, totaling approximately 275 person-weeks of employment. The construction jobs that were created have also spun-off other economic benefits in the small northern community. This occurred through the purchase of goods and services in the community by the workers, as well as can lead to a potential expansion of operations of the more sustainable contractors.

Improved driving and lower costs: It is estimated that motorists face $300-$400 worth of repair and replacement costs to their vehicles every year when driving on poor roadways. By repairing the road surface, commuters eliminate these expenses and have more money to spend on goods and services.

b) Social

Accessibility: The resurfacing work contributed to increasing community safety standards and removing physical barriers to accessibility for disabled citizens by repairing sidewalks and creating sloped curbs. The resurfacing repairs increased the road standards to community levels and addressed the severe problems with poor road conditions.

Standards, codes and by-laws: The 13 various roadways were brought-up to current standards and the local infrastructure was improved. With properly resurfaced roads and intersections, driving conditions have improved.

c) Environment

Environmental protection: Through the replacement and repair of curbs and gutters, the drainage off the roadways has improved.

4. Lessons learned

The following lessons learned emerged from this case study.

Strategic priority areas: The experience of the road upgrades in Sudbury provide an example of one of the core infrastructure types of renewal work. Providing adequate roads and highways is considered to be a fundamental service for economic development schemes. Future infrastructure works programs should continue to support these kind of projects. These programs must be well defined, simple in process and requirements, and meet the needs of the communities. Local municipalities need to determine the strategic areas to direct their available funding.

Funding issues: As the transportation infrastructure within Ontario ages, increased funding is required to repair deteriorated and below-standard roadways. This will improve driving conditions, increase safety, and lower traffic congestion and emissions.

G. Construction of Storm Sewer and Replacement of a Water Main on Regent Street, Hawkesbury

1. Profile

The town of Hawkesbury, with a regional population of 20,000, is located east of Ottawa. The municipal officials of this town strive to maintain a sound infrastructure. The maintenance and building of sewers is an infrastructure element that must be reviewed and evaluated, as sewers respond to environmental concerns and contribute to the enhancement of the quality of life for all Hawkesbury residents.

a) COIW project overview

The Town of Hawkesbury applied for, and received, funding from the COIW2 program. The funding was needed for the construction of a storm sewer and the replacement of a water main on Regent Street from McGill Street to Stanley Street. The construction of a new storm sewer would diminish the current flow to the Water Pollution Control Plant, which was operating at 86.3% capacity — the plant has a capacity of 12,000 cubic meters per day.

The project entailed the construction of a storm sewer for the purpose of separating the current combined sanitary/storm sewer. The existing 8-inch diameter water main was replaced with a new water main, and shallow or lead water service connections to buildings on Regent Street, from McGill Street to Stanley Street, were replaced.

The initial cost for this project was $77,000. The eligible federal/provincial share was $25,997. An amendment was requested, as the estimated costs submitted by the consultant were lower than the actual costs. The amended total project costs were $132,331 and the amended federal share was $44,084.

The work for this project was to commence on August 18, 1997 and was to be completed by September 26, 1997. However, approval for the project was not received until October 3, 1997. Since the approval was received after the scheduled start date, the municipality had to postpone the work until the spring of 1998 due to the inclement weather in autumn.

2. Rationale

Funding from the Canada/Ontario Infrastructure Works program would enable the project to begin one year earlier. However, due to delays in the approval process, the project did not commence on schedule. However, as with any municipality, the

funding was needed to improve the physical infrastructure of the community and thus improving the quality of life for the inhabitants.

3. Benefits

Several benefits were realized from these two projects:

a) Economic

Employment: To complete this infrastructure project, 37 person-weeks of work were needed. These jobs were short-term and ended upon the completion of the project.

Incrementality: Funding from the COIW program enabled the project commencement date to be brought forward by one year.

Other economic: As the level of sewer water running through the Water Treatment Plant diminishes, fewer chemicals are needed to treat the water. The ultimate benefits of this project ensue from the health and safety aspects of a sewer and water main system complying with provincial standards.

b) Social

Community service: The maintenance of sewers helps maintain essential community services that Hawkesbury residents depend upon. By upgrading the water main on Regent Street, the water flow and the pressure along Main Street, the commercial core of Hawkesbury, has increased.

Standards, safety codes and by-laws: Community standards have improved as a result of the construction of the storm sewer. Residents expect a level of water flow or pressure that is comparable to those of other municipalities. This project succeeded in increasing the water flow and pressure as a result of the decrease flow to the Water Treatment Plant.

c) Environment

Environmental protection: The construction of the Storm Sewer and the Replacement of a Water Main will have a positive effect on the environment, as the project has successfully reduced the amount of combined sewers being sent to the Water Treatment Plant or directly to the Ottawa River during rainfalls. The construction of a storm sewer will lead to an increase in the storm flow to the Hawkesbury Creek, and to the diminishment in the amount of flow that is being treated at the Storm Water Treatment Plant.

4. Lessons learned

Strategic priority areas: A primary concern for a town/city/region is to maintain the physical infrastructure, the quality of life, and the economic viability of the

community. Funding received from the COIW2 program is needed and can be applied to many different types of infrastructure projects.

