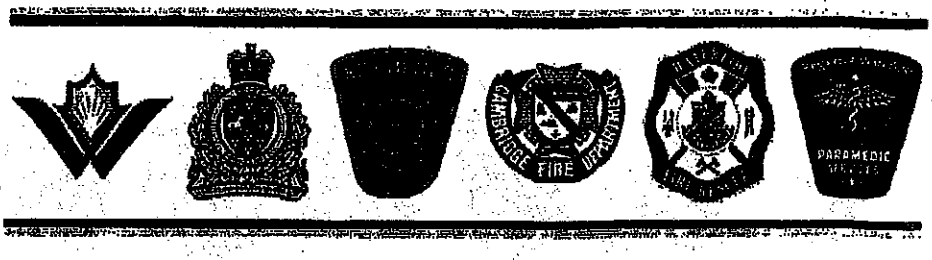

IMPLEMENTATION REPORT

COMMON TECHNOLOGY PLATFORM FOR POLICE AND FIRE DISPATCH IN WATERLOO REGION

CHIEF BRYAN LARKIN
WATERLOO REGIONAL POLICE SERVICE

CHIEF JON REHILL
KITCHENER FIRE DEPARTMENT

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CAMBRIDGE FIRE DEPARTMENT

CHIEF RICHARD HEPDITCH
WATERLOO FIRE RESCUE

CHIEF STEPHEN VAN VALKENBURG
REGION OF WATERLOO PARAMEDIC SERVICES

APRIL 4, 2017

IMPLEMENTATION REPORT:

COMMON TECHNOLOGY PLATFORM FOR POLICE AND FIRE DISPATCH IN WATERLOO REGION

APEXPRO CONSULTING INC.

APRIL 4, 2017

APEXPRO CONSULTING INC.

EXCELLENCE COMMITMENT PARTNERSHIP – EVERY CLIENT! EVERY TIME!

30 KARL CRT., THORNHILL ON L4J 8H7 CANADA

April 4, 2017

Mr. Mark Bullock
Inspector, Operational Support Division
Waterloo Regional Police Services
200 Maple Grove Road
Cambridge, ON N3H 5M1

Dear Sir:

IMPLEMENTATION REPORT: COMMON TECHNOLOGY PLATFORM FOR POLICE AND FIRE DISPATCH IN WATERLOO REGION

It is with great pleasure that we submit this report on behalf of the Project Implementation Team.

The report contains relevant information that will enable project participants - *Waterloo Region and the cities of Kitchener, Cambridge and Waterloo* - to implement a common technology platform for Police and Fire dispatch, based on an expansion of the Intergraph CAD system used by WRPS.

The report is supported by prior research sponsored by the Region of Waterloo; analyses and insights contributed by Project Team members; and a Statement of Work/Cost Proposal supplied by the Intergraph CAD vendor, HEXAGON Safety and Infrastructure.

The report contents include: a description of the proposed dispatch model; a project implementation plan; project resourcing and cost estimates; and a proposed cost apportionment arrangement.

The project implementation plan assumes that fire's transition to the Intergraph CAD will be undertaken concurrently with the project to replace the Region's public-safety grade voice radio communications system; this, to attain cost savings from concurrent project implementation.

The Fire CAD project will take about 16 months to implement. Since the new radio system is scheduled to go live by the end of 2018, commencement of the Fire CAD project will be targeted to June 1, 2017 (subject to budget approvals), with completion by September 2018.

.... / 2

April 4, 2017

Mark Bullock, Inspector Operational Support, Waterloo Regional Police Services

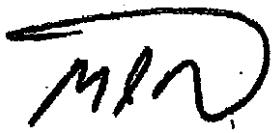
Project oversight will be provided by a Steering Committee that includes senior management representation from WRPS, and the fire departments of Cambridge, Kitchener and Waterloo. WRPS will chair the Steering Committee.

WRPS will also lead the Project Implementation Team. The team will include subject matter experts from WRPS IT Division, and the Cambridge and Kitchener fire departments. They will interact extensively with all key stakeholders, including the four township fire departments (Woolwich, Wellesley, Wilmot and North Dumfries).

It is incumbent upon project participants to work with the information contained in this report in the development of their related business plans, to ensure the successful and timely implementation of the Fire CAD project.

Thank you for giving us the opportunity to serve as consultant facilitator for the development of this document.

APEXPRO CONSULTING INC.



Marvin Rubinstein
President

Enc.

c.c. Project Implementation Team

Mark Bullock, Inspector, Operational Support, Waterloo Regional Police Services (Project Manager)
Robert Hilhorst, Director, Information and Technology, Waterloo Regional Police Services
Jon Rehill, Fire Chief, Kitchener Fire
Dimetra Resendes, Manager Emergency Communications, Kitchener Fire
Neil Main, Fire Chief, Cambridge Fire
Brian Arnold, Deputy Fire Chief, Cambridge Fire
Richard Hepditch, Fire Chief, Waterloo Fire
Stephen Van Valkenburg, Chief, Waterloo Regional Paramedic Services

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1 INTRODUCTION

1.1 Historical Context

The development of a contemporary, emergency dispatch system for the Region of Waterloo – *one that fully integrates 9-1-1 call taking with dispatch services for police, fire and EMS* – has been a recommendation advocated repeatedly by elected officials, public safety leaders, consultants and stakeholders across the Region, for over 20 years.

- 1996: Regional dispatch services are discussed in the context of local government reform. Kitchener Fire assumes responsibility for dispatching Waterloo Fire, and becomes responsible for all fire dispatching north of Highway 401.
- 1998-99: Area Chiefs undertake and present the findings of a road tour of multiple, consolidated dispatch services.
- 2001: Terrorist attacks on September 11, 2001 elevate awareness to improve interoperability of communications between emergency responder agencies.
- 2007-09: A Dispatch Model Working Group is formed. A report by PSTG Consulting presents options for decreasing emergency services response times.
- 2012: Transportation Safety Board releases its report on a fatal 2011 helicopter crash, which includes recommendations for improving inter-agency communications in the region
- 2014: A feasibility report by L.R. Kimball Consulting concludes that full integration of emergency dispatch services in Waterloo Region is feasible; however, MOHLTC is not prepared to participate, and acceptable arrangements for governance, labour, funding and cost-sharing are major challenges that would need to be addressed.
- Kimball also concludes that, although MOHLTC is not prepared to participate, significant benefits can still be achieved by consolidating 9-1-1 with police and fire dispatch.
- **June 2014: A recommendation to implement a common technology platform for Police and Fire dispatch is tabled at an All Council Meeting. The recommendation is supported, as the first step forward in establishing a fully integrated emergency dispatch centre.**
- 2015-16: Kimball performs a functional review of fire CAD, which concludes that all fire CAD capabilities can be retained, or enhanced, if fire migrates on a shared basis, to the Intergraph CAD platform used by WRPS.
- 2016: Waterloo Region's 'Paramedic Services Master Plan (2017-2027)' supports migration over time, to a fully integrated emergency dispatch system.

1.2 Direction Forward

In January 2017, the CAOs and public safety leaders from Waterloo Region, and communities of Kitchener, Cambridge and Waterloo, convened to expedite *implementation of a common technology platform for Police and Fire dispatch*, as the first step forward in establishing a fully integrated emergency dispatch centre.

They agree on a model in which the Intergraph CAD system used by WRPS will be expanded to support the dispatch operations of the Cambridge and Kitchener fire departments, on a shared basis with WRPS. More specifically:

- Kitchener Fire will continue to dispatch fire resources for five municipalities north of Highway 401 (Kitchener, Waterloo, Woolwich, Wellesley and Wilmot). Cambridge Fire will continue to dispatch fire resources for two municipalities south of Highway 401 (Cambridge and North Dumfries).
- Kitchener and Cambridge fire departments will continue to dispatch individually, from their own facilities, using their own dispatch personnel, and their own established SOPs; however, going forward, they will deploy fire resources using the WRPS Intergraph CAD, on a shared basis with WRPS.

The proposed dispatch arrangement is sufficiently flexible to accommodate EMS dispatch as a potential future add-on.

In agreeing to move to *a common technology platform for Police and Fire dispatch* the group acknowledges that MOHLTC is not prepared to re-establish the EMS-TIF interface, currently used by Kitchener Fire, following the dispatch center's migration to the shared police-fire CAD platform; and that Waterloo Regional representatives will need to aggressively advocate the Ministry if access to TIF is to be maintained/re-established. [1]

1.3 Responsibility for Project Implementation

Responsibility for implementing the Fire CAD project is assigned to a Project Implementation Team represented by the following public safety organizations:

- Mark Bullock, Inspector, Operational Support, Waterloo Regional Police Services (serving as Project Manager)
- Robert Hilhorst, Director, Information and Technology, Waterloo Regional Police Services
- Jon Rehill, Fire Chief, Kitchener Fire
- Dimetra Resendes, Manager Emergency Communications, Kitchener Fire
- Neil Main, Fire Chief, Cambridge Fire
- Brian Arnold, Deputy Fire Chief, Cambridge Fire
- Richard Hepditch, Fire Chief, Waterloo Fire
- Stephen Van Valkenburg, Chief, Waterloo Regional Paramedic Services
- Marvin Rubinstein, APEXPRO Consulting Inc. (consultant facilitator).

[1] The Kitchener Fire dispatch center is equipped with EMS-TIF, a CAD-to-CAD interface that enables automatic transfer of EMS calls from the Ministry's Central Ambulance Communications Center (CACC) under defined Tiered Response criteria. The Cambridge Fire dispatch center receives such requests by telephone. Equipping both fire dispatch centers with EMS-TIF would be the optimum scenario.

1.4 Implementation Report

This Implementation Report, prepared by the Project Implementation Team, contains relevant information that will enable project participants - *Waterloo Region and the cities of Kitchener, Cambridge and Waterloo* - to implement a common technology platform for Police and Fire dispatch, based on an expansion of the Intergraph CAD system used by WRPS.

The report is supported by prior research sponsored by the Region of Waterloo; analyses and insights contributed by Project Team members; and a Statement of Work/Cost Proposal supplied by the Intergraph CAD vendor, HEXAGON Safety and Infrastructure.

The report contents include: a description of the proposed dispatch model; a project implementation plan; project resourcing and cost estimates; and a proposed cost apportionment arrangement.

The project implementation plan assumes that fire's transition to the Intergraph CAD will be undertaken concurrently with the project to replace the Region's public-safety grade voice radio communications system; this, to attain cost savings from concurrent project implementation.

The Fire CAD project will take about 16 months to implement. Since the new radio system is scheduled to go live by the end of 2018, commencement of the Fire CAD project will be targeted to June 1, 2017 (subject to budget approvals), with completion by September 2018.

Project oversight will be provided by a Steering Committee that includes senior management representation from WRPS, and the fire departments of Cambridge, Kitchener and Waterloo. WRPS will chair the Steering Committee.

WRPS will also lead the Project Implementation Team. The team will include subject matter experts from WRPS IT Division, and the Cambridge and Kitchener fire departments. They will interact extensively with all key stakeholders, including the four township fire departments (Woolwich, Wellesley, Wilmot and North Dumfries).

It is incumbent upon project participants to work with the information contained in this report in the development of their related business plans, to ensure the successful and timely implementation of the Fire CAD project.

