September 2011

MARKHAM
FIRE AND EMERGENCY SERVICES

Markham Fire and Emergency Services
MASTER FIRE PLAN

Final Report

Submitted by:

DILLON CONSULTING

Town of Markham
Master Fire Plan

September 2011

Project: 10-3352

Submitted By:

Dillon Consulting Limited

In Association With:

Thurlow Consulting Ltd. and LEA Consulting

Executive Summary

Introduction

The Town of Markham initiated this Master Fire Plan (MFP) study as part of its comprehensive community planning initiatives to manage the projected growth within the municipality over the next ten-year period. Demands on the current system of public fire protection, prevention and education are expected to continue to increase as a result of projected growth.

Completion of this MFP recognizes the continued commitment of Council and senior staff to providing the highest level of services and programs to the community in the most cost-effective and efficient manner. This MFP provides a complete review of the current operations of the Markham Fire and Emergency Services (MFES) to assist Council in establishing key objectives for the department. The plan includes recommendations to address both short-term and long-term strategies for the municipality, consistent with the master fire plan process outlined within the Office of the Fire Marshal, Ontario's (OFM), *Shaping Fire-Safe Communities Initiative*.

The overarching goal of this report is to assess and present the existing and future requirements of the MFES. This report was prepared to respond to the following objectives identified by the Town of Markham and contained within the *Terms of Reference* for this study:

- Assess community needs resulting from the impacts of existing and future growth;
- Review existing research, information, issues and strategies and complete a trend analysis related to the overall fire and emergency services to ensure best practices are being followed or recommended for adoption;
- Involve the public and stakeholders through innovative and targeted consultation; and
- Develop directional statements to guide future decisions relating to the MFES.

Background

The Town of Markham is the largest town in Canada and one of the fastest growing municipalities. The current population of approximately 300,000 is anticipated to grow to a projected population of 445,000 by the year 2031. With this significant population increase expected over the next 20 years, one of MFES' biggest challenges will be to continue to provide effective fire and emergency services while meeting the demands of a growing population.

Not only is the Town of Markham's population growing in numbers, but also in diversity. Members of the community come from a full-range of ethno-cultural backgrounds, with approximately 60% of the population speaking English as a second language. This places the Town of Markham and MFES in a unique and challenging position for both public education and fire prevention.

Markham Fire and Emergency Services continues to address matters related to diversity by actively engaging the public, acting as a role model for recruitment and through the provision of programs geared toward cultural diversity, including training for staff.

Community Risk Management

MFES has built risk management planning into the on-going planning that occurs within the municipality and the fire and emergency service. This is evidenced by the various divisional and department studies and plans that have been prepared by MFES. These include:

- Simplified Risk Assessment
- Municipal Fire Protection Information Survey
- Deployment Study 2001
- Vehicle Standardization 2002
- Training Survey and Needs Analysis 1998

The Master Fire Plan (MFP) study is an extension of MFES' risk management planning approach. It will provide Council and staff with a strategic long-term plan. The MFP has taken into account the planning and analysis completed within the previous deployment study.

Moving forward, MFES will maintain a proactive risk management planning process by ensuring the following:

- Continuous planning in order to maintain a responsive approach to the changing needs of the community and local areas;
- Continuous review of divisional services provided and functions conducted by the MFES to confirm that objectives are being achieved in accordance with the strategic plan, as dictated by the Establishing and Regulating By-law;
- Continuous awareness of new and changing standards, evolving technologies, innovations, and other advances that would improve service delivery;
- Inclusion and accountability of personnel in risk management planning process; and
- Incorporation of pre-emergency planning into the overall risk management planning process.

Community risk planning assists in the identification of the needs and circumstances within the Town. These risks, needs and circumstances should be taken into consideration when planning the future programs and resources for Markham's Fire and Emergency Services.

Recommendations

- Consideration should be given to implementing an ongoing process to update the community risk profile of the Town of Markham. Having readily available access to a current community risk profile can be a valuable asset to the MFES management team in guiding their strategic and daily decision-making.

Legislated Requirements

Within the Province of Ontario the relevant legislation for the operation of a fire department is contained within the Fire Protection and Prevention Act, 1997 (FPPA). The FPPA states that, *"every municipality shall, establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances."*

The FPPA also requires compliance with the minimum requirements of a Community Fire Safety Program, which must include:

- *a smoke alarm program with home escape planning;*
- *the distribution of fire safety education material to residents/occupants;*
- *inspections upon complaint or when requested to assist with code compliance (including any necessary code enforcement); and*
- *a simplified risk assessment.*

To further assist communities the Office of the Fire Marshal, Ontario (OFM) has developed the Comprehensive Fire Safety Effectiveness Model. The model identifies *"three lines of defence"* that can be utilized in responding to local community needs. The three lines of defence include:

1. *Public education and prevention;*
2. *Fire safety standards and enforcement; and*
3. *Emergency response.*

Performance Measures, Goals and Objectives

Establishing a measurement-supported set of performance targets or service standards, together with clear goals and objectives, are core components of evaluating the overall effectiveness of providing fire and emergency services.

As identified in the FPPA, the OFM has the power to issue guidelines to municipalities in respect to fire protection services and related matters. These *Public Fire Service Guidelines* (PFSG) are to be used by local municipalities to determine the level of fire protection services they deem necessary, in accordance with their individual needs and circumstances.

In addition, the National Fire Protection Association (NFPA) has developed specific standards for a wide scope of services that municipal fire departments provide. For example, NFPA 1710 *"Standard for the Organization and Deployment of Fire Suppression Operations"* describes a standard for the delivery of emergency response services by a full-time fire service. Other standards such as NFPA 1221 *"Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems"* are also being utilized by municipalities to design and measure the effectiveness of their fire services.

Over the past several years the MFES has been moving toward a target of achieving the standards defined within NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* as the performance level target for emergency response. The 2001 Deployment Study completed by the MFES used the NFPA 1710 standard as the benchmark for assigning fire suppression staff and developing appropriate emergency response protocols.

Divisions and Staffing

MFES has evolved since it was originally established in 1971 to its present form as a full-time fire department.

The Divisions of MFES include:

1. Division of Administration
2. Division of Fire Prevention & Public Education
3. Division of Suppression
4. Division of Training
5. Division of Apparatus and Equipment
6. Division of Communications

The total staffing for MFES is broken down in the table below titled ***Markham Fire & Emergency Service Staffing***. As of the end June, 2011, MFES was comprised of 258 staff members within its six primary divisions.

Markham Fire & Emergency Service Staffing		
Division	**Staff Positions**	
Division of Administration	1 Fire Chief, 2 Deputy Fire Chiefs, 3 Administrative Support Staff	6
Division of Fire Prevention & Public Education	1 Chief Fire Prevention Officer, 1 Senior Fire Prevention Officer, 2 Plans Examiners, 8 Fire Prevention Officers and 2 Special Projects / Public Education Officers	14
Division of Training	1 Chief Training Officer, 4 Training Officers	5
Division of Apparatus & Equipment	2 Mechanical Staff	2
Division of Communications	1 Dispatch Supervisor, 10 Alarm Room Operators	11
Division of Suppression	4 Platoon Chiefs, 4 District Chiefs, 212 Suppression Staff	220
Total Staffing*:		**258**

**staffing as of June 27, 2011*

Division of Administration

As with any organization the size of MFES, the preparation and ongoing monitoring of capital and operating budgets is a significant activity. Ultimately, the Fire Chief is directly responsible to Council for its capital ($1.5 million in 2010) and operating ($26 million in 2010) budgets. The recently approved 2011 capital and operating budgets are $1.0 million and $28 million, respectively. The Deputy Fire Chiefs provide assistance to the Fire Chief and are delegated a range of responsibilities that align with the respective divisions for which they are accountable. The Fire Chief has delegated further authority to other senior staff within the MFES for oversight of both capital projects and spending with regard to operating expenses.

Recommendations

The following recommendations relate to MFES' Division of Administration:

- In consultation with other Town departments, the MFES should consider options for the provision of additional office space and meetings rooms. This should be considered in conjunction with the relocation of the Division of Communication to the 8100 Warden Avenue location.

- Consideration should be given to implementing a formal Standard Operating Guideline Review Committee comprised of a cross section of department staff. Implementing a formal staff committee assigned with the responsibility of research, development, and regular review of standard operating guidelines will ensure that MFES maintains the level of documentation required to meet the department's need and regulatory requirements. Ensuring that Standard Operating Guidelines are developed approved and distributed for all areas of the Section 21 guidance notes which should be considered a priority.

- As part of assessing the effectiveness of the current "transitional" MFES management team roles and responsibilities consideration should be given to adding a third Deputy Fire Chief. In addition to adding to the overall depth of the non-union management team this resource would provide the required focus for the management team to implement the strategic priority of increasing public education and fire prevention activities within the MFES.

- Consideration should be given to providing additional administrative support to the MFES management team. Factors that should be considered include the addition of an assistant to the proposed third Deputy Fire Chief, and the immediate need for a redundancy strategy to support the current technical fire administrative coordinator position.

- In consultation with senior corporate staff the MFES should consider options for the provision of a human resource/labour relations staff person dedicated to supporting the MFES management team. In response to existing activities within this area and the planned growth within MFES providing additional staff support within this area would be an effective strategy to mitigate and potentially reduce human resource costs within MFES in the future.

Division of Fire Prevention & Public Education

The MFES fire prevention and public education efforts are focused on the first two lines of defence of the Comprehensive Fire Safety Effectiveness Model. These include the delivery of public education and fire prevention programming and activities related to fire safety standards and enforcement.

The Division of Fire Prevention & Public Education currently has a unique organizational design in comparison to other typical fire and emergency services of comparable size. There is currently a split reporting structure within this division that has the Chief Fire Prevention Officer and a portion of the divisional staff reporting to one of the Deputy Fire Chiefs and the Special Projects / Public Education Officers reporting to the other Deputy Fire Chief.

Our review of the historical dollar loss and emergency call volume for the Town of Markham indicates relatively small increases in comparison to the significant growth within the community during the past several years. In our experience minimal increases such as this can in part be attributed to aggressive and proactive strategies targeted at the first two lines of defence (i.e. public education and fire prevention).

Community-Based Fire Protection Model

The primary initiative of a Community-Based Fire Protection Model would be the co-location of Public Education/Fire Prevention Officers (Fire Inspectors) and fire suppression services (firefighting crews) under one roof. This initiative is designed to achieve a consolidated, team-based and customer-focused approach to managing fire risks within a particular area of a community.

The foundation for this model already exists in the Town of Markham as a number of the fire stations already have co-location Public Education/ Fire Prevention and firefighting staff. Subject to approval and re-assignments of the current Fire Prevention Officers, MFES would have sufficient Fire Prevention Officers to implement the Community-Based Fire Protection Model, within the existing complement of fire stations. Further consideration will be required to include Fire Prevention Officers within the complement of any new fire stations.

Public Education

MFES provides a proactive and comprehensive range of public education services and fire prevention programs. The MFES has two Special Projects / Public Education Officers, as well as two Plans Examiners. The two public education personnel are responsible for developing and delivering the public education programs using the community risk profile to determine risk demographics. The Fire Prevention Officers also assist in the delivery of public education programs, such as those delivered to schools. However, under the current practice these personnel are primarily assigned to other fire prevention activities, such as inspection and enforcement.

The four core public education programs that are implemented across the Town of Markham are as follows:

- Smoke Alarm Program;
- Markham Fire and Emergency Services School Program;
- Older and Wiser; and
- The Arson Prevention Program for Children (TAPP-C).

Fire Prevention

The primary roles of MFES Fire Prevention staff are to ensure compliance with the Ontario Fire Code through a program of proactive fire inspections and, in the absence of achieving compliance, utilizing the authority of the Ontario Fire Code to achieve compliance through enforcement. The division is also responsible for fire investigations. This typically includes the activities required to determine the origin and cause of a fire.

MFES has a process in place to conduct post-fire evaluations for all fires. This is a brief assessment and summary of the cause, origin and events of the fire. These summaries are then filed in the MFES data management system. This is an effective strategy for senior staff to determine if there are any patterns.

With the support of Council, the MFES has clearly developed and implemented a public education and fire prevention program that is responding to the current needs and circumstances of the community. As the municipality continues to face further growth, and the community risk profile evolves, sustaining the effectiveness of the current programming will be essential. Where possible, MFES should consider introducing further activities to enhance the level of fire prevention and public education service provided. This will require MFES and Council to provide the necessary resources and funding to sustain the effectiveness that has been achieved.

Plans Examinations

MFES has two Plans Examiners. Given the significant role the fire and emergency services plays in the design, development and construction of buildings, these staff members conduct plans examination from the perspective of fire and life safety.

Investigations and Post-Fire Evaluations

The division is responsible for fire investigations. This typically includes the activities required to determine the origin and cause of a fire. MFES generally conducts approximately twenty fire investigations per year. Therefore investigations are not a major component of division workload, but they do require a commitment to ongoing training and certification of staff.

MFES has initiated a process of conducting public information post-fire sessions for all fires over $50,000 in property loss or those fires that have an impact on the public (After the Fire Program). This program provides a brief assessment and summary of the fire. This is an effective strategy for senior staff to determine if there are concerns related to the on-going education of the public as well as identify any patterns or risks associated with each fire. This activity can also be beneficial in evaluating the current public education and fire prevention programs, and identifying where possible revisions may be necessary. The *After the Fire Program* is an excellent learning and self-evaluation tool for the fire and emergency service.

Recommendations

The following recommendations relate to MFES' Division of Fire Prevention & Public Education:

- To achieve the targets of programs such as retrofitting of fire and life safety systems the workload of the Plans Examiners should be monitored to ensure sufficient resources are dedicated to these important activities, especially as the Town continues to undergo significant growth.

- Performance targets for the frequency of inspections can be directly related to the depth of staff resources available to complete these tasks. It is recommended that MFES include Council in the approval process of setting these performance targets.

- In conjunction with previous recommendations within this report, including the recommendation of adding a third Deputy Fire Chief, consideration should be given to reviewing the organizational structure, responsibilities and accountabilities within this division. Within this review, consideration should be given to the addition of another Senior Fire Prevention Officer. This resource would provide further depth to the division's supervisory requirements and workload management as well as adding depth to the overall management of the Division of Fire Prevention & Public Education.

- In order to work towards 100% compliance consideration should be given to a complete review and development of a new and enhanced Smoke Alarm Program. The new program should consider the goals and objectives established by the OFM and the needs of the Town of Markham, as well as the newly implemented zero tolerance policy, in order to provide the most effective solution to ensuring the safety of the Town residents.

- MFES should consider the implementation of a formal *"Community-Based Fire Protection Model"* in conjunction with the current organizational structure and reporting relationships within the Division of Fire Prevention & Public Education. This would provide further efficiencies within the division.

- The MFES management team has indicated that they will be requesting approval for an additional Fire Prevention Officer in their 2012 operating budget submission to Council. Subject to approval and re-assignments of the current Fire Prevention Officers, the MFES would have sufficient Fire Prevention Officers to implement the Community-Based Fire Protection Model within the nine fire stations that will include Station 99 opening in 2012. Consideration should be given to including a Fire Prevention Officer as part of the complement of staff hired for new fire stations.

- Our review indicates that only Fire Station 96 does not have the current capacity to provide office space for staff from the Fire Prevention and Public Education Division. Capital funds would be required to complete alterations to this station to accommodate the staff needs of a Community-Based Fire Protection Model.

- Consideration should be given to implementing a formal Standard Operating Guideline review process for the Division of Fire Prevention & Public Education Standard Operating Guideline.

Division of Fire Suppression

Markham Fire and Emergency Services (MFES) consists of 258 personnel, of which 220 (85%) are assigned to the suppression division. MFES suppression staff currently operates from eight fire stations. The eighth fire station (Station 93) opened in July 2010. The ninth fire station, in Cornell, is planned to open in January 2012.

As with most municipal fire services, MFES assumes responsibility for intervention in a number of emergency situations beyond those that are fire-related. These include assistance to the emergency medical service (EMS), highway extrication, hazardous materials incidents, water and ice rescue and the provision of fire protection at Toronto Buttonville Municipal Airport.

Within the current organizational structure the Deputy Fire Chiefs are each assigned management responsibility for two of the four platoons that make up the Division of Fire Suppression. A Platoon Chief is assigned to each of the four platoons and is delegated direct responsibility for the overall supervision and accountability of the platoon.

Each platoon is comprised of 55 fire suppression staff including a Platoon Chief, District Chief, 10 Captains and 43 firefighters. Fire suppression staff are assigned to a shift schedule, defined within the collective agreement, and provide 24 hours per day, seven days per week coverage for 365 days per year. The minimum established on-duty complement includes four staff including a Captain and three firefighters for each front run apparatus within the MFES.

Fire suppression is the "third line of defence" within an overall community fire safety plan. Effective and efficient fire suppression capability is a critical component in ultimately protecting life safety and reducing property loss as a result of fire within a community.

The Town of Markham and the MFES have established an effective and efficient Division of Fire Suppression. With the support of Council, MFES has identified NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations*" as the "target" for emergency response performance. NFPA 1710 was developed to address the fire risks associated in responding with an initial full alarm assignment to a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. The *first response* and *full response / depth of response* performance measures for this basic type of fire are:

- First Response: The fire service's fire suppression resources shall be deployed to provide for the arrival of an engine company (minimum of four firefighters) within a 240-second (four minute) travel time to 90% of the incidents.

- Full Response / Depth of Response: The fire department shall have the capability to deploy an initial full alarm assignment (minimum of 14 firefighters, 15 if an aerial is sent) within a 480-second (eight minute) travel time to 90% of the incidents.

With regard to the depth of resources, as identified within NFPA 1710, it is also important to consider the community risk profile in assessing the appropriate level of resources required. NFPA 1710 was developed in response to a very basic fire in a single family dwelling. The building stock profile of the Town of Markham confirms that there is a large component of the community that will require resources beyond those for typical single family dwelling fires to be deployed to achieve an appropriate depth of response, based on life safety and fire risk.

Our assessment revealed statistics for property loss (as a result of fire), and emergency response call volume that have remained relatively constant through an era of significant community growth. These are both strong indicators of the commitments the Town of Markham and the MFES have made to public education and fire prevention activities as the "first line of defence" in an effective community fire safety plan.

The historical call data analysis of the components of dispatch time, turnout time and travel time indicate that the MFES is below the 90th percentile for performance targets regarding dispatch time, turnout time, first response travel time and depth of response time / staffing combined. These response times and the procedures related to them should be reviewed in order to identify efficiencies which could be implemented to improve the times of these emergency response components and reduce overall emergency response times.

Recommendations

The following recommendations relate to MFES' Division of Fire Suppression:

- As a "performance target" NFPA 1710 is an appropriate performance measure for the Town of Markham and the MFES. Consideration should be given to utilizing this performance measurement tool for the ongoing assessment of the level of emergency response services to be provided by the MFES.
- Planning projections indicate that the Town of Markham will continue to experience increased growth. Consideration should be given to developing strategies to match the number of personnel responding to incidents based on type and risk while responding to growth, an aging population and an aging building infrastructure profile.
- Existing residential occupancies in the community include townhouse, stacked townhouse, medium and high-density condominiums, and high-rise structures. These types of occupancies all have increased fire and life safety risks. Consideration should be given to the deployment of additional emergency response staff within the initial response to match the required depth of response resources based on the results of the community risk profile.
- Consideration should be given to the provision of separate storage rooms for firefighters bunker gear that includes a separate ventilation system.
- Consideration should be given to the provision of additional general storage in all MFES stations where possible, and when renovations and/or new construction are considered.
- To work toward the depth of resource targets continue with a plan to place a third ladder truck into service at Station 96 by 2014, along with the associated full time staff complement consistent with the background study.
- Consideration should be given to the addition of a 10th fire station to be located in the vicinity of the intersection of Warden Avenue and Highway 7. This station should be staffed with an additional front run apparatus and associated full-time staff complement. This station is identified in the background study for 2017.
- Consideration should be given to the addition of an 11th "satellite" fire station[1] to be located on the Yonge Street corridor. The timing for this station should be consistent with the intensification along Yonge Street and the Langstaff development. Call volume and type should be monitored to determine the timing for this station. As an interim measure, consideration should be given to additional, staffed, responding units at existing Station 91 and / or automatic aid agreements with the Town of Richmond Hill. It is anticipated that this would be undertaken within a five to ten year horizon. The satellite station should be staffed with an additional engine company and associated full-time staff complement.

[1] Satellite Fire Station: In comparison to the typical fire station design, construction and amenities of other existing fire stations within the Town of Markham, a satellite fire station would contain the same types of amenities to accommodate a complement of firefighters required to staff a front run apparatus. However, from a physical facility perspective a satellite fire station could be included within an existing or planned commercial/residential or industrial complex. Opportunities for partnership with the private sector and/or other agencies would be beneficial to this type of facility. The most critical factor should be location.

- With the addition of the stations, apparatus and staff listed above, consideration should be given to the reassignments of ladder trucks so that:
    - Ladder 966 (placed in service in 2014 at Station 96) moves to Station 97 once Station 90 is in operation (e.g. 2017);
    - Ladder 916 continues to be deployed from Station 91;
    - Ladder 956 moves from Station 95 to Station 90; and
    - Any new ladders should be designed based on similar specifications to Ladders 916 and 956 to benefit from standardized apparatus.

Division of Training

The Town of Markham Fire and Emergency Services (MFES), Division of Training, consists of a Chief Training Officer and four Training Officers. The division's primary responsibilities are to research, develop, deliver and coordinate training programs. A major target of these training programs is the Division of Suppression. However, the Division of Training is responsible for ensuring that all MFES personnel receive the training necessary to meet the legislative requirements of the Ontario Fire Prevention and Protection Act (FPPA) and the Occupational Health and Safety Act of Ontario (OHSA).

The Chief Training Officer reports directly to one of the Deputy Fire Chiefs. The Chief Training Officer and four Training Officers are assigned offices at the MFES headquarters facility located at 8100 Warden Avenue. The Division of Training is currently utilizing a decommissioned fire station located at 438 John Street and the adjacent municipal property as an interim training centre.

In addition to the staff assigned to the division, MFES also utilizes fire suppression staff assigned as "temporary /on-shift instructors" to facilitate platoon instruction. This is particularly useful for programs requiring large-scale and ongoing re-certification training, such as emergency medical responder, ice/water rescue and travel restraint training. This strategy is also applied for training on MFES computer programs. Division of Training staff provide the on-shift instructors with program support, direction, coordination, consistency, and quality assurance.

Under the leadership of the Chief Training Officer, MFES develops an appropriate Annual Plan that responds to the relevant legislative training requirements. MFES uses a range of strategies to deliver training including the use of "temporary / on-shift instructors". This strategy appears to be working very well for the MFES.

The MFES has a well-developed records management system for all training records. Procedures and responsibilities are in place to ensure that all training records are submitted and up to date. Further consideration of strategies targeted at succession planning and officer development would assist the MFES in preparing for the future both from a perspective of staff turn-over as a result of retirements and due to growth within the municipality.

The current training centre is insufficient for the training activities that a large, full-time fire service such as MFES requires. The current strategy of using live fire training centres in other municipalities is an appropriate short-term solution, however there is a financial impact to renting these facilities, and a negative impact on the number of emergency response resources available within the Town of Markham when on-duty fire suppression staff and apparatus attend training centres outside its boundaries.

Recommendations

The following recommendations relate to MFES' Division of Training:

- Consideration should be given to attaining recognition of 'equivalency" from the OFM for the current MFES training program. The OFM is the organization recognised as having overall legislated responsibility for monitoring the delivery of fire protection in Ontario.

- In light of the high risk involved with the specialized emergency responses requiring technical training (i.e. hazardous materials, confined space rescue, ice/water rescue, high-angle rescue, etc.), consideration should be given to including the Town of Markham Council in the decision-making to determine level of service delivery that the Markham Fire and Emergency Service will ultimately provide for these types of incidents.

- In determining the levels of technical response to specialized calls the MFES should also consider opportunities for partnerships and/or strategic alliances with other adjacent municipalities or agencies. This could include sharing of equipment, coordinated training sessions or the implementation of automatic aid agreements to provide first response or additional support.

- Consideration should be given to establishing an acting position to fill the role of Chief Training Officer during absences, for succession planning purposes.

- Consideration should be given to the opportunity to utilize the Markham Learn Centre as a resource to increase officer development programming directed at current and future officer candidates, and succession planning activities within the MFES.

- It is recommended that MFES investigate its particular need for a live fire training facility. The first step would be a needs assessment to determine the potential benefits and identify any specialized / unique training aids that would best-suit fire-related MFES calls.

- Consideration should be given to explore internal, private and public partnerships in the research and development of a training facility also to include potential revenue generating opportunities.

- Ongoing consideration of the strategic priorities of the division is required to ensure staffing resources within the Division of Training are appropriate to maintain the current level of efficiency and effectiveness. This will be particularly relevant as the MFES expands to meet municipal growth and increased needs.

Division of Apparatus and Equipment

The Division of Apparatus and Equipment (also commonly referred to as the 'Mechanical' Division) is responsible for the maintenance and repair of Markham Fire and Emergency Services' (MFES') vehicles. This includes the small vehicle fleet as well as the heavy, specialty fire apparatus fleet. The division conducts routine and required maintenance. The division also conducts or coordinates annual testing and certification, such as pump and ladder testing or Periodic Mandatory Commercial Vehicle Inspections (PMCVIs) of apparatus.

A Deputy Fire Chief oversees the Division of Apparatus and Equipment. The division includes two mechanical staff assigned directly to the MFES. In addition, the division receives support from the Town's Fleet Supervisor.

The Town of Markham has adopted a proactive life cycle planning and asset management system. In addition to being a good financial planning tool this system is providing an effective process for the management and replacement of all major corporate assets, including those within the MFES.

The MFES Fleet Standardization Plan approved by Council is also proving to be a valuable strategy towards maintaining an effective, modern fleet of fire apparatus. As the MFES continues to grow a strategy should be considered for sustaining reserve apparatus within the MFES Fleet Standardization Plan.

Further consideration of the organizational structure and supervisory requirements of this division should be made. Ideally, this would be done in tandem with a review of current staff workload and the potential of adding a position of "apprentice mechanic" to the division. Assessing the current staff resource needs, in addition to planned growth within the MFES, and opportunities to enhance the efficiency of the division through increased use of technology such as laptop computers, should provide an effective strategy in managing the needs of this division into the future.

Recommendations

The following recommendations relate to MFES' Division of Apparatus and Equipment:

- Consideration should be given to conducting a review of the organizational reporting structure, supervisor requirements and workload of this division. Options should be considered to implement a "mechanic supervisor" position and create an "apprentice mechanic" position utilizing the benefits of the Ontario Youth Apprenticeship Program.

- The reserve fleet should, wherever possible, be consistent with the specifications of the fleet standardization plan for front run apparatus.

- Identifying options for providing a larger apparatus repair and maintenance facility should be considered a priority for the MFES. The facility should include a minimum of two bays of varying length and sufficient length and/or height in a minimum of one bay to fully extend the large ladders. It is recommended that MFES conduct a needs assessment study for a new facility to house the Division of Apparatus and Equipment.

- Consideration should be given to conducting a detailed review of the current functional capabilities of the Division of Apparatus and Equipment. Opportunities to enhance the accessibility to other MFES and corporate software programs, such as parts inventory, vehicle maintenance records, etc., should be considered. The provision of laptop computers should also be considered a priority when assessing equipment and technology needs.

Division of Communications

Reporting directly to one of the Deputy Fire Chiefs, the Dispatch Supervisor is responsible for the administration and operation of the MFES Communications Centre currently housed within Fire Station 95, located on Main Street in Unionville. The Communications Centre includes the dispatch alarm room and a communications equipment room.

The primary functions of the Communications Centre are to receive calls from the public and other agencies typically through the 911 call system, determine the nature of the emergency, and dispatch the appropriate emergency response apparatus and staff as defined by predetermined protocols.

The Dispatch Supervisor is responsible for the management of Division of Communications' staff, which currently consists of 10 Alarm Room Operators who function as dispatchers / call-takers. Currently two Alarm Room Operators are assigned to each of the four platoons and two Alarm Room Operators fill floating positions, to accommodate vacation, sick leave, etc. The Dispatch Supervisor can act as an Alarm Room Operator as required (on-duty relief, sick leave, etc.).

In comparison to industry best practices and the NFPA 1221 standard the Division of Communication is not meeting the performance targets for emergency call taking and dispatching. MFES should review each step of the call handling and dispatching process in order to identify efficiencies to improve the 90th percentile dispatch times. The efficiency and effectiveness of a number of the technology components of the call taking and dispatching system are and issue. Many are either reaching the end of their life expectancy, or no longer meeting the current and forecasted needs of a large urban fire and emergency service.

The current facility that houses the division has reached its life expectancy and no longer meets operational needs. Consideration of alternate locations is required. The MFES management team has recognised these challenges and is currently in the planning process to relocate the Division of Communications to 8100 Warden Avenue. The results of this analysis support this relocation strategy, and identify other areas such as technology architecture, redundancy/disaster recovery, and improved functionality that should be considered within any relocation planning.

Recommendations

The following recommendations relate to MFES' Division of Communications:

- MFES should work with the Town's Information Technology Services to develop a specific technology architecture and deployment plan for the fire and emergency service including:
    - technology linkages and overall architecture
    - technology standards
    - upgrade options and directions
    - backup and redundancy procedures
    - maintenance procedures

- A Review should be conducted to asses each step of the call handling and dispatching process to determine if there are any efficiencies which could improve this component of emergency response time.

- Consideration should be given to the installation of a redundant/ fail over server system for the CAD/ AVL/ RMS applications at a designated disaster recovery location.

- Consideration should be given to commencing planning efforts to upgrade or replace the current GEAC CAD / AVL / RMS system and Thales call recorder system.

- Consideration should be given to developing a succession plan to address ongoing staff resources required to support current and future IT systems within the MFES.

- Consideration should be given to the continued upgrade of the CAD/AVL functionality on board all fire suppression apparatus to include integrated mapping and reporting features and real time links to the central systems.

- Consideration should be given to adding alarm room staff as the Town grows and call volumes increase.

Study Consultation

The Markham Master Fire Plan started with a project initiation meeting, held on May 10, 2010. As the study progressed, various forms of consultation activities were employed to engage the public and gather feedback from stakeholders and members of the community. Effective communication and consultation with stakeholders and the community is essential to ensure that those responsible for implementing this Master Fire Plan, and those with a vested interest, understand the basis by which certain decisions are made and why particular actions are required.

The consultation program included a number of meetings with the project steering committee, interviews with key stakeholders and a public open house.

Implementation Plan

Recommendations resulting from this analysis were derived to form an action plan for implementation, shown in the table below.

Implementation Plan				
Item	**Plan Year**	**Description**	**Proposed Costs**	
			Operating	**Capital**
1	**2012**	Add third Deputy Fire Chief position	$ 120,000	-
2		Administrative support. Succession planning should be completed to address ongoing staff resources required to support current and future IT systems within MFES	$ 35,000	-
3		One Fire Prevention/Education Officer for Station 99 Cornell (Community Based Fire Protection Model)	$ 86,000	-
4	**2013**	Redundant/fail over server systems should be installed for the CAD/AVL/RMS applications at a designed disaster recovery location	-	$ 50,000
5		Develop IT technology architecture and deployment plan for Division of Communications	-	$ 75,000
6		Complete assessment for the Regional Radio System changes scheduled for 2014	-	$ 50,000
7	**2014**	Mechanical Facility Needs Assessment	-	$ 50,000
8		Upgrade or replace the current GEAC CAD/AVL/ Records Management systems and Thales call recorder system	-	$ 500,000

Implementation Plan				
Item	**Plan Year**	**Description**	**Proposed Costs**	
			Operating	**Capital**
9		Purchase Ladder Truck for Station for 96 and add 20 Firefighters (Included in existing DC background study)	$ 2,100,000	$ 1,200,000
10	**2015**	Add 2nd Senior Fire Prevention Officer position	$ 100,000	-
11		Retrofit Station 96 to accommodate a Fire Prevention/Education Officer for Community Based Fire Protection Model	-	$ 75,000
12	**2016**	Continue to upgrade CAD/AVL functionality on board the fire trucks to include integrated mapping and reporting features and real time links to the central systems	-	$ 150,000
13	**2017**	Station 90 + 20 Firefighters + 1 Fire Prevention/Education Officer (Community Based Fire Protection Model - included in existing DC background study)	$ 2,100,000	$ 4,500,000
14		Purchase Engine 901 and equipment for Station 90	-	$ 800,000
15	**2019**	Add Satellite Station to Langstaff high density development in Thornhill. One Engine + 20 Firefighters (to be added to next DC background study)	$ 2,000,000	$ 3,000,000
16		Purchase Engine for Satellite Station and equipment	-	$ 800,000
		TOTALS	***$ 6,541,000***	***$ 11,250,000***

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

The Town of Markham initiated this Master Fire Plan (MFP) study as part of its comprehensive community planning initiatives to manage the projected growth within the municipality over the next ten-year period. Demands on the current system of public fire protection, prevention and education are expected to continue to increase as a result of projected growth.

Completion of this MFP recognizes the continued commitment of Council and senior staff to providing the highest level of services and programs to the community in the most cost-effective and efficient manner. This MFP provides a complete review of the current operations of the Markham Fire and Emergency Services (MFES) to assist Council in establishing key objectives for the department. The plan includes recommendations to address both short-term and long-term strategies for the municipality, consistent with the master fire plan process outlined within the Office of the Fire Marshal, Ontario's (OFM), *Shaping Fire-Safe Communities Initiative*.

The overarching goal of this report is to present a clear understanding of the existing and future requirements of the MFES. Referencing best practices, including relevant standards and legislation, this report was prepared to respond to the following objectives identified by the Town of Markham and contained within the Request for Proposal for this study:

- Assess community needs resulting from the impacts of existing and future growth;
- Review existing research, information, issues and strategies and complete a trend analysis related to the overall fire and emergency services to ensure best practices are being followed or recommended for adoption;
- Involve the public and stakeholders through innovative and targeted consultation; and
- Develop directional statements to guide future decisions relating to the MFES.

1.1 Key Issues and Initiatives

The Town of Markham is the largest town in Canada and one of the fastest growing municipalities, and has been identified for growth and development in the Province of Ontario's Places to Grow Strategy. The Town, covering approximately 212 square kilometres, is currently a mix of established and new urban areas, including many communities and hamlets, such as Thornhill, Milliken, Unionville, Markham, Cedar Grove, Cornell and Wismer. The current population of approximately 300,000 is anticipated to grow to a projected population of 445,000 by the year 2031.

With this significant population increase expected over the next 20 years, one of MFES' biggest challenges will be to continue to provide effective fire and emergency services while meeting the demands of a growing and diverse population. In order to do so, it will be necessary to identify the current and future needs of the Town of Markham and the Markham Fire and Emergency Service as they relate to the provision of fire and emergency services.