H. District Cooling Water System Expansion, City of Toronto

The City of Toronto is Canada's largest urban centre. The City has approximately 2.4 million residents within 632 sq. km. In addition, one third of Canada's population is located within 160-km radius of Toronto. As a result, a fully functional and effective key infrastructure system—including roads, bridges, and water/sewers—is a priority for municipal officials.

1. Profile

Toronto borders the northern shoreline of Lake Ontario, which provides access to a large pool of water for cooling purposes.

a) The TDHC/Enwave local partner

Enwave (previously known as the Toronto District Heating Corporation (TDHC)) was a not-for-profit, public utility established by an Act of provincial legislation in 1980. TDHC announced on March 20, 2000 that it has transformed itself into a new private-public partnership called Enwave, in order to recapitalize and explore new opportunities in Ontario's de-regulated energy market place.

One of North America's largest district energy companies, its mandate is to deliver district heating and cooling to a network of commercial and institutional facilities in downtown Toronto. Its customers include all three levels of government, several major teaching hospitals and a growing number of commercial buildings. The Enwave system is comprised of three central steam-generating plants, one central chilled water plant and an underground distribution network. Because of their central design and flexibility, district energy systems are environmentally superior, more energy efficient and therefore cost-competitive compared with other conventional systems.

Enwave currently supplies 25 per cent of the downtown energy requirements for space heating from its three steam plants, using a network of underground pipes.

b) COIW proposed work

The City of Toronto applied for, and received, funding from the COIW2 program for a number of projects. Specifically, the approved "District Cooling Water System Extension" project involved the first phase of a

massive infrastructure development within the downtown core to provide access to cold water cooling services from Lake Ontario.

The application for $4M of work prescribed a 33% federal share, for a funding contribution of $1,333,333.

c) Overview of activities

The COIW2-funded Phase 1 (District Water Cooling Extension project) extended the existing pipe network to enable the delivery of district cooling to both the Railway Lands East and the lower downtown area (from Front Street southwards). Presently, Enwave produces chilled water for air conditioning purposes using steam-fired absorption chillers at its new central cooling plant.

The pipeline extension is crucial to the development of Phase 2 (Deep Lake Water Cooling, or DLWC), a cooling technology with unprecedented energy efficiency and environmental benefits. Development and implementation of DLWC—a project estimated at $40 million—depends on the establishment of major customers in the target area, an intended result from the COIW2 funding.

Phase 2 is a $40M initiative, which was not funded by COIW2, but is conditional on the success of the extension of TDHC chilled water distribution line that was funded by the program. Phase 2 will install a new deeper water intake line at the Island Plant and upgrade the John Street Pumping Station and connecting bunk lines.

d) Breakdown of activities

Phase 1 of the project, the COIW2-funded District Cooling Water System Extension, installed new sections of an underground distribution system for chilled water for downtown office towers and other customers. The main undertaking of this phase was the installation of 1.2 metre diameter chilled water pipes in existing steam line tunnels.

The work did not require “open-cuts” to the downtown network of roads. Instead, the pipe laying was completed through 2 shafts in which the workers used to access the existing tunnels. However, once past the design phase and underground, the project management realized that the steam line tunnels were not large enough to accommodate two new 1.2m pipes (one for supply of cold water and one for return). Therefore, they determined a separate tunnel would be built through the bedrock specifically for the cold water pipes. As the new tunnel was constructed within defined safety parameters, the piping was laid. Location of the project was North on York Street from Bremner Blvd to Front Street; and east on Front Street to Younge Street.

The new pipe system was then linked with the harbour water intake and mechanical chillers. This currently supplies customers in the core downtown area with shallow water until Phase 2 enables a deep-water intake.

The work was proposed to commence Jun 30, 1997 and be completed by September 31, 1997. However, a revised application was submitted in Sept. 1997 to reflect the incrementality of the two-phased approach. The revised completion date was March 1998. Actual completion of Phase 1 occurred in June 1999 due to numerous delays including the need to build a new tunnel, the requirement for a Class EA, and a challenge by a potential district cooling system competitor.

2. Rationale

On June 4th, 1997 the Metro Toronto Council prioritized urban initiatives to request funding from the COIW2 program. The following table outlines the top three areas to be proposed for funding.

Priority	Project	Total Project Cost
1st	Works Department – District Cooling Water System Extension	$ 4M
2nd	Transportation Dept – Road Reconstruction (various locations)	$ 19M
3rd	Don Valley Parkway Illumination	$ 2M

The expansion was the top priority for infrastructure renewal due to the incremental benefits that could result from the project.

The District Cooling Water System Expansion was the top infrastructure renewal priority for the Metro Council. Since the COIW2 funding would allow the Phase 1 project to be completed at a much quicker pace, the larger, self-funded Phase 2 could then be implemented sooner. It was felt that this initiative was a high priority for the local community.

In addition, the success of Phase 2 requires the establishment of a critical base of customers—these office tower clients could only be secured once the network piping had been extended to reach the downtown core.

Metro Council had made arrangements for Enwave to provide the municipality's funding portion at no cost to municipal taxpayers or water rate payers. The future revenue stream from the new pipe system and recent restructuring would allow Enwave to raise the further infrastructure funding needed for Phase 2.[1]

a) Innovative technology

Specifically, the COIW2-funded Phase 1 extension project did not incorporate innovative technology, except for the tunnel construction that did not rip open the downtown roads. However, it is the first step to an innovative, sustainable and efficient energy technology available for the entire downtown core.