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+ 8718

2 CRITICAL ROLE OF A CONTEMPORARY EMERGENCY DISPATCH SYSTEM

Emergency communications plays a significant role within the continuum of police, fire and EMS public safety services.

As the 'first' of the first responders, communications center personnel serve as the critical link between callers and the emergency help they require.

Providing continuous coverage by way of telephone, radio and computer aided dispatch (CAD) systems, communications center personnel quickly and efficiently evaluate incoming 9-1-1 calls to determine the location, nature and urgency of each incident; and rapidly deploy critical emergency resources as required (i.e., police, fire and/or EMS).

In times of crisis it is not only the caller who relies on communications center personnel for assistance. Emergency service responders (police, fire and EMS) also rely heavily on communications center personnel for relevant information and auxiliary support that will ensure a rapid, effective, coordinated, and safe response.

Whether it is a police, fire or medical emergency, the dispatch system must meet the complex demands of an incident as it unfolds, and provide communications center personnel, as well as responders in the field, with the tools they require to:

- Rapidly answer emergency calls
- Create and update incident details
- Deploy critical emergency resources
- Import critical information from up-to-date mapping and other databases
- Coordinate a multi-agency response when required, and
- Manage / support multiple resources through real time interaction of live incident data.

Contemporary emergency dispatch systems are designed to fulfil these needs, by integrating and ensuring interoperability between a host of crucial components, including:

- Computer aided dispatch system (CAD)
- Radio and telephone systems
- In-vehicle mobile work stations (MWS)
- Portable communications devices (i.e., pagers and smartphones)
- Records management systems (RMS), and
- Reliable critical information interfaces, including GPS mapping, and GIS/AVL.

In short, a contemporary emergency dispatch system provides communications center personnel and responders in the field, with the tools and real time mission critical information, that enables them to respond together - rapidly, safely and effectively - to meet the complex demands of an emergency incident as it unfolds.

3 CURRENT EMERGENCY COMMUNICATIONS ENVIRONMENT

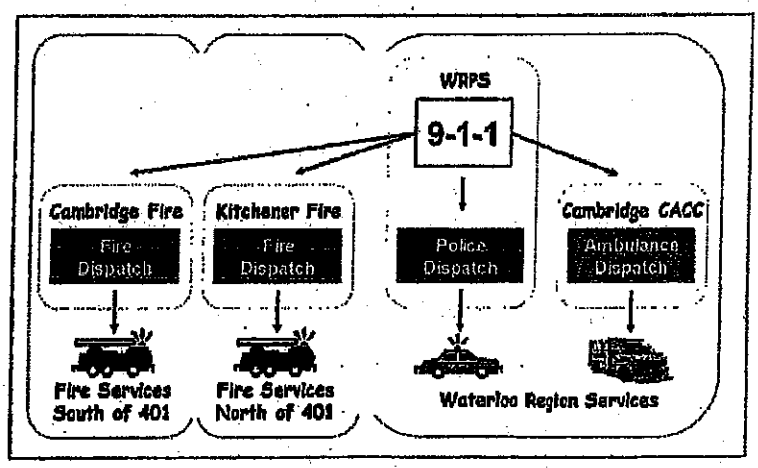
Waterloo Region is currently served by four (4) stand-alone, and independently managed emergency communications centers.

Waterloo Regional Police Services (WRPS) operates a fully integrated 9-1-1 / police communications center, which in addition to the 9-1-1 function, dispatches and coordinates the deployment of WRPS resources.

Emergency 9-1-1 calls requiring fire services are routed to the Kitchener Fire communications center, which dispatches fire resources for five municipalities north of Highway 401 (Kitchener, Waterloo, Woolwich, Wellesley and Wilmot), or to the Cambridge Fire communications center, which dispatches fire resources for two municipalities south of Highway 401 (Cambridge and North Dumfries).

Emergency 9-1-1 calls requiring paramedic services are routed to the Cambridge Central Ambulance Communications Center (CACC) operated by MOHLTC.

EXHIBIT 3.1: CURRENT 'STAND-ALONE' EMERGENCY COMMUNICATIONS ENVIRONMENT



3.1 WRPS 9-1-1 / Police Communications Center

Situated in WRPS headquarters, at 200 Maple Grove Road, in the City of Cambridge, this facility serves as primary Public Safety Answering Point (PSAP) for the Region, handling an annual call volume of about 130,000 incoming 9-1-1 emergency calls, and 170,000 non-emergency calls (that are received on 10-digit phone lines). The annual event volume, as recorded by CAD, is approximately 300,000 incidents a year.

Communications center staffing consists of: 2 managers; 5 supervisors; 2 training supervisors; 42 full-time communicators (call takers and dispatchers); and 16 part-time/temporary employees for communications backfill. Minimum staffing per shift is 10 communicators and 1 supervisor.

The center is outfitted with 21 work stations, which include: 12 for call taking; 4 for radio dispatch; 1 for backup radio dispatch; 2 for training; and 2 for supervisors. An additional 7 work stations, which are occasionally used for training, are located off site at an emergency backup communications center.

The center is equipped with a leading-edge Intergraph computer aided dispatch (CAD) system, with interfaces to:

- E9-1-1
- Integrated GIS/mapping
- GPS/AVL for vehicle and asset tracking
- Radio console
- Mobile wireless mapping, data and messaging
- Text/alphanumeric paging
- Integrated Niche records management system (RMS).

The technology systems are managed and maintained by WRPS IT personnel (i.e., analysts, programmers, technicians and administrators) whose range of expertise includes: computers, networks, software applications, business systems, data security, and mobile workstations.

3.2 Kitchener Fire Communications Center

Situated in the City of Kitchener Fire Department headquarters, at 270 Strasburg Road, this communications center dispatches the following fire resources north of Highway 401:

- Kitchener Fire – 7 stations staffed with career firefighters
- Waterloo Fire – 4 stations staffed with career firefighters
- Wellesley, Wilmot and Woolwich fire departments - 12 stations staffed by paid-on call firefighters.

The center handles approximately 19,650 fire and emergency incidents a year, including structure fires, outdoor fires, multi-vehicle collisions, and medical assist calls.

Most fire calls are routed from the primary PSAP at WRPS. Requests for medical assistance are received directly from Cambridge CACC, based on agreed upon tiered response arrangements. The Kitchener fire communications center is equipped with EMS-TIF, a CAD-to-CAD interface that enables automatic transfer of EMS calls from CACC under the tiered response criteria.

Communications center staffing consists of: 1 manager; 1 supervisor; and 12 full-time communicators serving as combined call taker/dispatcher. Minimum staffing is 2 communicators per shift.

The center is outfitted with 3 work stations; each equipped for call taking, and a CAD and radio dispatch console. It utilizes a Crisys Limited Xpert CAD and Fire software system for: call handling and dispatch; incident management; reporting; personnel and equipment management; and fire prevention. The CAD is equipped with an integrated GIS/mapping interface.

Fire station alerting is by way of a stand-alone Zetron base paging system. The system provides audible alert tone and dispatch announcement. Wellesley, Wilmot and Woolwich's paid-on call firefighters are paged out using portable pagers capable of text messaging.

For IT support, Kitchener Fire relies on technology vendors; Corporate IT; a Program Manager, Fire Systems and Projects; and a Fire Systems Specialist.

There currently are no mobile data terminals (MDT) or mobile work stations (MWS) on the system. MWS that interface with CAD, and a full suite of CAD functions, are being considered by both the Kitchener and Waterloo fire departments. [2]

3.3 Cambridge Fire Communications Center

Situated in the City of Cambridge Fire Department headquarters, at 1625 Bishop Street North, this communications center dispatches the following fire resources south of Highway 401:

- Cambridge Fire – 5 stations staffed with career firefighters
- North Dumfries Fire Department – 1 station staffed with paid-on call firefighters.

The center handles approximately 7,000 fire and emergency incidents a year, including structure fires, outdoor fires, multi-vehicle collisions, and medical assist calls.

Most fire calls are routed from the primary PSAP at WRPS. Requests for medical assistance are received directly from Cambridge CACC, based on agreed upon tiered response arrangements. Cambridge Fire communications center is not equipped with EMS-TIF. Calls for tiered assistance are received by telephone.

Communications center staffing consists of: Division Chief of Communications serving as manager; 5 full-time communicators serving as combined call taker/dispatcher; and 1 support technician. Four (4) of the five communicators are assigned to a platoon rotation. The 5th is a floater who works daytime during the week; and backfills for scheduled absences including vacation, and for unplanned absences due to illness, etc. When additional backfill is required, the center relies on firefighters trained in the communications function. Shift staffing is typically 1 communicator per shift, and 2 on weekday days.

The center is outfitted with 2 work stations; each equipped for call taking, and a CAD and radio dispatch console. It utilizes a Crisys Limited Xpert CAD and Fire software system for: call handling / dispatch; incident management; reporting; personnel and equipment management; and fire prevention. The CAD is equipped with an integrated GIS/mapping interface.

Fire station alerting is by way of a stand-alone Zetron base paging system. The system provides audible alert tone and dispatch announcement. North Dumfries' paid-on call firefighters are paged out using portable pagers capable of text messaging.

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[2] Mobile Data Terminals (MDT) operate using stand-alone software applications that are not interfaced with CAD. They are used predominately for mapping, routing, provision of relevant incident data, and for vehicle tracking if equipped with GPS/AVL. Mobile Work Stations (MWS) are in-vehicle hardware devices (computers / tablets) that interface with CAD, and a full suite of CAD functions, using Mobile for Public Safety software.

The communications center relies on the technology vendors for technical IT support.

There currently are 5 stand-alone MDT on the system (i.e., 5 frontline vehicles that are equipped with computers), with a 6th MDT expected in the short term (i.e., a frontline vehicle which is soon to be equipped with a tablet). Cambridge Fire advises that it will require 7 MWS, as follows: 6 to replace the existing/planned MDT plus 1 additional MWS, which is to be installed on a command vehicle. [3]

3.4 Cambridge Central Ambulance Communications Center

MOHLTC manages a province-wide system of Central Ambulance Communications Centers (CACC) that are responsible for dispatching municipal paramedic (land ambulance) resources. The Cambridge CACC situated at 15 Reuter Drive in the City of Cambridge, is responsible for dispatching the Waterloo Regional Paramedic Service. This CACC also serves to dispatch land ambulance services for portions of Oxford, Wellington and Dufferin counties.

The Cambridge CACC operates with a TriTech CAD system which is integrated with an E9-1-1 interface for caller location, ambulance dispatch and incident record management. The system also has built in provisions for emergency backup. Should Cambridge CACC go offline, a neighbouring CACC will immediately step in to provide emergency medical dispatch coverage.

CACC communicators and supervisors are well-trained, and are committed to supporting in-the-field paramedic services provided by Waterloo Region. Overall, the CACC's relationship with Waterloo Regional Paramedic Services is good.

Supported by a CAD interface known as Dispatch Priority Card Index V2.0 (DPCI2), CACC communicators prioritize each request for medical assistance, on a scale ranging from 'non-urgent' to 'life threatening'. They dispatch the closest available, and most suitable ambulance, to each 'life threatening' call.