Not only is the Town of Markham's population growing in numbers, but also in diversity. Members of the community come from a full-range of ethno-cultural backgrounds, with approximately 60% of the population speaking English as a second language. This places the Town of Markham and MFES in a unique and challenging position for both public education and fire prevention. In order to foster and maintain a strong community relationship, MFES requires a clear approach on how to best serve this diverse society. Strategies should be developed to disseminate information in all required languages, while paying particular attention to promoting unity and inclusion.

Markham Fire continues to address matters related to diversity by actively engaging the public, acting as a role model for recruitment and through the provision of programs geared toward cultural diversity including training for staff.

Markham hosts three major shopping centres, two hospitals, and over 1,000 businesses and many corporate headquarters. On-going development of additional residential, commercial and industrial land uses continues to contribute to the growth and intensification of Markham. In addition to the Town of Markham exhibiting a variety of land uses and occupancy types it is located at the crossroads of two major provincial highways (Highway 407 and Highway 404), and hosts the busy Toronto Buttonville Municipal Airport. The Town covers an area of over 200 square kilometres and is bounded by five municipalities: City of Toronto, City of Vaughan, Town of Richmond Hill, City of Pickering and Municipality of Whitchurch-Stouffville. These factors provide unique challenges from both a suppression and fire prevention and public education perspective.

By commissioning this study, the Town of Markham plans to identify current and future needs as they relate to fire and emergency services in their growing and diverse community. The Master Fire Plan will be broad in scope and include a full review of current MFES operations, staffing and services provided compared against industry best practices. The plan will establish strategic priorities that take into consideration financial implications, performance measures and a clear action plan to guide the department through the next five and ten years of growth.

Engaging stakeholders through a variety of public engagement and consultations processes is a key objective of this study. Understanding the needs and circumstances of the community at large is a core component of ensuring existing services and programs are effective in responding to existing community needs. These engagement strategies are also critical to understanding future trends and challenges that the department may be facing.

The Town of Markham and MFES has a well established history of being pro-active in developing operational and strategic plan documents. Evidence of this can be seen in a number of recent documents and reports including:

- 2001 Deployment Study;
- 2002 Vehicle Standardization;
- Building Audit and Familiarization Program;
- Training Survey and Needs Analysis 1998;
- Sole source purchasing plan; and
- Corporate training strategies.

This Master Fire Plan has been developed using current information and best planning estimates for the future. Even with our best planning projections unforeseen factors can result in changes to projected timing and amount of growth. Therefore, plans such as this need to be treated as living documents, which require on-going assessment and updating. Updates should be completed at regular intervals throughout the duration of the projected 10-year horizon of this plan.

1.2 Legislated Requirements

Within the Province of Ontario the relevant legislation for the operation of a fire department is contained within the Fire Protection and Prevention Act, 1997 (FPPA). The FPPA states that, *"every municipality shall, establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances."*

Developing a MFP is recognised as an appropriate strategy in assessing the needs and circumstances within a specific community to assist local council's in developing an overall service delivery model for their community.

To further assist communities the Office of the Fire Marshal, Ontario (OFM) has developed the Comprehensive Fire Safety Effectiveness Model. The model identifies "*three lines of defence*" that can be utilized in responding to local community needs. The three lines of defence include:

- Public education and prevention;
- Fire safety standards and enforcement; and
- Emergency response.

The ultimate goal of any fire and emergency service is to prevent a fire. In utilizing these three lines of defence the Comprehensive Fire Safety Effectiveness Model emphasises the importance and value of preventing a fire. This is important from both an economic and life safety perspective. The model also recognises that developing programs and providing resources to effectively implement the first line of defence (a proactive public education and prevention program) can be an effective strategy to reduce and potentially minimize the need for the other lines of defence.

To further assist communities, the OFM has a role to monitor municipal compliance with the FPPA. This reviews compliance with the minimum requirements of a Community Fire Safety Program, which must include:

- a smoke alarm program with home escape planning;
- the distribution of fire safety education material to residents/occupants;
- inspections upon complaint or when requested to assist with code compliance (including any necessary code enforcement); and
- a simplified risk assessment.

1.3 Municipal Fire Protection Information Survey

In 2004 the OFM conducted a survey to asses the level of municipal compliance with the FPPA across the province. Within the survey the purpose was defined as;

- *"To assist municipalities in complying with the minimum requirements for fire protection services, as directed by the Fire Protection and Prevention Act 1997 (FPPA); and*

- *To enable the OFM to meet its responsibility for monitoring the levels of fire protection services in Ontario, as required by the FPPA."*

MFES participated in the *Municipal Fire Protection Information Survey* and was confirmed by the OFM as achieving the minimum requirements of the Fire Prevention and Protection Act 1997 (FPPA).

The Town of Markham was subsequently granted a "*Certificate of Compliance"* from the Office of the Fire Marshal, Ontario as confirmation.

1.4 Performance Measures, Goals and Objectives

Establishing a measurement-supported set of performance targets or service standards, together with clear goals and objectives, are core components of evaluating the overall effectiveness of providing fire and emergency services.

As identified in the FPPA, the OFM has the power to issue guidelines to municipalities in respect to fire protection services and related matters. These *Public Fire Service Guidelines* (PFSG) are to be used by local municipalities to determine the level of fire protection services they deem necessary, in accordance with their individual needs and circumstances.

In addition, the National Fire Protection Association (NFPA) has developed specific standards for a wide scope of services that municipal fire departments provide. For example, NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* describes a standard for the delivery of emergency response services by a full-time fire service. Other standards such as NFPA 1221 "*Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems"* are also being utilized by municipalities to design and measure the effectiveness of their fire services.

Over the past several years the MFES has been moving toward a target of achieving the standards defined within NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* as the performance level target for emergency response. The 2001 Deployment Study completed by the MFES used the NFPA 1710 standard as the benchmark for assigning fire suppression staff and developing appropriate emergency response protocols.

Based on our experience, the NFPA 1710 standard is appropriate for the MFES and the Town of Markham to consider in adopting a "performance measure target" for emergency response. Adopting this standard as a "target" rather than formally adopting it as a performance standard would provide the MFES and Council with a recognized standard and best practice to assist in the planning and implementation of appropriate resource deployment and an effective measurement tool in monitoring the efficiency and effectiveness of the MFES.

To complete this review we have referred to the relevant OFM guidelines and NFPA standards, including NFPA 1710, to evaluate the current and projected future performance of the MFES. In addition, we have used industry best practices and comparative analysis with other similar size municipalities, where possible.

Our review also assesses the current goals and objectives of the MFES and where relevant, provides recommendations for review or updates.

2.0 COMMUNITY RISK PROFILE

The Office of the Fire Marshal, Ontario's (OFM) *Fire Risk Sub-model*[2] introduces the importance of community risk in the following paragraph:

> "*Assessing the fire risk within a community is one of the seven components that comprise the Comprehensive Fire Safety Effectiveness Model. It is the process of examining and analyzing the relevant factors that characterize the community and applying this information to identify potential fire risk scenarios that may be encountered. The assessment includes an analysis of the likelihood of these scenarios occurring and their subsequent consequences.*"

Community fire risks are explained in detail within the OFM's *Fire Risk Sub-model* as follows:

> *"The types of fire risks that a community may be expected to encounter are influenced by its defining characteristics. For example, a "bedroom community" presents a different set of circumstances over one that is characterized as an "industrial town". Communities that are distinguished by older buildings will pose a different set of concerns over those that are comprised of newer buildings constructed to modern building codes. Communities populated by a high percentage of senior citizens present a different challenge over ones with a younger population base.*
>
> *Assessing fire risk should begin with a review of all available and relevant information that defines and characterizes your community. Eight key factors have been identified that contribute to the community's inherent characteristics and circumstances. These factors influence events that shape potential fire scenarios along with the severity of their outcomes:*
>
> - *Property Stock*
> - *Building Height and Area*
> - *Building Age and Construction*
> - *Building Exposures*
> - *Demographic Profile*
> - *Geography/Topography/Road Infrastructure*
> - *Past Fire Loss Statistics*
> - *Fuel Load"*

[2] Source: *Comprehensive Fire Safety Effectiveness Model, Fire Risk Sub-Model*, June 2009 Office of the Fire Marshal, Ontario

2.1 Property Stock

The majority of Markham's property stock is residential with an average of just over three people living in each building or suite. The number of single-family dwelling units being used as two-unit buildings or even rooming houses is an area of concern for the MFES.

When Markham amalgamated with the smaller communities in the area (i.e. Unionville, Thornhill, Milliken, etc.) it inherited the separate, older downtown cores associated with those communities. The Thornhill area also includes a small cluster of high-rise residential buildings.

Markham has several industrial and commercial occupancies. In 2006-2007 Markham was considered the "high tech" capital of Canada. The largest employers in Markham are now AMD (formally ATI), American Express, and IBM. The total number of employees is well over 35,000. A loss in one of these buildings could be quite damaging to the community as well as the province. Markham's building stock profile is summarized in ***Table 2.1***.

Table 2.1: Property Stock Profile

Occupancy Classification		Number of Occupancies
Group A	Assembly	737
Group B	Institutional	15
Group C	Single family	68,121
	Multi-unit residential	15,422
	Hotel / Motel	10
	Mobile Homes & Trailers	0
	Other	0
Groups D & E	Commercial	2,765
Group F	Industrial	1,306
Other occupancies not classified in Ontario Building Code (i.e. farm buildings)		88
Totals		88,464
Total # of mixed occupancy buildings		77

2.1.1 Building Height and Area

MFES has developed a comprehensive inventory of buildings using a common definition of heights and area to assess property risk, identify reasons for concern and to identify the number of buildings within each category. These are summarized in ***Table 2.2***.

Table 2.2: Building Height and Area

Property Risk	Reason for Concern	Number of Buildings
High Rise Residential (>6 storeys)	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety. High occupant loads, as well as the difficulties posted for fighting fires in high buildings.	30
Low Rise Residential (<=6 storeys)	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety.	80
Two-Unit Apartment Buildings (converted Single Family)	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety.	852
Rooming Houses	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety. Licensed by Town creating more Town responsibility. Inquest recommendations place greater onus on the Town for their inspection.	Unknown
Group Homes	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety. Licensed by the Town, thus more Town responsibility. Inquest recommendations place greater onus on the Town for their inspection.	18
Single Family Dwellings	Significant risk of residential fires, property loss, injuries or deaths. There is reliance by occupants upon building safety features for their safety. Municipal by-law requiring carbon monoxide alarms.	67,515
Hospitals, Nursing Homes and Homes for the Aged	Incapacity of occupants to protect themselves. Significant risk of fire occurrence. Potential large loss of life. There is reliance by occupants upon building safety features for their safety.	15
Schools	Potential high life loss risk, occupants (students) under control of building operators (principals); minors placed in the care of government.	80

2.1.2 Building Age and Construction

Markham was originally settled as a predominantly farming township. With growth and development over the years Markham is now much more urbanized. Much of this development is of relatively recent construction and it followed the opening of Highway 404 in the 1970s and Highway 407 in the late 1990s. As the first Ontario Building Code was issued in 1975, structures built after that date can be considered a lower risk from a fire perspective. From 2006 census data, it was estimated that only 41% of Markham's dwellings were constructed prior to 1986, which is 28% lower than the provincial average of 69%. However, there are several (approximately 50) preserved or restored heritage buildings in the Town. These structures date back to the 1800s, although many have been restored since the building code was put in place.

2.1.3 Building Exposures

Markham is currently making an effort to reduce and prevent the phenomena of urban sprawl. This has resulted in intensification of the urban centres of the Town. Many of these areas are original community centres, from the original municipalities that now comprise the Town of Markham. This intensification creates building exposures. Closely spaced buildings, typical of infill construction, have a higher risk of a fire propagating. A fire originating in one building could easily be transferred to neighbouring structures due to close proximity. This is an added community risk that the Town of Markham should monitor given the planned intensification areas noted within current growth plans.

2.2 Demographic Profile

In terms of demographic profile, ***Table 2.3*** provides information which compares the age characteristics of Markham's population with the provincial averages. The vulnerable populations are children less than 15 years of age and seniors age 65 and older. In Markham, the percentage population of the age group less than 15 years is 18.2%, which is the same as the provincial average. Markham's percentage population for the age group of 65 years and older is 10.7%, which is slightly lower than the provincial average of 13.6%. While these segments are lower in Markham than the provincial average they should remain a focus for fire prevention and public education activities.

According to the 2006 census from Statistics Canada, the median income in 2005 for all census families in Markham was $74,889. From the same data set, the median age in Markham was reported as 38.1 years, which is slightly lower than the provincial median age of 39.0. The population density was estimated at 1230.5 persons per square kilometre. The average value of an owned dwelling in Markham in 2005 was estimated to be $440,755, which is more than 65% higher than the provincial average of $263,369. Out of a total of 77,195 dwellings, census data shows that 89% are owned and 11% are rented. Markham's dwelling ownership is much higher than the provincial ownership average of 71%.

Table 2.3: Demographic Profile				
Age Characteristics of the Population	**Markham**		**Ontario**	
	Total	**% Total**	**Total**	**% Total**
Total population	261,575	-	12,160,285	-
0 to 4 years	14,165	5.4%	670,770	5.5%
5 to 9 years	15,415	5.9%	721,590	5.9%
10 to 14 years	18,070	6.9%	818,445	6.7%
15 to 19 years	19,395	7.4%	833,115	6.9%
20 to 24 years	19,250	7.4%	797,255	6.6%
25 to 44 years	73,775	28.2%	3,452,055	28.4%
45 to 54 years	43,180	16.5%	1,861,370	15.3%
55 to 64 years	30,460	11.6%	1,356,515	11.2%
65 to 74 years	16,325	6.2%	868,190	7.1%
75 to 84 years	8,915	3.4%	589,180	4.8%
85 years and over	2,625	1.0%	191,810	1.6%
Median age of the population	38.1	-	39.0	-
population aged 14 and under	47,650	18.2%	2,210,805	18.2%
population aged 65 and over	27,865	10.7%	1,649,180	13.6%

The population levels for municipalities within York Region are summarized in ***Table 2.4***. The Town of Markham is the largest municipality within York Region, accounting for approximately 29% of the regional population.

Table 2.4: Population by Municipality				
Municipality	**Population***	**%**	**York Region Estimates****	**%**
Aurora	47,629	5.3	53,686	5.2
East Gwillimbury	21,069	2.4	23,086	2.2
Georgina	42,346	4.7	45,940	4.4
King	19,487	2.2	20,556	2.0
Markham	261,575	29.3	304,060	29.4
Newmarket	74,295	8.3	83,048	8.0
Richmond Hill	162,704	18.2	183,237	17.7
Vaughan	238,866	26.8	283,886	27.5
Whitchurch-Stouffville	24,390	2.7	35,106	3.4
Total	892,361	100	1,032,606	100

**Source - Statistics Canada, 2006 Census* ***Source – York Region Population Estimates, December 31, 2009*

2.3 Geography/Topography/Road Infrastructure

The Town of Markham is made up of a variety of land uses and occupancy types including:

- high-rise apartments and condominiums;
- single-family dwellings and townhouses;
- industrial development;
- commercial development;
- historic rural communities; and
- agricultural areas.

It is also home to the busy Toronto Buttonville Municipal Airport and is located at the crossroads of two major provincial highways (Highway 407 and Highway 404). The Town is bounded by five municipalities that cover an area of over 200 square kilometres. The majority of lands designated for urban development within the Town of Markham are predicted to be built-out within the 20 year planning horizon. The existing land uses and future development areas are depicted in ***Figure 2.1.***

The Town was identified in the 2006 Places to Grow Act prepared by the Ontario provincial government. As a result, two major development areas have been identified for intensification: Langstaff Gateway and Markham City Centre. Intensification will also occur in smaller urban areas of the Town throughout the next twenty years.

Town of Markham Master Fire Plan

Figure 2.1: Existing Land Use and Future Development Areas

DILLON CONSULTING

Legend

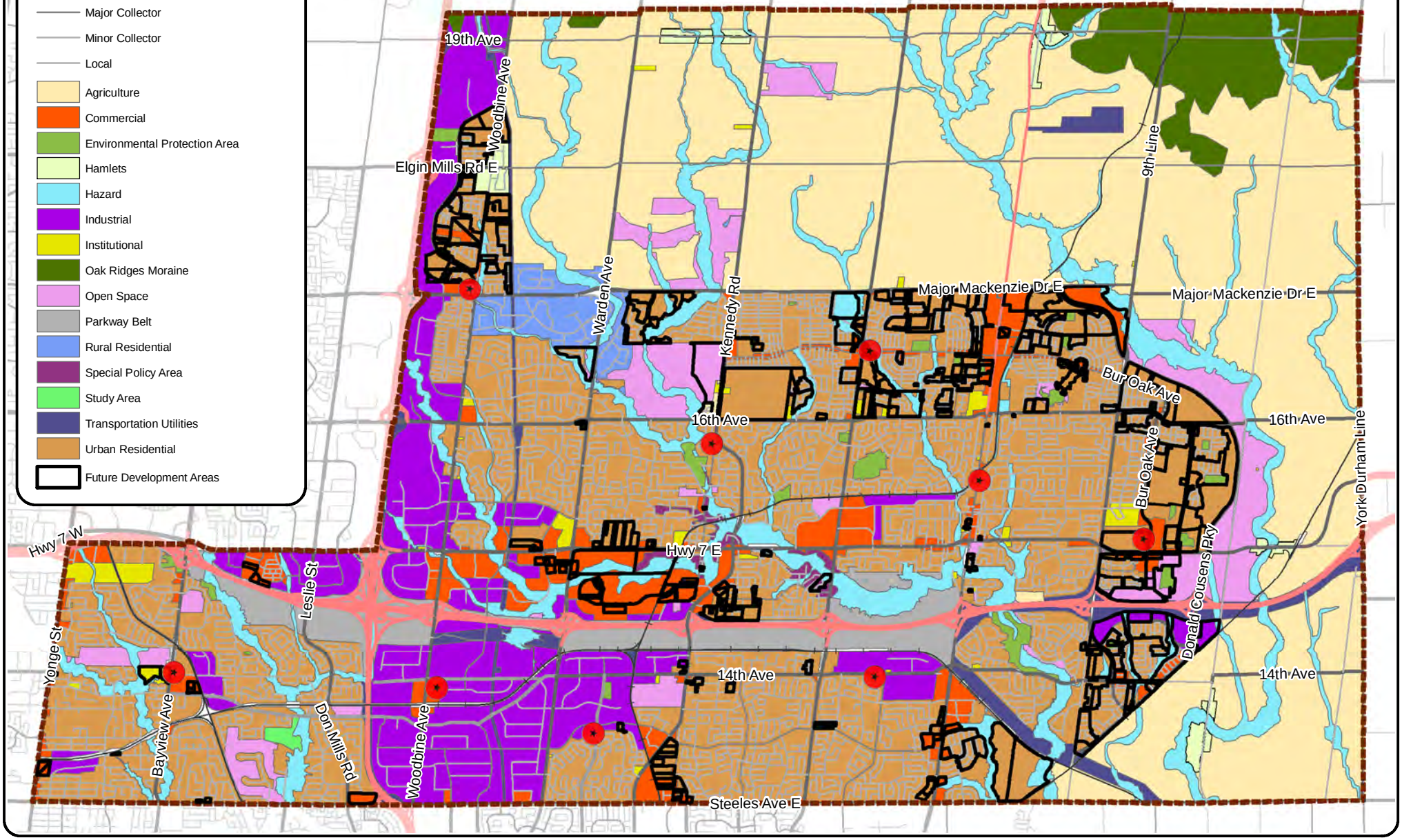
- Fire Stations
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Agriculture
- Commercial
- Environmental Protection Area
- Hamlets
- Hazard
- Industrial
- Institutional
- Oak Ridges Moraine
- Open Space
- Parkway Belt
- Rural Residential
- Special Policy Area
- Study Area
- Transportation Utilities
- Urban Residential
- Future Development Areas

0 0.5 1 2

Kilometres

1:82,615

Modified: July 13, 2010



2.4 Past Fire Loss Statistics

Understanding community risks involves consideration of past fire loss, fire-related deaths and injuries as well as fire-related financial loss. This section reviews past fire losses within the Town of Markham.

Table 2.5 summarizes fire deaths and injuries for 2006 to 2008, as presented within the Town's simplified risk assessment.

Table 2.5: Municipal Fire Deaths and Injuries (2006-2008)

Year		2006		2007		2008		2006-2008	
Occupancy Classification		Deaths	Injuries	Deaths	Injuries	Deaths	Injuries	Total Deaths	Total Injuries
Group A	**Assembly**	0	2	0	0	0	0	***0***	***2***
Group B	**Institutional**	0	0	0	0	0	0	***0***	***0***
Group C	**Residential**	0	1	2	2	0	2	***2***	***5***
Groups D&E	**Commercial**	0	0	0	0	0	0	***0***	***0***
Group F	**Industrial**	0	0	0	0	0	0	***0***	***0***
Mobile Homes & Trailers		0	0	0	0	0	0	***0***	***0***
Other		0	0	0	0	0	0	***0***	***0***
Total Deaths / Injuries		0	3	2	2	0	2	***2***	***7***

The highest number of fire-related deaths and injuries occurred within residential occupancies. Two deaths (the only fatalities from 2006 to 2008) and five injuries occurred in residential occupancies. In 2006, two fire-related injuries were experienced in assembly occupancies.

A summary of the fire-related municipal property dollar loss, between the years of 2006 and 2008 is shown in ***Table 2.6***.

Residential fires resulted in the greatest property dollar loss in the Town of Markham from 2006 to 2008. This is consistent with residential occupancies being the largest group within the building stock profile for the Town. Based on discussions with MFES Fire Prevention staff, this has been the historic trend in Markham since 1996.

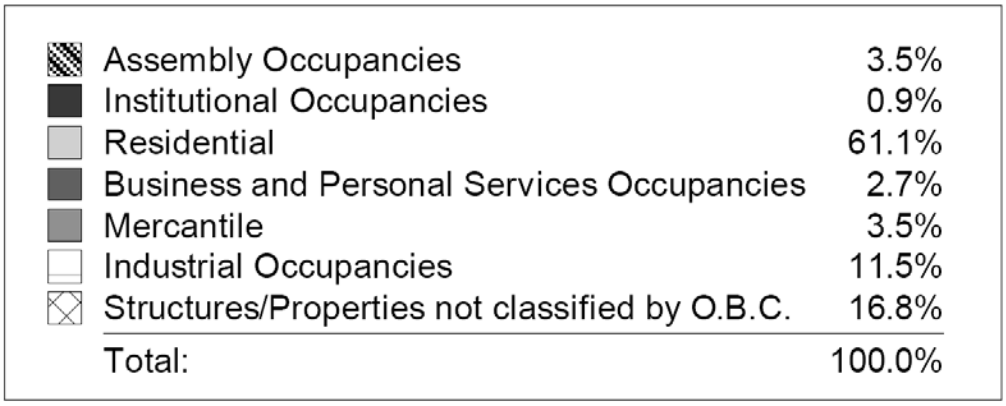
Table 2.6: Municipal Property Dollar Loss (2006-2008)								
Occupancy		**Year 2006**		**Year 2007**		**Year 2008**		**% Total Dollar Loss (2006 – 2008)**
Classification		**# of fires**	**Dollar Loss ($)**	**# of fires**	**Dollar Loss ($)**	**# of fires**	**Dollar Loss ($)**	**%**
Group A	Assembly	18	47,800	19	635,302	10	11,000	4%
Group 3	Institutional	1	150	1	1,000	1	1	<1%
Group C	Residential	87	3,915,723	78	4,736,921	91	3,323,222	76%
Groups D & E	Commercial	20	715,360	14	149,950	14	189,440	7%
Group F	Industrial	12	278,200	9	541,000	20	1,208,300	13%
Mobile Homes & Trailers		0	0	0	0	0	0	0%
Other		74	19,672	79	6.3	57	44.8	<1%
Total Losses		***203***	***4,976,907***	***200***	***6,070,936***	***193***	***4,776,758***	***100%***

A summary of calls compared to losses is shown in **Table 2.7**. In 2008, Markham Fire and Emergency Services responded to a total of 7,615 incidents. Of these, only 159 resulted in fire losses (2.1%) resulted in fire losses. This suggests that the overall risk of fire in the Town of Markham is relatively low.

Table 2.7: MFES 2008 Calls and Fire Losses	
Call Type	2008 Result
2008 Total Calls	7,615
Structure Fire Losses	96
Other Fire Losses	17
Vehicle Fire Losses	46
No Loss (fire call)	83
Non-fire Emergency Call	7,373

The percentages of fire losses, organized by property type (excludes vehicle fires), from the 2008 MFPIS for Markham are included in ***Figure 2.2*** highlighting that residential fires are the property type of greatest concern, followed by structures/ properties not classified under the Ontario Building Code and industrial occupancies.

Figure 2.2: Fire Loss by Property Type (2008)



As described above, the greatest fire losses experienced in Markham have historically occurred within residential occupancies. As well, the building stock profile within the Town is comprised of predominantly residential occupancies. There is also a great deal of residential development, in the form of single family, townhouses, and high-rise apartments / condominiums. These add to the existing residential building stock. For these reasons, residential occupancies present the greatest fire risk within the Town of Markham. The practice of identifying building risks as part of the fire prevention program is proactive and prudent. Markham has a significant number of each of these residential building types. The risk associated with the buildings support targeting these occupancies and buildings with fire prevention efforts.

2.5 Summary and Recommendations

MFES has built risk management planning into the on-going planning that occurs within the municipality and the fire and emergency service. This is evidenced by the various divisional and department studies and plans that have been prepared by MFES. These include:

- Simplified Risk Assessment
- Municipal Fire Protection Information Survey
- Deployment Study 2001
- Vehicle Standardization 2002
- Training Survey and Needs Analysis 1998

The MFES Master Fire Plan (MFP) study is an extension of this risk management planning. It will provide Council and staff with a strategic long-term plan. The MFP has taken into account the planning and analysis completed within the previous deployment study.

Moving forward, MFES will maintain a proactive risk management planning process by ensuring the following:

- Continuous planning directed towards maintaining responsive approach to the changing needs of the community and local areas;
- Continuous review of divisional services provided and functions conducted by the MFES to confirm that objectives are being met, in accordance with the strategic plan, as dictated by the Establishing and Regulating By-law;
- Continuous awareness of new and changing standards, evolving technologies, innovations, and other advances that would improve service delivery;
- Inclusion and accountability of personnel in risk management planning process; and
- Incorporation of pre-emergency planning into the overall risk management planning process.

Community risk planning assists in the identification of the needs and circumstances within the Town. These risks, needs and circumstances should be taken into consideration when planning the future programs and resources for Markham's Fire and Emergency Services.

2.5.1 Recommendations

- Consideration should be given to implementing an ongoing process to update the community risk profile for the Town of Markham. Having access to a current community risk profile can be a valuable asset to the MFES management team in guiding their strategic and daily decisions.

3.0 DIVISION OF ADMINISTRATION

3.1 Mission Statement

The Markham Fire and Emergency Services (MFES) vision statement is as follows:

"*To become Canada's best Fire Department for our citizens*"

The department's mission statement reads as follows:

"Markham Fire & Emergency Services is committed to providing the highest level of life safety and property protection to those who live, work or play in our community. We will perform in a sensitive and caring manner, through the provision of excellent preventative, educational and emergency services."

The MFES mission statement is relevant and up to date. It relates to the comprehensive fire safety effectiveness model's three lines of defence, as it covers emergency response, life safety, prevention and education. It also specifies the service is provided for the community, which is relevant for the FPPA 'needs and circumstances' clause.

3.2 Goals and Objectives

Within the Town of Markham's "*Establishing and Regulating By-law, 2002-25"* Council has established the goals and objectives for the MFES to guide the department in the provision of services to the community. The goals identified include:

- Provide fire protection services through a range of programs;
- Protect lives and property of the inhabitants from the adverse effects of fires, sudden medical emergencies, or exposure to dangerous conditions created by man or nature; and
- Provide fire protection services, first to the Town, and second to those municipalities requiring assistance through authorized emergency fire service plans and program (mutual aid) activities.

Also included within the '*Establishing and Regulating By-law 2002-25'*, are the following objectives:

1. *Identify and review the fire and emergency service requirements for the Town.*
2. *Provide an administrative process consistent with the needs of the Department.*
3. *Ensure that firefighting equipment and operations personnel are available within the Town to provide response to a citizen's call within a reasonable length of time.*
4. *Provide departmental training, which will ensure the continuous upgrading of all personnel in the latest techniques of fire prevention, public education, firefighting, and controlling emergency situations and to cooperate with other municipalities with respect to management training and other programs.*
5. *Provide a maintenance program to ensure all fire protection apparatus including allied equipment is ready to respond to emergency calls.*

6. *Provide an effective Fire Prevention and Public Education Program to:*

    a) *Ensure, through plan examination and inspection, that required fire protection and life safety equipment is installed and maintained within the buildings,*
    b) *Reduce and eliminate fire hazards,*
    c) *Ensure compliance with applicable Municipal, Provincial and Federal fire prevention legislation, statues, codes, and regulations in respect to fire safety.*
    d) *Develop and maintain an effective public information system and educational program, with particular emphasis on school fire safety program; and commercial, industrial and institutional staff training.*

7. *Ensure in the event of a major catastrophe in the Town, assistance with the situation is available from outside Departments, other agencies in addition to our own Town Departments.*
8. *Develop and maintain a good working relationship with all Federal, Provincial and Town Departments, utilities and agencies, related to the protection of life and property.*
9. *Interact with other Town Departments respecting the aspects of fire on any given program.*
10. *Ensure these objectives are not in conflict with any other Town Department of Policy.*

These lists of goals and objectives for the MFES are quite thorough, detailed and relevant. Having a set of clear goals and objectives, such as this, is exemplary within the fire service industry and above what many peer departments currently have in place.

3.3 MFES Divisions and Staffing

In Ontario fire departments are typically categorized based on the makeup of their firefighting staff. The three common categories are volunteer departments (primarily comprised of volunteer firefighters), composite departments (a combination of volunteer firefighters and fulltime firefighters) and full-time departments (uses only full-time or professional firefighters).

MFES has evolved since it was originally established in 1971 to its present form as a full-time fire department.

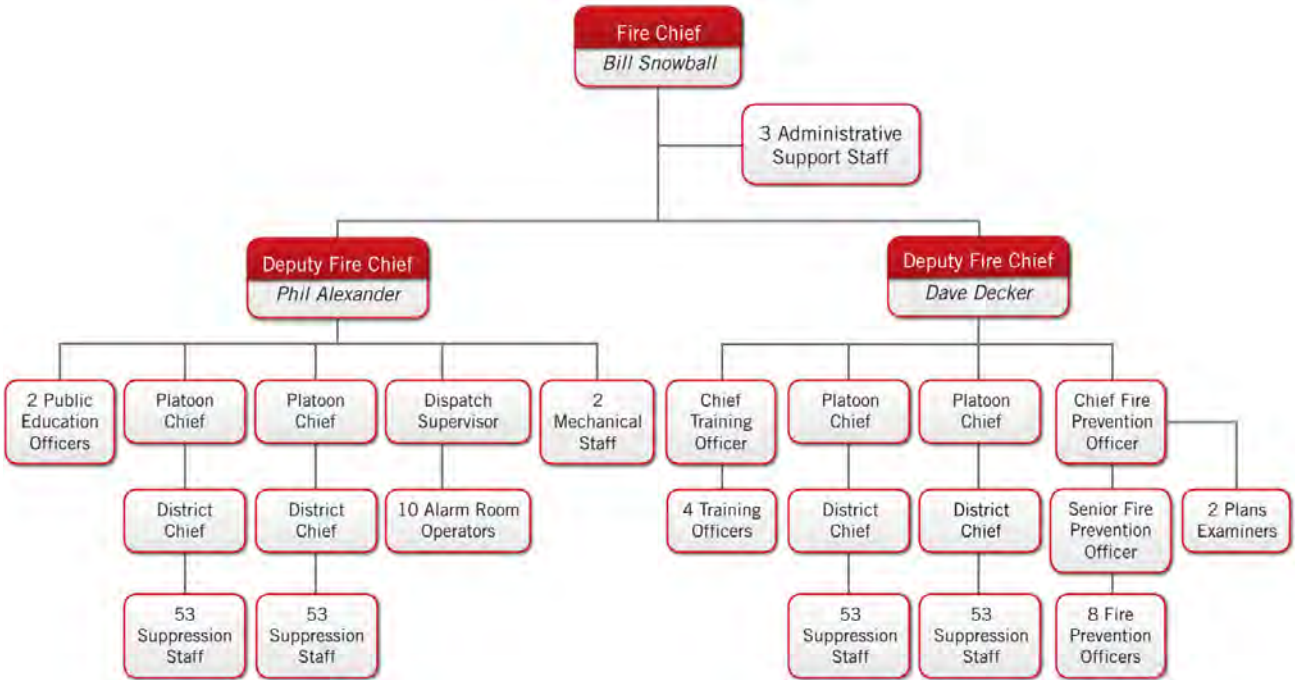
The Divisions of MFES include:

1. Division of Administration
2. Division of Fire Prevention & Public Education
3. Division of Suppression
4. Division of Training
5. Division of Apparatus and Equipment
6. Division of Communications

Throughout its evolution, and during its recent past, the fire and emergency service has undergone a number of leadership changes at the Fire Chief and senior management level. As in any organization this can be difficult and can cause uncertainty to those within the organization. Our observations are that the current management team, including the Fire Chief and two Deputy Fire Chiefs, have garnered strong support both within the MFES and with other Town staff. In part, this may be attributed to their length of service with the fire and emergency service in previous positions. Their commitment to the success of the MFES and in particular to their commitment to function as a management team is very clear.

In response to the changes in the management team the Fire Chief has implemented a somewhat unique delegation of responsibilities to the two Deputy Fire Chiefs. The Deputy Fire Chiefs are each responsible for one half of the Division of Suppression. This is in addition to their responsibilities for the other divisions. The Fire Chief oversees the Division of Administration. One Deputy Fire Chief oversees the Division of Training, Division of Apparatus and Equipment, Division of Communications in addition to the two platoons of suppression staff. The other Deputy Chief oversees the Division of Fire Prevention & Public Education, which includes the direct reporting of the two Special Projects / Public Education Officers and the two Plans Examiners, in addition to the two platoons of suppression staff. In most comparable fire departments the responsibility for these divisions, particularly suppression, would not be divided. The organizational chart for MFES is shown in ***Figure 3.1***.

Figure 3.1: Organizational Chart of Markham Fire and Emergency Service



At present this model appears to be working well for the management team. However, there are challenges such as ensuring consistent communication and commitment to the needs of the respective divisions. This is particularly relevant for the Division of Suppression.