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[1] *All capital and operating costs related to the intake pipe, upgrading of John Street Pumping Station and connecting trunk lines, adaptation of Enwave central water handling facility and extension of Enwave chilled water distribution lines will be borne by Enwave, as an agreement with the Municipality of Metropolitan Toronto.*

The next step, Phase 2 – the DLWC project, will utilize innovative infrastructure improvements such as constructing a new 65-70 metre deep intake pipe which will prevent current silting and inconsistent water temperatures experienced with shallow water intakes. Overall, the DLWC is a cooling technology with unprecedented energy efficiency and environmental benefits.

b) Competition issues—Northwind

After the contractor had already tendered work on the pipe system extension, Northwind, a joint venture of Toronto Hydro, Ontario Hydro and Unicom Thermal Technologies, registered a competition-related complaint over the funding and application process. Northwind's proposal was to use off-peak power to produce ice during the night that could be used for daytime cooling.

Industry Canada had stated that they did not view competition as a valid concern given that there are no competitors currently operating a district cooling service. Metro responded to the competition concerns stating that the agreement with Enwave was not an exclusive agreement and that opportunities exist at other water filtration plants to develop a similar project using deep lake water cooling. Northwind's major issue was that the publicly funded pipe infrastructure would interfere with the competitive process as Northwind would have to build its own network and pass along the expense to its customers, while Enwave would not.

Intense communication between Northwind and the provincial and federal governments occurred, culminating in June 1998 when Toronto Hydro submitted a request, on behalf of Northwind, for an individual environmental assessment on the proposed project based on disagreement with its May 1998 assessment. The request was withdrawn on June 22, 1998 and the Enwave District Cooling Water Extension project was essentially given the "green light" to proceed.

c) Environmental assessment

Since the first application of the District Cooling Water System expansion did not entail renovation or renewal of a municipal water supply system, Phase 2 was incorporated into a revised application three-months later in September 1997. As part of the initial application, Schedule 3a was completed in June 1997 that concluded that the project was not excluded from examination under CEAA and Schedule 3b should proceed.

Phase 1 alone did not raise any major environmental issues as the pipeline extension was planned within existing steam tunnels. However, with Phase 2 now part of the revised COIW2 application, environmental issues arose from the installation of a new intake pipe at the Toronto Island Water Purification Plant. Phase 1 was screened on Feb. 24, 1998 and approved.

As part of the screening approval and in order to address the environmental issues, a condition was imposed stating that no federal/provincial funds would be disbursed for Phase 1, until all federal/provincial environmental requirements for Phase 2 had been fully met.

Subsequently, the environmental screening of Phase 2 was completed in May 1998. After a brief challenge by Toronto Hydro/Northwind the assessment was approved and the project was eligible for its funding. Therefore, due to the EA requirement, work tendered in the Spring of 1998 was not started until the summer.

3. Benefits

The City of Toronto and its citizens realized numerous benefits through the COIW2 project funding. These included:

a) Economic

Incrementality: The COIW2 funded Phase 1 allowed Enwave to expand its existing delivery infrastructure to the lower downtown area of Toronto and the Railway Lands East. The district water cooling pipe extension would have not proceeded in 1997 or 1998 without the support of the COIW program. Phase 1 was a key step for the larger, $40M Phase 2 deep lake water intake project. It was estimated that the COIW2 funding accelerated both phases by over one and a half years.

Many existing buildings in the core area needed to replace aging chillers, while a number of new buildings were nearing design completion. To have secured their business in anticipation of supplying them with DLWC in the near future—and to prevent the use of old, less energy-efficient technology that is dependent on ozone-depleting chemicals—Enwave's distribution network needed prompt extension to the downtown core in 1997/98.

By creating the infrastructure that will eventually be used with DLWC, the project was also the gateway to major improvements at the Metro Toronto Island Water Treatment Plant well as the design and construction of a major downtown District Cooling System intended to supply over 200 potential customer buildings.

Employment: Approximately 1,987 person-weeks of employment were created in the community. Most of these jobs occurred in the construction and engineering sectors. In addition, two long-term FTEs were hired to monitor the new system.

The project has enhanced the local skill base in the area of water cooling technology and has improved the pricing of the innovative cooling services. Expansion of the utility infrastructure will create an excellent opportunity for skilled tradespersons to gain experience in various aspects of utility and absorption equipment installation, and for professionals to learn from its

design and implementation. The later construction involved in the Deep Lake Water Project will require standard skills to be adapted to the use of renewable resources. Given the importance of sustainable development, this kind of specialization significantly enhances long-term skills.

Increased competitiveness: The project will enhance economic competitiveness in several ways. Many of Enwave's customers are public sector institutions and government. Because of the nature of a district system, the more customers it serves, the greater the potential for efficiency-related, system-wide savings; an extension of the distribution network translates into cost-savings that benefit all its customers, and therefore citizens of Toronto.

In addition to enabling Enwave to offer competitive cooling rates, district cooling services also reduce overhead, operating and maintenance costs in customer buildings. As building owners save money in these areas, occupancy costs can become lower. This in turn makes Metropolitan Toronto more competitive overall in terms of attracting public and private sector tenants and enables it to increase its tax revenue base.