Cambridge CACC dispatches Waterloo Regional Paramedic Services to approximately 40,000 medical incidents a year, generating about 45,000 ambulance responses. About 70% of ambulance responses are dispatched as 'life threatening' with lights and siren.

Fire Departments operating in Waterloo Region assist with medical calls, in accordance with terms set out in agreed-upon Tiered Response Agreements. Fire services dispatched by Kitchener Fire are tiered automatically using EMS-TIF, a CAD-to-CAD interface that enables automatic transfer of EMS calls from CACC to the Kitchener CAD system when a fire response is required. Cambridge Fire communications center is not equipped with EMS-TIF. They receive calls for tiered assistance by way of telephone.

[3] Mobile Data Terminals (MDT) operate using stand-alone software applications that are not interfaced with CAD. They are used predominately for mapping, routing, provision of relevant incident data, and for vehicle tracking if equipped with GPS/AVL. Mobile Work Stations (MWS) are in-vehicle hardware devices (computers / tablets) that interface with CAD, and a full suite of CAD functions, using Mobile for Public Safety software.

3.5 Regional Voice Radio System for Police and Fire

The Waterloo Regional voice radio system, EDACS, is a public-safety grade two-way voice radio communications for Waterloo Regional Police Service, municipal fire departments, and various other regional and municipal operations departments (principally Grand River Transit). The radio system serves as the primary link between 9-1-1 dispatch and police and fire personnel for all day-to-day communications and provides critical interoperability between all users in the event of a Region-wide emergency.

The EDACS system was originally installed in 1994 and since then, it has undergone several upgrades to ensure optimum performance and coverage. This notwithstanding, the system is past its end-of-life cycle, and current challenges / difficulties include:

- Obtaining replacement parts and effective support services.
- System coverage and in-building penetration, particularly in the Cambridge area.
- The system will not readily accommodate NG9-1-1.
- The system does not support contemporary standards for interoperable, digital public safety radio communications, i.e., the Project 25 (P25) North American standards for public safety communication, established by the Association of Public-Safety Communications Officials (APCO).

The next evolution of the voice radio system is required by the end of 2018 to ensure system reliability. Waterloo Region is in the process of planning a full radio system replacement which will take advantage of the improvements associated with a digital system; provide increased functionality; and comply with P25 digital public safety radio communications standards established by APCO.

Motorola Solutions Canada Inc. was recently awarded the radio system replacement contract and the new radio system is scheduled to go live by the end of 2018.

3.6 Provincial Radio System for Ambulance Communications

Cambridge CACC and Waterloo Regional Paramedic Services use the Provincial Fleet NET trunked radio system for dispatch and day-to-day radio communications.

The system consists of a Motorola Smart Zone Type II system licensed and operated in the VHF radio spectrum. Waterloo Regional Paramedic Services units have some capabilities to operate on the Region's EDACS system, but in accordance with MOHLTC policy, that is not a common practice.

4 CASE FOR CONSOLIDATING POLICE & FIRE DISPATCH TECHNOLOGY

4.1 Challenges in the Current Emergency Communications Environment

Although each of the four communications centers is staffed with well trained, dedicated employees that perform excellent work, the current 'stand-alone' emergency communications environment is deficient in key areas including:

- The communications centers operate under autonomous governance structures and mandates, with training programs and operating procedures that are uniquely designed to attain and support their respective emergency responder activities.
- Their operations are supported by individual CAD systems and backup solutions that vary in age and technological capability.
- The separation of police, fire and EMS communications creates a disjointed environment where 9-1-1 calls are often transferred one or more times to receive required services from police, fire and EMS.
- Tiered call taking causes duplication, contributes to time delays, and adversely affects response times.
- The physical, management and technological separation of communications centers hinders interoperability and coordination among agencies.
- The more centers involved in responding to an incident, the more opportunity for human error, especially under high-stress conditions.
- Operating individually, there are limited opportunities for each center (particularly those of smaller scale) to upgrade technology, enhance training, or to improve QC/QA and business supports.

4.2 A Fully Integrated Dispatch Would Be the Optimum Model

Based on North American leading practices, a 'fully integrated' emergency communications services system designed to deliver 9-1-1 on an integrated basis with dispatch services for police, fire and EMS, would be the optimum model for Waterloo Region.

This also is the view that has been advocated repeatedly by elected officials, public safety leaders, consultants and stakeholders across Waterloo Region, for over 20 years.

Such models have been implemented in major centres across the USA, with several also in Canada. They include: Public Safety Communications, Calgary Alberta; Bureau of Emergency Communications, Portland Oregon; Public Safety Communications, Fairfax County Virginia; and Denver 911, Denver Colorado.

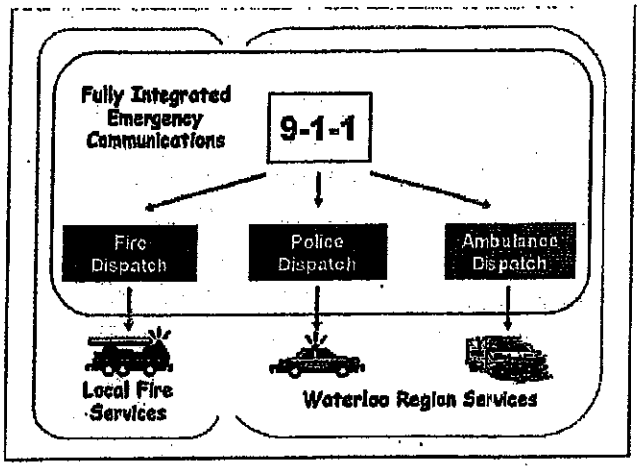
Partially integrated communications centers, delivering 9-1-1 with dispatch services for police and fire (but excluding dispatch for EMS) are also common, e.g.: Integrated Emergency Services, Halifax Nova Scotia, and E-Comm, Vancouver British Columbia.

The main features of 'fully integrated' emergency communications systems are listed below:

- Shared CAD, radio and telephone systems for maximum interoperability
- Co-location in a secure, purpose-built communications facility
- Integrated dispatch delivery by communications staff who are cross-trained to carry out multiple functions (9-1-1 and dispatch for police, fire and EMS)
- Organizational structure that supports effective management and operations
- Appropriate business and technological supports
- Accountability framework that promotes risk and quality management, including standardized SOPs, training and QC/QA procedures
- Governance framework that ensures client services, expectations, and reporting
- Functional independence, operating as a separate business unit
- Sustainable and stable source of capital and operating funds
- Agreed upon cost distribution arrangement
- Backup solutions to ensure uninterrupted delivery of critical services
- Responding agencies (police, fire and EMS) having direct access to their respective incident records.

Exhibit 4.1 is a concept drawing showing how such a model would apply to Waterloo Region.

EXHIBIT 4.1: FULLY INTEGRATED EMERGENCY COMMUNICATIONS



4.3 Moving Forward by Consolidating Dispatch Technology

A May 2014 feasibility report by L.R. Kimball Consulting concluded that full integration of emergency dispatch services in Waterloo Region is feasible; however, MOHLTC is not prepared to participate, and acceptable arrangements for governance, labour, funding and cost-sharing are major challenges that would need to be addressed.

The Kimball report also concluded that, although MOHLTC is not prepared to participate, significant benefits can still be achieved by consolidating 9-1-1 with police and fire dispatch.

A recommendation to implement a common technology platform for Police and Fire dispatch was tabled at an All Council Meeting in June 2014. The recommendation was supported, as the first step forward in establishing a fully integrated emergency dispatch centre.

In 2015-16, Kimball performed a functional review of fire CAD, which concluded that all fire CAD capabilities can be retained, or enhanced, if fire migrates on a shared basis, to the Intergraph CAD platform used by WRPS.

In January 2017, CAOs and public safety leaders from Waterloo Region, and communities of Kitchener, Cambridge and Waterloo, agreed on a model in which the Intergraph CAD system used by WRPS will be expanded to support the dispatch operations of the Cambridge and Kitchener fire departments, on a shared basis with WRPS. More specifically:

- Kitchener Fire will continue to dispatch fire resources for five municipalities north of Highway 401 (Kitchener, Waterloo, Woolwich, Wellesley and Wilmot). Cambridge Fire will continue to dispatch fire resources for two municipalities south of Highway 401 (Cambridge and North Dumfries).
- Kitchener and Cambridge fire departments will continue to dispatch independently, from their own facilities, using their own dispatch personnel, and their own established SOPs; however, going forward, they will deploy fire resources using the WRPS Intergraph CAD, on a shared basis with WRPS (i.e., using a common shared CAD platform configured in the same manner).

Other examples

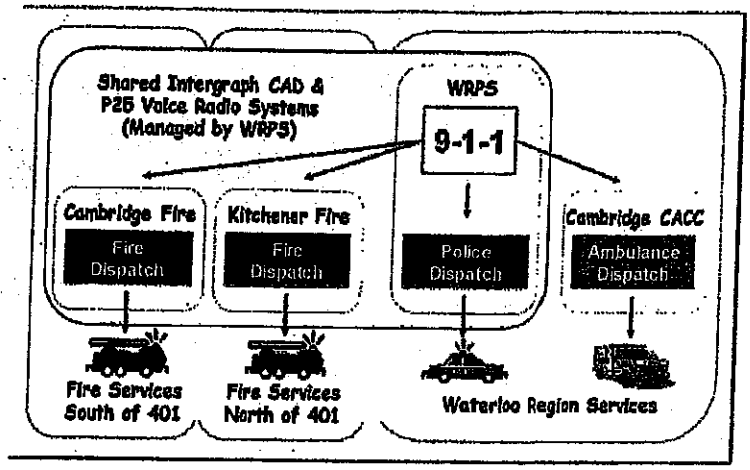
The proposed dispatch arrangement is similar to models implemented in many other North American jurisdictions, including:

- City of Ottawa, where the City's police and fire departments share CAD and radio systems (managed by the police department), but they continue to dispatch individually, from separately located stand-alone facilities, accessing the shared CAD system by way of a high-speed fibre optic network and wireless mobile devices.
- Region of York, where YRP, and the Vaughan and Richmond Hill fire departments, share CAD and radio systems managed by YRP, but they continue to dispatch individually, from separately located stand-alone facilities, accessing the shared CAD system by way of a high-speed fibre optic network and wireless mobile devices. Vaughan Fire dispatches two fire departments. Richmond Hill Fire dispatches six fire departments.

This proposed dispatch arrangement is sufficiently flexible to accommodate EMS dispatch as a potential future add-on.

A concept drawing showing how such a model will apply to Waterloo Region is shown in Exhibit 4.2 (next page).

EXHIBIT 4.2: COMMON TECHNOLOGY PLATFORM FOR POLICE AND FIRE DISPATCH



Listed below are the principal attributes for a model featuring a common technology platform for police and fire dispatch:

- Shared CAD, radio and telephone systems for maximum interoperability
- Primary server equipment and software reside at a secure communications center, situated in a police facility (the host)
- Clientele (fire and others) dispatch individually, from own facilities, accessing the shared CAD by way of a high-speed fibre optic network and wireless mobile devices
- Shared CAD system configured to client requirements, for confidentiality and security.
- Police IT personnel are responsible for system integrity and security. They manage the shared server equipment, software, and inter-connected devices on behalf of the clients.
- Data base management is centrally coordinated (by Police IT personnel) to ensure up-to-date mapping and consistency of other mission critical information
- Governance framework that ensures client services, expectations, and reporting
- Sustainable and stable source of capital and operating funds
- Agreed upon cost distribution arrangement
- Backup solutions to ensure uninterrupted delivery of critical services
- Responding agencies (clientele) having direct access to their respective incident records.