Operationally either the Fire Chief or one of the Deputy Fire Chiefs is required to be on-call 24 hours per day, seven days per week. This responsibility provides support to the on-duty Platoon Chief at major emergency incidents as well as a depth of senior leadership in the event of simultaneous or multiple emergency responses. This is a common practice in the fire service industry that also provides a level of 'corporate' management and leadership within the emergency response capabilities of the MFES. This also ensures that best practices for risk management strategies are in place on behalf of the Town of Markham.

MFES' strategic priority to enhance and expand fire prevention and public education will result in a need for increased depth of management resources. The current structure for dividing management responsibilities creates a challenge when considering the addition of fire prevention and public education priorities.

The total staffing for MFES is broken down in ***Table 3.1***. As of the end of June 2011, MFES was comprised of 258 staff members within the six primary divisions.

Table 3.1: Markham Fire & Emergency Service Staffing

Division	Staff Positions	# Staff
Division of Administration	1 Fire Chief, 2 Deputy Fire Chiefs, 3 Administrative Support Staff	6
Division of Fire Prevention & Public Education	1 Chief Fire Prevention Officer, 1 Senior Fire Prevention Officer, 2 Plans Examiners, 8 Fire Prevention Officers and 2 Special Projects / Public Education Officers	14
Division of Training	1 Chief Training Officer, 4 Training Officers	5
Division of Apparatus & Equipment	2 Mechanical Staff	2
Division of Communications	1 Dispatch Supervisor, 10 Alarm Room Operators	11
Division of Suppression	4 Platoon Chiefs, 4 District Chiefs, 212 Suppression Staff	220
Total Staffing:		**258**

**staffing as of November 23, 2010*

MFES has recently increased staffing within the Division of Suppression with the opening of new Fire Station 93. It will be further increasing its staff with the opening of the new Fire Station 99, scheduled for January 2012. In response to these added resources within the Division of Suppression and in the interest to prioritise public education and fire prevention programming, consideration should be given to adding a third Deputy Fire Chief to the MFES management team. This added resource would be very beneficial to achieving the priorities of the MFES as well as providing added depth to the relatively small, non-union management team. ***Table 3.2*** provides peer comparison data for numbers of Deputy Fire Chief staff positions in a number of comparable fire departments.

As the MFES full-time staff complement continues to grow there are a number of factors that should be considered when evaluating the current and future workload and capacity of the management team.

The option of implementing a third Deputy Fire Chief position would increase the depth of resources for MFES in the following ways:

- Workload capacity for the non-union administrative roles and responsibilities of the MFES would increase. Managing the daily and strategic priorities of the corporation with regard to labour relations and administration of the collective agreement is currently limited to the Fire Chief and two Deputy Fire Chiefs.

- Further advancement the "first line of defence" by providing enhanced public education and fire prevention programming. This should include an increased dedication of resources at the management team level to support service delivery in this area as an overall strategic priority of the MFES to further improve community safety.

- Planned and proposed increases to staff, particularly within the Division of Suppression, will further increase the full-time complement of the MFES and will require additional capacity from the management team. Where possible, there may be opportunities to delegate some additional workload to the Platoon Chiefs, with the exception of non-union responsibilities.

- Succession planning would be enhanced by the development of a third Deputy Fire Chief position. In addition to increasing the workload capacity, the opportunity to increase the depth of resources provides an important succession planning opportunity.

- Capacity for advancing the opportunity for the management team to implement and evaluate performance measurement as a core component of all activities within the MFES.

The peer comparison shown in ***Table 3.2*** indicates that there is a trend for larger fire departments to use three Deputy Fire Chiefs. There is no definite threshold to transition from two to three deputies, however, as Markham grows, it should consider adding a third Deputy Fire Chief to the MFES to appropriately distribute roles and responsibilities among management resources.

Table 3.2: Peer Comparison of Deputy Fire Chief Staffing							
Municipality	**Population (2006 Census)**	**Land Area (km^2)**	**Number of Fire Stations**	**Fire Suppression Staff**			**Deputy Fire Chief staffing**
				Full time	**Volunteer**	**Total**	
Ajax	90,167	67	3	111	-	111	2
Brampton	433,806	267	13	350	30	380	2
Burlington	164,415	186	7	177	65	242	3
Hamilton	504,559	1,117	30	472	257	729	2 (+ 4 Assistant Deputy Fire Chiefs)
Kitchener	204,668	137	7	210	-	210	3
London	352,395	421	13	361	-	361	1 (+ manager of finance & planning)
Markham	**261,573**	**213**	**6**	**220**	**-**	**220**	**2**
Mississauga	668,549	288	22	659	-	659	2 (+ 2 Assistant Deputy Fire Chiefs)
Oakville	164,613	139	7	172	-	172	3
Ottawa	812,129	2778	43	921	425	1346	3
Richmond Hill	162,704	101	5	139	-	139	2
Vaughan	238,866	274	9	237	18	255	2

3.4 Administrative Support & Records Management System

3.4.1 Administrative Support

MFES currently has three full-time administrative assistants assigned to the Division of Administration. These include the assistant to the Fire Chief, the administrative clerk, and the technical fire administrative coordinator. Together with the management team these three positions comprise the non-union component of the MFES.

The staff in these positions are responsible for all administrative support to the management team and other members of the MFES. This includes daily preparations of reports, correspondence, data entry as well as budget preparation and monitoring. The technical fire administrative coordinator is responsible for all MFES data programming (development and maintenance), including MFES records management programs and databases.

3.4.2 Records Management

MFES has developed and customized its own records management system (RMS) using software called GEAC, along with Microsoft Access databases and Visual Basic scripts. The technical fire administrative coordinator, who manages the RMS functions and reporting, developed this customized system.

The features of the GEAC system used for records management include scheduling of staff (e.g., shift changes, vacations, etc.) and fire reporting under the Division of Communications. Customized Microsoft Access databases are used for work orders, training time records, master staff database, and vehicle inventory.

The in-house records management process in use is unique compared to many large organizations and specifically fire departments. However, internal feedback, collected through our review, indicates that this system is working very effectively for MFES. The challenge for MFES is that the technical fire administrative coordinator has developed these systems internally with no redundancy support. In the event the current individual was to retire or leave MFES, it would leave a gap in the records management capabilities and the data management process. It is anticipated that the current technical fire administrative coordinator will retire within the horizon of this MFP.

From a technology perspective the current programming and infrastructure is meeting the needs of the fire and emergency service. From a human resource perspective this strategy is not sustainable. Providing additional support to this role should be considered a high priority for MFES.

Consideration should be given to identifying strategies to provide further staffing resources to enhance the role of the overall administrative support team. Records management is a critical component of the fire and emergency service. This includes information systems and programming the support functions, such as training records, shift schedules, vacation time, sick time, and other confidential information. One strategy is to consider support for the function through a review of the roles and responsibilities of others within this area. This could be considered in conjunction with the recommendation for adding a third Deputy Fire Chief and the administrative support that will be required with that position.

3.5 Administrative Workspace

The Division of Administration of the MFES is located at 8100 Warden Avenue which is a Town-owned office facility co-located with a number of municipal groups. This location differs from the more commonly used model of a “purpose built” fire service headquarters / fire station.

Our review indicates that this location is working well for the MFES. Interaction with municipal staff from other departments provides the added value of corporate interaction and communication. Planning is currently underway to relocate the MFES Division of Communications to this location. Further information with regard to this initiative is included within the Division of Communications section of this report.

The utilization of meeting space within this facility appears to be reaching capacity. Consideration should be given to expanding the amount of meeting space available within the facility’s overall space allocation (e.g. during any planned renovations).

3.6 Division Roles and Responsibilities

The Fire Protection and Prevention Act, 1997 (FPPA) states that, *"A Fire Chief is the person who is ultimately responsible to the council of a municipality that appointed him or her for the delivery of fire protection services"*. The *"Establishing and Regulating By-law, 2002-25"* appoints the current Fire Chief to this role.

In addition to responsibilities as a member of the corporate management team the Fire Chief is directly responsible for the overall operation and administration of the MFES including the following:

- Developing / preparing by-laws, standard operating procedures, general orders and department rules;
- Reviewing / updating departmental policies and procedures / establishing an advisory committee to assist;
- Taking proper measures for prevention, control and extinguishment of fires for the protection of life and property. This includes enforcing municipal by-laws and exercising the powers imposed by the FPPA;
- Enforcing departmental rules, procedures, general orders and the establishing and regulating by-law;
- Reporting all fires to the Office of the Fire Marshal (OFM), as required by the FPPA; and
- Preparing annual budget estimates to Council for approval.

The Deputy Fire Chiefs are the second ranking officers in the department. They are responsible for carrying out the directives of the Fire Chief. In the absence of the Fire Chief, the Deputy Chiefs have all the powers and shall perform all duties of the Fire Chief.

3.7 By-Laws and Agreements

3.7.1 By-laws

The Municipal Act, R.S.O. 1990 requires a municipality to enact a number of by-laws to operate a municipality and specifically their fire department. In addition to meeting this legislative responsibility by-laws provide the community with important information with regard to the level of service that a municipality intends to provide. By-laws also provide municipal staff with the authorization to provide these services as well as the responsibility to achieve the prescribed service level.

Our review of the existing by-laws approved by the Town of Markham Council for the MFES indicates that all required by-laws are in place. Ensuring these documents are regularly reviewed and updated to reflect any changes in service level or changes in authority are important functions. Our review indicates that regular reviews occur and by-laws are updated as required.

3.7.2 Mutual Aid Agreements

Mutual aid agreements are predetermined plans that allow a participating fire department to request assistance from a neighbouring fire department. Public Fire Safety Guideline (PFSG 04-05-12) provided by the OFM identifies the information required to develop and approve these agreements.

There are two main scenarios when mutual aid agreements are enacted:

1. When a fire department is on-scene at an emergency, has received information that immediate assistance is required, it may ask for mutual aid assistance from a neighbouring fire department.

2. Where distance and/or conditions are such that a neighbouring fire department could provide a more timely response, fire departments may immediately request a simultaneous response from a participating fire department.

MFES participates in the York Region Mutual Aid Plan. This agreement includes the Town of Georgina (three fire stations), Town of East Gwillimbury (three fire stations), Township of King (three fire stations), Central York Fire Services (four fire stations), Town of Whitchurch-Stouffville (two fire stations), City of Vaughan (nine fire stations), Town of Richmond Hill (five fire stations) and the Town of Markham (eight fire stations).

The York Region Mutual Aid Plan is up to date and provides the Town of Markham with a valuable asset in the event assistance, as defined within the plan, is required. Representatives from the participating municipalities and the OFM meet every four months to review the York Region Mutual Aid Plan, and when necessary recommend updates / revisions to the plan.

3.7.3 Automatic Aid Agreements

In contrast to mutual aid agreements, automatic aid agreements are programs designed to provide and/or receive assistance from the closest available resource, irrespective of municipal boundaries, on a day-to-day basis.

The obvious advantage of implementing an automatic aid program is the person experiencing the emergency receives fire services from the closest available provider by supplying seamless service through the elimination of artificial service boundaries. Some of the additional benefits that an automatic aid agreement provides include:

- an enhancement of the level of public safety;
- a reduction of the critical element of time between the commencement of a fire and the application of an extinguishing agent to the fire by dispatching the closest available assistance;
- the reduction of life, property and environmental losses; and
- the improvement of public and fire-fighter safety.

MFES is not currently involved in any automatic aid agreements.

3.7.4 Medical Aid First Response Agreement

An agreement with York Region emergency medical services (EMS) is currently being reviewed by the Fire Chiefs of York Region. This agreement will provide guidance for the delivery of medical aid first response by MFES.

3.8 Policies and Procedures

MFES follows a number of corporate policies and procedures.

3.8.1 Standard Operating Guidelines

Standard operating guidelines are used within the fire service to establish a written statement to guide the performance or behaviour of departmental staff, whether functioning alone or in groups. Standard operating guidelines are intended to:

- enhance safety;
- increase individual and team effectiveness;
- improve training efficiency;
- improve orientation for entry-level staff;
- improve risk management practices;
- prevent / avoid litigation;
- create objective post-incident evaluations; and
- permit flexibility in decision making.

Best practices and the OFM indicate that creating and empowering a committee of fire service staff to research, develop, and draft standard operating guidelines can be a successful model for administering these core documents. Activities that impact on firefighter safety, the most common emergency operations, or high risk operations should be the top priority for a fire and emergency service to have in place.

Standard operating guidelines are required to be finalized and approved by the Fire Chief. Procedures should then be in place within the fire and emergency service to ensure that these guidelines are distributed to all staff affected by the guidelines, understood by all staff and followed as directed. Applicable procedures to record this process of development, approval and distribution must be in place to ensure due diligence on behalf of the fire and emergency service and the municipality, as the employer.

Health and safety is an essential consideration for fire and emergency services. In addition to the relevant sections of Ontario's Occupational Health and Safety Act (OHSA) the fire service is also required to comply with the OHSA Section 21 Guidance Notes. Ensuring that standard operating guidelines are developed, approved and distributed for all Section 21, Guidance Notes should be considered a priority.

MFES currently has a well-developed set of standard operating procedures in place. Lists of the current standard operating procedures, relevant to each division of MFES, are included in ***Appendix A***. These standard operating procedures describe, in detail, the roles, responsibilities and duties of MFES staff. As a result, they form an overall basis for training MFES personnel.

There is an informal process in place to develop, approve and distribute these documents utilizing staff expertise and input on an individual basis. Our review also identified that the department has used the committee structure in the past, but this practice is not currently formalized. Consideration should be given to formalizing a committee of staff with the responsibility to research, develop and draft standard

operating guidelines for the MFES. Included within the responsibilities of this committee should be the task of regular review and updating of these guidelines.

3.9 MFES Annual Reports

The MFES Division of Administration prepares an annual report to summarize the activities, operations and successes completed over the course of the year. These reports are organized by division, providing details on staff, programs, changes and accomplishments during the year.

Our review of previous Annual Reports completed by the MFES indicates a high degree of professionalism, both in the format and content of the documents reviewed. The annual reports provide a valuable communications tool to inform the community and Council on the performance of the fire and emergency services.

Preparation of an annual report also provides a high degree of accountability and transparency within the fire and emergency service, which is desirable in current economic and political conditions.

3.10 Human Resources

MFES currently receives staff support from the Town's Human Resources Department for activities such as recruitment, labour relations, employee benefits, and programs such as 'return to work' and 'modified duties'. Many of these activities can be time consuming and require continuous administration and monitoring. As an example, firefighter recruitment is becoming an ongoing activity. In part this is due to the current growth of the MFES. However given the size of the MFES and as more firefighters reach retirement, recruitment should be expected to continue as a regular and ongoing activity.

MFES currently represents approximately one third of the overall full-time employee complement of the Town of Markham. In addition to this, the fire and emergency service is recognised as having a very unique culture. In part this can be attributed to the nature of the work, hours of work and labour management format. With this unique culture come unique human resources needs, issues and challenges.

Our review indicates that the current working relationship between the MFES and the Human Resources Department is very positive. There is recognition of the respective roles and responsibilities of staff between the departments and a high level of reciprocal respect.

As the MFES continues to grow, the activities within this area can be expected to increase and become more complex. Consideration should be given to providing the MFES with dedicated human resources support to maintain the level of efficiency that has been achieved in the past and to introduce new activities / initiatives. Providing a resource to the MFES management team that is dedicated specifically to the MFES would be a significant asset to the overall administration and management of the fire and emergency services. It would give MFES the ability to maintain the skills and experience related to its unique operations and labour relations culture.

3.11 Capital and Operating Budgets

As with any organization the size of MFES, the preparation and ongoing monitoring of capital and operating budgets is a significant activity. Ultimately, the Fire Chief is directly responsible to Council for its capital ($1.5 million in 2010) and operating ($26 million in 2010) budgets. The recently approved 2011 capital and operating budgets are $1.0 million and $28 million, respectively. The Deputy Fire Chiefs provide assistance to the Fire Chief and are delegated a range of responsibilities that align with the respective divisions for which they are accountable. The Fire Chief has delegated further authority to other senior staff within the MFES for oversight of both capital projects and spending with regard to operating expenses.

The Town of Markham utilizes an asset management system and replacement policy that provides a very valuable tool to the MFES in terms of life cycle planning and replacement. This is particularly important to the MFES given the high costs associated with emergency response vehicles and equipment (e.g., breathing apparatus and firefighters bunker gear).

Other tools should be assessed to further assist staff responsible for managing capital projects and operating expenses. Consideration should be given to supporting software applications or other means of realizing efficiencies that may be available to assist staff in the preparation and ongoing management of capital and operating budgets.

3.12 Summary and Recommendations

The following provides a summary of our recommendations drawn from the assessment of the Division of Administration.

The MFES management team lead by the Fire Chief has introduced a unique delegation of responsibilities within the fire and emergency services particularly at the Deputy Fire Chief level. In part this is due to the relatively short period of time during which the new management team has been in place. It was also an opportunity to use the transition period to try alternatives to the traditional fire service organizational designs and responsibility portfolios.

Overall the current management team is working well and has developed a positive working relationship amongst its members and within the MFES and the Town of Markham. The participative leadership style of the Fire Chief is a key component of the success the MFES management team has achieved.

3.12.1 Recommendations

The following recommendations relate to MFES' Division of Administration:

- In consultation with other Town departments, the MFES should consider options for the provision of additional office space and meetings rooms. This should be considered in conjunction with the relocation of the Division of Communication to the 8100 Warden Avenue location.

- Consideration should be given to implementing a formal Standard Operating Guideline Review Committee comprised of a cross section of department staff. Implementing a formal staff committee assigned with the responsibility of research, development, and regular review of standard operating guidelines will ensure that MFES maintains the level of documentation required to meet the department's need and regulatory requirements. Ensuring that Standard Operating Guidelines are developed approved and distributed for all areas of the Section 21 guidance notes should be considered a priority.

- As part of assessing the effectiveness of the current "transitional" MFES management team roles and responsibilities consideration should be given to adding a third Deputy Fire Chief. In addition to adding to the overall depth of the non-union management team this resource would provide the required focus for the management team to implement the strategic priority of increasing public education and fire prevention activities within the MFES.

- Consideration should be given to providing additional administrative support to the MFES management team. Factors that should be considered include the addition of an assistant to the proposed third Deputy Fire Chief, and the immediate need for a redundancy strategy to support the current technical fire administrative coordinator position.

- In consultation with senior corporate staff the MFES should consider options for the provision of a human resource/labour relations staff person dedicated to supporting the MFES management team. In response to existing activities within this area and the planned growth within the MFES providing additional staff support within this area would be an effective strategy to mitigate and potentially reduce human resource costs within the MFES in the future.

4.0 DIVISION OF FIRE PREVENTION & PUBLIC EDUCATION

The MFES fire prevention and public education efforts are focused on the first two lines of defence of the Comprehensive Fire Safety Effectiveness Model. These include the delivery of public education and fire prevention programming and activities related to fire safety standards and enforcement.

Our review of the historical dollar loss and emergency call volume for the Town of Markham indicates relatively small increases in comparison to the significant growth within the community during the past several years. In our experience minimal increases such as this can in part be attributed to aggressive and proactive strategies targeted at the first two lines of defence (i.e., public education and fire prevention).

The Municipal Fire Protection Information Survey (MFPIS) conducted by the Office of the Fire Marshal, Ontario (OFM) is another effective process to gauge a municipalities' compliance with legislated fire protection services requirements. The MFPIS is used to assist municipalities in complying with the minimum fire protection services, especially in the areas of public education and fire prevention. The Markham Fire and Emergency Services (MFES) completed the MFPIS on behalf of the Town of Markham, confirming that it had achieved compliance with Section 2.1(a) of the Ontario Fire Protection and Prevention Act 1997 (FPPA) and was presented with a Certificate of Compliance by the OFM.

The MFES management team are strongly committed to the effective implementation of the '*three lines of defence'* as defined within the *Shaping Fire-Safe Communities* initiative of the OFM. As the first line of defence, current public education and fire prevention activities are having a significant positive impact in reducing fire loss and improving public safety. The management team are united in their efforts to further advance the priority of increasing the MFES activities and resources in this area, as a strategic priority in responding to the growing needs of the community.

Further evidence of the commitment that the MFES has dedicated to the delivery of effective public education programming is the response to members of the community who speak English as a second language. In order to assist with mitigating potential language barriers, MFES provides all public education pamphlets in Cantonese as well as Mandarin, in addition to English. MFES also hosts a fire safety radio program on a Chinese language radio station and presents bilingual information displays in Chinese languages at select public venues.

4.1 Public Education & Plans Examination

MFES provides a proactive and comprehensive range of public education services and fire prevention programs. The MFES has two Special Projects / Public Education Officers, as well as two Plans Examiners. The two public education personnel are responsible for developing and delivering the public education programs using the community risk profile to determine risk demographics. The Fire Prevention Officers also assist in the delivery of public education programs, such as those delivered to schools. However, under the current practice these personnel are primarily assigned to other fire prevention activities, such as inspection and enforcement.

4.1.1 Public Education

The four core public education programs that are implemented across the Town of Markham are as follows:

- Smoke Alarm Program;
- Markham Fire and Emergency Services School Program;
- Older and Wiser; and
- the Arson Prevention Program for Children (TAPP-C).

One of the legislated requirements of the FPPA is the delivery of a Smoke Alarm Program. MFES is currently meeting this requirement; however, this is one area that our review has identified as a strategic priority for improvement, consistent with discussions with the MFES management team.

In recent years the OFM has been implementing revisions to the goals and objectives of a municipal Smoke Alarm Program. Specifically these revisions have related to the compliance with, and the implementation of a zero tolerance policy. This has also lead to an aggressive enforcement practice, including the issuance of tickets for non-compliance as a provincial offence. These revisions have caused the fire service, including the MFES, to revaluate their Smoke Alarm Programs.

In response to these "zero tolerance" revisions, and to ensure that the MFES is able to provide an effective and sustainable Smoke Alarm Program, consideration should be given to a complete review and redevelopment of the Smoke Alarm Program. The new program should consider the goals and objectives established by the OFM. It should also assess the needs of the Town of Markham to provide the most effective solution to ensuring the safety of Markham residents.

The following are examples of other public fire safety programs delivered by MFES. These programs are researched, developed and implemented to respond to the specific needs of targeted groups and demographics. Examples of these programs include:

- Home Fire Safety Presentations
- Fire Prevention Week
- School Fire Drills and Education Programs
- Fire Safety Trailer
- Fire Chief-for-a-Day
- High Rise Supervisory Staff Training Course
- High Rise Fire Safety Program
- Health Care Facility Training
- Emergency Procedures Training
- English as a Second Language (ESL) Program
- Mall Displays
- Public Service Announcements
- Community Presentations
- Station Visits
- Post Fire Community Information Blitz
- Fire Extinguisher Training
- School Fire Drills

The Special Projects / Public Education Officers also fulfill the role of Public Information Officers for the MFES. These officers have received specific training for this activity. As such the two Special Projects / Public Education Officers are the primary media contacts on behalf of the MFES. They also directly handle requests for public education programs.

4.1.2 Plans Examinations

MFES has two Plans Examiners. Given the significant role the fire and emergency services plays in the design, development and construction of buildings, these staff conduct plans examination from the perspective of fire and life safety.

The following plans examination services are provided by MFES Division of Fire Prevention & Public Education:

- Review of subdivision / development plans;
- Review of building plans / renovation plans;
- Review of layout plans for exhibitions / trade shows;
- Review of site plans and security measures for high hazard fireworks displays; and
- Review of property records (fee for service).

Our review indicates that this is an area where workload needs to be monitored on an ongoing basis. The current staffing level is able to maintain the level of performance required to achieve the Town of Markham's performance targets for development applications, building permit issuance and other related time sensitive practices. However, as the Town continues to undergo significant growth and to achieve the targets of programs, such as retrofitting of fire and life safety systems, workload of the Plans Examiners should be monitored to ensure sufficient resources are dedicated to these important activities.

4.2 Fire Prevention, Safety Standards, and Enforcement

The primary roles of MFES Fire Prevention staff are to ensure compliance with the Ontario Fire Code through a program of proactive fire inspections and, in the absence of achieving compliance, utilizing the authority of the Ontario Fire Code to achieve compliance through enforcement.

Under the leadership of the Fire Chief the MFES prioritizes its efforts to achieve compliance wherever possible. At times this can be a more labour-intensive strategy than moving quickly to enforcement. However, in the interests of reaching the ultimate goal of having an effective fire and life safety program, this strategy is working well for the MFES and the community it protects.

MFES Fire Prevention staff has expert knowledge of the Ontario Fire Code and how it applies to the varied building stock of the Town of Markham. The Chief Fire Prevention Officer currently determines routine inspection targets and conducts a simplified risk assessment process. ***Table 4.1*** provides an overview of the current inspection schedule by type of occupancy.

The inspection schedule shown in ***Table 4.1*** has been an effective strategy for the MFES. We are aware that the OFM is currently reviewing and developing a new Public Fire Safety Guideline (PFSG) to assist municipalities in meeting their legislated responsibilities in this area. Risk analysis is also a key component of the OFM's most recent PFSG "*Operational Planning: An Official Guide to Matching Resource Deployment and Risk*".

Further developing the community risk profile, including developing a database of building stock within the community would be beneficial. This could assist with the preparation of the fire prevention inspection schedule.

Table 4.1: Inspection Schedule by Occupancy

Occupancy Classification	Occupancy Type	Frequency of Inspection
Class A - Assembly	Public Assembly Halls, Arenas, Exhibition Halls, Restaurants, licensed Beverage Establishments, Theatres, Churches	Annually
Class B - Institutional	Hospitals, Institutions, Nursing Homes, Homes for the Aged, Residential Care Facilities, Special Needs Care	Annually
Class C – Residential	High-Rise multi family	3 years
	Low-Rise, multi family	3 years
	Seniors Residential Facilities	Annually
	Two unit Residential	Request/Complaints & after all fires
	Boarding Lodging and Rooming Houses	Request/Complaints & after all fires
	Group Homes	Annually
	Hotels/Motels	Annually
	College/University Residential	Annually
Class D – Business	High-Rise Office Building	3 years
	Low-Rise Office Buildings	Request/Complaints & after all fires

Table 4.1: Inspection Schedule by Occupancy		
Occupancy Classification	**Occupancy Type**	**Frequency of Inspection**
Class E – Mercantile	Shopping Centres	Annual/Seasonal Campaigns
	Shops and Stores	Request/Complaints & after all fires
Class F1, F2, F3 - Industrial	All	Request/Complaints - after all fires
	"Clean" Industries (Hi-Tech Industries)	3 years
	"Dirty" Industries (Heavy Manufacturing)	Annually or Request/Complaints

In addition to considering new strategies to determine priorities within the fire prevention inspection schedule the MFES should consider including the Town of Markham Council in the process of approving the priorities and schedule. The Ontario Fire Code and the FPPA, in many instances, require establishing frequencies. For example, the municipality is legislated by the FPPA to provide inspections upon receiving a complaint.

As performance targets, the frequency of inspections can be directly related to the depth of staff resources available to complete these tasks. It is recommended that MFES include Council in the approval process of setting these performance targets.

The roles and responsibilities of the Division of Fire Prevention & Public Education are stated within the Establishing and Regulating By-law, and include:

- Conducting fire inspections of premises within the Town;
- Maintaining a written record of all fire inspections;
- Examining building plans for fire safety purposes;
- Promoting fire prevention and safe life styles by establishing educational programming for presentation in the community;
- Maintaining fire loss records for reference by the Fire Chief;
- Receiving, processing and following-up on reports of fire prevention inspections conducted by the Division of Suppression;

- Preparing annual report and budget of the Division of Fire Prevention & Public Education for submission to Division of Administration; and

- Conducting investigations of fire to determine cause and origin. Where appropriate, requesting OFM or other agencies to conduct an investigation.

The Division of Fire Prevention & Public Education also currently provides the following Ontario Fire Code enforcement inspection services:

- Complaint inspections, initiated by persons with fire safety concerns;

- Fire inspection referrals from other Town departments;

- Routine inspections (conducted as listed in ***Table 4.1***);

- Fire code retrofit inspections; and

- Joint inspections with the building department on buildings being constructed / significantly renovated.

Fire Prevention Officers also have the authority to assess immediate threats to life in building inspections and can enforce building closures, levy monetary fines or provide remediation items to be confirmed upon re-inspection.

4.3 Division of Fire Prevention & Public Education Staffing

Following the same strategy as the MFES management team, the Division of Fire Prevention and Public Education currently has a unique organizational design in comparison to other typical fire and emergency services of comparable size. There is currently a split reporting structure within this division that has the Chief Fire Prevention Officer and a portion of the divisional staff reporting to one of the Deputy Fire Chiefs and the Special Projects/Public Education Officers reporting to the other Deputy Fire Chief.

The two Special Projects / Public Education Officers, as well as the two Plans Examiners, report to the other Deputy Fire Chief.

This structure appears to be working relatively well for the MFES, as a transitional structure, given the amount of leadership change MFES has undergone in the last several years. There are some uncertainties at the staff level, working within this structure in regard to supervision, accountability and authority. These are not uncommon factors when there is this type of split reporting within a given division.

The MFES management team is well aware of the current impacts of this split reporting structure and they have been discussing the potential options available to provide further clarity and/or make revisions to introduce further efficiencies into this division.

As previously discussed within this report, under the leadership of the Fire Chief and the MFES management team, implementing strategies to enhance the effectiveness and efficiency of the current MFES public education and prevention programming is a strategic priority. As the first line of defence the Fire Chief is well aware of the positive impact an effective public education and prevention program can have in achieving an optimal community fire safety plan.

In conjunction with previous recommendations within this report, including the option of adding a third deputy Fire Chief, consideration should be given to the structure, organizational design, responsibilities and accountabilities within this division. Consideration should be given to the addition of another Senior Fire Prevention Officer position when conducting a review of the division organizational structure. The addition of a senior position as part of the growth in staff within this division would provide the opportunity to sustain an appropriate reporting structure and leadership role within the division. This strategy would be beneficial in assisting with the supervision and management workload of the Chief Fire Prevention Officer. This resource would provide further depth to the division's supervisory requirements, workload management, and depth to the overall management of the division.

A further strategy that the MFES may consider in response to the current organizational structure and reporting relationships within the Division of Fire Prevention & Public Education and to seek further efficiencies within the division would be the implementation of a formal *"Community-Based Fire Protection Model"*. This model has been implemented in a number of municipalities across Ontario and has proven to be an effective strategy in enhancing a community fire safety plan. This model targets the development and implementation of a more effective working relationship between the traditional firefighting staff and public education/prevention staff resulting in more effective delivery of services and programs to the community.

Our review of the MFES recognizes a clear commitment of Council and MFES staff to providing an effective Community Fire Safety Program. This commitment is particularly evident in MFES' dedication to public education and fire prevention activities. Current services and programs within these areas have become an effective strategy to mitigate and reduce fire losses in a community undergoing significant growth.

4.4 Community-Based Fire Protection Model

The primary initiative of a Community-Based Fire Protection Model would be the co-location of Public Education/Fire Prevention Officers (Fire Inspectors) and fire suppression services (firefighting crews) under one roof. This initiative is designed to achieve a consolidated, team-based and customer-focused approach to managing fire risks within a particular area of a community.

The foundation for this model already exists in the Town of Markham as a number of the fire stations already have co-location Public Education/ Fire Prevention and firefighting staff. Subject to approval and re-assignments of the current Fire Prevention Officers, MFES would have sufficient Fire Prevention Officers to implement the Community-Based Fire Protection Model, within the existing complement of fire stations. Further consideration will be required to include Fire Prevention Officers within the complement of any new fire stations.

During 2011, MFES relocated Fire Prevention Officers as part of the Community-Based Fire Prevention Education Initiative. By the end of 2011 Fire Prevention Officers will be present in stations 91, 92, 93, 97 and 98. MFES plans to relocate Fire Prevention Officers to stations 94, 95 and 99 during 2012.

Our review indicates that only Station 96 does not have the current capacity to provide office space for staff from the Division of Fire Prevention & Public Education to introduce this model. Some capital funding would be required to complete alterations to this station to accommodate this need. MFES plans to hire the ninth Fire Prevention Officer in 2012/2013. At that time each of the nine station areas will be covered by a Fire Prevention Officer.

In our discussions with other municipalities that have implemented this concept, they have experienced evidence of significantly improved interaction and relationships between these two traditional functions within the fire service. The impact of this has been more effective service delivery in both areas. It helps prepare fire suppression staff as they are advised regularly by the in-house Fire Prevention Officer of building risks within their assigned response area. It also assists in pre-planning and expands public education and prevention activities through enhanced working relationships, cooperation, and assistance between the two divisions.

Fire suppression personnel currently assist with some public education and fire prevention activities, including participation at festivals, community street parties, and fundraising events, and delivery of school based education programs and home smoke alarm programs. With the full implementation of a Community-Based Fire Protection Model, MFES can expect to realize a number of further significant benefits, including:

1. Access to expertise from all areas of fire safety

   Similar to "a one stop shop" the Community-Based Fire Protection Model offers the opportunity to contact a local station and receive prevention and public education information at the local level, with a wide range of expertise available from both prevention and suppression staff.

2. Local access to public education programs and learning opportunities.

   Public education must be a major driver within the fire and emergency service. Access to programs at the community level through delivery at local stations will enhance the effectiveness of both the programs and the commitment to meet the needs of each community.

3. Targeted risk management designed to address specific local needs.

   The opportunity for both suppression and prevention staff to work together in addressing the fire risks within each district or community at the local level will enhance the ability to ensure proactive inspections and preplanning efforts are coordinated.

4. Greater opportunity for input from stakeholders (i.e. residents)

   A community-based program will provide the local communities with an opportunity for enhanced input into the specific programs required, as well as provide direct feedback to the staff delivering the services and programs.

5. Improved visibility and openness of the fire stations as public resource buildings

   The use of fire stations as a local meeting place for groups such as Neighbourhood Watch, offers the opportunity to enhance the use of the existing resources within the community. It also enhances the ability for staff to become familiar with the needs of the community through partnerships.

6. Cross training opportunities

   The opportunity to further develop suppression staff in areas of prevention and public education by working together with prevention staff will assist the MFES in providing a focus on public education and prevention.

A pilot program introduced by a comparable community provides an excellent example of the type of effectiveness this model can achieve. Working together with the Special Projects / Public Education Officer, fire suppression staff developed a partnership with two local schools. In this example, the on-duty suppression staff assisted in implementing an "*All Star Reading Program*" at the schools. The feedback from the teachers was extremely positive. The students identified the firefighters as role models

and became active participants in the reading program, while also garnering a better understanding of fire safety.

Given the demographic profile of the number of residents with English as a second language living within the Town of Markham, and the wide diversity of cultural backgrounds, a program such as this can provide effective learning and relationship opportunities for the MFES.