The Municipality of Metropolitan Toronto, the Province of Ontario and the federal government have all made commitments to reduce the emissions that contribute to ozone depletion and global warning, *and* to minimize consumption of natural resources. Once implemented, DLWC will reduce energy consumption by up to 90% over conventional cooling methods.

Over the long-term, implementation of Phase 2 will improve pricing of public services in the following ways:

- improve the value received by the taxpayer for the capital already invested in the plant;
- the low temperature raw water will have lower algae levels and no zebra mussels, thereby reducing the need for prechlorination, the addition of alum and the production of trihalomethanes (chloro-organics);
- eliminate the need to install activated carbon filtration at the Island Filtration Plant at a minimum cost of $11 million;
- reduce the costs incurred by water treatment, maintenance, equipment purchase, water refrigeration in summer and water heating in winter; and
- ultimately provide a revenue stream to Metro through fees charged to Enwave by Metro for the energy transfer from Metro's water to Enwave’s chilled water return lines.

Other benefits: By enabling the supply of district cooling to this part of the municipality, the project will result in significant energy and cost savings compared with conventional thermal energy-based cooling systems. In

addition, atmospheric emissions will be reduced and the use of ozone-depleting, CFC-based refrigerants will be eliminated completely.

Consumers can readily enter into long-term, 20-year agreements and benefit from uncoupling from the energy market, which is subject to market price swings.

b) Social

Standards, safety codes and by-laws: The tunnels and pipes in Phase 1 were constructed according to current safety and construction standards and were compliant with American Water Works Association (AWWA) standards. This included tunneling at least two tunnel-diameters (i.e., 2.4 metres) below the Subway tunnels.

The accelerated Phase 2 will replace two of the oldest intake pipes in Metro system with longer, deeper intake pipe, upgrade John Street Pumping Station and connecting trunk lines and conserve energy currently expended on summer water refrigeration and winter water heating. These intakes are also subject to nearshore effects and warming during the summer months. Also, water taken from much lower depths will have less taste and odour-causing agents, resulting in less customer sensitivity to taste and odour.

c) Environment

Energy Efficiency: District energy's basic design—a central plant that feeds many buildings via an extensive distribution network—leads to better operating efficiencies that automatically lowers fuel consumption and therefore harmful emissions. Multiple, individual cooling towers are eliminated; in Enwave's case, lake water is used for heat rejection in its cooling system, eliminating cooling towers altogether—as well as the visual pollution, noise and humidity they generate. District cooling eliminates the use of CFC-based refrigerants, thereby improving the greater environment for the general public as well as the working environment of anyone in direct contact with the system through maintenance and operation work.

The major environmental benefits resulting from the District Cooling Water System expansion project derive primarily from the follow-on phase involving the deep lake water intake.

Because it is a virtually non-mechanical process, DLWC uses up to 90% less energy than conventional systems; the potential for emission reduction once implemented is therefore significant. In addition, DLWC relies on a naturally occurring and endlessly renewable thermal layer of lake water that is permanently just above freezing (4 degrees C), making it completely sustainable.

The environmental benefits upon completion of both phases include:

- energy reduction of up to 90% over conventional chillers and therefore major emission reductions;
- total elimination of CFCs, HCFCs and HFCs;
- elimination of noise, visual pollution and humidity from chillers, fans and cooling towers,
- significant reduction of fossil fuel imports to supply summer peak cooling loads, and
- no adverse environmental impacts on lake.

4. Lessons learned

The following are lessons learned from the "District Water Cooling Extension" project.

Project timelines: Funding schemes for infrastructure and capital projects can not be tied to government fiscal years with short implementation horizons. A project like the District Cooling Water System Expansion and its second phase needs longer-term continuity and less uncertainty. With a longer-term approach to the program, projects can be proposed and analyzed based on the return on investment and direct environmental benefits.

Strategic priority areas: In the initial design and application phases of this case study, there was a question as to whether the system extension part of this project was eligible for infrastructure funding. As a result, there was a delay in the application process. The program guidelines stated that a project of this type only required that it involve "pipes that carry water." Discrepancy over whether the system extension was eligible as a stand-alone project, forced Phase 2 to be added to the proposal. To address strategic priorities adequately, future infrastructure works programs may need to provide greater clarity in the definition of eligible projects.

I. Glen Road Bridge Reconstruction, City of Toronto

1. Profile

The City of Toronto applied for, and received, funding from the COIW2 program. The approved "Glen Road Bridge Reconstruction" project involved the renewal and replacement of the bridge deck and sidewalks, which is an enhancement of the overall structure of the Glen Road Bridge.

The $1,800,000 project proposed $600,000 in federal funding through COIW2. The final cost was under budget with a total expenditure of $1,787,180. The Final federal share amounted to $595,727.

a) Overview of the situation

The Glen Road Bridge lies between South Drive and Highland Avenue, approximately 1/2 km north of Bloor Street in the Rosedale residential community north of downtown Toronto. This section of Glen Road functions as a residential collector street, serving Rosedale neighbourhood residents. It carries traffic in the order of 6,000 vehicles per day is well as a Toronto Transit Commission bus route.