4.4 Potential Advantages / Benefits to Waterloo Region

Presented below (next page) are the potential advantages to Waterloo Region, from a 'fully integrated' emergency dispatch arrangement, and from a model featuring a 'common technology platform for police and fire dispatch'.

The information was assembled by the authors of this report, with some information coming from prior research, and some from interviews with senior management employed by full and partially-integrated dispatch centers in Canada and the U.S.A.

The assembled information affirms that significant benefits can be attained from a dispatch model featuring a 'common technology platform for police and fire dispatch'.

POTENTIAL ADVANTAGES / BENEFITS TO WATERLOO REGION	COMMON TECHNOLOGY (9-1-1, POLICE & FIRE)	FULLY INTEG'D DISPATCH (9-1-1, POLICE, FIRE & EMS)
Use of Shared Technology		
- Maximizes interoperability of communications, and improves utilization and coordination of police and fire resources.	√	√
- Contributes to functional streamlining, reduces duplication of call taker efforts, and expedites call processing and dispatch times, resulting in potentially faster on-scene times for police and fire.	√	√
- Increases response effectiveness by lowering the potential for human or technology errors.	√	√
- Enhances execution of a coordinated police/fire response to large scale incidents. Also, enhances an automatic aid or mutual aid.	√	√
- Facilitates information flow and exchange of mission critical information between responders in the field; thus, improving community and police/fire responder safety.	√	√
- Centrally coordinated data base management, ensuring up-to-date mapping and consistency of other relevant information.	√	√
Co-Location / Integrated Dispatch Delivery		
- Functional streamlining / elimination of call transfers between communications centers.	-	√
- Region-wide public safety focus. Improves situational awareness, and promotes a coordinated response.	-	√
- Helps to quickly identify and resolve conflicts, and confusion, that may arise during an emergency.	-	√
- Standardized SOPs, training and QC/QA procedures increase consistency and reliability of call taking and dispatching functions.	-	√
Advantages to Emergency Responding Agencies		
- Transfers responsibility for managing the technology systems to an organization dedicated to this purpose.	√	√
- Transfers responsibility for delivering emergency dispatch services to an organization dedicated to this purpose.	-	√
- Benefit from leading edge technological systems, and a stable source of funding that would not be otherwise feasible.	√	√
- High quality/reliable emergency dispatch services, that would not be otherwise financially or organizationally feasible.	-	√
- Dedicated IT support for: CAD; in-vehicle and portable mobile devices; and agency-specific technology add-ons (e.g., RMS).	√	√

POTENTIAL ADVANTAGES / BENEFITS TO WATERLOO REGION	COMMON TECHNOLOGY (9-1-1, POLICE & FIRE)	FULLY INTEG'D DISPATCH (9-1-1, POLICE, FIRE & EMS)
- Increased capability through collaboration and cost-sharing, to invest periodically in technology upgrades / new technology.	√	√
- Potential opportunities to standardize SOPs, training and QC/QA procedures, that would not be otherwise feasible.	-	√
- Expanded career opportunities for 'civilians' employed by communications centers, that would not be otherwise feasible.	-	√
Financial		
- Cost savings derived from shared technology (i.e., procurement, upgrades, connectivity, and maintenance).	√	√
- Shared systems will allow for new technology (i.e., P25 radio, NG 9-1-1, etc) to roll out seamlessly, without expensive interfaces.	√	√
- Cost savings derived from co-location and integrated dispatch delivery.	-	√

5 MAIN FEATURES OF THE PROPOSED DISPATCH ARRANGEMENT

5.1 Membership in the PRIDE Cooperative

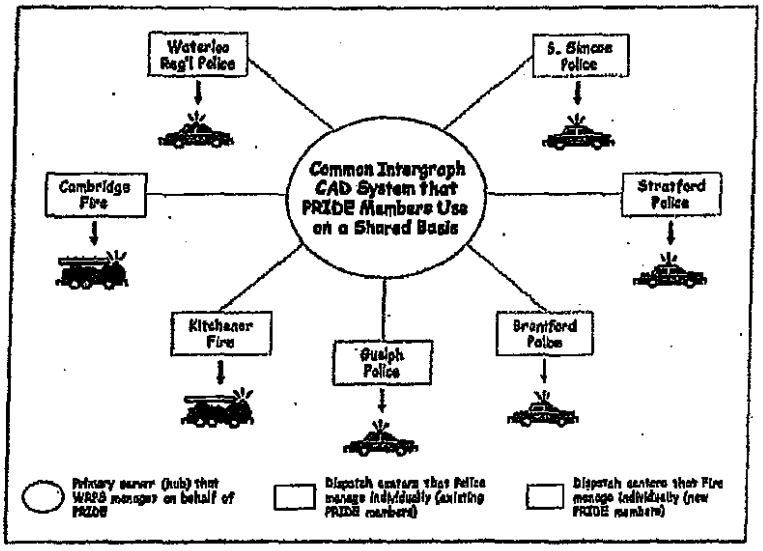
WRPS is a member of the Police Regionalized Information Data Entry (PRIDE) cooperative that deploys resources using a common Intergraph CAD platform, on a shared basis with the police departments of: Guelph, Brantford, Stratford, and South Simcoe.

Under the recommendation adopted by Waterloo Region, and communities of Kitchener, Cambridge and Waterloo, the PRIDE cooperative will be expanded to include Kitchener and Cambridge fire departments as new members, who will use the common Intergraph CAD infrastructure on a shared basis, to deploy fire resources throughout Waterloo Region.

5.2 Hub and Spoke Dispatch Arrangement

Exhibit 5.1 is a concept drawing showing the PRIDE cooperative arrangement with Kitchener and Cambridge fire departments as new members.

EXHIBIT 5.1: PRIDE COOPERATIVE ARRANGEMENT WITH THE ADDITION OF FIRE



Fundamentally, the PRIDE cooperative maintains a hub and spoke arrangement. The hub is where the primary server equipment and software reside. The resident systems are managed and maintained, round-the-clock, by WRPS IT personnel, who also coordinate database management to ensure up-to-date mapping and consistency of mission critical information.

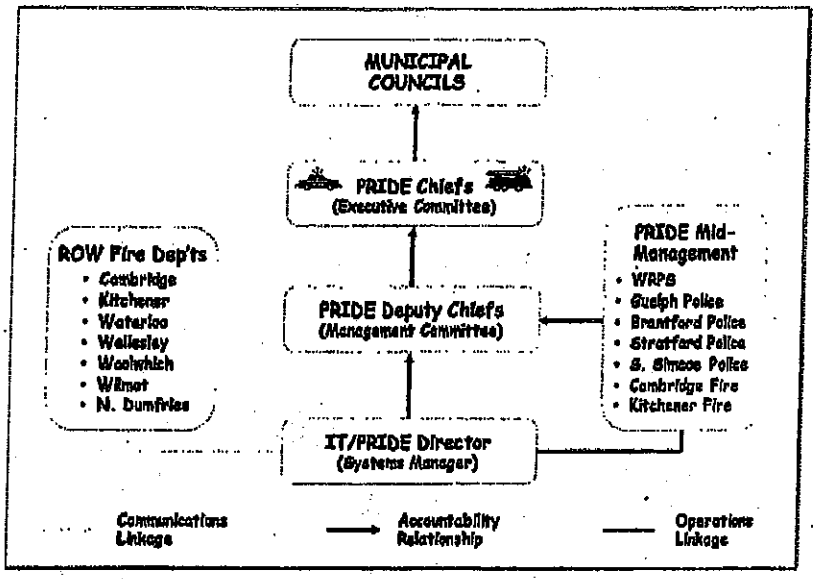
Dispatch centers that are managed individually by PRIDE agencies are the spoke installations, as they are fed by the WRPS infrastructure.

The spoke installations are connected to the hub by way of a high-speed fibre optic network and wireless mobile devices including laptops, smartphones and tablets. Individual dispatch centers are able to interact and share information electronically with both the hub, and the other centers on the system.

5.3 Governance Structure

The governance structure with the addition of Cambridge and Kitchener fire departments to the PRIDE cooperative is shown in Exhibit 5.2.

EXHIBIT 5.2: GOVERNANCE STRUCTURE WITH THE ADDITION OF FIRE



The current governance arrangement is as follows. WRPS is accountable for the integrity and security of the shared technology system, with the IT/PRIDE Director reporting to the Management Committee consisting of PRIDE Deputy Chiefs, and they in turn reporting to the Executive Committee consisting of PRIDE Chiefs. These accountability relationships are shown in blue.

The PRIDE Executive Committee recommends PRIDE policy for IT requirements, technology direction, budget and cost distribution. Budget recommendations are forwarded to the respective municipal councils for approval.

The PRIDE Management and Executive Committees will be expanded to include representatives from the Cambridge and Kitchener fire departments.

Kitchener Fire will continue to dispatch fire resources for five municipalities north of Highway 401 (Kitchener, Waterloo, Woolwich, Wellesley and Wilmot). Cambridge Fire will continue to dispatch fire resources for two municipalities south of Highway 401 (Cambridge and North Dumfries).

The WRPS IT unit will continue to manage and maintain the CAD server equipment, software and interconnected network devices, on behalf of the PRIDE cooperative, including Cambridge and Kitchener fire departments; this, as shown by the operations linkage in green.

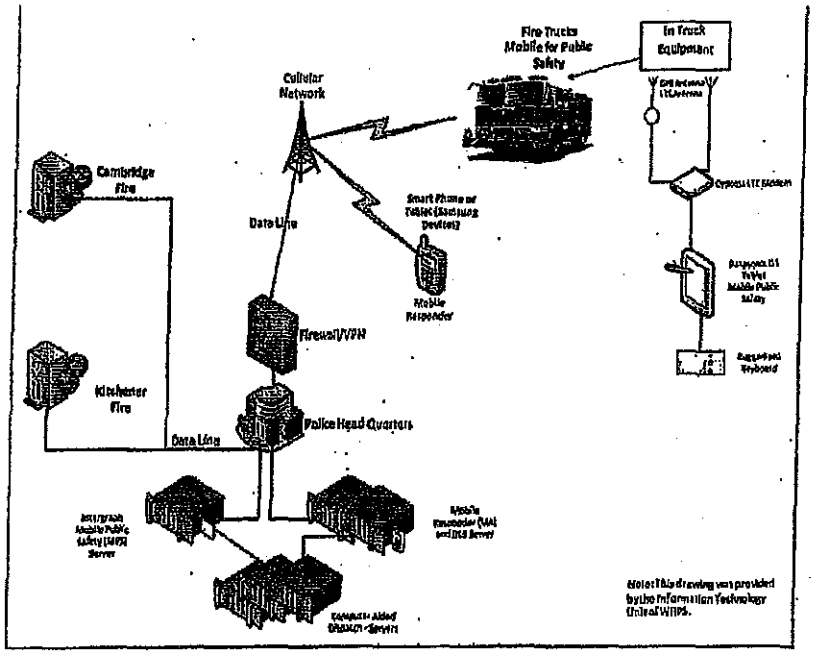
WRPS will continue to liaise with a host of stakeholders within the emergency services community, including the Intergraph CAD vendor, suppliers, consultants and other organizations.