4.5 Fire Investigations and Post-Fire Evaluations

The division is responsible for fire investigations. This typically includes the activities required to determine the origin and cause of a fire. Fire investigations, carried out by the trained and qualified Fire Prevention Officers, are conducted during regular business hours. When fires occur outside of business hours, the fire scene is secured and held by police until the fire investigator is on duty. This reduces the cost of overtime. MFES generally conducts approximately twenty fire investigations per year. Therefore investigations are not a major component of division workload, but they do require a commitment to ongoing training and certification of staff.

MFES has a process in place to conduct post-fire evaluations for all fires. This is a brief assessment and summary of the cause, origin and events of the fire. These summaries are then filed in the MFES data management system. This is an effective strategy for senior staff to determine if there are any patterns.

MFES has initiated a process of conducting public information post-fire sessions for all fires over $50,000 in property loss or those fires that have an impact on the public (After the Fire Program). This program provides a brief assessment and summary of the fire. This is an effective strategy for senior staff to determine if there are concerns related to the on-going education of the public as well as identify any patterns or risks associated with each fire. This activity can also be beneficial in evaluating the current public education and fire prevention programs, and identifying where possible revisions may be necessary. The *After the Fire Program* is an excellent learning and self-evaluation tool for the fire and emergency service.

4.6 Priority Setting Worksheet

Another valuable tool in identifying the priority areas for this division includes the completion and regular updating of a priority setting worksheet. This document can provide an accurate overview of the priorities, activities and programs, either legislated and/or otherwise, that the fire and emergency services has identified or implemented.

Table 4.2 has been developed with the assistance of the MFES:

Table 4.2: Priority Setting Worksheet

Priority	Status		Effectiveness, Goals/Objectives		
Fire Safety Priority (List in order of Priority)	**Current fire prevention / public education programs that address the fire safety priority**		**Existing programs adequately address the fire safety priority & ensure compliance with minimum FPPA requirements?**		
				If No, how should this change?	
	Fire Prevention (Inspection) Activities	**Public Education Activities**	**Y/N**	**Fire Prevention Activities**	**Public Education Activities**
1) Children	• Annual School Fire Drills • Routine Inspections of schools / daycare facilities	• MFES School Program (including Fire Safety House Mobile Classroom & Learn not to Burn) • Junior Fire Chief Program • The Juvenile Fire Setter Program / The Arson Prevention Program for Children (TAPP-C) • Station Tours / Visits • Comfort Bear Program • Sparky the Fire Dog	Y	• Community-Based Fire Protection Model provides FPO for specific schools	• Continue use of in-service firefighters to deliver programs to schools
2) Seniors	• Routine Inspections of Health Care Facilities, Seniors' Care Facilities, Group Homes, etc.	• Older and Wiser	Y	• Community-Based Fire Protection Model provides FPO for specific facilities • Monitor and grow the Fire Prevention staff size as population of seniors grows	• Monitor and grow the Public Education staff size as population of seniors grows
3) All Residents	• Inspections upon complaint / request • High risk properties, low rise and high rise residential inspected routinely (every three years)	• Smoke Alarm Program • Fire Prevention Week • After the Heat • High Rise Fire Safety Program • Mall Displays • Public Service Announcements through various media (local TV & radio, paper media, Twitter, etc.) • Station Tours / Visits • Post-Fire Community Information Blitz • Fire Extinguisher Training	Y	• Community-Based Fire Protection Model provides FPO for specific residential areas • After the Fire	• Enhance Smoke Alarm Program
3) Commercial / Office	• Inspections (Routine, Request and Complaint)	• High Rise Supervisory Staff Training Course	Y	• Community-Based Fire Protection Model provides FPO for specific commercial areas	
4) Industrial	• Inspections (Routine, Request and Complaint)	• Fire Extinguisher Training	Y		

4.7 Records, Reports and Statistics

The Town of Markham uses the AMANDA software suite, from CSDC Systems as the platform for data management. MFES staff consider it to be a flexible and capable software application for data management. It automates functions within several Town departments, including planning, building inspections, by-law enforcement and the MFES. Within the MFES, the Division of Fire Prevention & Public Education is currently the main user of this tool. Utilizing this type of software is another indication of the advanced level of service delivery that, with the support of Council, the MFES has been able to achieve. Numerous other municipal fire services have contacted MFES to garner an understanding of the value and efficiencies that the AMANDA system can provide both to the fire service, and to enhance communications and information sharing between municipal departments.

4.7.1 Standard Operating Procedures

The Chief Fire Prevention Officer is responsible for maintaining sufficient and updated standard operating procedures (SOPs) related to fire prevention division activities. As previously indicated, consideration should be given to implementing a process to review and revise all fire and emergency services SOPs regularly. This process should involve stakeholder input, including all Division of Fire Prevention & Public Education staff. SOPs should also be developed and maintained for public education programs, efforts, tasks and responsibilities.

4.8 Workspace, Facilities and Equipment

As previously described, staff within this division are currently assigned to a number of different fire stations or offices, including 8100 Warden Avenue. From a space perspective, this would make moving towards a more formal Community-Based Fire Protection Model, with staff from this division assigned to all stations, a relatively easy strategy to implement.

All stations, except for Station 96, appear to have the current capacity to provide office space to house Fire Prevention Officers from this division.

One of the creative tools that the MFES Division of Fire Prevention & Public Education uses to demonstrate the fire risks associated with a typical college / university dormitory room is an eight foot cubed burn cell. This presentation is typically aimed at high school students preparing to move into college/university accommodations. The simulated burn is set to initiate in the wastepaper basket using a match as the source of ignition. The purpose of the simulation is to visualize the speed that fire will spread in these conditions and therefore motivate students to take fire safety precautions.

MFES also uses an auto extrication-training device to simulate how the MFES removes a person from a car accident by detaching the top of the car utilizing the “jaws of life”. This public safety demonstration is targeted at teenagers in their later years of high school, to emphasize the importance of not drinking and driving.

In June of 2008 the MFES acquired a custom built “Fire Safety House”. This 36’ trailer unit is another excellent portable public education and fire prevention training aid. The Fire Safety House can seat approximately 50 students at a time in stadium-style seating. This valuable teaching aid includes a heated door, functional stove, smoke machine, working smoke alarms and a severe weather package (for emergency preparedness demonstrations).

In 2009 MFES Fire Prevention Officers were provided with mobile computing tablets to access property and inspection information remotely. The impact of this technology has increased the efficiency of inspections and reporting, and has reduced the response times to customer service requests.

4.9 Summary and Recommendations

With the support of Council, the MFES has clearly developed and implemented a public education and fire prevention program that is responding to the current needs and circumstances of the community. As the municipality continues to face further growth, and the community risk profile evolves, sustaining the effectiveness of the current programming will be essential. Where possible, MFES should consider introducing further activities to enhance the level of fire prevention and public education service provided. This will require MFES and Council to provide the necessary resources and funding to sustain the effectiveness that has been achieved.

4.9.1 Recommendations

The following recommendations relate to MFES' Division of Fire Prevention & Public Education:

- To achieve the targets of programs such as retrofitting of fire and life safety systems the workload of the Plans Examiners should be monitored to ensure sufficient resources are dedicated to these important activities, especially as the Town continues to undergo significant growth.

- Performance targets for the frequency of inspections can be directly related to the depth of staff resources available to complete these tasks. It is recommended that MFES include Council in the approval process of setting these performance targets.

- In conjunction with previous recommendations within this report, including the recommendation of adding a third Deputy Fire Chief, consideration should be given to reviewing the organizational structure, responsibilities and accountabilities within this division. Within this review, consideration should be given to the addition of another Senior Fire Prevention Officer. This resource would provide further depth to the division's supervisory requirements and workload management as well as adding depth to the overall management of the Division of Fire Prevention & Public Education.

- In order to work towards 100% compliance consideration should be given to a complete review and development of a new and enhanced Smoke Alarm Program. The new program should consider the goals and objectives established by the OFM and the needs of the Town of Markham, as well as the newly implemented zero tolerance policy, in order to provide the most effective solution to ensuring the safety of the Town residents.

- MFES should consider the implementation of a formal *"Community-Based Fire Protection Model"* in conjunction with the current organizational structure and reporting relationships within the Division of Fire Prevention & Public Education. This would provide further efficiencies within the division.

- The MFES management team has indicated that they will be requesting approval for an additional Fire Prevention Officer in their 2012 operating budget submission to Council. Subject to approval and re-assignments of the current Fire Prevention Officers, the MFES would have sufficient Fire Prevention Officers to implement the Community-Based Fire Protection Model within the nine fire stations that will include Station 99 opening in 2012. Consideration should be given to including a Fire Prevention Officer as part of the complement of staff hired for new fire stations.

- Our review indicates that only Fire Station 96 does not have the current capacity to provide office space for staff from the Fire Prevention and Public Education Division. Capital funds would be required to complete alterations to this station to accommodate the staff needs of a Community-Based Fire Protection Model.

- Consideration should be given to implementing a formal Standard Operating Guideline review process for the Division of Fire Prevention & Public Education Standard Operating Guideline.

5.0 DIVISION OF FIRE SUPPRESSION

Markham Fire and Emergency Services (MFES) consists of 258 personnel, of which 220 are assigned to the Fire Suppression Division. As with most municipal fire services, MFES assumes responsibilities for intervention in a number of emergency situations beyond those that are fire-related. These include assistance to the emergency medical service (EMS), highway extrication, hazardous materials incidents, water and ice rescue and the provision of fire protection at Toronto Buttonville Municipal Airport.

The Division of Fire Suppression is responsible for carrying out the duties of the division, as listed in the Establishing and Regulating By-law:

- Prevent, control and extinguish fires;
- Perform rescue and salvage operations;
- Render first aid;
- Respond and assist at emergencies, as required by the Fire Chief;
- Participate in training at stations;
- Conduct pre-firefighting operations planning; and
- Perform apparatus maintenance and cleaning duties at stations.

In a rapidly growing municipality the need for these services is expected to increase. Challenges related to an aging population, growth and intensification, new hazards (e.g. illegal drug laboratories), emergency medical demands, technological change, traffic, and other elements of growth are currently and will continue to challenge the fire suppression resources of the MFES.

5.1 Fire Suppression Staffing

Within the current organizational structure the Deputy Fire Chiefs are each assigned management responsibility for two of the four platoons that make up the Division of Fire Suppression. A Platoon Chief is assigned to each of the four platoons and is delegated direct responsibility for the overall supervision and accountability of the platoon.

Each platoon is comprised of 55 fire suppression staff including a Platoon Chief, District Chief, 10 Captains and 43 firefighters. Fire suppression staff are assigned to a shift schedule, defined within the collective agreement, and provide 24 hours per day, seven days per week coverage for 365 days per year. The minimum established on-duty complement includes four staff including a Captain and three firefighters for each front run apparatus within the MFES.

The minimum staffing level of the MFES Division of Fire Suppression is 42 staff on duty at all times. The difference in the assigned staffing level of 55 and the minimum staffing level of 42 accounts for vacation time, banked time, workers compensation injuries, and sick time. In the event the minimum staffing level drops below the required 42, the on-duty Platoon Chief is authorized to use the overtime call back system to maintain the minimum staffing level.

The current staffing level within the Division of Fire Suppression, including the minimum staffing levels per vehicle, is consistent with other comparable sized municipalities, and other fire service collective agreements. Assigning four fire suppression staff, including an officer (Captain) and three firefighters to vehicles, such as engines and aerials (ladders), is also considered a best practice in Ontario. This staffing level is also consistent with NFPA standard 1710 and best practices in the assembly of a firefighting team on a fire scene.

Table 5.1 provides an overview of the existing Suppression Staffing assignments per station and per vehicle.

Table 5.1: Existing MFES Suppression Staffing

Station	Vehicle	Minimum Staffing Assignment	Platoon #1 Staffing Assignment	Platoon #2 Staffing Assignment	Platoon #3 Staffing Assignment	Platoon #4 Staffing Assignment
Station 91	Engine 911	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
	Ladder 911	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
Station 92	Engine 921	1 Captain 3 Firefighters	1 Captain 6 Firefighters	1 Captain 6 Firefighters	1 Captain 6 Firefighters	1 Captain 6 Firefighters
	District Chief Car	1 District Chief	1 District Chief	1 District Chief	1 District Chief	1 District Chief
	Air Light 920	(Reserve / Not Staffed)	-	-	-	-
	Trailer 928	(HAZMAT)	-	-	-	-
Station 93	Engine 931	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
	Spare 9833	(Reserve / Not Staffed)	-	-	-	-
Station 94	Engine 941	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
	Spare 9841	(Reserve / Not Staffed)	-	-	-	-
Station 95	Engine 951	1 Captain 3 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters
	Ladder 956	1 Captain 3 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters	1 Captain 5 Firefighters
	Tanker 954	Not Staffed	-	-	-	-
	Personnel 950	(Reserve / Not Staffed)	-	-	-	-
	Platoon Chief	1 Platoon Chief	1 Platoon Chief	1 Platoon Chief	1 Platoon Chief	1 Platoon Chief
Station 96	Engine 961	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
Station 97	Engine 971	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
	Spare 9871	(Reserve / Not Staffed)	-	-	-	-

Table 5.1: Existing MFES Suppression Staffing						
Station	**Vehicle**	**Minimum Staffing Assignment**	**Platoon #1 Staffing Assignment**	**Platoon #2 Staffing Assignment**	**Platoon #3 Staffing Assignment**	**Platoon #4 Staffing Assignment**
Station 98	Engine 981	1 Captain 3 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters	1 Captain 4 Firefighters
	Spare 9881	(Reserve / Not Staffed)	-	-	-	-
Total Staffing		**42 Minimum**	**55 Maximum**	**55 Maximum**	**55 Maximum**	**55 Maximum**

5.2 Fire Stations

MFES currently operates from eight fire stations depicted in ***Figure 5.1***. The stations are dispersed throughout the Town as shown in ***Figure 5.2***. The Town's stations are operated by full-time firefighters providing first response capabilities on a 24-hour a day basis 365 days per year.

The eighth fire station (Station 93) opened in July 2010. Construction of a ninth station, in Cornell, commenced in July 2010 and is planned to open in January of 2012. The station is located on Bur Oak Avenue, behind the Markham Stouffville Hospital. . The recruitment of firefighters for the ninth station began in the fall of 2010.

Station 92, opened in May 2004, is the first facility shared between the MFES and York Region EMS. The original Station 92 was located at 438 John Street and is now the training and educational facility for MFES.

Each fire station is equipped with a diesel emission exhaust system, pressure washer, hose rack and small mechanical workbench. The entrances of all fire stations have an emergency telephone and public washrooms. All stations include dormitories, exercise equipment, kitchen facilities, washroom facilities, lounge areas and lockers for use by the suppression crews.

Four of the current MFES stations are equipped with industrial-sized washing machines that are used to clean firefighter bunker gear. There are small clothes dryers in all stations and small laundry washing machines in all stations that do not have the industrial-sized machines. These facilities meet the current needs of the Division of Fire Suppression.

Four of the stations are also equipped with air filling stations for refilling air cylinders. The maintenance of air equipment is the responsibility of the suppression staff, overseen by a Captain. This practice is working well and should continue.

In most stations, firefighters bunker gear is currently being stored in the open areas surrounding the apparatus bays. This current storage practice may subject firefighter bunker gear to increased potential of exposure to airborne diesel particulate within the apparatus room, and sun penetration exposure from open storage. There is also increased potential of residue from a fire that remains on the bunker gear to be released into the station, or onto adjacent gear. Consideration should be given to the provision of separate storage rooms for firefighters bunker gear that includes a separate ventilation system.

General storage space is limited at all MFES stations and facilities. This is something to be addressed within planning for renovations and/or new fire stations.

Figure 5.1: MFES Existing Fire Stations

Fire Station 91: 7801 Bayview Avenue **(Built 1989)**

Fire Station 92: 10 Riviera Drive **(Built 2003)**

Fire Station 93: 2930 Major Mackenzie Dr. East **(Built 2010)**

Fire Station 94: 7300 Birchmount Road **(Built 1980)**

Fire Station 95: 316 Main Street, Unionville **(Built 1978)**

Fire Station 96: 5567 Fourteenth Avenue **(Built 1996)**

Fire Station 97: 209 Main Street, Markham **(Built 1985)**

Fire Station 98: 650 Bur Oak Avenue **(Built 2005)**

Markham Fire & Emergency Services Master Fire Plan

Figure 5.2: Existing and Future Fire Stations

DILLON CONSULTING

Legend

- Existing Fire Stations
- Future Fire Station
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

0 0.5 1 2

Kilometres
1:87,946

STATIONS & STAFFING

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

STATION 93
Pump - 4 Firefighters

STATION 94
Pump - 4 Firefighters

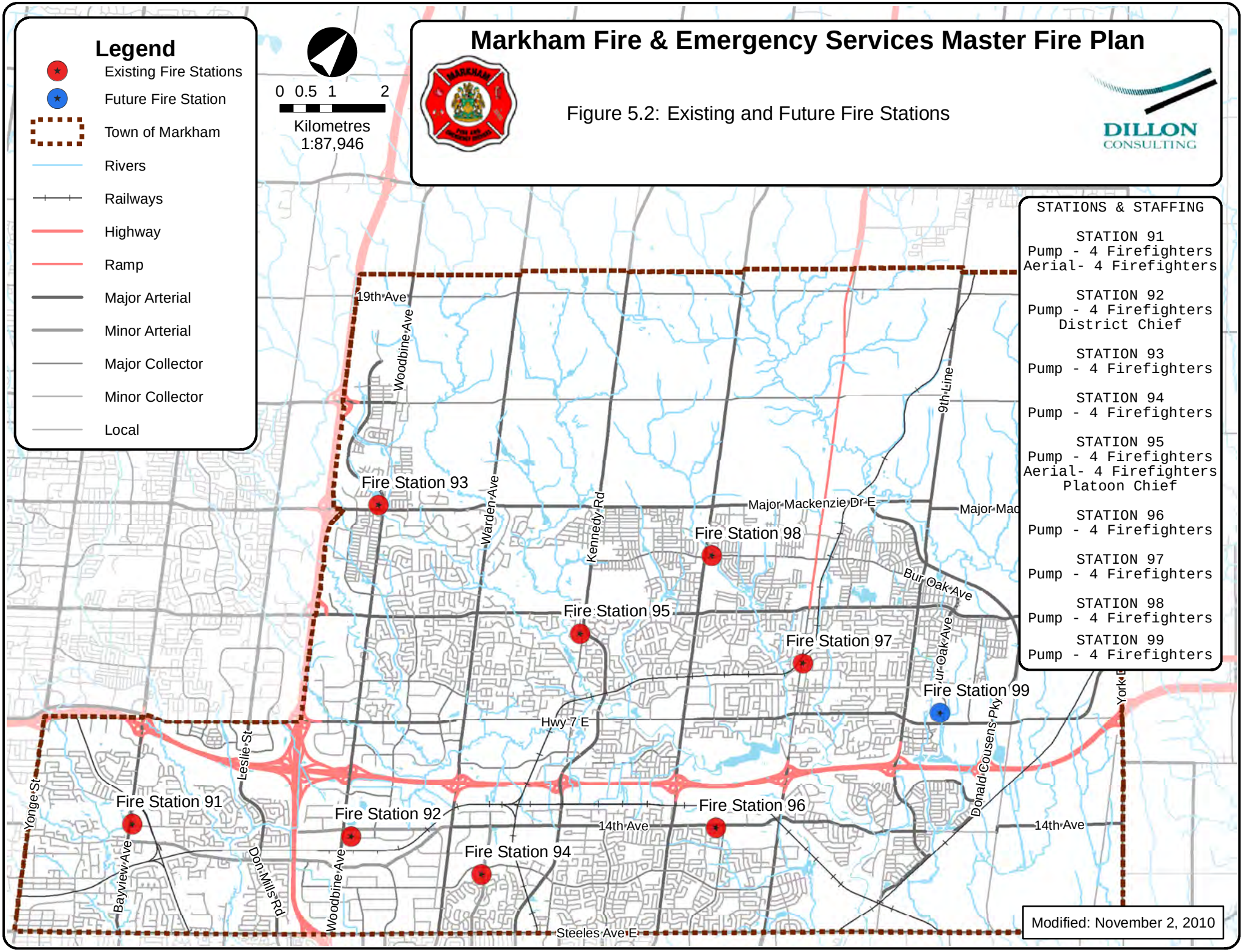
STATION 95
Pump - 4 Firefighters
Aerial- 4 Firefighters
Platoon Chief

STATION 96
Pump - 4 Firefighters

STATION 97
Pump - 4 Firefighters

STATION 98
Pump - 4 Firefighters

STATION 99
Pump - 4 Firefighters



Modified: November 2, 2010

5.3 Performance Measures for Fire Suppression

Core components of evaluating the overall effectiveness of providing fire and emergency services include establishing a measurement-supported set of performance targets (i.e. service standards) and setting clear goals and objectives. As identified in the *Fire Protection and Prevention Act, 1997*, the Office of the Fire Marshal, Ontario (OFM) has the power to issue guidelines to municipalities with respect to fire protection services and related matters. These *Public Fire Service Guidelines* (PFSG) are to be used by local municipalities to determine the level of fire protection services they deem necessary, in accordance with their individual needs and circumstances.

The National Fire Protection Association (NFPA) has also developed specific standards for a wide range of the services that municipal fire departments provide. For example, NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* describes a standard for the delivery of emergency response services by a full-time fire service. Other standards, such as NFPA 1221 "*Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems,"* are also being utilized by municipalities to design and measure the effectiveness of their fire dispatching services.

Over the past several years the MFES has been moving toward a target of achieving the standards defined within NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* as the performance measure target for emergency response. The 2001 Deployment Study, completed by the MFES, used the NFPA 1710 standard as the benchmark for assigning fire suppression staff and developing appropriate emergency response protocols. The 2001 study considered a first response performance measure target of 90% coverage within six minutes from the time of call (four minutes of travel time). The depth of response was measured as eight minutes travel time, with 90% coverage as the performance measure target.

In our experience using the NFPA 1710 standard is an appropriate strategy for the MFES and the Town of Markham to consider when adopting a "performance measure target" for emergency response. Adopting this standard as a "target" rather than formally adopting it as a "performance standard" would provide MFES and Council with a recognized best practice to assist with the planning and implementation of appropriate resource deployment. It will also act as a valuable measurement tool in monitoring the efficiency and effectiveness of the MFES.

To conduct this review we considered the relevant OFM Guidelines and NFPA standards, including NFPA 1710, to evaluate the current and projected future performance of the MFES. In addition, we applied industry best practices and comparative analysis with other similar-sized municipalities, where possible.

The total response time to an emergency call can be separated into three components: *dispatch time, turn-out time,* and *travel time*. Together these elements make up the total response time required for a fire and emergency service to receive a call from someone at the scene, identify the location of the emergency and dispatch appropriate vehicles and staff, and travel to the scene of the incident. The common definitions of these three components are:

1. Dispatch Time: The time that it takes for the person responsible for "*alarm answering*", and "*alarm processing*" to be able to dispatch the appropriate apparatus and staff to respond to the emergency.

2. Turn-out Time: The time interval that begins when the emergency response staff receive the required dispatch notification and ends at the beginning point of travel time.

3. Travel Time: The travel time interval starts when the assigned emergency response apparatus begins the en-route travel to the emergency and ends when the apparatus arrives at the scene.

NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* was developed to address the fire risks associated in responding with an initial full alarm assignment to a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. The *first response* and *full response / depth of response* performance measures for this basic type of fire are:

- First Response: The fire service's fire suppression resources shall be deployed to provide for the arrival of an engine company (minimum of four firefighters) within a 240-second (four minute) travel time to 90% of the incidents.

- Full Response / Depth of Response: The fire department shall have the capability to deploy an initial full alarm assignment (minimum of 14 firefighters, 15 if an aerial is sent) within a 480-second (eight minute) travel time to 90% of the incidents.

5.3.1 First Response

The NFPA 1710 standard for first response of four firefighters is widely accepted as the minimum initial response and best practice in order to commence limited rescue or fire fighting involving a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. Until a minimum of four firefighters has assembled on the fire ground, there is not sufficient staff on hand to safely undertake either of these roles. If fewer than four firefighters arrive on scene, they must wait until a second vehicle arrives to have sufficient staff to safely undertake a rescue or fire fighting operation.

The ranking officer assumes command of the emergency scene while one firefighter assumes the role of pump operator. A third firefighter is responsible for making a hydrant connection. The team then has the option of initiating limited search and rescue (i.e. looking for trapped persons immediately inside doorways or windows) or beginning limited firefighting using two firefighters for either task.

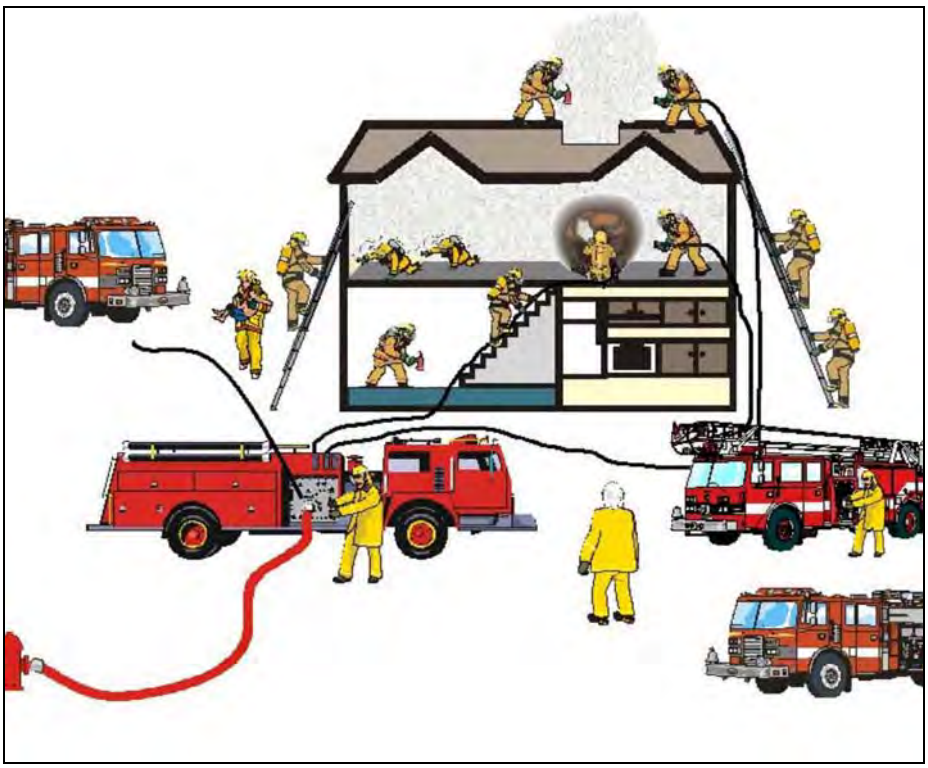
Fewer than four arriving firefighters can commence limited fire ground operations but this does not include fire rescue. Interior rescue or interior fire attack is not an option that can be undertaken safely with only four firefighters. Fire scene responsibilities are highlighted in ***Figure 5.3*** (Courtesy of the Office of the Fire Marshal, Ontario).

Figure 5.3: First Response Fire Scene Responsibilities

5.3.2 Depth of Response

The NFPA 1710 standard for depth of response is also recognised as the best practice staffing assignment. It recognizes that 14 firefighters (15 firefighters if an aerial device is sent) are required for either aggressive interior fire suppression or for rescue operations, but not both, for a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. Fire scene responsibilities are highlighted in ***Figure 5.4***.

Figure 5.4: NFPA 1710 Full Response Fire Scene Responsibilities



It is very important to recognise that each of these responses are associated with a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. Fires involving other occupancies, such as multi-unit townhouses, medium and high-density residential complexes, as well as high-risk occupancies, such as senior residences, nursing homes and hospitals, will require the automatic deployment of additional resources.

MFES meets the NFPA 1710 depth of response performance measure by deploying four front run apparatus, staffed with four firefighters each, and a Platoon Chief or District Chief to fire calls. This results in a response of 17 suppression staff.

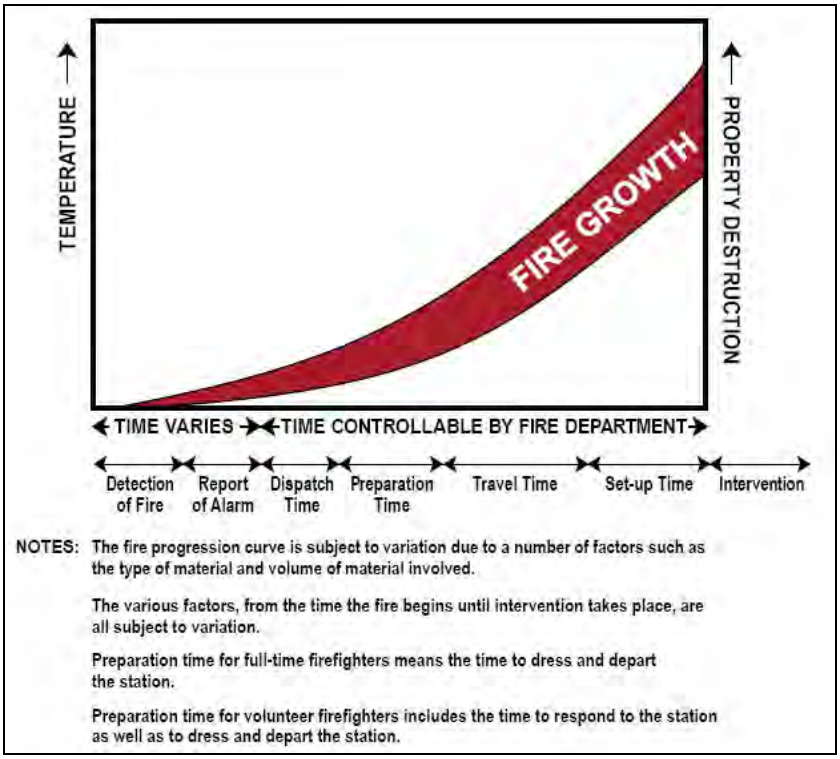
5.3.3 Importance of Time with Respect to Fire Growth

Time is critical with respect to fire growth. Research conducted by the OFM and National Research Council of Canada indicates that a fire in a non-sprinklered residential occupancy can spread from the room of origin in 10 minutes or less. Tests have shown that fire can extend from the room of origin in as little as three minutes, under fast fire growth conditions. Fire growth rates, defined by the Society of Fire Protection Engineers, as slow, medium and fast are listed in ***Table 5.2***. The growth rates are measured by the time it takes for a fire to reach a 1 megawatt (MW) fire. This is roughly equivalent to an upholstered chair burning at its peak. A 2 MW fire is approximately equal to a large upholstered sofa burning at its peak.

Table 5.2: Fire Growth Rates as Defined by Society of Fire Protection Engineers		
Time to Reach 1 MW and 2 MW Fire Growth Rates in the Absence of Fire Suppression		
Fire Growth Rate	*Time in Seconds to Reach 1MW*	*Time in Seconds to Reach 2 MW*
Slow	600	848
Medium	300	424
Fast	150	212
Source: Office of the Fire Marshal, Ontario, 'Operational Planning: An Official Guide to Matching Resource Deployment and Risk', January 7, 2011 (www.ofm.gov.on.ca)		

Within the 10 minute time period flashover conditions can occur. The combustible items within a given space reach a temperature that is sufficiently high for them to auto-ignite. The graph in ***Figure 5.5*** highlights the importance of fire fighting intervention, given the exponential increase in fire temperature, and the potential for loss of property/loss of life with the progression of time (*Courtesy of the Office of the Fire Marshal, Ontario*).

Figure 5.5: OFM Fire Progression Curve



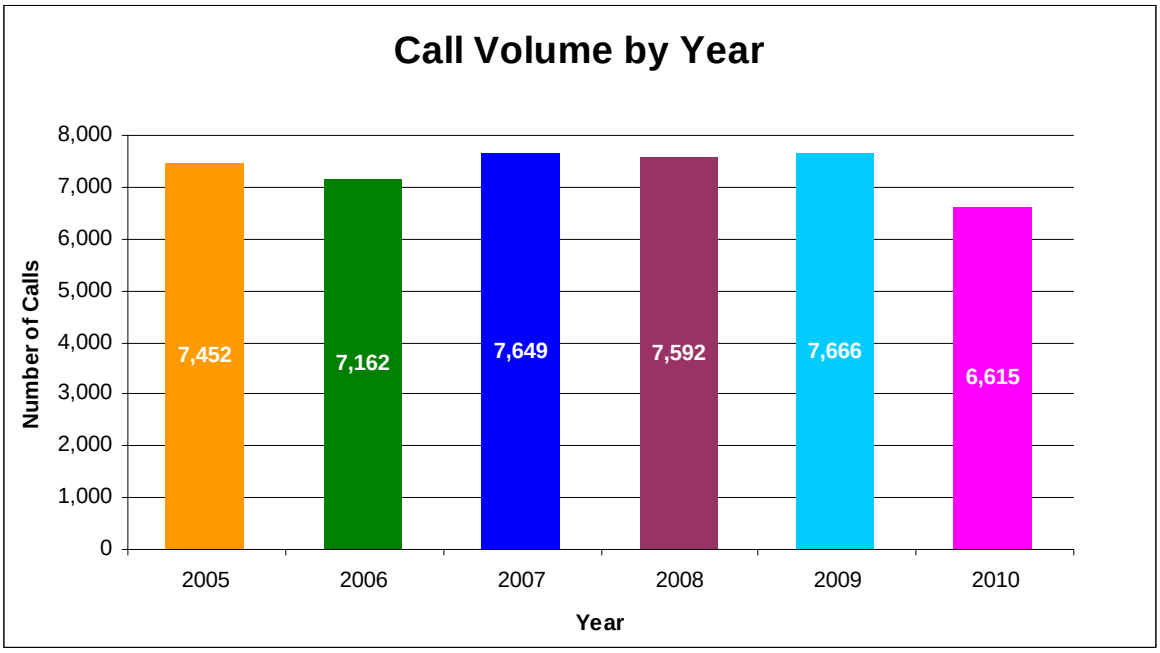
Source: Office of the Fire Marshal, Ontario, 'Operational Planning: An Official Guide to Matching Resource Deployment and Risk', January 7, 2011 (www.ofm.gov.on.ca)

5.4 Current Emergency Response Overview

5.4.1 Call Volume

Our analysis of emergency response statistics in Markham during the period from 2005–2010 indicates a relatively consistent annual emergency call volume during this period, as shown in ***Figure 5.6***. In a time period when the municipality was undergoing major growth and intensification this is a significant achievement. This can, in part, be attributed to relatively new building stock and associated increased life/fire safety systems and construction materials. This can also be attributed to MFES' strong commitment to providing a proactive fire prevention and public education program, as endorsed by Council.