The bridge was constructed in 1928 and spans a distance of 195m over the Rosedale Valley Ravine. The bridge consists of concrete piers and a concrete deck with asphalt riding surface on a steel arch center span and 3 steel girder spans at each end. The last major repair work on the bridge was carried out in 1961 consisting of repairs to the deck and sidewalk.

Replacement of the bridge deck was included in Progress Report No. 2 on City of Toronto Bridges and Underpasses for the period 2007 - 2016. However, in 1992 a limited bridge condition survey was carried out by Morrison Hershfield Limited Consulting Engineers which identified that the concrete deck, especially the approach spans and file sidewalk areas, were in very poor condition with deterioration to a depth of almost 70% of the deck surface. It was recommended that the deck be replaced within the next few years. In 1996, sections of the sidewalk fell away leaving holes that had to be temporarily covered with plywood forms.

b) Infrastructure renewal activities

Further details on the infrastructure renewal work completed on the historically significant bridge are outlined below.

Before the COIW2 funding opportunity, the Glen Road Bridge had emergency repair work to fix various components such as the falling sidewalks. The bridge did not get serious funding attention as many other arterial bridges required intensive repair work and were of higher priority. However, the various repairs amounted to short-term results as a bridge condition survey concluded that much of the bridge deck needed complete replacement.

The COIW2 project enabled a complete rehabilitation and enhancement to the overall structure of the bridge. Work included replacement of the entire bridge deck and sidewalks. The work also included rehabilitation of the parapet walls, as well as repairs to expansion joints and bearings.

The bridge's unique architecture was preserved in the renewal efforts to maintain an accurate looking structure within the community. While the bridge lies on a collector road for a residential community rather than a main arterial road, it represents an important link of the neighbourhood.

Effort was taken to preserve the wooded valley and the environment under the bridge to mitigate safety and environmental risks.

The work was proposed to commence on October 6th, 1997 and be completed by June 5th, 1998. However, actual rehabilitation work started on July 1, 1997 and concluded on November 11, 1998, approximately five months behind schedule. The delays were mainly due to the short construction season, project timing and the need for public consultation.

2. Rationale

The city uses a Bridge Management System to determine the repair work required on an on-going basis. This system categorizes bridges by age and condition using a computer model to develop long-term infrastructure repair plans. As a bridge approaches its slated reconstruction date, an inventory is conducted to determine if the actual condition of the bridge requires work, and if so should it be brought forward, kept in the same schedule, or deferred. Metro Council proposed most of the bridge repair and reconstruction work in the original COIW program. In fact, the Glen Road Bridge was not due for reconstruction work until about 2002.

a) Why COIW?

Once the severity of the actual deteriorated condition of the bridge surface and sidewalks become known, the project was added to Metro Council's proposed COIW2 projects.

The bridge represented a safety hazard to pedestrians and vehicles crossing the bridge, as well as to joggers, cyclists and others using the paths in the valley below. In addition, the poor state of the bridge created an eyesore for the community.

b) Other issues

The rehabilitation work required an expanded completion deadline past March 31/98 due to unavoidable circumstances and prudent planning considerations, namely:

- **Local conditions—**The Glen Road Bridge is located in a sensitive area. Due to the sensitive nature of the bridge surroundings and topography, public consultations were held, city councillors were met with, and notices delivered door-to-door. They had to establish construction phasing and access that restricted hours of work, and created full or partial closures and associated detours.

- **Nature and scope of the work—**The Glen Road Bridge Rehabilitation Project was relatively complex and involved specialized consulting and construction services.

- **Lateness in the construction season—**Limited progress resulted during the winter work conditions.

c) Environmental assessment

Initially the project did not complete Schedule 3. They were requested to do so on October 8, 1997 after work had commenced. However, since the bridge does not cross a watercourse, the project did not require a complete Environmental Assessment pursuant to subsection 1. Furthermore, the project is approved under Section 14 of the EAA without conditions in accordance with the Class EA for Municipal Road Projects, Schedule A, dated June 1993.

3. Benefits

The City of Toronto, its citizens and visitors realized numerous benefits through the COIW2 project funding. These included:

a) Economic

Incrementality: The replacement of the concrete bridge deck was initially anticipated beyond 2005, but due to deterioration the replacement should have been carried out within 1-2 years at the time of the COIW2 program. Funds for this purpose had not yet been approved by City Council, so the program enabled the work to be brought forward a number of years.

The sidewalks would have been closed and the valley trails below barricaded for safety reasons if the reconstruction work was not brought forward. This

would have created problems for the community's commuters and residents, as well as users of the valley recreational paths.

In addition, the early implementation of the infrastructure renewal work has reduced emergency maintenance and repair expenditures by enhancing the overall structure.

Employment: Approximately 450 person-weeks of employment were created through the work, primarily in the construction sector. The Glen Road Bridge project did not result in any significant long-term job creation.

b) Social

Community standards: Major effort was taken to maintain the social and historical significance of the Glen Road Bridge. There were public consultations and three main elements were considered: the physical renewal work and the resulting physical structural changes, the mitigation of impacts on the ravine environment below, and the temporary effects on traffic flow as there were no alternative for going around the ravine.

The TTC was also brought in as project planning partners due to the effected bus route crossing the bridge. The implementation has also eliminated emergency maintenance and repair to the previously eroding sidewalks.