Going forward, the stakeholders will include local fire services that are dispatched by Cambridge and Kitchener fire departments (i.e., the end users). WRPS will liaise with local fire services; this, in consultation with the Cambridge and Kitchener fire departments. Communications linkages are shown in yellow.

5.4 Fire Mobile Environment within the Hub and Spoke Arrangement

Exhibit 5.3 is a more detailed illustration of the Kitchener and Cambridge fire mobile environment within the hub and spoke arrangement.

EXHIBIT 5.3: FIRE MOBILE ENVIRONMENT



The main features of this fire mobile environment are listed below:

- Kitchener Fire will continue to dispatch fire resources for five municipalities north of Highway 401 (Kitchener, Waterloo, Woolwich, Wellesley and Wilmot). Cambridge Fire will continue to dispatch fire resources for two municipalities south of Highway 401 (Cambridge and North Dumfries).

- Kitchener and Cambridge fire departments will continue to dispatch individually, from their own facilities, using their own dispatch personnel, and their own established SOPs; however, going forward, they will deploy fire resources using the PRIDE Intergraph CAD, on a shared basis with WRPS and the other members of PRIDE.
- Primary server equipment and software will reside at a secure communications center (i.e., the hub) hosted by WRPS.
- Kitchener and Cambridge fire departments will access the shared CAD by way of a high-speed fibre optic network (i.e., high speed data lines that run from the individual spoke installations to the hub), and by in-vehicle and portable wireless mobile devices, including laptops, smartphones and tablets.
- WRPS IT personnel will be responsible for system integrity and security. They will continue to manage and maintain the primary server equipment and software; emergency backup solutions; the radio system; and the network inter-connected devices for all PRIDE members, including Kitchener and Cambridge fire departments. [4]
- WRPS IT personnel will also continue to centrally coordinate data base management, to ensure up-to-date mapping and consistency of mission critical information.

The main advantages of this hub and spoke dispatch arrangement are listed below.

- Kitchener and Cambridge fire departments will be secure in the knowledge that their emergency dispatch needs are sustained by reliable and resilient technology systems, with built-in emergency backup, that are managed and maintained by dedicated IT support, 24/7 – without having to maintain their own independent systems.
- Kitchener and Cambridge fire departments will maintain autonomy for call-taking and dispatch operations, using the common technology platform on a shared basis.
- Kitchener and Cambridge fire departments may continue to dispatch from existing fire response plans or, if there is agreement among participants, they may migrate to a common response plan for the Region; this, on the understanding that the systems are configured the same way for both fire dispatch centers.
- The common technology platform maximizes the sharing of information between Kitchener and Cambridge fire dispatch centers, while eliminating the need for each center to maintain their own independent system.
- Data base management is centrally coordinated on behalf of PRIDE members. This ensures that Kitchener and Cambridge fire departments will receive regular, consistent and timely mapping and mission critical information updates.

[4] City IT departments will be responsible for arranging feeds to fire sub-stations over City IT networks.

- Shared use of a common technology platform enhances redundancy and continuity of operations capability. Kitchener and Cambridge fire departments will be better positioned should they choose to serve as one-another's emergency backup.
- Shared use of a common technology platform enhances capabilities to train Kitchener and Cambridge fire personnel. Staff from any one of the member organizations can be used to train fire personnel, following a common training outline.

5.5 Buying Power of the Combined Group

As members of PRIDE, Kitchener and Cambridge fire departments will benefit financially from the buying power of the combined group, and a stable source of funding that would not be otherwise feasible. Benefits include:

- Cost savings from shared systems procurement, upgrades, connectivity, and maintenance.
- Increased capability through collaboration and cost-sharing, to invest in technology upgrades / new technology.
- Shared systems will also allow for new technology (i.e., P25 radio, NG 9-1-1, etc) to roll out seamlessly, without expensive interfaces.
- IT support personnel with expertise in many fields, are dedicated to the management and maintenance of the shared technology network and connected devices. IT resourcing to a similar level would not be otherwise feasible by individual agencies.

PRIDE members attain the above benefits, but avoid the complexities of having to negotiate new governance and labour relations arrangements, as would be required in the development of a fully-integrated dispatch model.

5.6 Configuration of CAD for Shared Use by WRPS and Fire

The Intergraph CAD system, which WRPS hosts on behalf of PRIDE, will be expanded to support the dispatch operations of the Cambridge and Kitchener fire departments. The expanded CAD system will include Fire communications servers, an integrated Fire CAD module, system interfaces, and incident management software.

The result will be an expanded CAD system for shared use by police and fire, similar to Intergraph CAD configurations currently in use in many Canadian and U.S. jurisdictions, including: Public Safety Communications Department, Calgary Alberta; and the Department of Public Safety Communications, Fairfax Virginia.

Hexagon Safety and Infrastructure will configure the Fire CAD module jointly with subject matter experts from Cambridge and Kitchener fire departments, by reviewing and aligning departmental workflows, graphical user interface needs, and other parameters. Workshop sessions dedicated to this objective are included in the Project Implementation Plan (in Section 6 of this document).

Following re-configuration, Cambridge and Kitchener fire departments will be supported by:

- Fire communications servers, and an integrated Fire CAD module (*ICAD*) that is specifically configured to the joint needs of Cambridge and Kitchener fire departments.
- *EdgeFrontier* (EF), an integration platform for interface development between systems, for integrating business processes, and for sharing data.
- Incident management software, including *Mobile for PublicSafety* (MPS) and *Intergraph Mobile Responder* (MR), which extend critical applications and information to field personnel on laptops, smartphones and tablets.

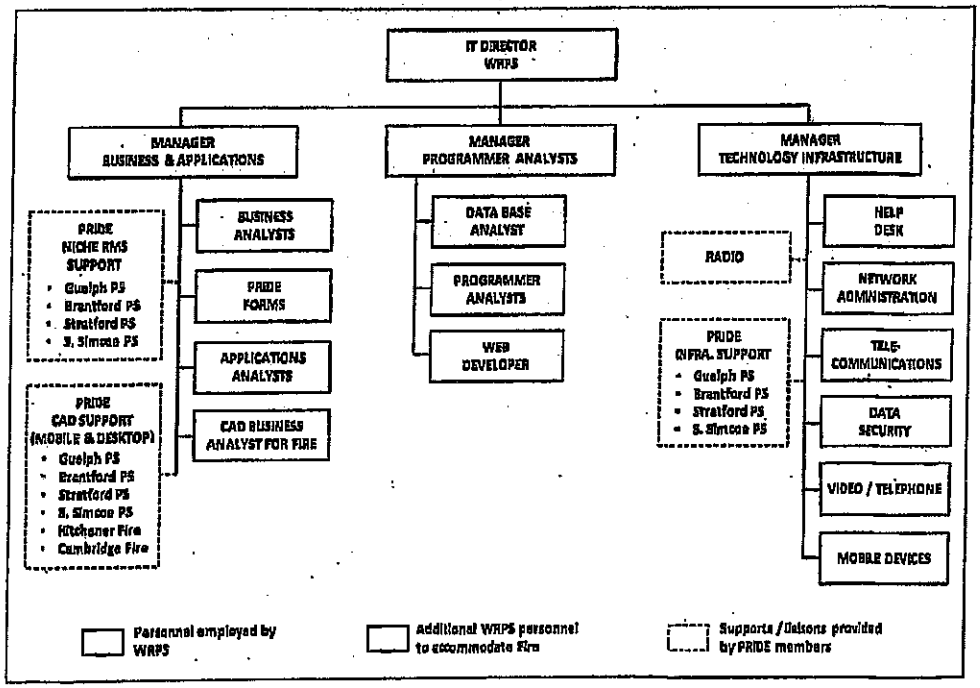
WRPS will be responsible for system integrity and security. They will ensure that the shared CAD system is configured to police (RCMP/CPIC) requirements for confidentiality and security.

5.7 Requirement for Increased IT Support

WRPS IT personnel manage and maintain the primary server equipment and software; emergency backup solutions; the radio system; and the network inter-connected devices. They centrally coordinate data base management, to ensure up-to-date mapping and consistency of mission critical information; and, in concert with members of the cooperative, they are responsible to ensure that the technologies in use, will support the cooperative's needs. They also staff a help desk, which provides members of the cooperative with technical support, 24/7.

For such purposes, WRPS employs IT personnel with a broad range of expertise, as illustrated by the schematic in Exhibit 5.4.

EXHIBIT 5.4: WRPS IT SUPPORT STRUCTURE WITH FIRE ADD-ON



Going forward, WRPS IT personnel will continue to manage and maintain the systems on behalf of the PRIDE cooperative, including the Kitchener and Cambridge fire departments.

To accommodate the work load increase attributed to Fire, WRPS IT Division will require at least one additional resource to serve as CAD Business Analyst (as shown by the above exhibit), and potentially a second additional resource, i.e.: Mobile Work Station Technician (not shown).

This opinion is derived from first-hand knowledge of present WRPS IT staffing levels and workloads; and from information supplied by York Regional Police (YRP), which manages a shared CAD arrangement for police and fire dispatch, for a service area of similar size and makeup to that of Waterloo Region.

YRP shares a common CAD platform with the fire departments of the City of Vaughan and Richmond Hill. Vaughan Fire deploys the fire resources of two municipalities. Richmond Hill Fire deploys the fire resources of six municipalities. The combined service area houses about 700,000 persons, which is only slightly larger than Waterloo Region's rapidly growing population base. [5]

The YRP IT Division is responsible to manage and maintain the shared CAD arrangement. The Vaughan and Richmond Hill fire departments have little in the way of internal IT support resources for the dispatch function. They rely extensively on YRP IT Division for dispatch technology support.

The YRP IT Division employs 2.5 personnel (FTE) who are dedicated to the needs of the fire services. One FTE is a CAD Business Analyst; one FTE is a MWS Technician; and the 0.5 FTE covers off a variety of work related to Fire servers, firewalls and security.

The 2.5 personnel are YRP employees; this, in accordance with RCMP/CPIC security requirements. YRP employs these 2.5 personnel on a full cost recovery basis, where the costs are apportioned between Vaughan and Richmond Hill fire departments, on behalf of their respective clientele.

Given the similarities between the YRP shared CAD arrangement for police and fire dispatch, and the shared CAD model proposed for Waterloo Region, and taking into consideration that Kitchener and Cambridge fire departments have little in the way of internal IT support resources for the dispatch function, and that they will rely extensively on WRPS IT support, the authors of this report support the following recommendations:

1) WRPS IT Division should recruit a CAD Business Analyst, to support fire dispatch operations in Waterloo Region.

    - The CAD Business Analyst (whose duties are summarized in Appendix C) will be dedicated to the dispatch needs of the local fire services - predominately, Kitchener

[5] The area served by Vaughan and Richmond Hill fire communications centers, excludes the City of Markham with a population of about 300,000 residents. The City of Markham Fire Department self-dispatches using stand-alone technology.

and Cambridge fire departments; but also, Waterloo Fire, and the paid-on call fire services operating in the four rural townships.