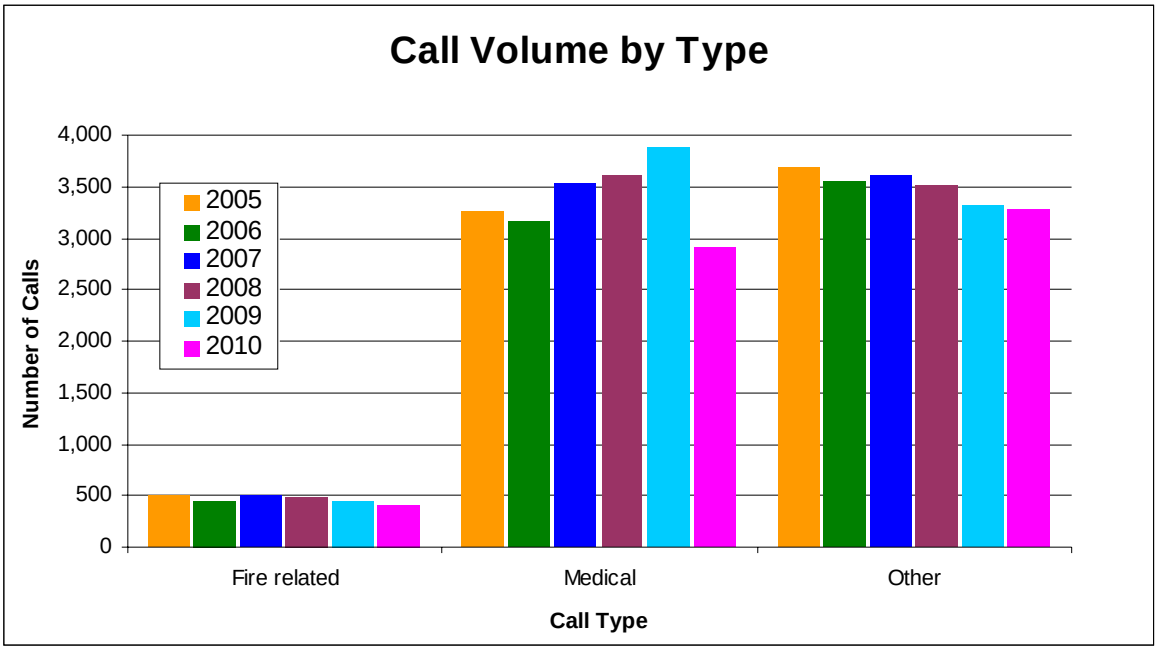
Figure 5.6: Emergency Call Volume by Year



5.4.2 Incident Types

The numbers of calls per type of incident are shown in ***Figure 5.7.***

Figure 5.7: Historical Call Volume by Type

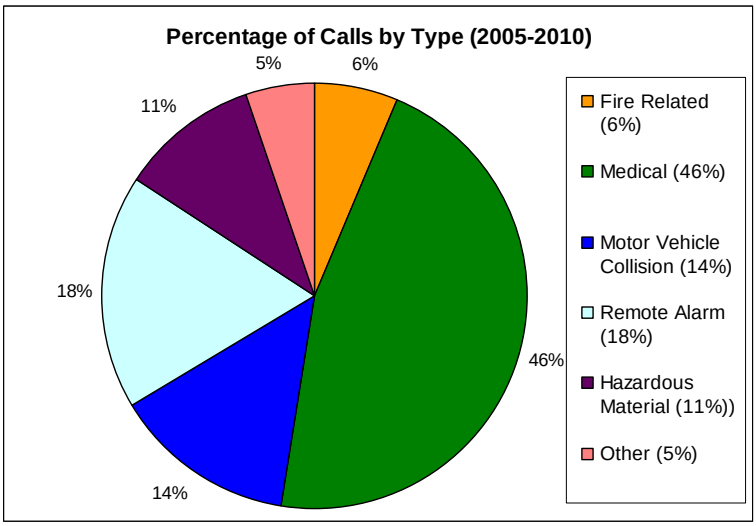


As shown in ***Figure 5.7*** the fire-related call volumes have been decreasing since 2007. This is a positive indication of successful fire prevention and education programs, especially when considering the rapid growth Markham has been experiencing over the past four years. Medical calls increased slightly from 2005 to 2009, as the population of Markham also increased. There was a decrease in medical calls in 2010 as a result of a change in dispatch protocols for tiered response for York Region EMS. Other calls have remained relatively constant from 2005 to 2010.

5.4.3 Percentage of Incident Type

Fire-related calls make up 6% of the MFES total calls from 2005 to 2010, which is comparable with other municipal fire departments. Medical calls are the most frequent type of emergency response conducted by MFES. Medical calls comprise 46% of all calls for the period from 2005 to 2010, as highlighted in ***Figure 5.8***. The "other" category is as prevalent as medical calls but it includes a number of sub-categories. The most common are motor vehicle collisions, remote alarms and hazardous material calls, as shown in ***Figure 5.8.*** Remote alarm calls (where fire alarm systems are installed to automatically signal a response from the fire service when activated) are the second most prevalent call type at 18% of all calls. Motor vehicle collisions make up 14% of all calls from 2005 to 2010. Hazardous material (hazmat) calls comprise 11% of all calls responded to by MFES. This is a fairly high occurrence of hazmat calls. Markham has experienced a number of hazmat calls as a result of illegal drug laboratories or as a component of automobile / truck accidents. Other calls (e.g. public assistance, lock-out, burn complaints, etc.) make up the remaining 5% of all calls.

Figure 5.8: Historic Average Call Volumes (2005-2010) by Percentage Type



5.4.4 Station Area Responses

Table 5.3 summarizes the total annual emergency responses for each station area from 2005 to 2010. The call volume noted for the Station 93 area is from the July 1, 2010 opening date. This likely contributed to the reduction in calls within the Station 95 area in 2010.

Table 5.3: Summary of Emergency Responses per Fire Station

Station	2005	2006	2007	2008	2009	2010
Station 91	1,382	1,353	1,343	1,337	1,331	1,054
Station 92	1,118	943	941	915	785	679
Station 94	857	748	839	826	785	736
Station 95	1,565	1,327	1,388	1,418	1,512	1,042
Station 96	1,036	950	1,198	1,197	1,272	1,137
Station 97	1,473	1,160	1,213	1,244	1,318	1,111
Station 98	21	681	727	655	663	623
Station 93	-	-	-	-	-	233

Historically Stations 91, 95 and 97 have typically experienced the highest area call volumes. The exception to this was in 2010 where Station 96 had the highest call volume of all station areas. Station 96 had a moderate area call volume, compared to the other MFES fire stations, between 2005 and 2009. Station 92 has remained somewhere in the middle of area call volumes for MFES stations from 2005 to 2010. Stations 94 and 98 have historically experienced lower area call volumes, as compared to the other MFES stations. Station 94 area call volumes are likely reduced as Highway 407 acts as a boundary and results in a restricted northerly response. Station 98 is bounded by undeveloped, rural areas to the north.

5.4.5 Emergency Response - Average Total Personnel Responding

Figure 5.9 presents a summary of the average total number of personnel responding to each type of incident for the period from 2005 to 2010. This represents all personnel that arrived on-scene to the emergency calls. No consistent time measure applies to this staffing response. During this period, the average number of personnel responding to fire-related and other types of incidents increased.

The increase in the number of personnel responding is directly related to the recent evolution within the fire service to utilize risk management practices in determining the appropriate number of staff required to respond by incident type. This strategy ensures that appropriate resources are deployed to a given type of incident. This is based on the fire and life safety risks that may be present at the scene, and the requirements of health and safety legislation to protect responding emergency services personnel. Different types of calls require different personnel responses. Medical calls, for example, receive a four person response according to MFES dispatch protocol.

Figure 5.9: Historical Personnel Response by Type (Total Staffing Response)

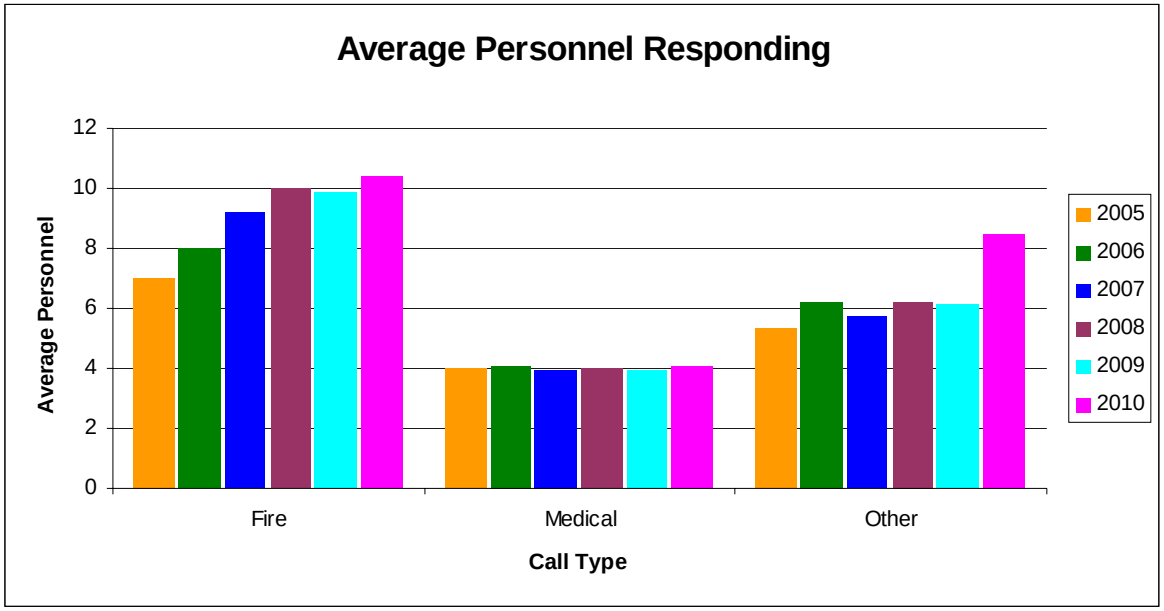


Figure 5.9 demonstrates that MFES has been considering its community risk profile and existing resources in order to implement deployment strategies. These strategies aim to match the number of responding emergency response staff to resource needs at specific incident types, based on the risks present. Medical calls are attended by an appropriate number of staff (i.e. four). Over the past five years an increasing number of personnel have been attending fire-related calls, better matching risks in the community and industry best practices. This is a direct result of the recent addition of MFES staff and stations.

Current planning projections indicate that the Town of Markham will continue to experience increased growth. This will include further intensification as well as greenfield development. MFES will need to consider further strategies to appropriately match the number of personnel responding with the incident type and risks present and to respond to growth and factors such as an aging population and an aging building infrastructure profile.

As previously indicated the NFPA 1710 standard was developed to identify the emergency response staffing required to address the fire risks associated with responding to an initial full alarm assignment at a structure fire in a typical 2,000 square foot, two storey single-family dwelling without a basement and without exposures. This full alarm assignment includes 14 firefighters (15 if an aerial is sent). The majority of residential occupancies in the Town of Markham exceed the level of risks associated with a fire in this type of structure.

Existing residential occupancies in the community include townhouses, stacked townhouses, medium and high-density condominiums, and high-rise structures. As an example of managing risk, these types of occupancies all have increased fire and life safety risks, and therefore will require the deployment of additional emergency response staff within the initial response to match the required depth of response.

5.4.6 Response Time Assessment

Response times are measured and analyzed according to percentile ranking (i.e. percentage of responses meeting a specified timeframe). The 90th percentile (i.e. where 90% or 90 out of 100 responses meet a specific response time target) is a common industry best practice for reporting and understanding emergency first responder performance. Fire services commonly utilize 90th percentile response time data for system planning and resource deployment purposes. Averages are displayed and discussed for comparison purposes. Averages represent the 50th percentile (i.e., where 50% or 50 out of 100 responses meet the target).

5.4.7 Dispatch Time

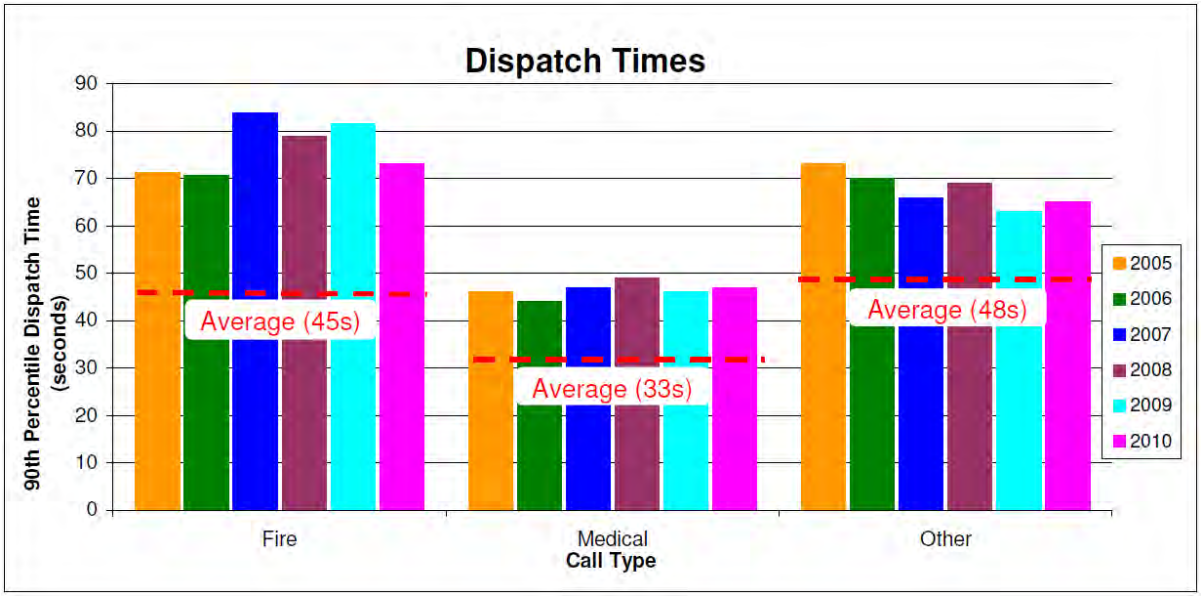
Dispatch time is defined by the NFPA in a standard called "*NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*", as follows:

> "*Emergency Alarm Processing / Dispatching*: *A process by which an alarm answered at the communications centre is transmitted to emergency response facilities (ERFs) or the emergency response units (ERUs) in the field.*"

NFPA 1221 is an industry best practice for dispatch time requirements. It requires processing of the alarm call (dispatching) to be completed within 60 seconds, for 90% of all calls (90th percentile), and within 90 seconds for 99% of calls. This means that the 90th out of 100 calls is required to be dispatched within 60 seconds and the 99th call out of 100 calls must be dispatched within 90 seconds.

Figure 5.10 presents a summary of the 90th percentile of historical dispatch times from the period of 2005 to 2010.

Figure 5.10: Historical Dispatch Times by Type



In comparison to the NFPA 1221 standard, the MFES dispatch performance is slightly slower than the performance measure target for emergency call dispatch time. Fire calls have historically had a 90th percentile time of slightly over 70 seconds, which is ten seconds more than the 60 second performance measure target. Medical call dispatching is below the 60 second 90th percentile performance measure target. These times, however, do not include the time for initial call taking, and therefore only include the fire component of dispatching.

Other calls have a decreasing trend for 90th percentile dispatch times, with the last four year of data showing 90th percentile times between 60 and 70 seconds. This is just slightly over the performance measure of 60 seconds. This data analysis shows that MFES is close to, but not currently meeting the NFPA 1221 performance measure for dispatch operations for fire calls and other calls.

The Town of Markham should review each step of the call handling and dispatching process to determine if there are any efficiencies which could improve this component of emergency response time. An improvement in any element of the call handling / dispatch times would be beneficial in moving MFES closer to the target dispatch time performance measure.

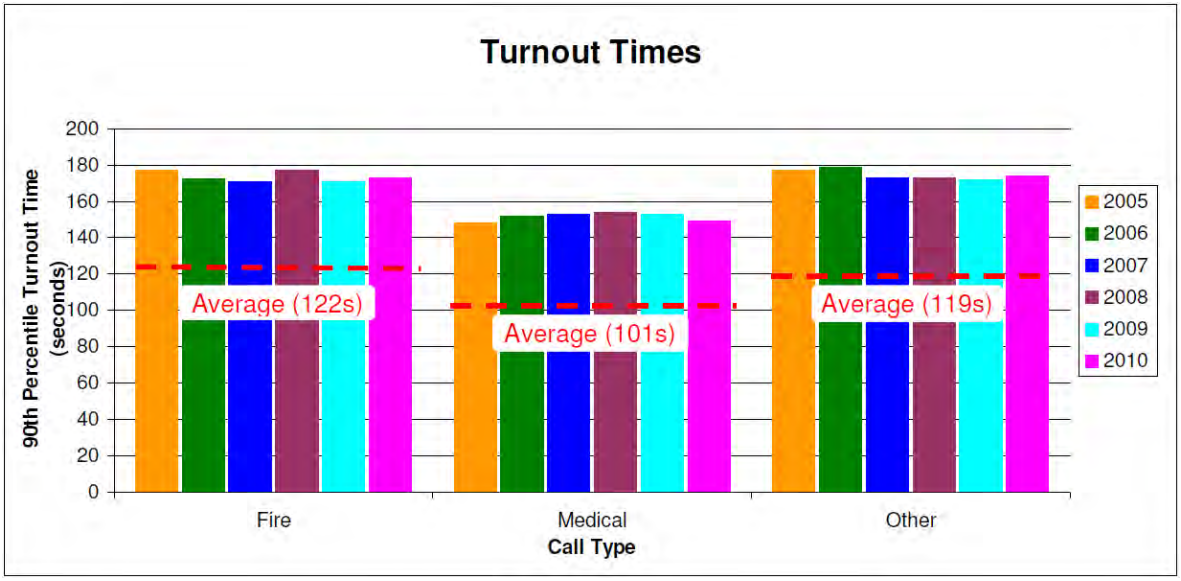
5.4.8 Turnout Time

Turnout time is defined by the NFPA, within the Standard for Organization and Deployment of Fire Suppression Operations by Career Fire Departments (NFPA 1710), as:

> "*the time interval that begins when the emergency response facilities (ERFs) and emergency response unit (ERUs) notification process beings by either an audible alarm or visual annunciation of both and ends at the beginning point of travel time.*"

In general, it is considered to be the preparation time required between the call being received at the fire station and the time the truck and firefighters leave the station. The objective set by NFPA 1710, for career departments, is to meet a turnout time of 60 seconds or less for medical calls and 80 seconds or less for fire or special operations calls. ***Figure 5.11*** presents a summary of MFES historical turnout times for the period of 2005 to 2010.

Figure 5.11: Historical Turnout Times by Type



For fire calls MFES has historic 90th percentile turnout times between 170 and 180 seconds. The performance measure for these calls is a 90th percentile turnout time of 80 seconds. MFES historic 90th percentile turnout times for medical calls are around 150 seconds, which is higher than the performance measure of 60 seconds.

For other calls, MFES has historic 90th percentile turnout times which are similar to fire calls, between 170 to 180 seconds. Again, this is higher than the performance measure of 80 seconds. This indicates that MFES should focus on implementing efficiencies to reduce overall turnout times for all call types.

Consideration should be given to implementing specific strategies targeted to reduce turnout time within the MFES. As a core component of the total emergency response time, identifying efficiencies that can allow the MFES to achieve the NFPA performance measures have a positive affect on total response times. Strategy development will need to balance the safety of firefighters with the desire to achieve this performance measure.

5.4.9 Travel Time

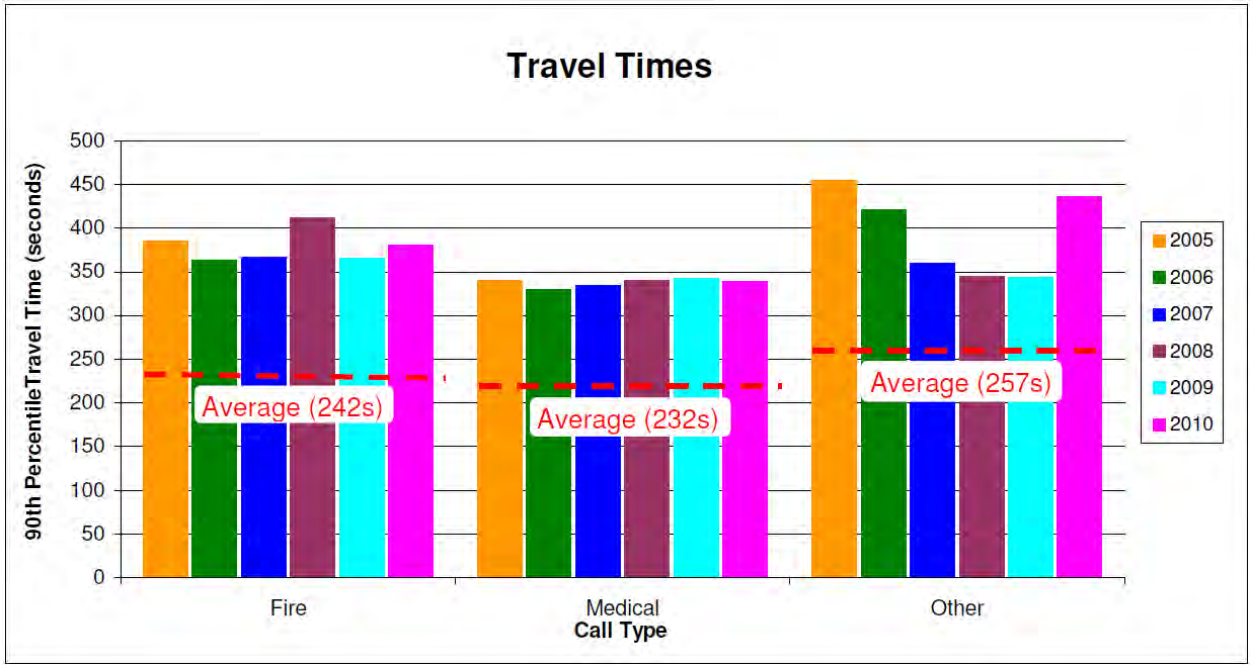
NFPA 1710 defines travel time as:

> *"The time interval that begins when a unit is en route to the emergency incident and ends when the unit arrives at the scene."*

First Response Travel Time:

The NFPA 1710 performance measure requires meeting a travel time of 240 seconds (four minutes) for the first arriving engine company (four firefighters) on-scene for 90% of calls (90th percentile). ***Figure 5.12*** presents a summary of historical 90th percentile MFES travel times for the first arriving vehicle (first response) for the period of 2005 to 2010. The historic 90th percentile first response travel times for all call types are greater than 300 seconds, which does not meet the performance measure target.

Figure 5.12: Historical Travel Times (First Arriving Vehicle) by Type

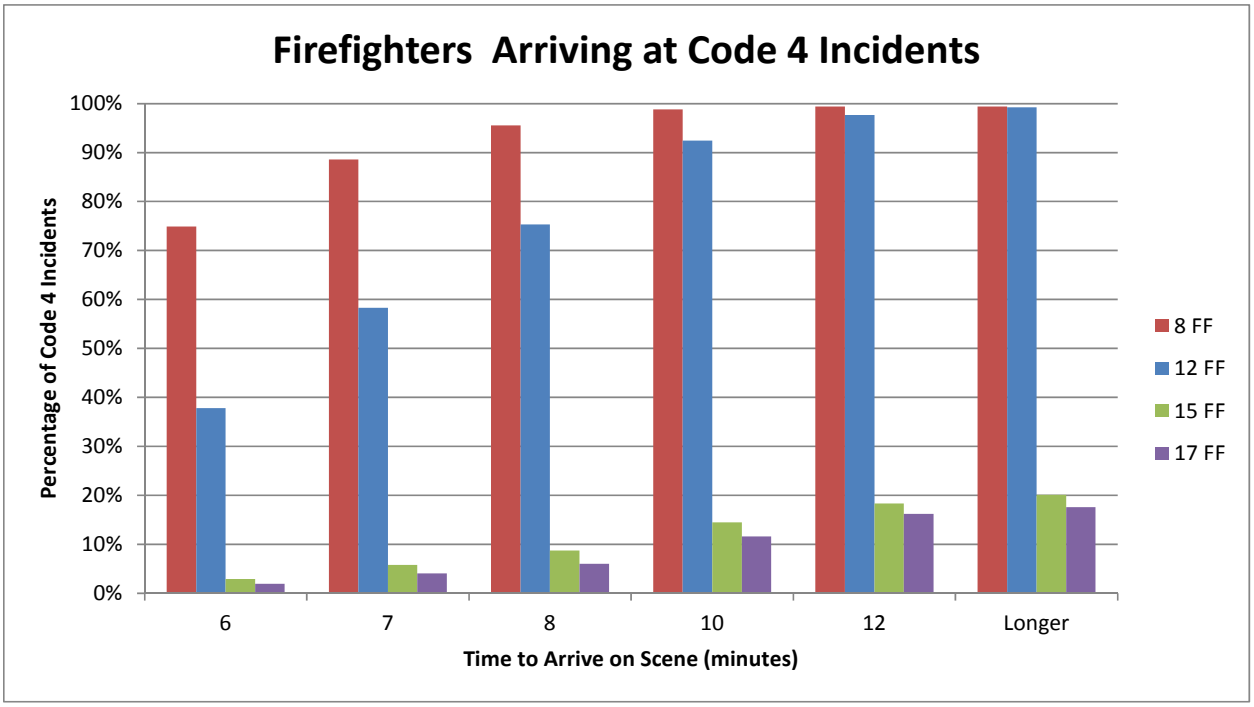


Depth of Response Travel Time:

NFPA 1710 indicates the performance measure of meeting a travel time maximum for depth of response of 480 seconds (eight minutes) for an initial full alarm assignment (14 firefighters or 15 if an aerial is sent) to arrive on-scene. The MFES has been tracking total responding vehicles, but the records rely on human data entry. Therefore some of the raw data collected is incomplete for measuring the depth of response performance. Moving forward, MFES should track this specific performance measure with detail to allow for accurate analytical results.

Figure 5.13 is based on available data for Code 4 "FIRE/SMOKE VISIBLE" calls only. It uses calls from 2005 to 2010 with complete data available, which equates to 518 calls represented. All percentages are based on that 518 total value. The figure shows the percentage of calls which achieved a response of eight, 12, 15 and 17 firefighters in six, seven, eight, 10, 12 and more than 12 minutes respectively. The performance measure requires 15 firefighters (assuming an aerial unit is deployed) on-scene within eight minutes for 90% of all calls. From the data available, MFES has historically achieved 15 firefighters on-scene in eight minutes for less than 10% of fire calls.

Figure 5.13: Historic Depth of Response



5.4.10 Total Response Time

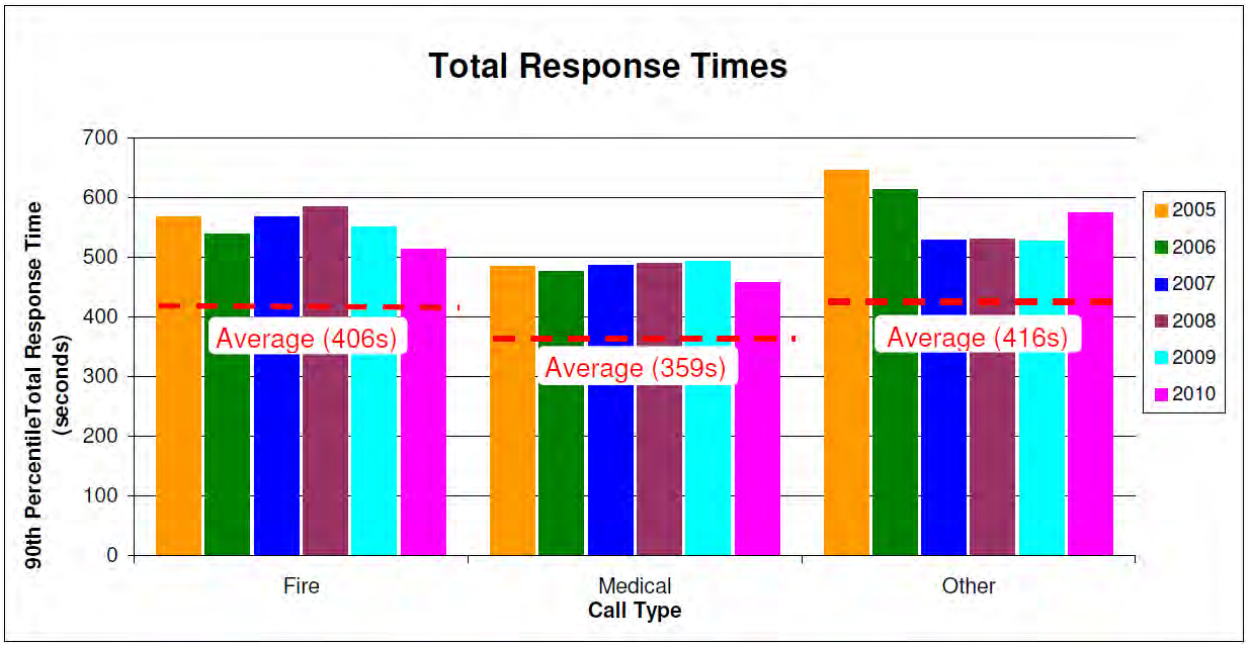
Total Response Time is defined by the NFPA within NFPA 1710 as follows:

> *"The time interval from the receipt of the alarm at the public safety answering point (PSAP) to when the first emergency response unit is initiating action or intervening to control the incident."*

Total response time includes dispatch time, turnout time and travel time components.

Figure 5.14 presents a summary of historical total response times for the first arriving vehicle. This data represents the period from 2005 to 2010. The total response performance measure for first response is the sum of dispatch time, turnout time and travel time. This equates to a 90th percentile total response time of 360 seconds for medical calls and 380 seconds for fire / other calls. MFES 90th percentile total response times are just under 500 seconds for medical calls and greater than 500 seconds fire / other calls. This highlights that each component, whether dispatch time, turnout time or travel time, impacts the total response time. It is important to aim to meet the performance measure target for each of these components in order to provide the best level of service for the overall emergency response.

Figure 5.14: Historical Total Response Times by Type



5.4.11 Property Fire Loss

Property fire loss is another valuable performance measurement tool in assessing the cumulative impact of the "*three lines of defence"* utilized by a fire and emergency service.

Table 5.4 provides the Town of Markham's historical property fire loss for the period from 2005 to 2009. An important consideration in evaluating this data is to consider the impact of a major fire with a large dollar loss and/or a series of larger fires with a combined significant large dollar loss.

Overall the Town of Markham has experienced a relatively constant level of property loss as a result of fire. This is another trend that can be attributed, in part, to the commitment of the MFES and Council to proactive public education and fire prevention activities.

Table 5.4: Fire Loss

Year	Fire Loss
2005	$4,113,550
2006	$5,425,419
2007	$6,941,200
2008	$5,581,850
2009	$4,374,000

Source: 2009 MFES Annual Report

5.5 Assessment of Response Coverage

The following sections detail the assessment of response coverage within the municipality. Various methods were employed to assess MFES' response coverage capabilities for existing conditions as well as for projected future conditions. A review of existing call data was carried out to determine MFES' success in meeting established response performance targets. The analysis was carried out using ESRI's Network Analyst, a GIS tool developed specifically for the purpose of assessing networks, such as roads.

5.5.1 Methodology

This section provides a brief outline of the scope and methodology used in order to provide insight into the modeling procedures adopted to assess existing and future response coverage and to test various combinations of fire suppression resources.

A Geographic Information System (GIS) program was used to assess the fire and emergency service's response coverage. Digital copies of GIS layers were provided by the Town for the existing and future road networks. Relevant base road information, such as road length and speed, was extracted from the GIS data. The model was calibrated from the posted speed to a modelled speed, to more accurately reflect travel times of the fire response units. A calibration table, as shown in ***Table 5.5***, is represented on all of the model output prints.

Table 5.5: Calibration Table

Class	Posted Speed	Modelled Speed
Expressway	80-100	100
Major Arterial	50-80	50
Minor Arterial	50	45
Major Collector	50-60	45
Local	40-50	30

Industry performance measures used for the assessment were applied to three different horizons:

- Existing conditions (2010);
- Business as usual (2012); and
- 10 year future horizon (2020).

The existing urban service area includes all areas that are currently serviced with fire hydrants. For analysis purposes, fire-hydranted service areas were defined as all areas within 200 metres of a fire hydrant. The future service boundary includes the existing coverage area plus all future development blocks identified by Town planners that are expected to receive municipal servicing within the 2021 horizon. The existing and future service areas modelled are shown in ***Figure 5.15***.