Standards, safety codes and by-laws: In order to maintain the historic value of the bridge, the reconstruction preserved the original look and feel of the structure. This means that the bridge had to be grandfathered into the new Bridge Code.

The reconstruction brought the bridge up to current safety and community standards. The sidewalks and vehicle lanes were improved and comply with safety requirements.

c) Environment

Environmental protection: The rehabilitation work has promoted the bridge's use and prevented further physical deterioration. In addition, the work did not increase the vehicle capacity of the bridge in order to maintain, but not increase, the traffic into the neighbourhood.

Construction efforts ensured that no construction material or debris was deposited within the ravine lands below or in the vicinity of the bridge. To protect the ravine, no construction work was undertaken from the valley floor and netting was erected to prevent debris from falling into the environment below.

Other benefits: There was a large positive impact to the community due to the high use (6,000 vehicles per day) and visibility of the bridge.

"As Ontario's capital, it is vital that Toronto have a strong transportation network. …These projects…will only add to the economic prosperity of the city."— Tony Clement, MPP

"Infrastructure renewal creates jobs, invigorates the economy and keeps our communities vital. These infrastructure projects enrich the quality of life for downtown Toronto residents."— Mr. Graham

"Toronto's ability to attract and retain investment will increase considerably. Investors are drawn to vital communities with healthy infrastructures."— Mel Lastman

4. Lessons learned

Project timelines: Found that the initial program time frame and intended results were ambitious. While this created momentum, it is harder to properly plan the work within a short construction season. Municipalities need more lead time for planning and re-arranging intended projects so as not to flood the construction market with work at any one time.

J. Reconstruction of Nine Roads, City of Toronto

1. Profile

The City of Toronto applied for, and received, funding from the COIW2 program. The approved "Reconstruction of Nine Roads" project involved full depth reconstruction of pavement structures, including boulevard treatment and traffic plant rehabilitation, as required, to nine proposed separate urban arterial road areas, for a total of 18km.

The $19M project resulted in $6.333M in federal funding through COIW2. The final cost was almost on budget with a slight overrun of $98K (or 1%).

a) Overview of activities

The application proposed nine road reconstruction activities within Metro Toronto, as shown in the table below.

Road	Reconstruction Area
York Mills Road	Bayview to York Ridge
Avenue Road	Dupont to St. Clair
Yonge Street	St. Clair to Eglinton
Yonge Street	Roxborough to Bloor
Yonge Street	Dundas to Carlton *
Lawrence Avenue	Yonge to Avenue Road
Finch Avenue	Weston to Islington
Old Weston Road	Dundas to CPR
Bathurst Street	Wilson to Sheppard

** While proposed, this activity was not undertaken.*

Due to cost overruns on other road reconstruction activities, the money for the Yonge Street-Dundas to Carlton reconstruction was re-allocated to the other eight activities.

b) Detailed infrastructure renewal work

Each of the eight road areas completed received the same type of work. All the roads underwent a complete reconstruction, which is much more intensive than resurfacing. In addition, minor operational changes and improvements were made where practical (i.e., addition of left turning lanes, stripping, etc.). It was not cost-effective for any of these roads to be re-surfaced since they required sub-base replacement due to age and level of use.

Road reconstruction involves the processes of ripping up the existing road to the sub-grade level. The road is then re-built from scratch with a sub-concrete

base, composite pavement and asphalt. In addition, new curbs and gutters are formed and the roads are re-graded. Sidewalks parallel to the roadways are completely redone and concrete outlines for crosswalks put in where required.

Work also involved upgrading the traffic signals and signs along the road areas being reconstructed. This involved various levels of repair work including replacing underground electrical components to installing new posts and signal lights.

The work was proposed to commence on September 1, 1997 and be completed within seven months by March 1998. Actual reconstruction work started one month early on August 1, 1997 to utilize the construction season, and was only completed on September 30, 1998.

2. Rational

The Metro Toronto Council was responsible for arterial roads within the city. The municipal government utilized a Pavement Management System to track and inventory road conditions and repair schedules. A citywide inventory was conducted every 2 years to determine the current state of each road. Then a computer model created simulated environmental conditions to determine and analyze potential aging and repair needs.

An arterial road with a high level of vehicle traffic generally has a 60-year life span. After the first 1/3rd of the life span (approximately 15-20 years) the road requires re-surfacing to repair damage from the combined effects of weather and traffic. Upon reaching the second 1/3rd milestone (approximately another 15-20 years later), another set of re-surfacing work must be done to maintain the road and prevent further damage. However, at the end of the life span (approximately 50-60 years) the road can not be simply re-surfaced again due to deterioration of the sub-base layer. Complete reconstruction of the road area is required at this time, although this work is five times more costly then resurfacing.

The Pavement Management System had indicated the top 20 or so road areas that required complete reconstruction. If these areas were not renewed the roads continue to deteriorate until money is found to reconstruct them. This provides an opportunity cost to the city and its inhabitants (i.e., through poor driving conditions, vehicle damage, unsafe pedestrian areas, etc.).

a) Why COIW?

Road reconstruction ranks about 3rd or 4th on the priority list for capital budgeting, so normally this area does not receive a lot of funding. While over 20 road-areas required reconstruction, the city selected the top 9 roads due to other initiatives it wished to receive funding.