- The CAD Business Analyst should be recruited prior to the start of Phase 1 of the Fire CAD project, which is targeted to June 1, 2017 (subject to budget approvals); this, to assist with the implementation of the Fire CAD.[6]

2) The CAD Business Analyst should be an employee of WRPS; this to satisfy RCMP/CPIC security requirements. However, the position should be filled on a full cost recovery basis, where the costs will be apportioned between Kitchener and Cambridge fire departments, on behalf of their respective clientele.

3) The project Steering Committee should assess the need for a Mobile Work Station Technician, at a later date; possibly in Q3 of 2018 during Phase 2 of the project, or in Q4 of 2018 following project completion.

[6] For information on the phased project implementation plan, the reader is directed to Section 6 of this document.

6 PROJECT IMPLEMENTATION

The authors of this report support the Project Scope, Implementation Plan, Organizational Structure, Resourcing, Costs, and Cost Apportionment, set out below.

6.1 Project Scope

The Intergraph CAD system, which WRPS hosts on behalf of PRIDE, will be expanded to support the dispatch operations of the Cambridge and Kitchener fire departments. The expanded CAD system will include Fire communications servers, an integrated Fire CAD module, system interfaces, and incident management software.

Project oversight will be provided by a Steering Committee that includes senior management representation from WRPS, and the fire departments of Cambridge, Kitchener and Waterloo. WRPS will chair the Steering Committee.

WRPS will also lead the Project Implementation Team. The team will include subject matter experts from WRPS IT Division, and the Cambridge and Kitchener fire departments.

Hexagon Safety and Infrastructure (the Intergraph CAD vendor) will provide and configure hardware and software, as listed below. Software maintenance for the first year is included in Hexagon's pricing: [7]

- Fire communications servers, and an integrated Fire CAD module (*ICAD*) that is specifically configured to the joint needs of Cambridge and Kitchener fire departments.
- *EdgeFrontier* (EF), an integration platform for interface development between systems, for integrating business processes, and for sharing data.
- Incident management software, including *Mobile for Public Safety* (MPS) and *Intergraph Mobile Responder* (MR), which extend critical applications and information to field personnel on laptops, smartphones and tablets.

Hexagon Safety and Infrastructure will configure the Fire CAD module jointly with the subject matter experts from Cambridge and Kitchener fire departments, by reviewing and aligning departmental workflows, graphical user interface needs, and other parameters. Workshop sessions dedicated to this objective are included in the Project Implementation Plan.

The Project Implementation Team will:

- Participate in workshops and training
- Install hardware and software
- Supply and load base data
- Perform end-to-end user acceptance testing
- Train end users.

[7] For additional detail on Intergraph product deliverables and pricing, please refer to Appendix B.

WRPS will be responsible for system integrity and security. They will ensure that the shared CAD system is configured to police (RCMP/CPIC) requirements for confidentiality and security.

WRPS IT personnel will manage and maintain the system for all PRIDE members, including Kitchener and Cambridge fire departments. They will also centrally coordinate data base management, to ensure up-to-date mapping and consistency of mission critical information.

Project capital and annual operating costs, are set out in Section 6.4. Costs will be apportioned on a full cost recovery basis, to Kitchener and Cambridge fire departments (on behalf of their respective clientele).

6.2 Project Implementation Plan

Fire's transition to the Intergraph CAD will be undertaken concurrently with the project to replace the Region's public-safety grade voice radio communications system; this, to attain cost savings from concurrent project implementation.

The Fire CAD project will take about 16 months to implement. Since the new radio system is scheduled to go live by the end of 2018, commencement of the Fire CAD project will be targeted to June 1, 2017 (subject to budget approvals), with completion by September 2018.

The Project Implementation Plan, based on this timeframe, is shown in Exhibit 6.1 (next page).

The authors of this report acknowledge that the Exhibit 6.1 timelines are ambitious, and that they may need to be adjusted upon commencement of the project, in Task 1.1 "Project Kickoff / Review & Finalize Work Plan".

The project will be implemented in two phases.

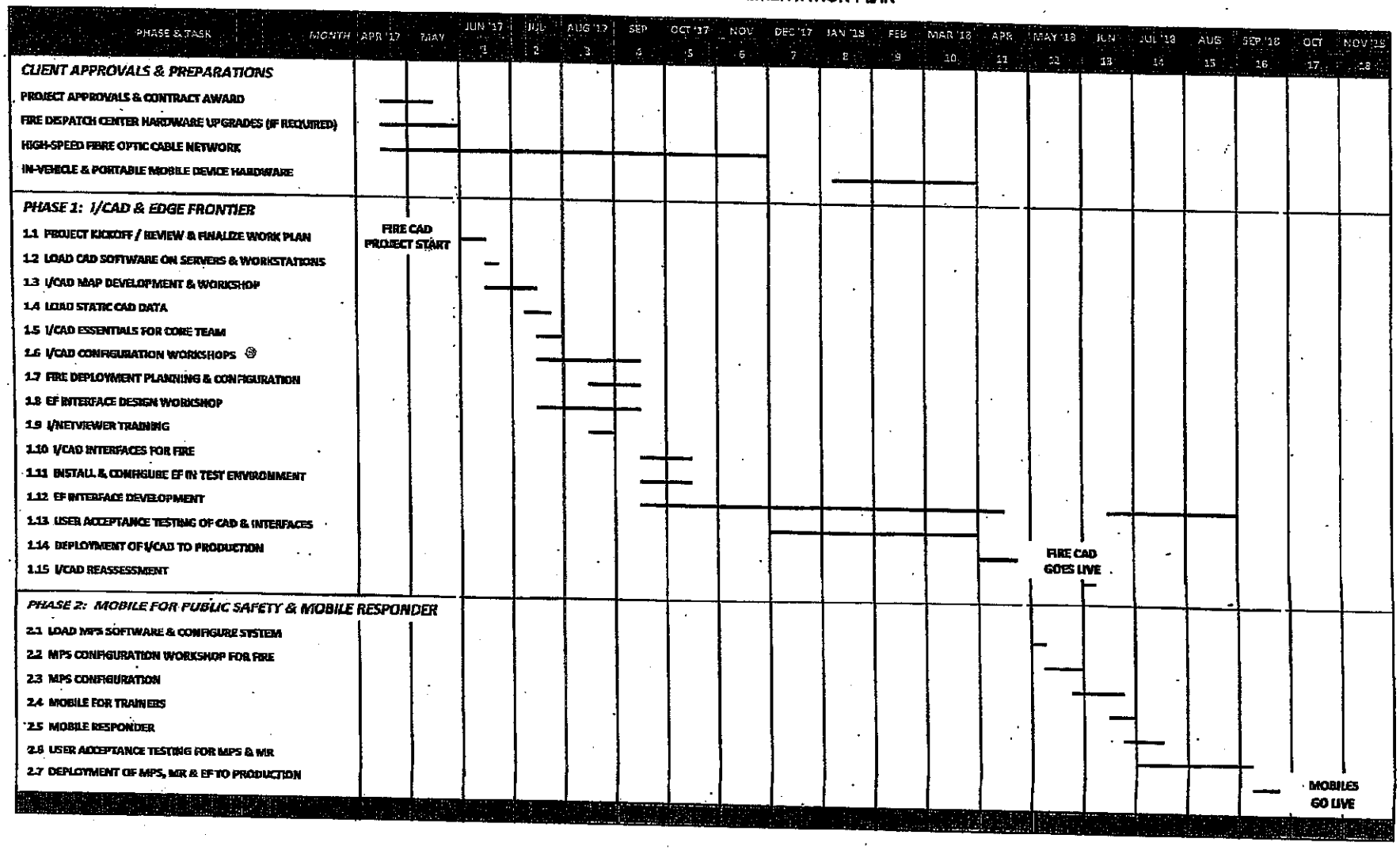
- Phase 1 will focus on implementing the I/CAD software and associated EdgeFrontier (EF) interfaces. This phase will be of about 11-months duration, with the Fire CAD targeted to go live by April 2018.
- Phase 2, which will commence immediately thereafter, will implement the Mobile for Public Safety (MPS) and Mobile Responder (MR) software on in-vehicle and portable mobile device hardware.[8] Phase 2 will be of 5-months duration, with mobile devices targeted to go live by September 2018.

The decision to adopt a 2-phased approach acknowledges that both Kitchener and Cambridge fire departments employ relatively few dispatchers; and to ensure continuous / uninterrupted delivery of fire dispatch services, staff training in the use of the new products will need to be staggered over an extended timeframe.

The 2-phased approach will provide sufficient time to train the staff appropriately in the use of each new product.

[8] To ensure network compatibility, and interoperability with other inter-connected devices, the fire mobile device hardware must comply to specifications set out by WRPS IT Division.

EXHIBIT 6.1: PROJECT IMPLEMENTATION PLAN



6.2.1 Client Approvals and Preparations

For the Fire CAD project to commence by June 1, 2017, client approvals and contract award to Hexagon Safety and Infrastructure must be completed by mid-May 2017.

Kitchener and Cambridge fire departments should complete any required upgrades to their dispatch centers prior to project start (i.e., work station or computer hardware upgrades). [8]

A high-speed fibre optic network connection to the Kitchener fire dispatch center is already in place. The Project Implementation Team will need to arrange a similar connection to the Cambridge fire dispatch center prior to the start of 'Task 1.13, User Acceptance Testing of CAD and Interfaces', which is scheduled to begin early in December 2017.

Phase 2 of the project, in which MPS and MR software is loaded onto the fire departments' in-vehicle and portable mobile device hardware (computers, tablets, smartphones), begins in May 2018. Kitchener and Cambridge fire departments will need to procure the mobile device hardware in advance. The Project Implementation Plan suggests that the procurement of mobile device hardware be commenced in January 2018, and that it be targeted for completion by March 2018 (at least one month in advance of the Phase 2 start). Fire departments, at their discretion, may commence and complete this task earlier.

Important note: To ensure network compatibility, and interoperability with other inter-connected devices, workstation computer hardware and fire mobile device hardware must comply to specifications set out by WRPS IT Division.

6.2.2 Phase 1: I/CAD & EdgeFrontier

Phase one of the project implements the I/CAD module and associated commercial off the shelf (COTS) software interfaces, as well as the EF custom developed interfaces. Services in this phase include: software installation; base configuration for COTS; workshops to define and develop custom configurations; and implementation of custom configurations and EF Systems.

Hexagon Safety and Infrastructure will work closely with subject matter experts assigned to the Client's Project Implementation Team, to configure the I/CAD module. The Project Implementation Team will: participate in workshops and training; supply and load base data; perform end-to-end user acceptance testing; and train end users.

If Phase 1 commences on June 1, 2017 (as currently anticipated), then user acceptance testing will be complete by end of March 2018; and I/CAD deployment to production will be completed in April 2018.

6.2.3 Phase 2: Mobile for Public Safety & Mobile Responder

Phase 2 will implement the MPS and MR software on in-vehicle and portable mobile device hardware procured by the fire departments (i.e., computers, tablets, smartphones). Services in

[8] To ensure network compatibility, and interoperability with other inter-connected devices, computer hardware must comply to specifications set out by WRPS IT Division.

this phase include: software installation; base configuration for COTS mobile software; workshops to develop custom configurations; and implementation of mobile EF Systems.