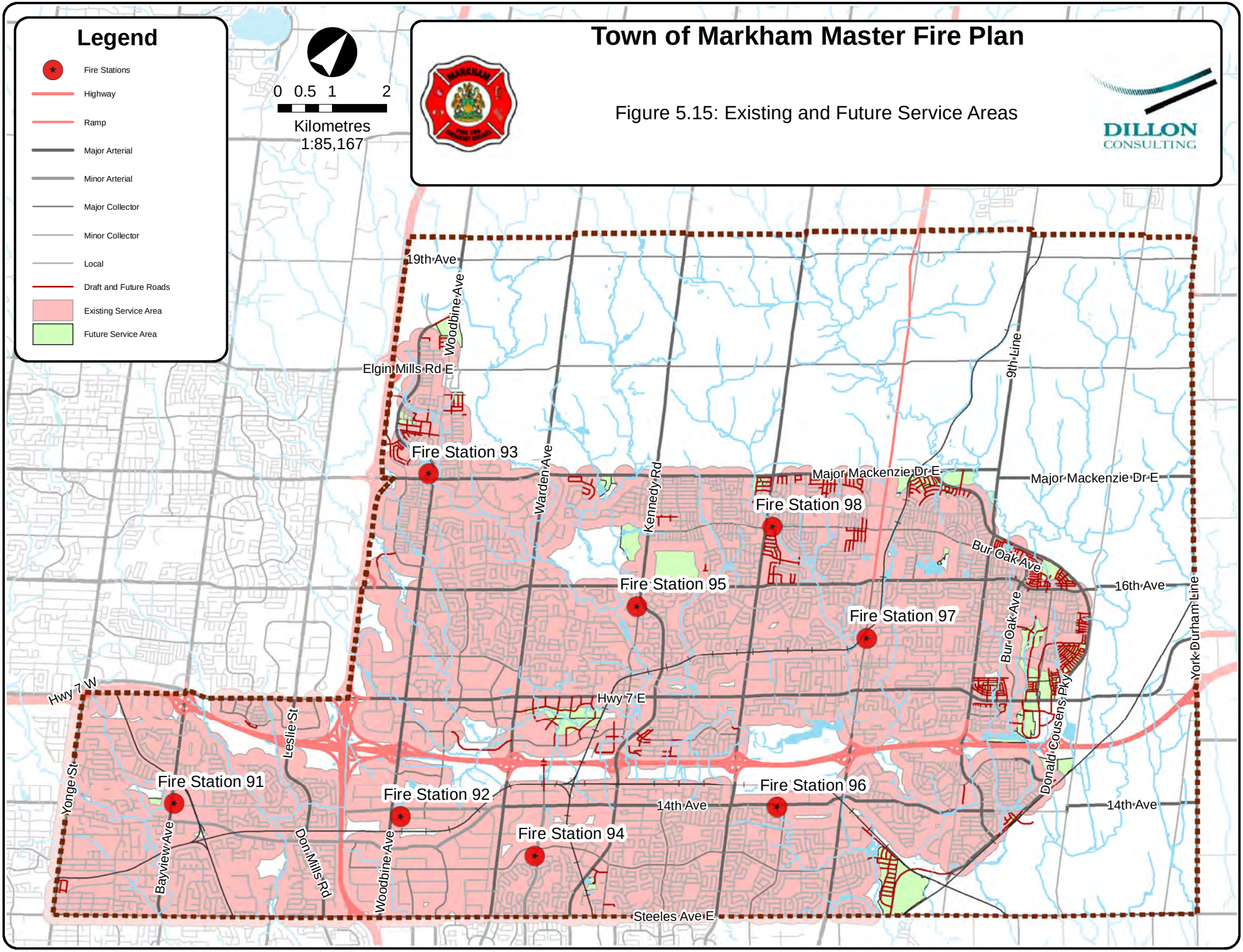
This information, combined with the station locations, was used to build "response polygons" around each station. These polygons represent the coverage each station can provide in four minutes of travel time. This assesses whether the Town is providing adequate first response coverage according to the NFPA 1710 standard. A similar process was carried out to determine the eight minute travel time to assess the NFPA 1710 depth of response standard. This analysis also identifies the areas where the fire department is not currently able to achieve the response time elements or the staffing elements of the NFPA 1710 performance measure.

5.5.2 Performance Measures

The assessment is based on the NFPA 1710 industry performance measures as described above. The travel time component of these standards is directly affected by the location of the fire stations, therefore particular emphasis will be placed on this measure during the analysis. As mentioned in the methodology above, response polygons outlining the area that responding fire apparatus can reach within a set time are used to delineate which areas of the municipality are deemed "covered" by the fire and emergency service. In the first response coverage assessment, the area covered in the first four minutes of apparatus travel time is represented. Assuming that dispatch and assembly times are within their respective standards this coverage represents the area of the Town in which you would expect to meet the NFPA 1710 first response measure target.

Town of Markham Master Fire Plan

Figure 5.15: Existing and Future Service Areas



5.6 Analytic Results

This section documents the results of the analysis for an existing "do-nothing" condition, a "business as usual" condition, a future "business as usual" condition as well as a range of other alternative station location scenarios. In undertaking the analyses, a number of station locations, station models, company variations and staffing scenarios were evaluated. The most promising and practical of these options are documented in this report. The following variables, and combinations thereof, were tested:

- addition of fire stations;
- addition of staffed fire apparatus; and
- relocation of staffed fire apparatus.

For ease of reference, the station, staffing and vehicle assignments modeled are summarized in a tabular format and also included within each model figure.

5.6.1 Coverage Assessment Scenarios

For the analysis, minimum staffing levels were assumed for front run apparatus at all fire stations. This translates to four firefighters on all engine or aerial apparatus, as previously described. The deployment of apparatus was based on geography, for the closest responding units and the assignment of apparatus to stations were consistent with the previously described assignments. The staffing and vehicle assignments are identified within each of the figures below for ease of reference.

First Response: The performance target for first response was measured (as a percentage) as the hydranted-area that four firefighters could reach within four minutes of travel time. For illustrative purposes "response bands" for five minutes or less and more than five minutes are also shown.

Depth of Response: The performance target for the depth of response was measured as 15 responding firefighters within eight minutes of travel time, consistent with NFPA 1710. This is based on the assignment of an aerial unit to all calls, which is warranted for all fire calls because of the community and building fire risk in the Town of Markham. For illustrative purposes "staffing bands" for less than 12 and 12 or more firefighter responses are also shown.

Scenario 1: 2010 Existing Conditions, Seven Station Model

This scenario is based on staffing levels as they were in June, 2010 and represents the existing "do-nothing" condition at the study outset. The road network and station locations reflect the conditions in 2010 before the addition of an eighth fire station and associated staff (i.e., Station 93).

The first response coverage of four firefighters arriving on-scene within four minutes of travel time is 55%. This is the baseline first response coverage. Results of the first response assessment are shown in ***Figure 5.16***. There are two significant areas within the results that highlight response challenges. The first is the urban area west of Warden Avenue and north of Highway 7. The second is the eastern edge of the urban area, along most of the 9th Line corridor.

For depth of response, the existing condition, with seven fire stations, yields coverage of 43% for the NFPA 1710 performance measure. This means that in 43% of the existing service areas of the Town, 15 firefighters are expected to arrive on-scene within eight minutes of travel time. Results of the depth of response assessment are shown in ***Figure 5.17***. This is the baseline depth of response coverage. The areas of first response challenges discussed above are also shown to be deficient in terms of depth of response performance. Additional areas that appear to pose challenges for meeting the depth of response performance measure are the southwest corner of the Town as well as the area between Steeles Avenue and 14th Avenue, east of Warden Avenue.

2010 Existing Conditions, Eight Station Model

This scenario is based on staffing levels as they are today (2011) and can be described as the base case or existing scenario. The road network, station locations and fire suppression staffing reflect conditions in the latter half of 2010, following the opening of Station 93 in July. The scenario was tested to evaluate the coverage that exists with the eight station model and associated resources.

The first response coverage area for this scenario, with four firefighters arriving on-scene within four minutes of travel time, is 63% of the existing service area. This is an improvement of 8% from the previous seven station model existing scenario, the baseline condition. The results are shown in ***Figure 5.18***.

This improves the first response deficiencies along the Woodbine Avenue corridor; however, there is still a section along Warden Avenue, between Highway 407 and Major Mackenzie Drive which is not meeting the performance measure.

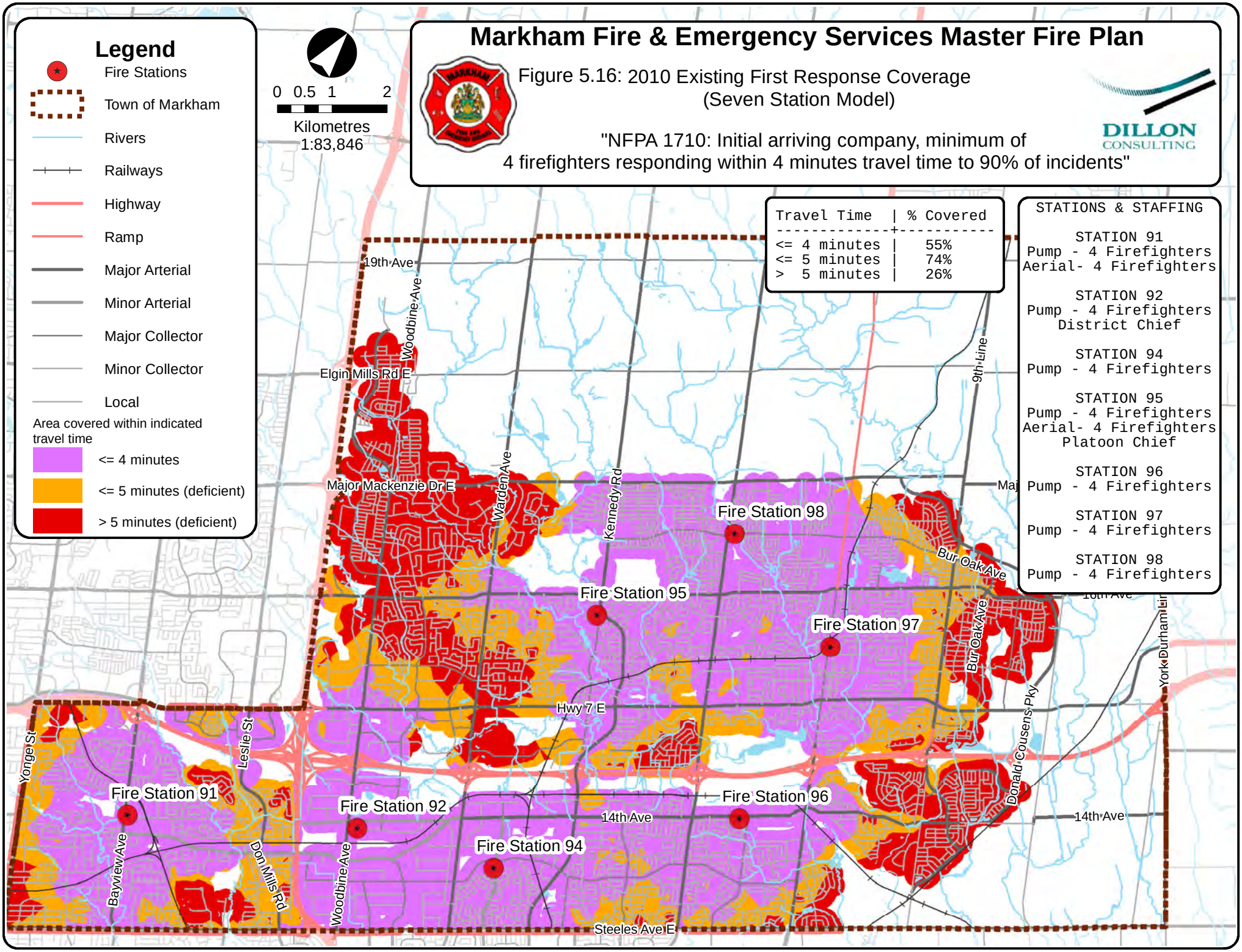
The depth of response for this scenario yields a coverage area of 50%, measuring where 15 firefighters can respond within eight minutes of travel time, as per the NFPA 1710 performance measure. This is an improvement of 7% from the previous (baseline) scenario with the seven station model. This scenario is represented in ***Figure 5.19***. The greatest improvements in the depth of response results for this scenario occurred between Highway 7 and Major Mackenzie Drive between Highway 404 and Kennedy Road.

Markham Fire & Emergency Services Master Fire Plan

Figure 5.16: 2010 Existing First Response Coverage
(Seven Station Model)

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING



Markham Fire & Emergency Services Master Fire Plan

Figure 5.17: 2010 Existing Depth of Response Coverage
(Seven Station Model)

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters
(15 if aerial is deployed) responding within
8 minutes travel time to 90% of incidents"

DILLON CONSULTING

Legend

- Fire Stations
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Total number of firefighters reaching area within 8 minutes of travel time

- < 12 Firefighters (deficient)
- 12 Firefighters (deficient)
- > 15 Firefighters

0 0.5 1 2
Kilometres
1:83,846

# of Firefighters	% Covered	% Aerial
< 12	32%	--
12	68%	56%
>15	43%	39%

STATIONS & STAFFING

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

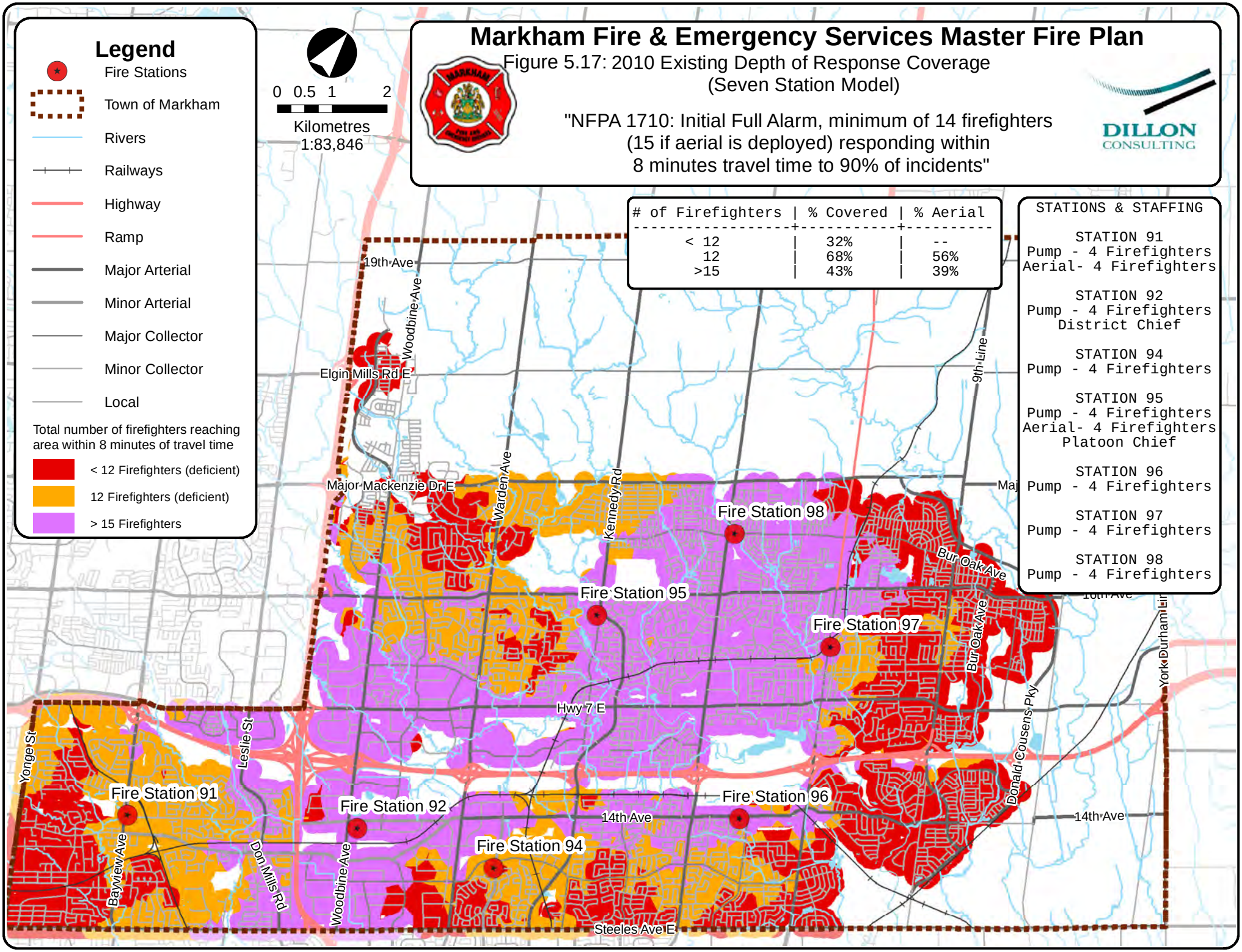
STATION 94
Pump - 4 Firefighters

STATION 95
Pump - 4 Firefighters
Aerial- 4 Firefighters
Platoon Chief

STATION 96
Pump - 4 Firefighters

STATION 97
Pump - 4 Firefighters

STATION 98
Pump - 4 Firefighters

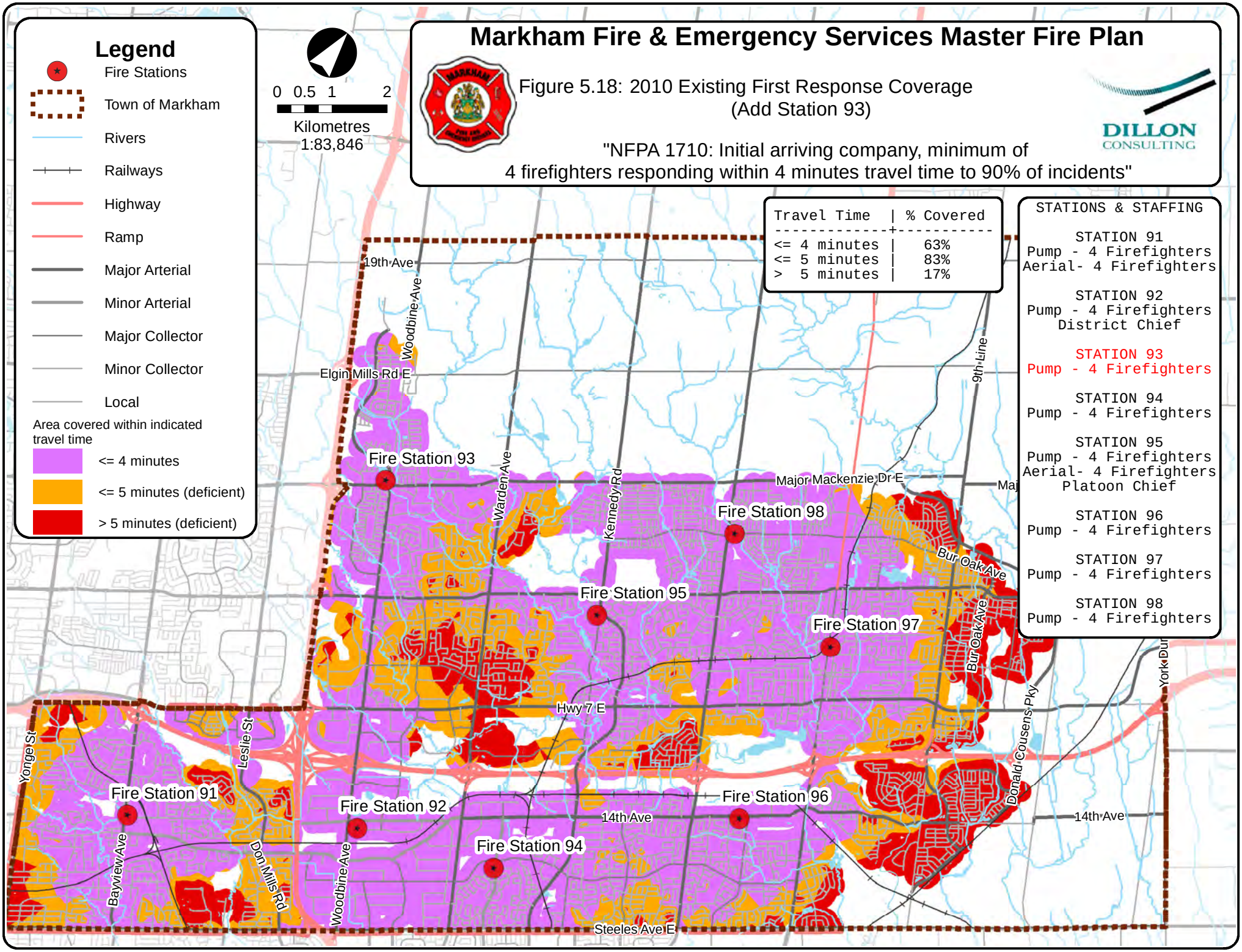


Markham Fire & Emergency Services Master Fire Plan

Figure 5.18: 2010 Existing First Response Coverage
(Add Station 93)

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING

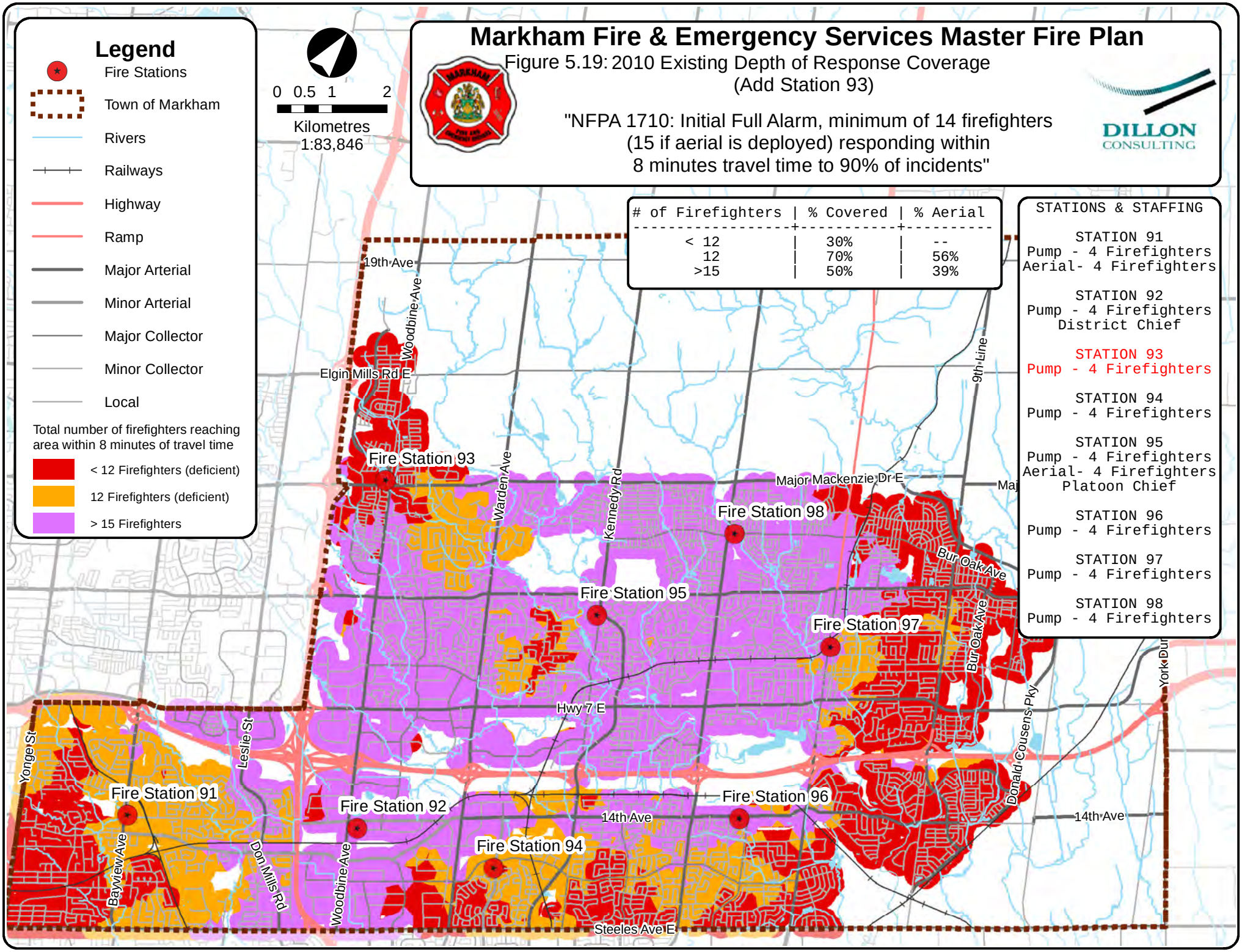


Markham Fire & Emergency Services Master Fire Plan

Figure 5.19: 2010 Existing Depth of Response Coverage
(Add Station 93)

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters
(15 if aerial is deployed) responding within
8 minutes travel time to 90% of incidents"

DILLON CONSULTING



2012 Existing Conditions, 'Business as Usual' Nine Station Model

This scenario evaluates the predicted coverage results for a horizon year of 2012. The 2010 road network and development horizon were assumed to be relevant for this interim scenario. This horizon follows the addition of the new Fire Station 99, currently scheduled for opening in January 2012. This station is planned to be staffed with a crew of four full-time firefighters and a front run apparatus (engine).

The coverage result for the 2012 'business as usual' first response is 68% of the existing service area, an improvement of 13% from the baseline conditions and 5% from the previous, eight-station scenario. The coverage resulting from this scenario is shown in ***Figure 5.20***. The main improvements in first response coverage are to areas along the eastern edge of the urban area, north and slightly south of Highway 407.

For depth of response, the 2012 'business as usual' condition yields a coverage area of 54% for the NFPA 1710 performance measure. This is an increase of 11% from the baseline conditions and 4% from the previous scenario. This is shown in ***Figure 5.21***. The increase in area that meets the performance measure is relatively small, however, the eastern boundary of the Town's urban area, north and south of Station 99, shows an improvement from less than 12 firefighters responding in eight minutes travel time in the eight station scenario to 12 firefighters responding within eight minutes of travel time. This is a step in the right direction toward meeting the performance target of 15 firefighters responding.

Future Option 1A: 2020 Future Conditions, 'Business as Usual' Nine Station Model

This scenario evaluates the coverage that would be expected within the 2020 horizon. This horizon incorporates a revised road network, provided by Town staff, and revised service area to reflect the predicted 10 year development of the Town. The 'business as usual' option includes the addition of the new Fire Station 99, scheduled to open in January 2012. This station is planned to be staffed with a crew of four full-time firefighters on front run apparatus.

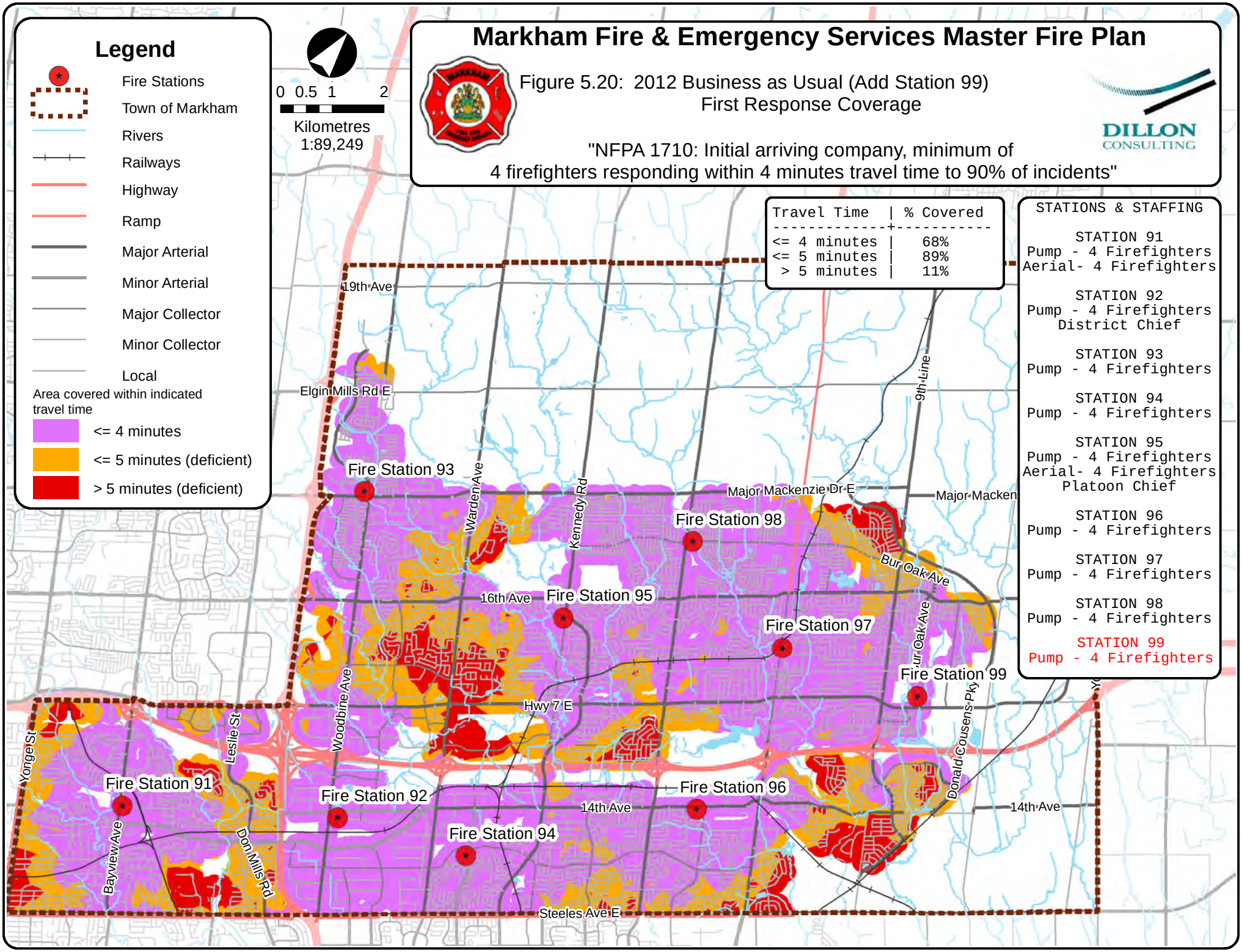
The first response coverage area anticipated to be reached by four firefighters within four minutes of travel time is 68% of the future service area, which is the same percentage coverage as in the previous scenario (2012 'Business as Usual'). This scenario produces very similar geographic coverage results to the previous scenario. There are additional areas of development included in the 2020 horizon, however they are located within close proximity to current or planned fire stations. The results of the first response analysis are shown in ***Figure 5.22***. The depth of response coverage for this scenario yields a coverage area of 54% of the future service area, measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is the same depth of response coverage as was calculated for the existing service area in the previous scenario. The results for the depth of response analysis are shown in ***Figure 5.23***. Again, the geographical coverage is very similar to the 2012 scenario, however the number of residential units (and therefore potential number of calls) that will be covered in the future 2020 scenario will be likely be greater as the Town will continue to grow and develop over the additional eight years.

Markham Fire & Emergency Services Master Fire Plan

Figure 5.20: 2012 Business as Usual (Add Station 99)
First Response Coverage

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING



Markham Fire & Emergency Services Master Fire Plan

Figure 5.21: 2012 Business as Usual (Add Station 99)
Depth of Response Coverage

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING

Legend

- Fire Stations
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Total number of firefighters reaching area within 8 minutes of travel time

- < 12 Firefighters (deficient)
- 12 Firefighters (deficient)
- > 15 Firefighters

0 0.5 1 2
Kilometres
1:89,249

# of Firefighters	% Covered	% Aerial
< 12	13%	--
12	87%	58%
>15	54%	47%

STATIONS & STAFFING

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

STATION 93
Pump - 4 Firefighters

STATION 94
Pump - 4 Firefighters

STATION 95
Pump - 4 Firefighters
Aerial- 4 Firefighters
Platoon Chief

STATION 96
Pump - 4 Firefighters

STATION 97
Pump - 4 Firefighters

STATION 98
Pump - 4 Firefighters

STATION 99
Pump - 4 Firefighters

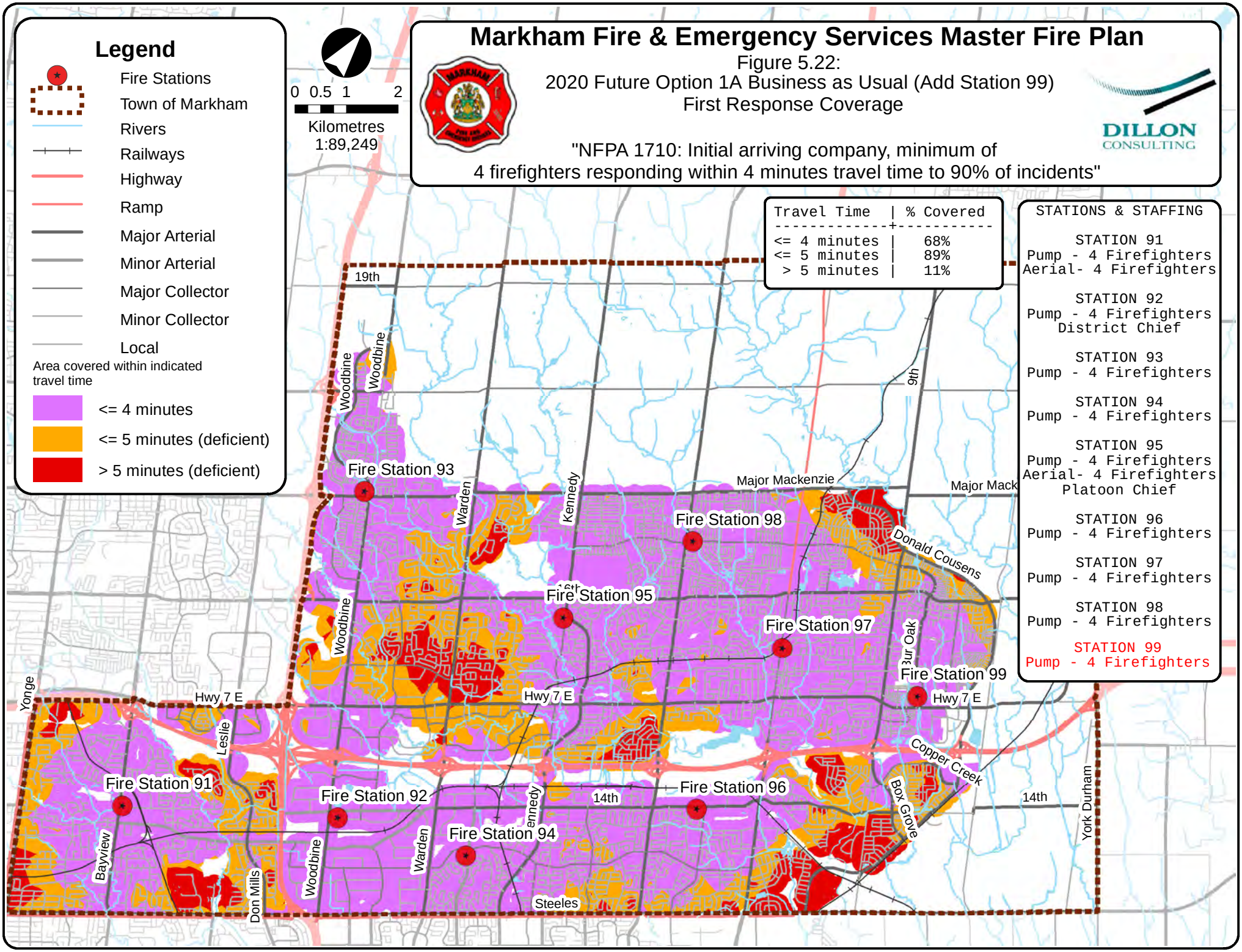
19th Ave
Elgin Mills Rd E
Major Mackenzie Dr E
Major Macken
16th Ave
14th Ave
14th Ave
Hwy 7 E
Steeles Ave E
9th Line
Warden Ave
Kennedy Rd
Woodbine Ave
Leslie St
Yonge St
Bayview Ave
Don Mills Rd
Bur Oak Ave
Donald Cousens Pky
Fire Station 91
Fire Station 92
Fire Station 93
Fire Station 94
Fire Station 95
Fire Station 96
Fire Station 97
Fire Station 98
Fire Station 99

Markham Fire & Emergency Services Master Fire Plan

Figure 5.22:
2020 Future Option 1A Business as Usual (Add Station 99)
First Response Coverage

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING

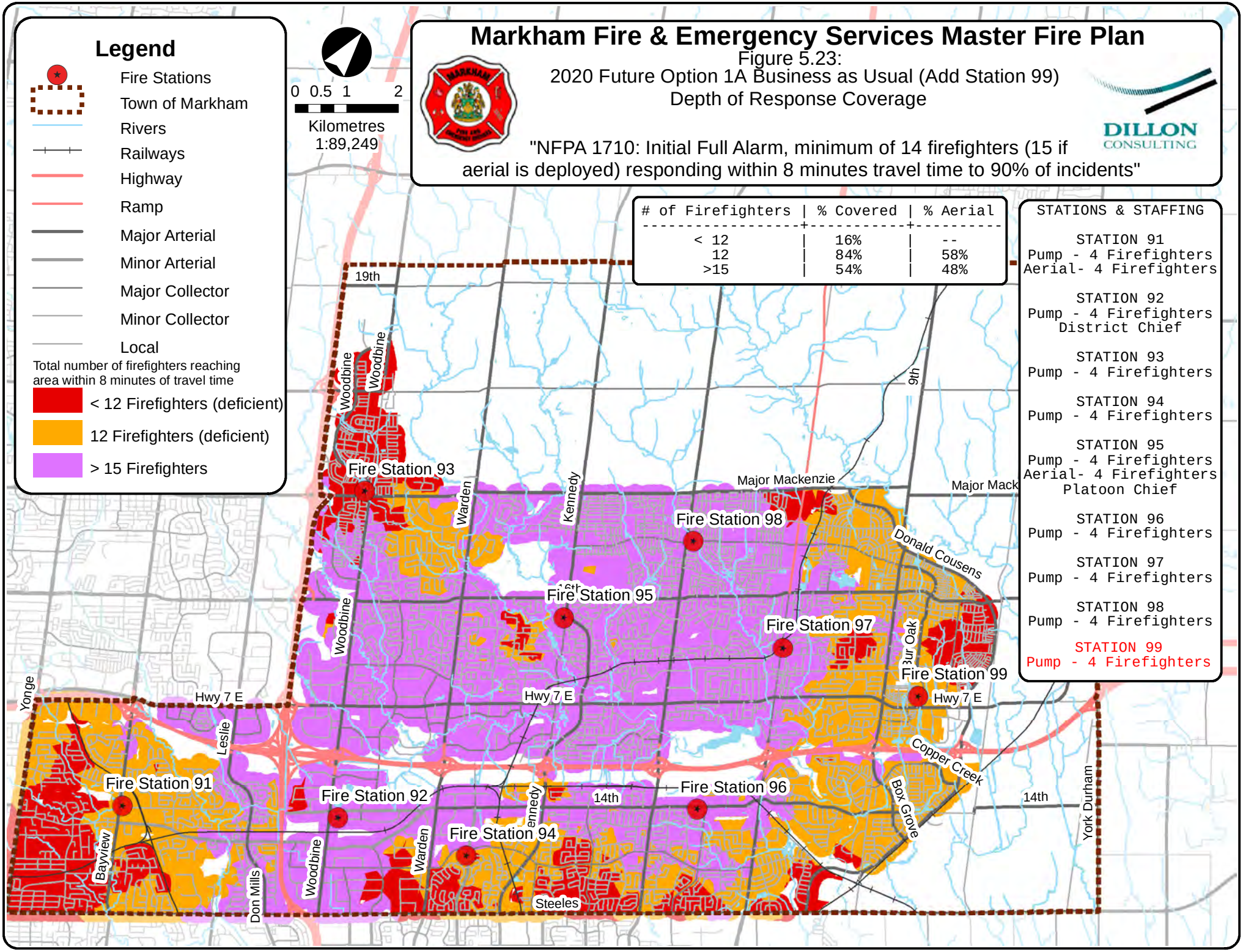


Markham Fire & Emergency Services Master Fire Plan

Figure 5.23:
2020 Future Option 1A Business as Usual (Add Station 99)
Depth of Response Coverage

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING



Future Option 1B: 2020 Future Conditions, 'Business as Usual' Nine Station Model, add Third Aerial Unit

The 'Business as Usual' Option 1B includes the addition of the new Fire Station 99 (similar to *Option 1A*) as well as the addition of a third aerial unit. The third aerial is currently planned for delivery in 2014. MFES expect to locate the aerial at Station 96, as an interim measure, staffed with a crew of four firefighters. The aerial responses from Station 96 will be monitored by MFES to confirm the ultimate location of the aerial as need requires and as space within stations allows.