Although the Pavement Management System identified a number of roads requiring reconstruction, money was not available in the operating budget.

b) Other issues

Traffic congestion is a major problem in Toronto. By reconstructing roads, the city can sustain the existing roadways for another 60 years of life. With improved road infrastructure, the city and its neighbourhoods realize less transportation costs to businesses and citizens.

c) Environmental assessment

An Environmental Assessment Process Schedule 3 was completed (June 27/97) before any road reconstruction work began. The project did not require a full assessment under CEAA, as it was an approved activity under Schedule A of the Class EA for Municipal Road Projects, dated June 1993.

The road reconstruction work was not located near the vicinity of any watercourses and all work was conducted within existing paved road areas. The project did not require an EA pursuant to subsection 1.

3. Benefits

The City of Toronto, its citizens and visitors realized numerous benefits through the COIW2 project funding. These included:

a) Economic

Incrementality: Without the COIW2 funding, the eight completed roads would not have received any rehabilitation work for a length of time. It was not cost effective to resurface the roads again since the sub-base layer needed replacement, and the roads would have continued to deteriorate. This deterioration could have sped up the damaging effects of weather and traffic for the years to come.

In addition, once drivers determine they do not want to drive on a poorly surfaced arterial road, there is a chance they may result to more residential roads to commute. This would reduce safety in these neighborhoods and accelerate the deterioration of the non-arterial roads. This issue was diverted as the reconstruction work was brought forward due to the COIW2 funding.

Employment: An estimated 14,896 person-weeks of employment were created through the road reconstruction work, approximately 76 person-weeks above the proposed level of employment. According to a Statistics Canada formula more than 253 short-term jobs were created as a result of the funding. Since the rehabilitation work was conducted in the “off-season”, construction would have had to hire new employees, thereby directly creating actual short-term jobs. No long-term jobs directly resulted from the reconstruction project.

Other benefits: Many of the road areas are in commercial districts. By improving the road and sidewalk conditions, the COIW2 funded project may

have made a further positive economic contribution by sprucing up the streets and the image of the communities to tourists and residents.

b) Social

Standards, safety codes and by-laws: The road reconstruction in eight locations brought up the arterial roadways up to current construction, engineering and design standards. The improved road infrastructure contributes to lower transportation costs to businesses and citizens.

The work restored the structural integrity of these core roadways, reducing long-term maintenance costs and improved public safety and traffic flows. By making minor operational improvements, such as left turn lanes and stripping, traffic flow has been enhanced. The replaced signal lights and posts, improved crosswalk areas, reconstructed sidewalks, and modern signage contribute to improved safety for both vehicle and pedestrian traffic.

The level of ride on the new pavement has improved which results in the economic benefit of less wear and tear on vehicles.

c) Environment

Environmental protection: The environment is improved through various indirect ways. The increased quality of the sidewalks and crosswalk areas encourages citizens to walk, cycle, or roller blade in a safer environment reducing the number of vehicles on the road. With improved traffic flow, less congestion and therefore less fossils fuel emissions occur. With better pavement surfaces, less wear and tear on the vehicles means less repairs and longer life spans.

Commuters in Metropolitan Toronto will benefit from safer travel and easier access to residential areas and businesses. They will enjoy smoother roads and improved sidewalks for many years to come.

"The Ontario Government recognizes the importance of keeping our province's road network safe and in good repair. Everyone using the routes, from commuters to employers, will notice the improvement."—Tony Clement, MPP

4. Lessons learned

The following are lessons learned from the "Reconstruction of Nine Roads" project:

Project timelines: Found the partnership between the city, provincial and federal governments worked fairly well. One major issue, however, was the time lag created in the approval process and the restricted ability to complete the project within the construction season.

Future infrastructure programs need to recognize the restraints of the construction season in Ontario. There should be a sufficient amount of lead-time for design and

planning. Due to the tight timeframe, the city took the risk of engaging the process by hiring design consultants before official approval.

Process and design: While not overwhelming, the paper work required seemed excessive. There was some difficulty experienced in the claims processing component.

Strategic priority areas: The experience of the nine roads reconstruction projects in this case study provide a good example of one of the core infrastructure types of renewal work. Providing adequate roads and highways is considered to be a fundamental service for economic development schemes. Future infrastructure works programs should continue to support these kinds of projects.

Appendix B

List of Interviews

List of Interviews

The following individuals (listed in alphabetical order) were interviewed for this report:

- Samuel Adopoe, Ontario Ministry Municipal Affairs and Housing
- Bill Bailey, Ontario Ministry of Training, Colleges and Universities
- Martin Bonhomme, Town of Hawkesbury
- Brian Booth, Industry Canada, Toronto
- Charles Brown, Ontario Ministry Transportation
- C.P. Caulfield, Queen's University, Kingston
- Gerry Cooper, Industry Canada, Toronto
- Joe Costantino, Ontario Ministry Transportation
- Aimee Dimatteo, Ministry Northern Development and Mines
- Rick Guyatt, Hamilton-Wentworth
- John Hamilton, Algonquin College, Ottawa
- George Heskaph, Ontario Ministry Transportation
- Robert Hilton, Treasury Board Secretariat, Ottawa
- Brigitte Hohn, Industry Canada, Toronto
- Andrew Kidobi, Ontario Ministry Transportation, COIW Secretariat
- Kevin Loughbourough, City of Toronto
- Wendy MacMillan, Hamilton-Wentworth
- Al Mathius, Ontario Ministry of Health
- A.E. McDonald, City of Mississauga