Hexagon Safety and Infrastructure will work closely with subject matter experts assigned to the Client's Project Implementation Team, to configure the mobile software applications. The Project Implementation Team will: participate in workshops and training; supply and load base data; perform end-to-end user acceptance testing; and train end users. The Project Implementation Team will also be responsible to supply and install the mobile device hardware for end users.

If Phase 2 commences in May 2018 (as currently anticipated), then user acceptance testing and deployment of mobile device software to production will be completed in September 2018.

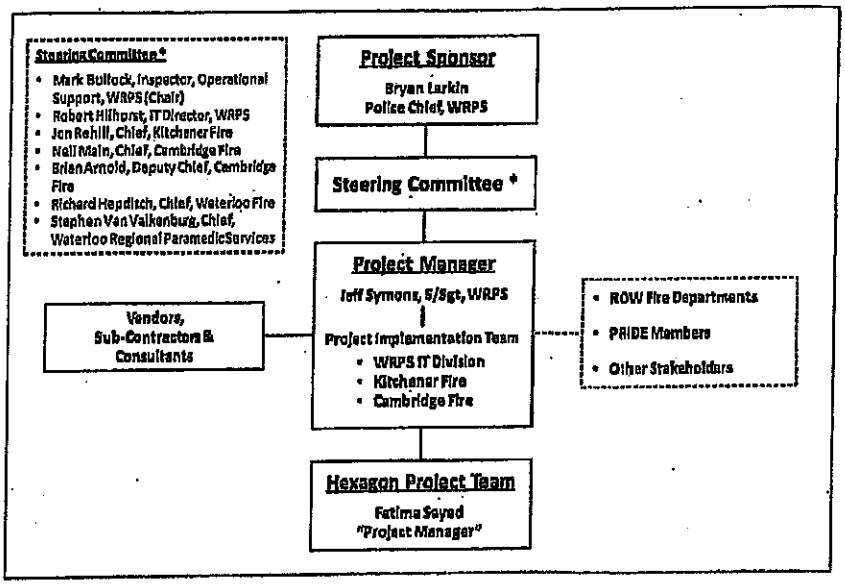
6.3 Project Organization and Resourcing

The Fire CAD Project Organization is shown in Exhibit 6.2. Project oversight will be provided by a Steering Committee that includes senior management representation from WRPS, and the fire departments of Cambridge, Kitchener and Waterloo.

Mark Bullock, Inspector, Operational Support WRPS, will serve as Steering Committee Chair, reporting to the Project Sponsor, Bryan Larkin, Police Chief WRPS.

Jeff Symons, S/Sgt. WRPS, will serve as Project Manager on behalf of the Client group. Jeff will be supported by a Project Implementation Team consisting of subject matter experts from WRPS IT Division, and the Cambridge and Kitchener fire departments.

EXHIBIT 6.2: PROJECT ORGANIZATION



Fatima Sayed will serve as Project Manager for the Hexagon Project Team. The Hexagon Team will be responsible to install and configure: Fire communications servers; ICAD module;

EdgeFrontier (EF) integrated interface platform; and incident management, Mobile for Public Safety (MPS), and Mobile Responder (MR) software.

The Project Implementation Team's responsibilities will be wide ranging, and include:

- Tasks for which the Client group is responsible, e.g.: project administration; project oversight management for the high-speed fibre optic network connection to the Cambridge fire dispatch center; procurement and distribution of mobile device hardware on behalf of Kitchener and Cambridge fire departments; etc.
- Working closely with the Hexagon Project Team throughout both phases of the Fire CAD project; participating in workshops and training, supplying and loading base data, performing end-to-end user acceptance testing, and training end users.
- Interacting as necessary with other members of the PRIDE cooperative; with stakeholders, including local fire departments.; and with other vendors, subcontractors and consultants.

To accommodate the above wide ranging responsibilities, the Project Implementation Team will require the following resourcing:

- A minimum of three (3) subject matter experts, dedicated to this project on a full-time basis for the project's entire 16-month duration, *i.e.: WRPS IT Division, Kitchener Fire and Cambridge Fire to assign one resource respectively.*
- Two (2) additional subject matter experts from December 2017 to April 2018, to support the user acceptance testing and product deployment activities (Tasks 1.13 and 1.14); and again, from July 2018 to September 2018, to support Tasks 2.6 and 2.7. *Kitchener Fire and Cambridge Fire to assign one additional resource respectively.*

These resourcing estimates are based on YRP's experience implementing a shared CAD arrangement for police and fire dispatch in York Region, and on Hexagon's intimate experience with multiple projects of similar scope. The authors of this report support these recommendations.

6.4 Project Costs

Project capital and annual operating costs are set out in Exhibit 6.3 (next page).

ASSUMPTIONS

- The expanded CAD system will include one Fire CAD module that is specifically configured to the joint needs of Cambridge and Kitchener fire departments (i.e., the application design will be the same for both fire dispatch centers).
- The Fire CAD module configuration will be established jointly by Hexagon and subject matter experts from the Cambridge and Kitchener fire departments, by reviewing and aligning departmental workflows, graphical user interface needs, and other parameters.
- Cambridge and Kitchener fire dispatch centers will deploy the new technology at roughly the same time (i.e., within a few days of one-another).

EXHIBIT 6.3: CAPITAL START UP & ANNUAL OPERATING COSTS

	CAPITAL START UP	ANNUAL OPERATING
1. I/CAD, MPS & MR FOR FIRE ADD-ON	**$1,150,000**	**$120,000**
Software Product / Licensing (Hexagon)	$577,000	–
Project Management Services (Hexagon)	$573,000	–
Software Maintenance (Hexagon)	–	$120,000
2. CAD BUSINESS ANALYST	**$67,000**	**$115,000**
3. HARDWARE INFRASTRUCTURE, DATA LINES & NG 911 INTERFACES	**$287,000**	**$70,000**
4. PROJECT IMPLEMENTATION / PROGRAM SUPPORT	**$210,000**	**$67,000**
TOTAL	**$1,714,000**	**$372,000**

6.4.1 I/CAD, MPS & MR for Fire Add-On

APT

These are Hexagon's costs for software product/licensing, project management services, and software maintenance, as detailed by their SOW, in Appendix B. Hexagon's software product fees apply to primary/main production licenses only. There are no costs associated with Backup and Test Licenses.

Hexagon will invoice maintenance when "Production Use" occurs. "Production Use" is defined as the day the software license is deployed in customer's production environment.

Hexagon's costing includes I/Fire Station Alerting software AND Station Pre-Alert software.

6.4.2 CAD Business Analyst

The cost to recruit a CAD Business Analyst, to support the dispatch operations of Fire, is assumed to be about $115,000 a year. This figure includes salary plus 30% in benefits.

It is assumed that the CAD Business Analyst will be in place in June 2017, therefore, capital start up includes 7-months' cost.

A second position in the form of a Mobile Work Station Technician may be needed downstream. It is suggested that the project Steering Committee re-assess the need for a Mobile Work Station Technician in Q3 or Q4 of 2018.

6.4.3 Hardware Infrastructure, Data Lines & NG911 Interfaces

HARDWARE INFRASTRUCTURE COSTS

- It costs about $600,000 a year to maintain the existing I/CAD infrastructure. The costs are apportioned to all PRIDE members. The costs shown in Exhibit 6.3 includes an apportionment to Fire of about $20,000 a year, for the use of existing I/CAD modules that they will require (i.e., $20,000 a year to be split between Kitchener and Cambridge Fire).

Tout 91

- The costs shown in Exhibit 6.3 include additional servers and routers (in addition to the existing I/CAD infrastructure) to support the Fire add-on's.
- The costs shown include replacement of 3 workstation computers in the Kitchener Fire dispatch center, and 2 in the Cambridge Fire dispatch center, as part of capital start-up. Current cost per device is assumed to be about $3,000.
- The costs shown include provision of 27 MWS for Kitchener, Cambridge and Waterloo fire vehicles, as part of capital start-up. Kitchener Fire advises that they require 11 MWS; Cambridge Fire requires 7 MWS; and Waterloo requires 9 MWS. Current cost per device is assumed to be about $7,000.
- Exhibit 6.3 excludes the cost of in-vehicle mounts and installation costs for MWS, which could be an additional $1,500 per device.
- Exhibit 6.3 excludes annual costs for MODEM to support in-vehicle MWS. It is assumed that such costs are already covered by way of other corporate arrangements.
- The proposed system is sufficiently flexible to accommodate additional in-vehicle MWS (e.g., for Wellesley, Wilmot, Woolwich and North Dumfries fire vehicles). The costs shown in Exhibit 6.3 do not include such additional MWS.
- It is anticipated that workstation computers and in-vehicle MWS will be refreshed on a 5-year cycle. The costs shown in Exhibit 6.3 do not include refresh costs. It is advisable that each fire service should set aside an annual reserve equal to 20% of the replacement cost of such devices.
- Exhibit 6.3 excludes potential costs that existing the fire RMS vendor may charge to interface with I/CAD.

DATA LINES & NG911 INTERFACES

A high-speed fibre optic network connection to the Kitchener fire dispatch center is already in place. A similar connection to the Cambridge fire dispatch center needs to be implemented. Exhibit 6.3 excludes the front-end cost to install this high-speed fibre optic connection. Further research is needed to identify this cost.

The above notwithstanding, the exhibit includes an annual cost allowance to maintain high-speed fibre optic network connections to both the Kitchener and Cambridge fire dispatch centers. The exhibit also includes an annual cost allowance to maintain a data line connection to WRPS headquarters.

Exhibit 6.3 also includes a capital start-up and ongoing annual cost allowance to install NG911 interfaces.

6.4.4 Project Implementation / Program Support

Project implementation is assumed to be approximately 15% of total cost, which is reasonable for projects of similar scope. Annual program support is assumed to equal 0.5 FTE (or about $67,000 a year).

Kitchener Fire and Cambridge Fire will be expected to assign subject matter experts to the Project Implementation Team. Exhibit 6.3 excludes the internal costs to Kitchener and Cambridge fire, for the assignment of such personnel to the project.

Total costs shown in Exhibit 6.3 exclude applicable taxes.

6.5 Proposed Apportionment of Project Costs

The proposed apportionment of project costs is shown in Exhibit 6.4. Key assumptions / highlights are discussed below.

EXHIBIT 6.4: PROPOSED COST APPORTIONMENT

	CAPITAL START UP			ANNUAL OPERATING		
	TOTAL	KITCHENER	CAMBRIDGE	TOTAL	KITCHENER	CAMBRIDGE
1. I/CAD, MPS & MR FOR FIRE ADD-ON	$1,150,000	$689,000	$461,000	$120,000	$72,000	$48,000
Software Product / Licensing *(Hexagon)*	$577,000	$345,000	$232,000	--	--	--
Project Management Services *(Hexagon)*	$573,000	$344,000	$229,000	--	--	--
Software Maintenance *(Hexagon)*	--	--	--	$120,000	$72,000	$48,000
2. CAD BUSINESS ANALYST	$67,000	$40,000	$27,000	$115,000	$69,000	$46,000
3. HARDWARE INFRASTRUCTURE, DATA LINES & NG 911 INTERFACES	$287,000	$194,000	$93,000	$70,000	$38,000	$32,000
4. PROJECT IMPLEMENTATION / PROGRAM SUPPORT	$210,000	$126,000	$84,000	$67,000	$40,000	$27,000
TOTAL	$1,714,000	$1,049,000	$665,000	$372,000	$219,000	$153,000

1,610,794 20

Project costs will be apportioned on a full cost recovery basis, to Kitchener and Cambridge fire departments (on behalf of their respective clientele).