The first response coverage for this scenario will be the same as Option 1A (68% coverage), shown above in ***Figure 5.22***.

The depth of response coverage for this scenario, shown in ***Figure 5.24***, yields a coverage area of 69% of the future service area, measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is a 15% improvement in coverage in depth of response as compared to Option 1A.

Future Option 2: 2020 Future Conditions, Add Station 99 and Station 90

This scenario evaluates the future development and road network conditions with the addition of Station 99 and a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard, near Highway 7 (Station 90). The new stations would each be staffed with crews of four full-time firefighters on front run apparatus.

The first response for this scenario, with four firefighters arriving on-scene within four minutes of travel time is anticipated to be 75% of the future coverage area. This improves the first response coverage by 20% from the baseline conditions and 7% from the previous scenario. This scenario greatly improves the response coverage between Highway 407 and Major Mackenzie Drive from Woodbine Avenue to Kennedy Road. The results of this coverage assessment are shown in *Figure 5.25***.**

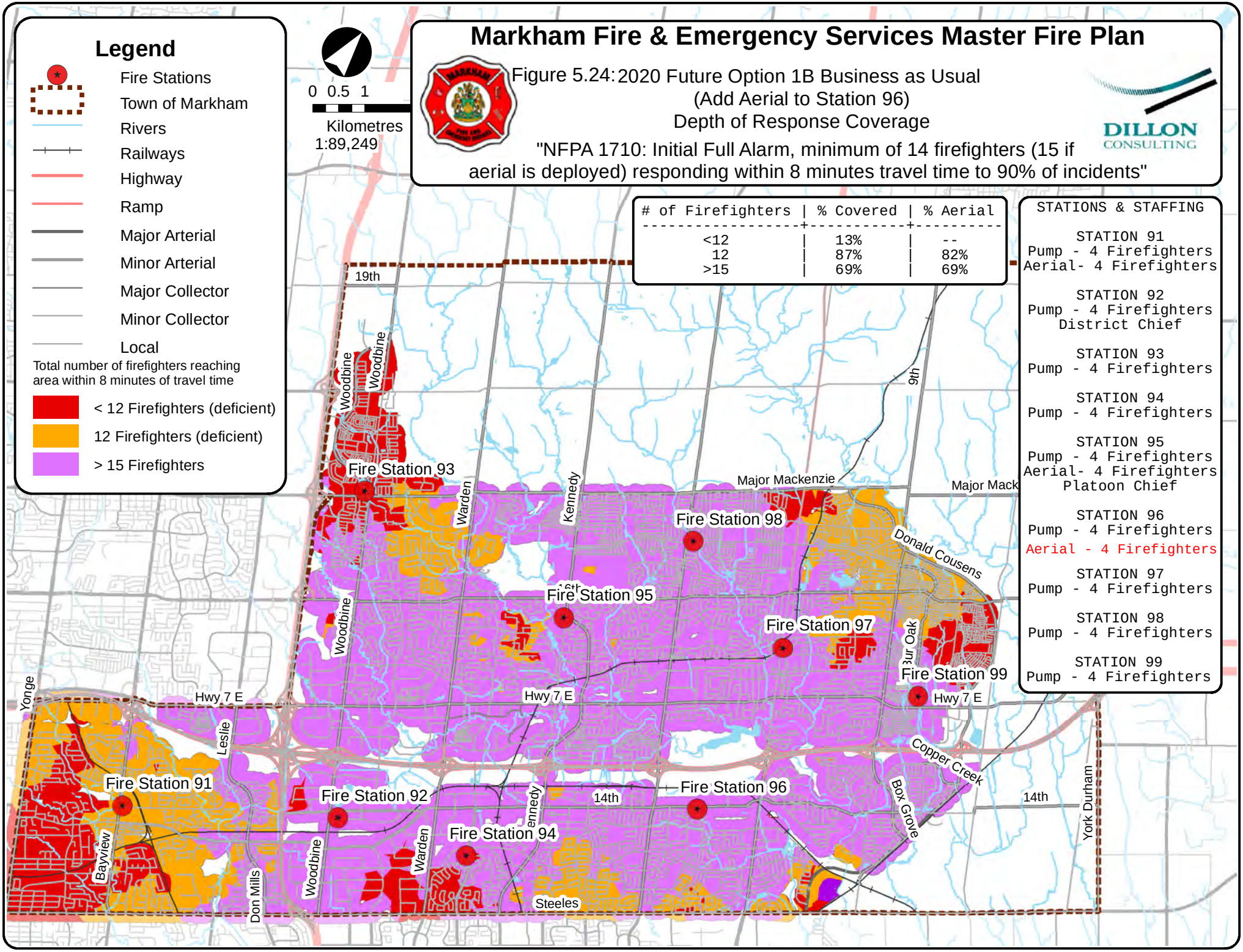
For the depth of response measure, this scenario results in 82% coverage measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is a 28% improvement from baseline conditions and a 13% improvement from the previous scenario. The results of this coverage assessment are shown in ***Figure 5.26***. The areas where two stations response polygons overlap experience an improvement in depth of response. This includes where Station 90 can meet and overlap with the responding crews from Stations 92, 93, 94 and 95.

Markham Fire & Emergency Services Master Fire Plan

Figure 5.24: 2020 Future Option 1B Business as Usual
(Add Aerial to Station 96)
Depth of Response Coverage

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING

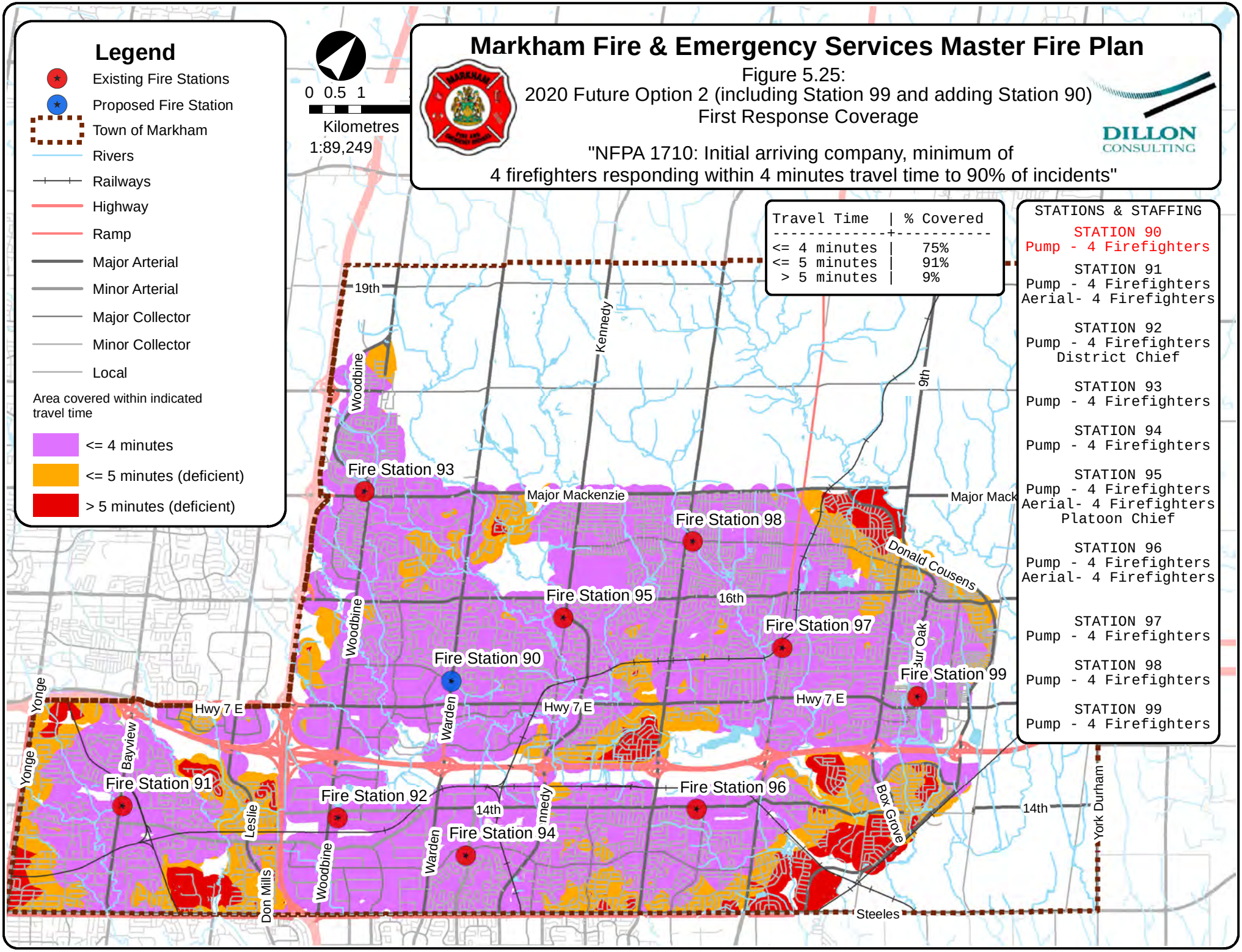


Markham Fire & Emergency Services Master Fire Plan

Figure 5.25:
2020 Future Option 2 (including Station 99 and adding Station 90)
First Response Coverage

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING



Markham Fire & Emergency Services Master Fire Plan

Figure 5.26:
2020 Future Option 2 (including Station 99 and adding Station 90) Depth of Response Coverage

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING

Legend

- Existing Fire Stations
- Proposed Fire Station
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Total number of firefighters reaching area within 8 minutes of travel time

- < 12 Firefighters (deficient)
- 12 Firefighters (deficient)
- > 15 Firefighters

0 0.5 1 2
Kilometres
1:89,249

# of Firefighters	% Covered	% Aerial
< 12	8%	--
12	92%	82%
> 15	82%	75%

STATIONS & STAFFING

STATION 90
Pump - 4 Firefighters

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

STATION 93
Pump - 4 Firefighters

STATION 94
Pump - 4 Firefighters

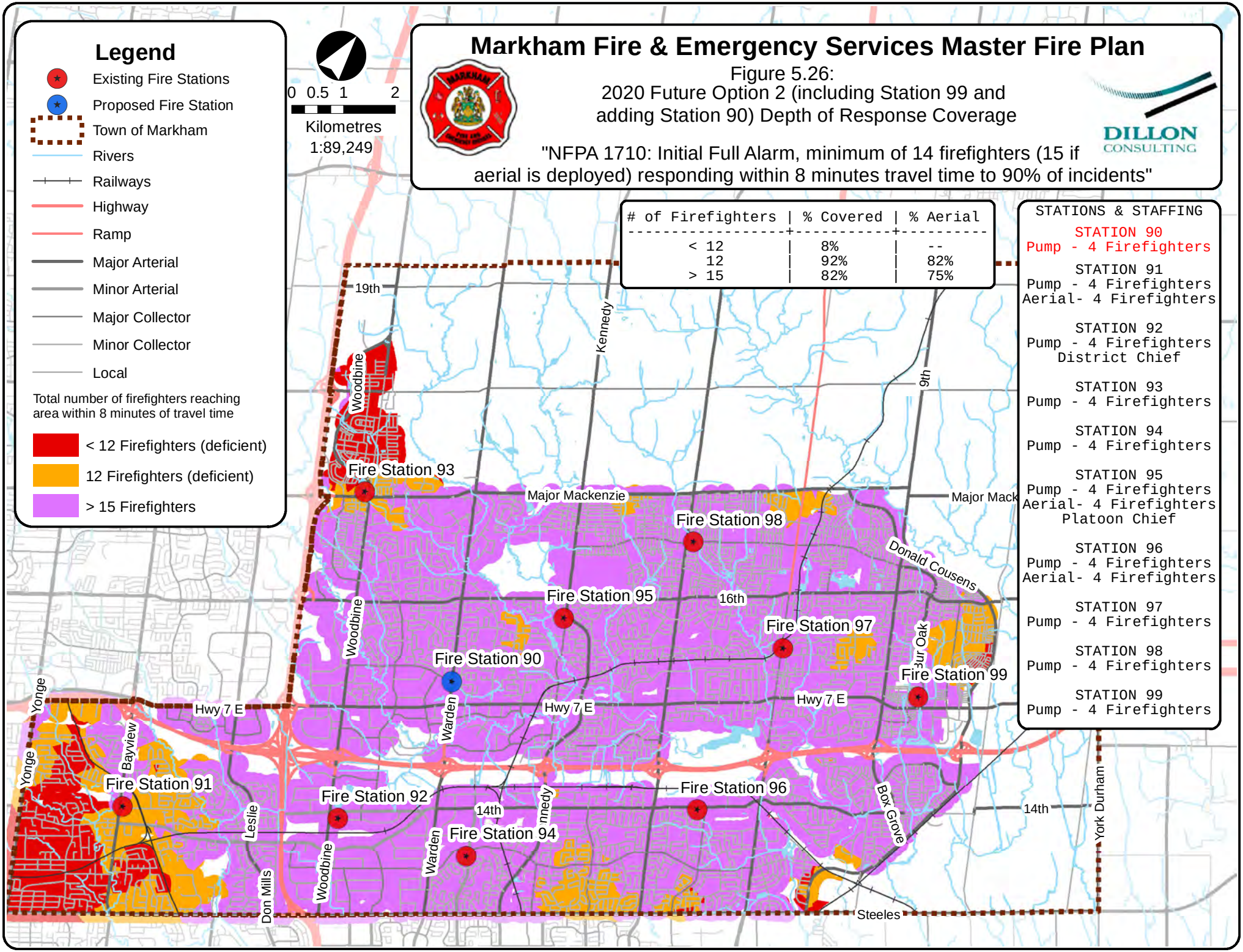
STATION 95
Pump - 4 Firefighters
Aerial- 4 Firefighters
Platoon Chief

STATION 96
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 97
Pump - 4 Firefighters

STATION 98
Pump - 4 Firefighters

STATION 99
Pump - 4 Firefighters



Option 3: 2020 Future Conditions, Add Station 99 and Station 90 and relocate aerials

This scenario reflects future 2020 development conditions with the addition of Station 99, the addition of Station 90 (a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard), and the relocation of the three aerial units and associated crews. The new stations would be staffed with four full-time firefighters and aerials would be located at Stations 90, 91 and 97.

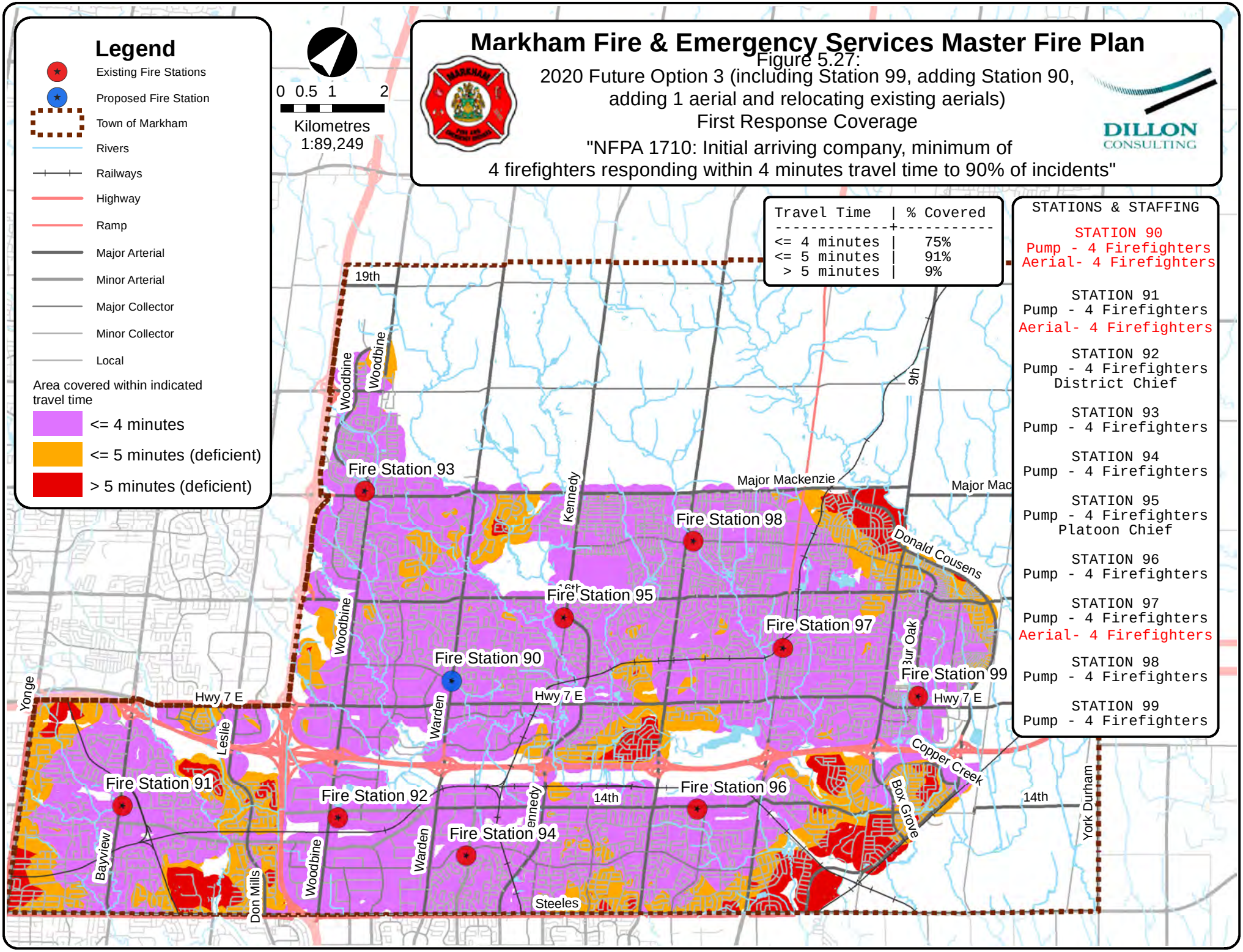
The first response analysis results in 75% coverage of the future service area. This is the same first response as the previous scenario and a 20% improvement over baseline conditions, as no new station locations were added in this scenario. The first response results are shown in ***Figure 5.27***.

For the depth of response assessment, the scenario yields 81% coverage of the future service area measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is an improvement of 38% over baseline conditions and a 17% improvement over the previous scenario. The coverage results, shown in ***Figure 5.28,*** depict a significant response improvement along the eastern boundary of the Town's urban area.

Markham Fire & Emergency Services Master Fire Plan

Figure 5.27:
2020 Future Option 3 (including Station 99, adding Station 90, adding 1 aerial and relocating existing aerials)
First Response Coverage
"NFPA 1710: Initial arriving company, minimum of 4 firefighters responding within 4 minutes travel time to 90% of incidents"

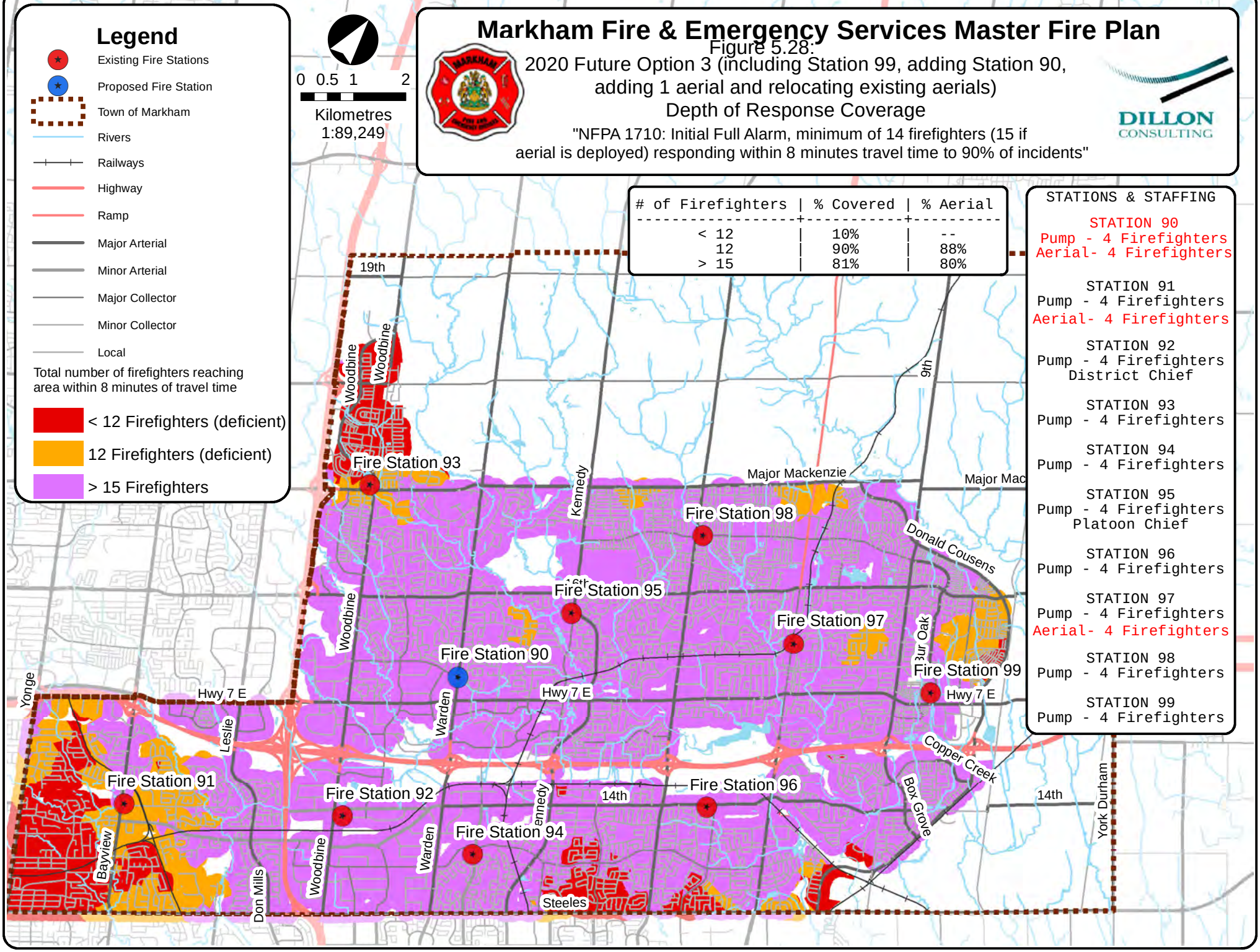
DILLON CONSULTING



Markham Fire & Emergency Services Master Fire Plan

Figure 5.28:
2020 Future Option 3 (including Station 99, adding Station 90, adding 1 aerial and relocating existing aerials)
Depth of Response Coverage
"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING



Option 4: 2020 Future Conditions, Station 99, add Station 90 and Satellite Station, and relocate aerials

This scenario reflects future 2020 development conditions with the addition of Station 99, addition of Station 90 (a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard) and the addition of a proposed satellite station at the intersection of John Street and Yonge Street. This also considers the relocation of the three aerial units, as per Option 3. The new stations would be staffed with four full-time firefighters and aerials would be located at Station 90, Station 91 and Station 97.

The decision to examine a satellite station at the intersection of John Street and Yonge Street was made to reflect future intensification development that will occur along the Yonge Street corridor. As well, John Street is a collector road that feeds into minor and major arterials. This will help improve travel time and facilitate firefighters reaching incidents in shorter travel time. This is also a central location along Yonge Street, which should help improve the response coverage to the north and south along the Yonge Street corridor.

The first response coverage result is 77% of the future service area. This is an improvement of 22% from the baseline conditions and 2% from the previous scenario. Although it is only a small improvement in geography from the previous scenario, it improves an area that is planned to be intensified (i.e. densely populated). Therefore a greater population will benefit from the improved response performance, despite the smaller geographical area coverage gain. The response coverage is shown in ***Figure 5.29.***

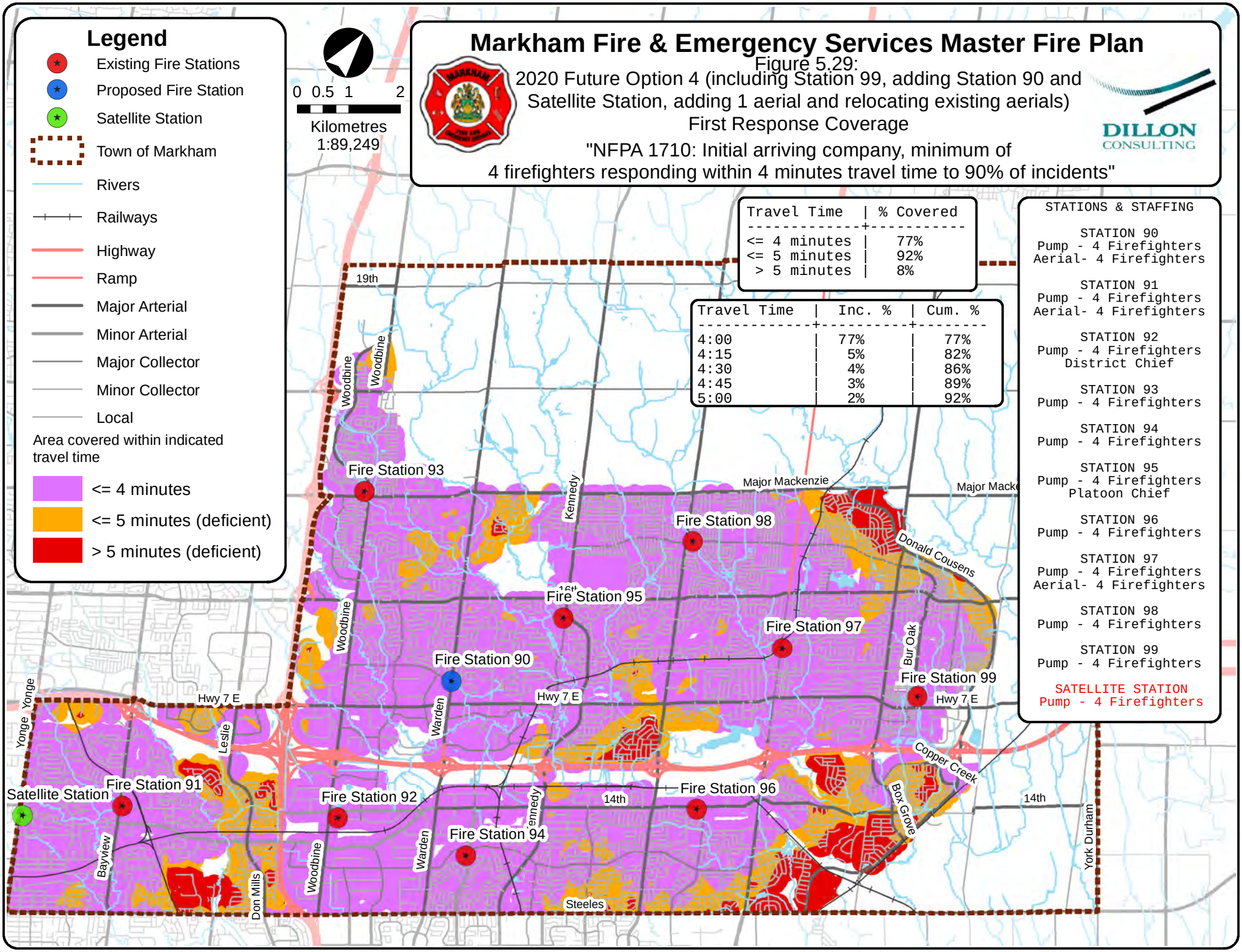
For depth of response analysis, Option 4 results in 86% coverage measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is an improvement of 43% from the baseline conditions and 5% from the previous scenario. The depth of response coverage is shown in ***Figure 5.30***. Again, this scenario adds valuable response resources to a vulnerable area planned for intensification. Highway 404 and Highway 407 act as barriers for travel to the area from the fire stations to the northeast and east. Additional responding units within this south-western pocket of the Town are essential to provide first and depth of response coverage to the heavily-developed Yonge Corridor.

The timing of this option should be coordinated with the intensification of the Yonge Street Corridor. As well, call volume data and call type data should be monitored to confirm need and timing for this option. As an interim measure MFES could consider adding crews to Station 91 to improve the depth of response to this area of the Town. Another option would be to investigate the possibility for automatic aid agreements with the Town of Richmond Hill, the neighbouring municipality to the west, to improve the service to this area.