- Tom Mulligan, City of Toronto
- John Niedra, City of Toronto
- Beverly Ogilvie, Merrickville
- Mike Rushton, Algonquin College
- Nancy Smith, Ontario Ministry Municipal Affairs and Housing
- Steve Stoddard, Town of Winchester
- Howie Wilcox, Ministry Northern Development and Mines
- Georgia Wood, Hamilton-Wentworth

Appendix C

Documents Reviewed

Documents Reviewed

In conducting the COIW2 evaluation, the project team reviewed and analyzed a number of documents from a variety of sources to collect relevant data. These included:

- *Canada-Ontario Infrastructure Works Agreement Amendment (1)*, August 1996
- *Canada-Ontario Infrastructure Works Agreement Amendment (2)*, May 1997
- *Canada-Ontario Infrastructure Works Agreement Amendment (3)*, December 1997
- *Canada-Ontario Infrastructure Works Agreement*, 1994
- Canada-Ontario Infrastructure Works Program Extension, *Application Guidelines and Requirements*
- Ekos Research Associates, *Evaluation Framework Report for the Canada-Ontario Infrastructure Works Program Extension*, 1999
- *Globe and Mail*
- Government of Canada, *Federal Budget*, 2000
- Industry Canada, COIW2 Correspondence
- Industry Canada, Project Files
- Office of the Auditor General, various reports, 1996 – 1999.
- *Ottawa Citizen*
- PIRS Database, Industry Canada
- Richard Soberman, *Review of the Canadian Infrastructure Works Program*, 1996.
- *Toronto Star*
- Treasury Board, *Review of the Canada Infrastructure Works Program*, 1996.

Appendix D

Sites Visited

Sites Visited

As the chart below shows, KPMG consultants visited 8 of the 14 project sites included in the report's case studies. When assessing the impacts of infrastructure improvements, it is often helpful to view first-hand actual project results. In particular, it seemed appropriate to visit project sites where tangible infrastructure improvements were made – road-widening projects did not require visits with the same urgency as did building erection/upgrade projects. Nevertheless, KPMG did visit at least one project associated with each COIW2 strategic priority area.

Strategic Priority Area	Infrastructure Project	Location
Roads and Highways	Highway 31 resurfacing	Winchester
Education	Algonquin College	Nepean
Education	Queen's University	Kingston
Health Care	District Community Health Centre	Merrickville
Health Care	Macassa Lodge	Hamilton-Wentworth
Municipal	9 roads (3 sections)	Toronto
Municipal	Glen Road Bridge	Toronto
Municipal	District Water Cooling System	Toronto

Appendix E

Interview Questions

Interview Questions

The following questions guided our interviews with COIW2 project authorities. These questions are consistent with both the *COIW2 Evaluation Framework* and with Treasury Board Guidelines for program evaluation.

Local Contact Interview Questions for each project:

1. Please briefly describe the infrastructure work done in this project under the COIW2 program?

2. What were/are the benefits of the project to the community?

3. What were/are the impacts of the project on local employment?

4. Other than employment, were/are there any other economic benefits of the project?

5. Were/are there any social benefits of the project?

6. Did the project result in any new investments in the community by the private sector?

7. Did local partners participate in the project, to provide additional investments or other contributions?

8. Did the project raise the infrastructure to community standards, codes and/or by-laws?

9. If an environmental impacts assessment was done for this project, what were the results of this assessment?

10. How well did the federal/provincial/municipal partnerships work in securing the necessary funding for this project?

11. What are the lessons learned from this project, which could be applied to future programs such as COIW2?

12. Any other comments?

Appendix F

File Review Template

File Review Template

KPMG used the template below to record information found in COIW2 project files. The subjects in the left-hand column of the template are consistent with issues raised in the *COIW2 Evaluation Framework* and with COIW2 program objectives. The data collected using this template is contained in a separate report submitted by KPMG to Industry Canada entitled: "Case Study File Data".

	INFORMATION OBTAINED FROM FILES
Title of project	
Type of project (health, road, education, etc.)	
Location	
Summary description of project	
Name of contact person	
Phone of contact person	
Estimated cost of project at start	
COIW2 contribution at start	
Estimated person-weeks directly created by project	
Estimated long-term jobs created by projects	
Proposed start date	
Proposed completion date	
Description of infrastructure renewed by project	
Enhanced competitiveness as a result of project	
Use of innovative technologies	
Brining infrastructure up to community standard, codes and by-laws	
Enhancing long-term skills in the workforce	
Enhancing environmental quality and sustainability	
Innovative financing	
Overall anticipated impacts	
Comments about incrementality	
Description of amendments (including scope of work, costs, employment effects, etc.)	
Comments on environmental	

assessment review (was it done? Any issues?)	
Federal share of costs (final)	
Other costs (final)	
Project start date (from final report)	
Project completion date (from final report)	
Other comments/issues about project that could be of interest to the evaluation	