Kitchener Fire and the fire departments under contract to Kitchener (Wellesley, Wilmot and Woolwich), will be define their respective cost sharing and invoicing arrangements. Similarly, Cambridge Fire and North Dumfries fire department (which is under contract to Cambridge) will be define their respective cost sharing and invoicing arrangements.

I/CAD, MPS AND MR FOR FIRE ADD-ON

- Costs for the following components are apportioned to Kitchener and Cambridge based on the number of workstations in each fire dispatch center: I/CAD software product / licensing; project management services; and software maintenance. Since Kitchener is outfitted with 3 workstations and Cambridge with 2 workstations, the costs are apportioned as follows: Kitchener - 60%, and Cambridge - 40%.

- The cost for MPS software product / licensing is apportioned based on the number of MWS required by each service. Kitchener Fire advises that they require 11 MWS; Cambridge Fire requires 7 MWS; and Waterloo requires 9 MWS.
- Costs assigned to Kitchener in Exhibit 6.4, include 20 MPS software product / licenses (i.e., their 11 MWS plus the 9 MWS required by Waterloo Fire, which is under contract to Kitchener). It is assumed that Kitchener and Waterloo fire departments will define their cost sharing and invoicing arrangements.
- The cost for MR software product / licensing will be apportioned based on the number of portable communications devices required by each service.

CAD BUSINESS ANALYST

This cost is apportioned 60% to Kitchener and 40% to Cambridge, based on their respective number of dispatch workstations.

HARDWARE INFRASTRUCTURE, DATA LINES & NG911 INTERFACES

- It was previously mentioned that fire is apportioned about $20,000 a year, for the use of existing I/CAD modules. This cost is apportioned 60% to Kitchener and 40% to Cambridge, based on their respective number of dispatch workstations.
- Costs for additional servers and routers to support the Fire add-on's (in addition to the existing I/CAD infrastructure), are apportioned 60% to Kitchener and 40% to Cambridge, based on their respective number of dispatch workstations.
- Costs to replace workstation computers is based on the current number in each fire dispatch center (i.e., Kitchener - 3, and Cambridge - 2).
- The cost for MWS is based on the number of MWS required by each service (Kitchener - 11, Cambridge - 7, and Waterloo - 9). Costs assigned to Kitchener in Exhibit 6.4, include 20 MWS (i.e., their 11 plus the 9 required by Waterloo Fire).
- The cost to maintain a high-speed fibre optic connection to the Kitchener fire dispatch center is estimated at $12,600 a year. The cost for Cambridge will be the same.
- Fire is apportioned about $6,600 a year for the use of the data line connection to WRPS headquarters. This cost is apportioned 60% to Kitchener and 40% to Cambridge, based on their respective number of dispatch workstations.
- WRPS sourced the cost of NG911 interfaces from Bell, who advise that the capital start-up cost will be about $23,400 per dispatch center, and that the ongoing annual will be approximately $7,600 per dispatch center.

PROJECT IMPLEMENTATION / PROGRAM SUPPORT

These costs are apportioned 60% to Kitchener and 40% to Cambridge, based on their respective number of dispatch workstations.

APPENDIX A – LIST OF ACRONYMS

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APCO	Association of Public Safety Communications Officials
AVL	Automatic Vehicle Location
CACC	Central Ambulance Communications Centre
CAD	Computer Aided Dispatch
CAO	Chief Administrative Officer
COTS	Commercial Off the Shelf
CPIC	Canadian Police Information Center
DPCI2	Dispatch Priority Card System V2.0
E9-1-1	Enhanced 9-1-1
EDACS	Enhanced Digital Access Communications System
EF	EdgeFrontier
EMS	Emergency Medical Services
EMS-TIF	Emergency Medical Services – Technology Interoperability Framework
FTE	Full time equivalent
GIS	Geographic Information System
GPS	Global Positioning Systems
I/CAD	Intergraph Computer Aided Dispatch
IT	Information Technology
MDT	Mobile Data Terminal
MOHLTC	Ministry of Health and Long-Term Care
MPS	Mobile for Public Safety
MR	Mobile Responder
MWS	Mobile Work Station
NG9-1-1	Next Generation 9-1-1. Sometimes also shown as NG911.
PSAP	Public Safety Answering Point
PRIDE	Police Regionalized Information Data Entry
RCMP	Royal Canadian Mounted Police
RMS	Records Management System
SOP	Standard Operating Procedure
SOW	Statement of Work
QA	Quality Assurance
QC	Quality Control
WRPS	Waterloo Regional Police Services
YRP	York Regional Police

APPENDIX B – SOFTWARE PRODUCT INFORMATION

APPENDIX B: SOFTWARE PRODUCT INFORMATION

Source: "Statement of Work - Appendix B", Hexagon Safety & Infrastructure, February 2017, adjusted following a survey of fire department requirements by the Project Implementation Team. The adjusted figures are shown in italics.

B.1 Software for Kitchener & Cambridge Fire Add-On

DESCRIPTION	QTY.	NET PRICE	EXT PRICE
I/Dispatcher NL	5	$32,100	$160,500
I/Fire Station Alerting NL	2	$19,400	$38,800
I/Fire Station Printing NL	1	$19,400	$19,400
I/FRMS-CADlink NL	1	$19,400	$19,400
I/Page NL	2	$38,900	$77,800
I/NetViewer – 25 users	1	$77,800	$77,800
EdgeFrontier Runtime Engine	2	$34,900	$69,800
Intergraph ANI/ALI Interface for AQS	2	$10,000	$20,000
I/Push To Talk NL	1	$19,400	$19,400
Mobile for Public Safety CC *(Quantity increased from 20 to 27. Price adjusted proportionately)*	*27*	$2,000	*$54,000*
Intergraph Mobile Responder Client – *50 Tablet CALs (Quantity reduced from 100 to 50. Price adjusted proportionately)*	1	*$19,650*	*$19,650*
Product Total – Primary/Production Licenses			***$576,550***

Note: Software Product fees apply to primary/main production licenses only. There are no costs associated with Backup and Test Licenses.

B.2 Maintenance

DESCRIPTION	QTY.	# OF MTHS	MONTHLY UNIT NET PRICE	EXT PRICE
I/Dispatcher NL	5	12	$552	$33,120
I/Fire Station Alerting NL	2	12	$336	$8,064

I/Fire Station Printing NL	1	12	$336	$4,032
I/FRMS-CADlink NL	1	12	$336	$4,032
I/Page NL	2	12	$669	$16,056
I/NetViewer – 25 users	1	12	$1,337	$16,044
EdgeFrontier Runtime Engine	2	12	$698	$16,752
Intergraph ANI/ALI Interface for AQS	2	12	$0	$0
I/Push To Talk NL	1	12	$336	$4,032
Mobile for Public Safety CC *(Quantity increased from 20 to 27. Price adjusted proportionately)*	*27*	12	$40	*$12,960*
Intergraph Mobile Responder Client – *50 Tablet CALs (Quantity reduced from 100 to 50. Price adjusted proportionately)*	1	12	$751	*$4,506*
Maintenance Total – Primary/Production Licenses				***$119,598***

Note: Maintenance will be invoiced when "Production Use" occurs. "Production Use" is defined as the day the software license is deployed in CUSTOMER's production environment.

APPENDIX C – CAD BUSINESS ANALYST & MOBILE WORK STATION TECHNICIAN

APPENDIX C: CAD BUSINESS ANALYST & MOBILE WORK STATION TECHNICIAN

Section 5 of this report recommends that WRPS IT Division should recruit a CAD Business Analyst, to support fire dispatch operations in Waterloo Region. Also, that the project Steering Committee should assess the need for a Mobile Work Station Technician, at a later date.

The duties and responsibilities of these positions are summarized below. The information is intended to describe the general level and nature of each position. The information is not intended to represent a comprehensive listing of all duties and responsibilities.

C.1 CAD Business Analyst

The position is dedicated to Fire dispatch operations.

Assists in the design, development, implementation and maintenance of systems and project solutions for Fire members of the PRIDE cooperative.

Analyzes user requirements and generates alternative approaches to information systems design. Plans and prioritizes needs; explores available options, and recommends solutions.

Provides quality, client focused business process and technology support, while also working with Fire department staff to implement Business Applications initiatives and related system interfaces.

Investigates, analyzes, troubleshoots and manages issues in regard to Fire-related Business Applications.

Responsible for data management, system management and version installs in the Business Applications computing environment, including configuration, security, resource monitoring, reporting, troubleshooting and the development of specialized programs.

Manages the deployment, testing, training, modification and implementation of systems or system enhancements by way of new releases.

Works closely with other IT staff to coordinate current and future project plans and activities including coordination and technical assistance to facilitate specific development projects that involve the computing environment, the coordination of software upgrades and the installation of new products.

Assists in forecasting future utilization and equipment requirements. Designs, develops, sets standards and monitors the necessary infrastructure process associated with the application of the Business Applications, CAD and Mobile Work Station (MWS) system changes, implementations and maintenance.

Maintains working knowledge of all legislative changes which may impact Fire dispatch operations. Recommends changes to meet mandated requirements.

Assists in the development of IT-related annual plans for Fire dispatch, ensuring that major initiatives are in line with the Information Technology, Information Services and PRIDE strategic plan.

Assists in the research, design, development and delivery of systems-related training programs for Fire members of PRIDE.

Liaises with vendors and the Region of Waterloo to ensure schedules, guidelines and protocols are adhered to, and client requirements achieved.

Ensures that computer hardware and software applications used by Fire are to the high level of standards required for the entire PRIDE organization, and that they properly interface to the Business Applications.

C.2 Mobile Work Station Technician

The position is dedicated to Fire dispatch operations.

Answers calls from end-users experiencing problems with mobile computing and communications hardware.

Assists with Fire MDT and MR related issues.

Provides technical support and maintenance of voice and data communications equipment, RF equipment, instruments and peripherals to end-users.

Monitors alarm conditions on Radio infrastructure, environment, power and door alarms at all remote tower locations.

Maintains a daily log of maintenance and preventative measures conducted.

Maintains up to date systems documentation.

Installs, tests, troubleshoots, evaluates and repairs in-vehicle voice and data communications components and related equipment.

Maintains an inventory on all related assets, including related stakeholders.

Remains current with new developments in public safety communications standards, communications technology trends, networks, software and hardware.

Liaises with WRPS service contract partners, hardware and software vendors.

Writes, modifies, integrates and tests software code.

Creates and maintains corporate MWS image, including operating systems, enterprise and in-house applications.

Provides support, troubleshooting and repair of MWS computer hardware on front-line vehicles.

Provides preventative maintenance, cleaning and refurbishing of laptops, and cellular modems during the transfer process.

Prepares reports and other documentation on the status, operation and maintenance of software.

Evaluates and installs computer hardware, networking software and operating system software.

Implements data, software and hardware security procedures.

Maintains up to date documentation, as required.

Researches, evaluates and integrates new network system and data communication hardware and software.