Markham Fire & Emergency Services Master Fire Plan

Figure 5.29:
2020 Future Option 4 (including Station 99, adding Station 90 and Satellite Station, adding 1 aerial and relocating existing aerials)
First Response Coverage
"NFPA 1710: Initial arriving company, minimum of 4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING

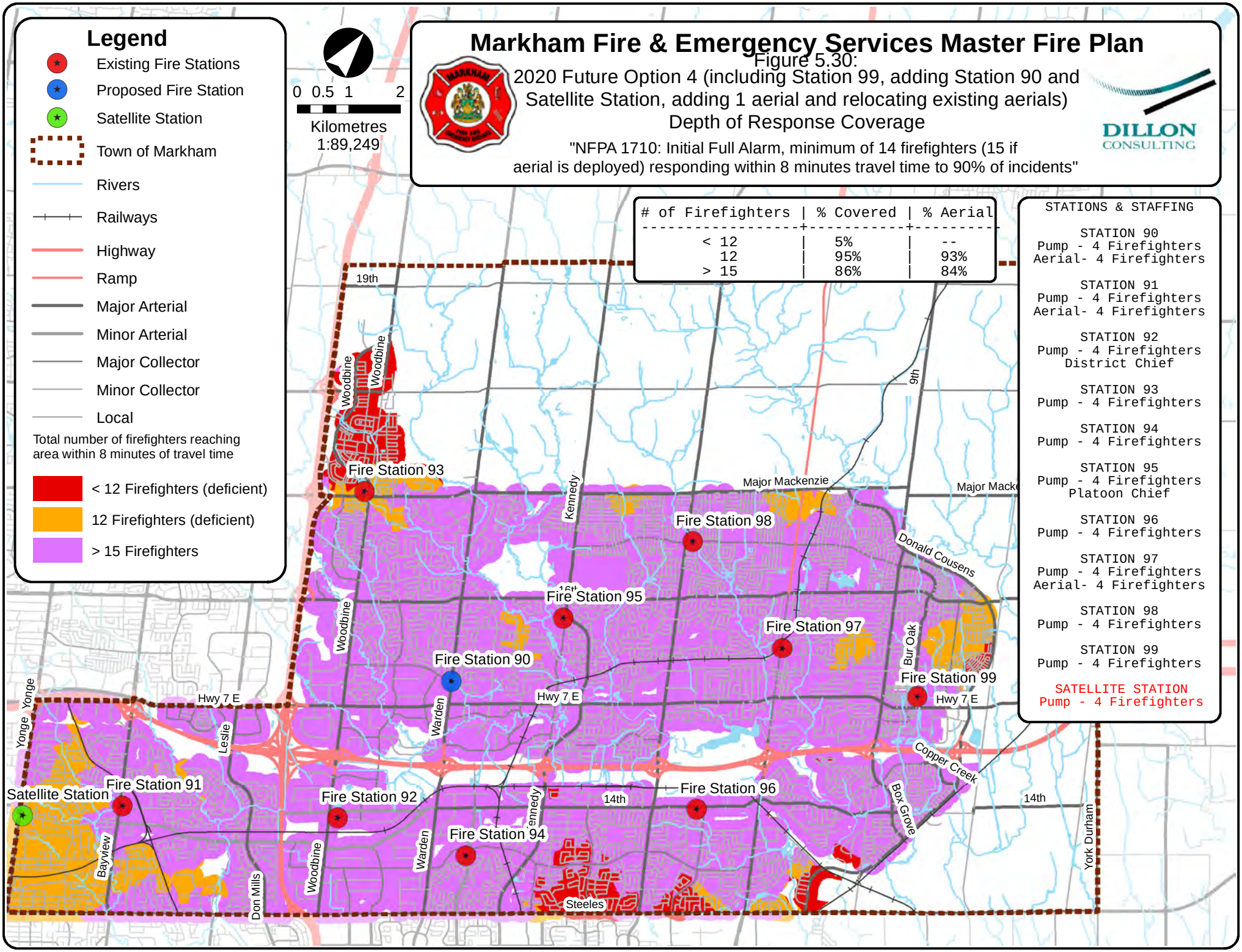


Markham Fire & Emergency Services Master Fire Plan

Figure 5.30:
2020 Future Option 4 (including Station 99, adding Station 90 and Satellite Station, adding 1 aerial and relocating existing aerials)
Depth of Response Coverage

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING



2031 Projected Growth Outside Built Boundary

This scenario reflects forecast future 2031 development conditions, and was included for high-level planning purposes. It takes into consideration the addition of new residential and employment areas planned for outside the current built boundary. The future service area has been expanded for this scenario to include these areas, located in the northwest corner of the Town. The scenario assesses all of the station and staffing assumptions from Option 4. This includes the addition of Station 99, a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard. (Station 90), a proposed Satellite Station at the intersection of John Street and Yonge Street, the addition of a third aerial and the relocation of the two existing aerials. The new stations would be staffed with four full-time firefighters and aerials would be located at Station 90, Station 91 and Station 97.

The first response coverage of this scenario is 71%. This is 6% less coverage than the 2020 future conditions and reflects a land mass that is 12% larger. This indicates that Markham's growth will likely trigger the need for additional fire service resources before 2031, in addition to the recommendations within this Master Fire Plan. If growth occurs faster than predicted, the need may present itself earlier. The first response results are shown in ***Figure 5.31***.

The depth of response coverage predicted for the 2031 condition yields coverage of 78% measuring where 15 firefighters can respond within eight minutes of travel time for the NFPA 1710 performance measure target. This is shown in ***Figure 5.32***. This is 8% lower than the previous scenario. This suggests there will be a gap in future fire suppression coverage when the 2020 growth boundary expands. This supports that fire response resources will need to be reviewed as growth occurs in the future.

Summary of Results

The summary of model results for first response and depth of response coverage, in existing and future conditions is included in ***Table 5.6***. The best coverage results for MFES are produced in Future Option 4. This scenario, based on future 2020 development conditions, included the addition of Station 99, Station 90 (a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard) and the addition of a new satellite station at the intersection of John Street and Yonge Street. As well, Option 4 considered the relocation of the three aerial units (two existing and one added in 2014).

Markham Fire & Emergency Services Master Fire Plan

Figure 5.31:
2031 Projected Growth Outside Built Boundary
Future Option 5
First Response Coverage

"NFPA 1710: Initial arriving company, minimum of
4 firefighters responding within 4 minutes travel time to 90% of incidents"

DILLON CONSULTING

Legend

- Existing Fire Stations
- Proposed Fire Station
- Satellite Station
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Area covered within indicated travel time

- <= 4 minutes
- <= 5 minutes (deficient)
- > 5 minutes (deficient)

0 0.5 1 2
Kilometres
1:89,249

Travel Time	% Covered
<= 4 minutes	71%
<= 5 minutes	87%
> 5 minutes	13%

STATIONS & STAFFING

STATION 90
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

STATION 93
Pump - 4 Firefighters

STATION 94
Pump - 4 Firefighters

STATION 95
Pump - 4 Firefighters
Platoon Chief

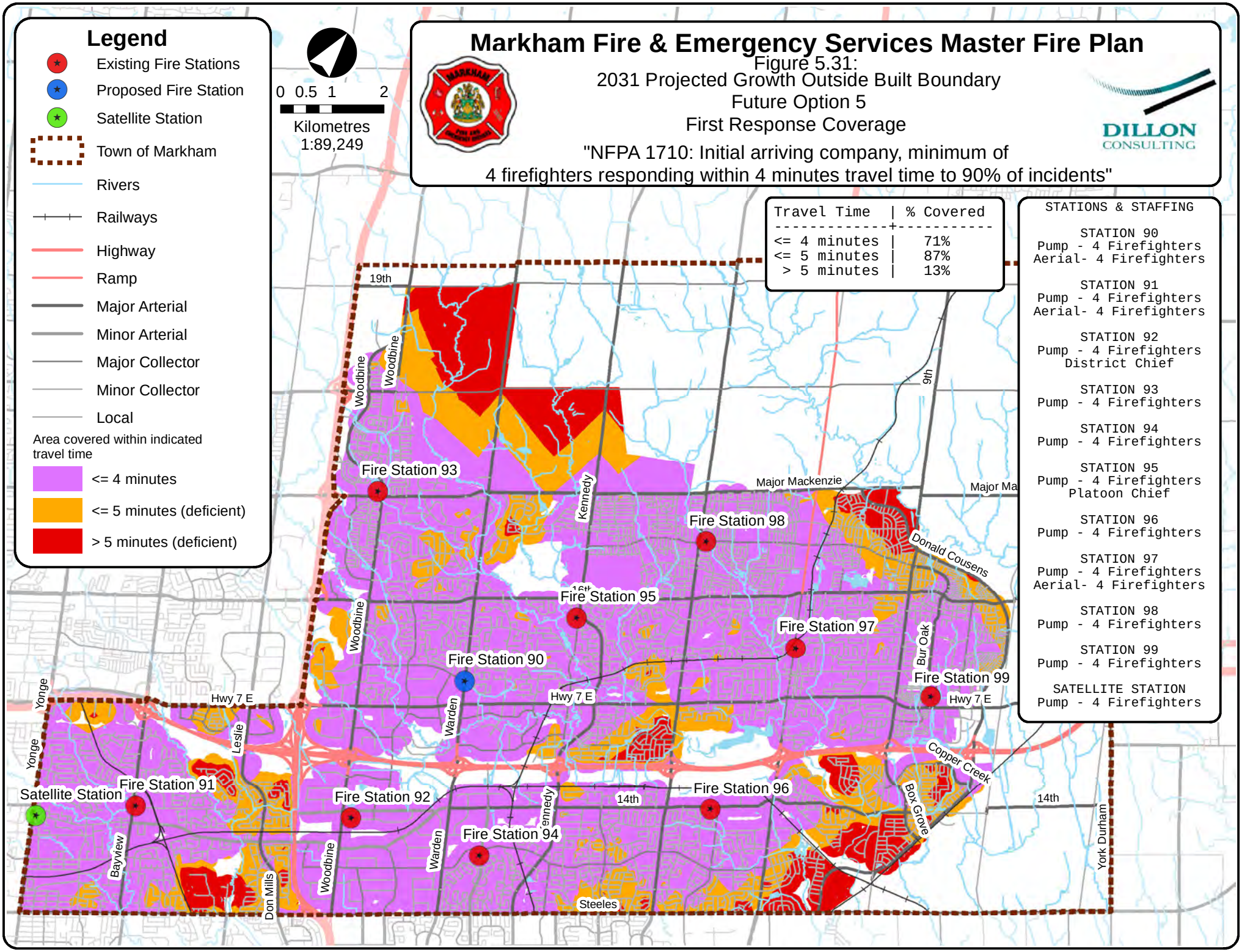
STATION 96
Pump - 4 Firefighters

STATION 97
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 98
Pump - 4 Firefighters

STATION 99
Pump - 4 Firefighters

SATELLITE STATION
Pump - 4 Firefighters



Markham Fire & Emergency Services Master Fire Plan

Figure 5.32:
2031 Projected Growth Outside Built Boundary
Future Option 5
Depth of Response

"NFPA 1710: Initial Full Alarm, minimum of 14 firefighters (15 if aerial is deployed) responding within 8 minutes travel time to 90% of incidents"

DILLON CONSULTING

Legend

- Existing Fire Stations
- Proposed Fire Station
- Satellite Station
- Town of Markham
- Rivers
- Railways
- Highway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Total number of firefighters reaching area within 8 minutes of travel time

- < 12 Firefighters (deficient)
- 12 Firefighters (deficient)
- > 15 Firefighters

0 0.5 1 2
Kilometres
1:89,249

# of Firefighters	% Covered
< 12	--
12	87%
> 15	78%

STATIONS & STAFFING

STATION 90
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 91
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 92
Pump - 4 Firefighters
District Chief

STATION 93
Pump - 4 Firefighters

STATION 94
Pump - 4 Firefighters

STATION 95
Pump - 4 Firefighters
Platoon Chief

STATION 96
Pump - 4 Firefighters

STATION 97
Pump - 4 Firefighters
Aerial- 4 Firefighters

STATION 98
Pump - 4 Firefighters

STATION 99
Pump - 4 Firefighters

SATELLITE STATION
Pump - 4 Firefighters

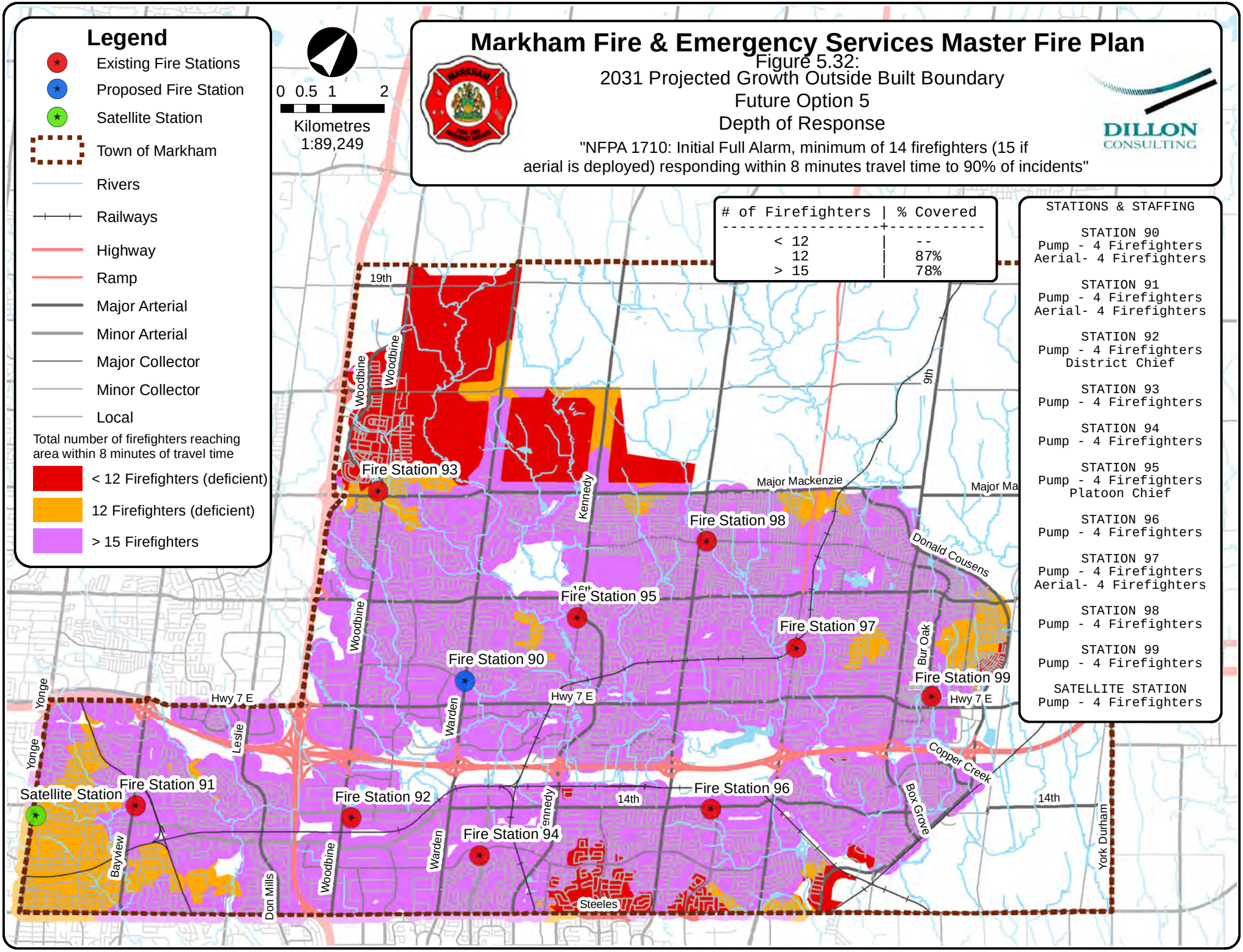


Table 5.6: Summary of Coverage Assessment Scenarios and Results

Scenario			First Response % Coverage			Depth Response % Coverage			Aerial % Coverage		
			<= 4 minutes	% Coverage Increase (over previous scenario)	<= 5 minutes	12 firefighters	15 firefighters	% Coverage Increase (over previous scenario)	12 firefighters	15 firefighters	% Coverage Increase (over previous scenario)
Figures 5.16 & 5.17	**Existing**	*Seven Station Model*	55%	-	74%	68%	43%	-	56%	39%	-
Figures 5.18 & 5.19	**Existing**	*Add Station 93*	63%	8%	83%	70%	50%	7%	56%	39%	0%
Figures 5.20 & 5.21	**2012 Existing Business as Usual**	*Add Station 99*	68%	5%	89%	87%	54%	4%	56%	39%	0%
Figures 5.22 & 5.23	**Future Option 1A Business as Usual**	*Add Station 99*	68%	0%	89%	84%	54%	0%	58%	48%	8%
Figure 5.24	**Future Option 1A Business as Usual**	*Add Third Aerial to Station 96*	68%	0%	89%	87%	69%	15%	82%	69%	21%
Figures 5.25 & 5.26	**Future Option 2**	*Station 99 and add Station 90*	75%	7%	91%	92%	82%	13%	82%	75%	6%
Figure 5.27 & 5.28	**Future Option 3**	*Station 99, add Station 90, and relocate aerials*	75%	0%	91%	90%	81%	17%	88%	80%	32%
Figures 5.29 & 5.30	**Future Option 4**	*Station 99, add Station 90 and Satellite Station, and relocate aerials*	77%	2%	92%	95%	86%	5%	93%	84%	5%
Figure 5.31 & 5.32	**Future Option 5**	*2031 Projected Growth Outside Built Boundary*	71%	-6%	87%	87%	78%	-8%	-	-	-

5.7 Summary and Recommendations

Fire suppression is the "third line of defence" within an overall community fire safety plan. Effective and efficient fire suppression capability is a critical component in ultimately protecting life safety and reducing property loss as a result of fire within a community.

The Town of Markham and the MFES have established an effective and efficient Division of Fire Suppression. With the support of Council, the MFES has identified NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations"* as the "target" for emergency response performance.

With regard to the depth of resources, as identified within NFPA 1710, it is also important to consider the community risk profile in assessing the appropriate level of resources required. NFPA 1710 was developed in response to a very basic fire in a single family dwelling. The building stock profile of the Town of Markham confirms that there is a large component of the community that will require resources beyond those for typical single family dwelling fires to be deployed to achieve an appropriate depth of response, based on life safety and fire risk.

Our assessment revealed trends for property loss (as a result of fire), and emergency response call volume that have remained relatively constant through an era of significant community growth. These are both strong indicators of the commitments that the Town of Markham and the MFES have made to public education and fire prevention activities as the "first line of defence" in an effective community fire safety plan.

The historical call data analysis of the components of dispatch time, turnout time and travel time indicate that the MFES is below the 90th percentile for performance targets regarding dispatch time, turnout time, first response travel time and depth of response time / staffing combined. These response times and the procedures related to them should be reviewed in order to identify efficiencies which could be implemented to improve the times of these emergency response components and reduce overall emergency response times.

5.7.1 Recommendations

The following recommendations relate to MFES' Division of Fire Suppression:

- As a "performance target" NFPA 1710 is an appropriate performance measure for the Town of Markham and the MFES. Consideration should be given to utilizing this performance measurement tool for the ongoing assessment of the level of emergency response services to be provided by the MFES.
- Planning projections indicate that the Town of Markham will continue to experience increased growth. Consideration should be given to developing strategies to match the number of personnel responding to incidents based on type and risk while responding to growth, an aging population and an aging building infrastructure profile.
- Existing residential occupancies in the community include townhouse, stacked townhouse, medium and high-density condominiums, and high-rise structures. These types of occupancies all have increased fire and life safety risks. Consideration should be given to the deployment of additional emergency response staff within the initial response to match the required depth of response resources based on the results of the community risk profile.

- Consideration should be given to the provision of separate storage rooms for firefighters bunker gear that includes a separate ventilation system.
- Consideration should be given to the provision of additional general storage in all MFES stations where possible, and when renovations and/or new construction are considered.
- To work toward the depth of resource targets continue with a plan to place a third ladder truck into service at Station 96 by 2014, along with the associated full time staff complement, consistent with the background study.
- Consideration should be given to the addition of a 10th fire station to be located in the vicinity of the intersection of Warden Avenue and Highway 7. This station should be staffed with an additional front run apparatus and associated full-time staff complement. This station is identified in the background study for 2017.
- Consideration should be given to the addition of an 11th "satellite" fire station[3] to be located on the Yonge Street corridor. The timing for this station should be consistent with the intensification along Yonge Street and the Langstaff development. Call volume and type should be monitored to determine the timing for this station. As an interim measure, consideration should be given to additional, staffed, responding units at existing Station 91 and / or automatic aid agreements with the Town of Richmond Hill. It is anticipated that this would be undertaken within a five to ten year horizon. The satellite station should be staffed with an additional engine company and associated full-time staff complement.
- With the addition of the stations, apparatus and staff listed above, consideration should be given to the reassignments of ladder trucks so that:
    - Ladder 966 (placed in service in 2014 at Station 96) moves to Station 97 once Station 90 is in operation (e.g. 2017);
    - Ladder 916 continues to be deployed from Station 91;
    - Ladder 956 moves from Station 95 to Station 90; and
    - Any new ladders should be designed based on similar specifications to Ladders 916 and 956 to benefit from standardized apparatus.

[3] Satellite Fire Station: In comparison to the typical fire station design, construction and amenities of other existing fire stations within the Town of Markham, a satellite fire station would contain the same types of amenities to accommodate a complement of firefighters required to staff a front run apparatus. However, from a physical facility perspective a satellite fire station could be included within an existing or planned commercial/residential or industrial complex. Opportunities for partnership with the private sector and/or other agencies would be beneficial to this type of facility. The most critical factor should be location.

6.0 DIVISION OF TRAINING

The Town of Markham Fire and Emergency Services (MFES), Division of Training, consists of a Chief Training Officer and four Training Officers. The division's primary responsibilities are to research, develop, deliver and coordinate training programs. A major target of these training programs is the Division of Suppression. However, the Division of Training is responsible for ensuring that all MFES personnel receive the training necessary to meet the legislative requirements of the Ontario Fire Prevention and Protection Act (FPPA) and the Occupational Health and Safety Act of Ontario (OHSA).

The Chief Training Officer reports directly to one of the Deputy Fire Chiefs. The Chief Training Officer and four Training Officers are assigned offices at the MFES headquarters facility located at 8100 Warden Avenue. The Division of Training is currently utilizing a decommissioned fire station located at 438 John Street and the adjacent municipal property as an interim training centre.

In addition to the staff assigned to the division, MFES also utilizes fire suppression staff assigned as "temporary /on-shift instructors" to facilitate platoon instruction. This is particularly useful for programs requiring large-scale and ongoing re-certification training, such as emergency medical responder, ice/water rescue and travel restraint training. This strategy is also applied for training on MFES computer programs. Division of Training staff provide the on-shift instructors with program support, direction, coordination, consistency, and quality assurance.

The combined use of full-time Training Officers, temporary / on-shift instructors, and a "train-the-trainer" practice for the delivery of training programs is providing MFES with an effective internal service delivery model. This approach provides a broad scope of skills and experience to ensure the MFES is achieving its training goals and objectives.

The Division of Training is responsible for carrying out the following duties, as listed within the Establishing and Regulating By-law:

- *"Establish a Department of Training program, complete with written records and conduct training for all personnel of the Department in fire administration, fire prevention, firefighting, and communications,*
- *Administer training programs in stations,*
- *Prepare and conduct promotional exams of members as required,*
- *Prepare an annual report and budget of the Division of Training to be submitted to the Division of Administration."*

The Division of Training oversees three main categories of training:

- Education Programs;
- Certification requirements; and
- In-house training programs.

The primary training activities within these main categories include:

- Recruit training;
- Annual live fire exercises;
- Airport rescue firefighting;
- Automobile extrication;
- Water/ice rescue operations (on shift instructors utilized);
- Medical training (Emergency Medical Responder) (on shift instructors utilized);
- Trench rescue (awareness level);
- Confined space (awareness level)
- Travel restraint (on shift instructors utilized);
- Adult education practices;
- Hazardous materials (currently awareness level);
- Driver training program;
- New apparatus and equipment training;
- Policies and procedures development;
- High rise firefighting;
- Promotional processes (reclassification and Company Officer);
- Emergency management;
- Firefighter rescue and survival;
- Self Contained Breathing Apparatus;
- Lock-out \ Lag-out; and
- Computer training (on shift instructors utilized).

6.1 Training Officers

MFES currently has four Training Officers who report directly to the Chief Training Officer. The Training Officers work a typical 8-hour day Monday through Friday. In addition to their skills and experience in providing basic firefighting training in an adult learning environment, each of the MFES Training Officers is also required to attain further certification and qualifications to provide training in one or more specific technical training area, such as hazardous materials response, ice/water training or driver training.

The Training Officers play a critical role in the overall research, development and delivery of training within the MFES. As coordinators for each Division of Suppression platoon, the Training Officers are required to work collaboratively with the Chief Training Officer, Platoon Chiefs and temporary / on-shift training instructors to ensure the annual training plan is implemented effectively and efficiently.

There have been a number of changes in personnel within the Training Officer positions over the past few years. Staff turn-over is a difficult issue for any organization. In a relatively small division, such as the MFES Division of Training, this can be a very challenging. It can even impact the development of the core technical competencies required to achieve the divisional goals and objectives.

The current workload of the Training Officers appears to be reaching capacity. The current staff is managing the strategic priorities of the division, however, major activities (e.g. firefighter recruitment is becoming a significant annual activity) will further impact the effectiveness of current resources. Ongoing consideration of the strategic priorities of the division is required to ensure staffing resources are appropriate to maintain the current level of efficiency and effectiveness. This will be particularly relevant as the MFES expands to meet municipal growth and increased needs.

6.2 Annual Training Plan

The Chief Training Officer is responsible for the development and implementation of the MFES Annual Training Plan. Training programs for firefighters are developed using the relevant National Fire Protection Association Standards (NFPA), manuals provided by the International Fire Service Training Association (IFSTA) and medical training standards provided by the Emergency Medical Responders Standards.

In partnership with the Ontario Association of Fire Chiefs, the Office of the Fire Marshal, Ontario (OFM) has also developed training standards for firefighters and Company Officers. These standards have been developed using many of the same standards, guidelines, and best practices as those currently used by the MFES.

As a large urban fire and emergency service, with a complement of full-time Training Officers, the MFES has chosen to develop a training program geared more specifically to the MFES requirements. This is not a unique strategy in Ontario. Many municipalities have chosen this same path. The OFM recognises this and has developed a process for municipal fire departments to apply for “equivalency” of their internal training program with that of the OFM. Our review indicates that the MFES has applied for this equivalency in the past, but has yet to be provided with a decision from the OFM.

Attaining recognition of equivalency from the OFM for the current MFES training program would provide further third party validation from the organization recognised as having overall legislated responsibility for monitoring the delivery of fire protection in Ontario. Consideration should be given to pursuing and attaining recognition of equivalency from the OFM.

In order to deliver any training program within the MFES the trainer must first attain certification and qualifications. The MFES training certification process uses a combination of third party training services and the Ontario Fire College for this activity.

The Training Plan is developed on an annual basis and provides quarterly training objectives to be achieved. The Training Officer assigned to each of the four platoons coordinates delivery of the training programs. The Training Officers are assisted by the temporary / on-shift instructors and the Company Officer responsible for each crew in the platoon to deliver the required training.

Quarterly training objectives include those activities required to maintain an ongoing level of skills in basic firefighting and to sustain the level of familiarization with tools, equipment and procedures used by the MFES. The Division of Training, in consultation with the Deputy Fire Chiefs and Platoon Chiefs, develop the annual and quarterly training objectives. Subjects are drawn from annual certification requirements, incident performance results, staff input and new equipment / procedures.

The temporary / on-shift instructors provide significant support in facilitating the delivery of the MFES Annual Training Plan. Standard Operating Procedure-015 defines the roles and responsibilities of the Chief Training Officer, Training Officer, Platoon Chief and the temporary / on-shift instructors as follows:

Chief Training Officer

The Chief Training Officer is primarily responsible for administering the temporary / on-shift instructor program. Specific duties include:

- Overall responsibility for all training issues including, but not limited to: program content, facilities and training equipment requirements and forecast needs, documentation, personal competencies, etc.
- Delegating to a Training Officer to coordinate programs delivered by the temporary / on-shift instructors.
- Leading the team in the interview stage of the selection process and notifying the successful candidates as outlined.
- Scheduling and/or arranging for the delivery of orientation sessions for all new temporary / on-shift instructors.
- Developing time line and training project schedule for delivery and notifying the appropriate departmental staff for each training program.
- Resolving scheduling conflicts with the Platoon Chiefs and adjusting project schedules as necessary to ensure each program is completed within the established time line.

- Meeting with the Platoon Chiefs and temporary / on-shift instructors to schedule temporary/ on-shift instructors to attend training courses, when scheduled for normal hours of work.

- Monitoring budget including validation of temporary/ on-shift instructors payment

- Compiling information and produce final reports summarizing participant evaluations as well as providing any recommendations for improving or altering the program.

Training Officer

One Training Officer is assigned to each platoon. He / she acts as the training program co-ordinators and are responsible to:

- Assist and coach temporary/ on-shift instructors in creating lesson plans, reference materials, instructional aids and documentation forms and monitor to ensure standardized program delivery.

- Provide the Chief Training Officer with objectives and recommended project schedules for each training program and forecast future training needs.

- Schedule and facilitate meetings with the temporary/ on-shift instructors and communicate their concerns to the Chief Training Officer.

- Ensure documentation is completed and forwarded to the Chief Training Officer, including logging of hours of temporary / on-shift instructors related to administration, research, program development and delivery.

- Periodically review the maintenance training program put into place to keep specific skills and knowledge up to date within each program delivered by a temporary / on-shift instructor.

- Assist, where necessary, in a team teaching environment with temporary/ on-shift instructors to maintain their own "direct delivery" training skills (e.g. as follow-up training or where necessary to complete training programs that temporary / on-shift instructors were not able to complete).

Platoon Chief

The Platoon Chiefs' responsibilities include:

- Assist the temporary / on-shift instructors with schedule coordination to keep within the established project schedule.

- Ensure that a reasonable number of personnel are prepared and ready to participate prior to attending each training session and to complete the program without creating a reduction in service to the public (e.g. due to out-of-service requirements).

- Address concerns and coordinate any re-scheduling with the Chief Training Officer.

Temporary / On-shift Instructor

The temporary / on-shift instructors' responsibilities include:

- Assist with the research and development of a particular program as directed by the Division of Training.
- Complete teaching plans, program delivery, personnel evaluation and documentation within the allotted time period.
- Meet with the Platoon Chief and immediate supervisor regarding scheduling and in the event of any conflicts, report such to their Training Officer Coordinator.
- Identify program and personnel competency concerns to the designated Training Officer which then will be forwarded to the Chief Training Officer.
- Attend training sessions and meetings scheduled by the Division of Training.
- Maintain personal competencies at a high level by performing in a professional manner to the best of capabilities.

6.3 Company Officer Training

In addition to the competencies required for firefighting, candidates for the position of Company Officer (Captain) and current Company Officers require further supervisory, administrative and managerial skills. Attaining and maintaining these additional competencies is critical to the success of Company Officers.

The MFES currently provides a three-phase process for candidates eligible for promotion to Company Officer. 'Phase I' includes a one-week program, defined in Standard Operating Procedure-021. Upon successful completion of 'Phase I' and upon placement on the "Acting Captain" reserve list, candidates for promotion are required to attend 'Phase II' of the Company Officer Training Program. This involves participating in the mentoring phase of the training program.

Components of the 'Company Officer (Captain) Training Program' include:

- Role of the Company Officer
- Harassment in the workplace
- Supervisors responsibilities – OH&S Act
- Fire Investigations
- Adult Learning
- The GEAC System/Reports
- Note Taking / GEAC staffing

- Incident command / functions action plan – sectoring – strategy
- Command simulator practical scenarios

Within the mentoring phase of the Company Officer Training Program and throughout the promotional process, prospective Company Officers are provided a safe environment to test new skills before being promoted officially.

6.4 Technical Training Program

In addition to basic firefighting and Company Officer Training, the Division of Training also provides training within other competencies, referred to within the fire industry as "technical training programs". These include training programs for firefighters to be competent and certified to respond to incidents such as hazardous materials incidents, ice/water rescues and rope/high-angle rescues. Within the Town of Markham technical training is also provided for response to incidents at the Toronto Buttonville Airport.

The MFES uses external agencies, such as the Ontario Fire College and private sector providers, to train and certify personnel using the "train-the-trainer" model to deliver this technical training program to MFES firefighters.

The MFES currently provides technical training for the following types of incidents and responses:

Airport Rescue / Suppression Training

MFES currently trains the fire suppression staff assigned to the three fire stations located closest to the Toronto Buttonville Airport to the appropriate NFPA standard for airport firefighting. All remaining of fire suppression staff are trained to the "functional level" of this NFPA standard.

Ice/water Rescue

MFES currently trains all fire suppression staff, and provides equipment on all front run emergency response apparatus, to complete shore-based ice/water rescue. MFES also has two inflatable watercrafts to perform water rescues.

Hazardous Materials Response

MFES currently trains all fire suppression staff to the NFPA "awareness level" for hazardous materials response. Planning is currently underway to increase the level of training in this area and to purchase the equipment required for providing the increased level of response. In a similar strategy to that used with airport training, the MFES will only be training a limited number of staff to this higher level and assigning these staff and the required equipment to a limited number of stations.

As an example of the types of hazardous material incidents that the MFES has responded to, illegal drug laboratories are considered one of the highest risks in this area. Unfortunately these laboratories are being found in a wide variety of structures, including residential housing.

Trench Rescue

MFES currently provides training and services to an "awareness level" for trench rescue. The historic call volumes for these services, approximately three calls over the last 10 or more years, would not appear to warrant increased levels of training in this area.

Rope / High-angel Rescue

MFES currently provides training and services to an "awareness level" for rope/high-angle rescue. MFES has also identified rope / high-angle rescue as a future initiative to develop.

6.4.1 Future Strategies for Technical Training Programs

Technical training requires a significant commitment of time as well as funding for the required equipment. In addition to the high levels of training that are necessary to achieve the initial certification requirements in these areas, the ongoing, and usually annual, re-certification requirements can be a challenge to sustaining high levels of competency.

This is a challenge for many municipalities, including the Town of Markham. Although the potential for these types of incidents to occur is minimal, the risks associated with ensuring staff are trained and qualified to respond are very high. In many cases a legislated level of training is prescribed by OHSA to initiate actions at the specialty emergency response scenes.

In light of the high risks involved with specialized emergency responses that require technical training, consideration should be given to including the Town of Markham Council in the decision-making process. Council should help to determine the level of service delivery that MFES will ultimately provide to wide range of incident types (e.g. hazardous material calls, ice/water rescue, confined space rescue, etc.). The FPPA is very clear in its definition that it is the municipality's responsibility to determine its needs and circumstances and set an appropriate level of service delivery.

As the MFES continues to assess the level of training and emergency response that will be provided in these areas, consideration should be given to opportunities for partnerships and/or strategic alliances with other adjacent municipalities, agencies or groups. This could include sharing of equipment or automatic aid agreements to provide first response or additional support. One strategy could include coordinating which municipal fire service should achieve the highest level of certification in each of these areas, without duplication and the subsequent provision of reciprocal agreements to provide these emergency response services across municipal boundaries.

6.5 Records Management

Records management is a critical component of an effective training program and is also necessary for due diligence requirements on behalf of the municipality as the employer.

Training records are currently tracked in computerized form within the MFES GEAC system. It is the responsibility of the Company Officer to enter and maintain computer training records and files for all staff under his/her supervision. Platoon Chiefs are responsible for forwarding a training report for each crew under his/her supervision at the completion of each quarter of the Annual Training Plan to the Chief Training Officer for review.

The current records management system appears to be meeting the needs of the MFES.

6.6 Succession Planning

Succession planning has not traditionally been an area of concern or consideration within the fire service in Ontario. It requires the implementation of strategies to ensure that opportunities, encouragement and additional training are available for those staff that may be considering further advancement within an organization. Only recently have fire services and municipalities recognised the importance and priority that succession planning should have within the municipal fire service.

One current area for improvement within the MFES would be in creating an acting position to fill the role of Chief Training Officer during any absences. This is a strategy used within the Division of Suppression throughout all officer ranks (e.g., the Platoon Chief role is filled in event of absence and Captains positions are filled in the event of absence).

The MFES provides limited succession planning in terms of formal strategies or policies and procedures. In the past, MFES conducted a three-day retreat for succession planning and officer development. The temporary / on-shift instructor program could be seen as a vehicle for succession planning into the Division of Training.

Corporately the Town of Markham has developed a program called the "Markham Learn Centre." It is intended to be a central records management portal for coordinating corporate training programs. Succession planning and management development is a major priority of the Markham Learn Centre. Human Resources will support the Markham Learn Centre program to make the information accessible to the management staff within MFES who require access. Corporate resources should be provided to use and support the Markham Learn Centre program, as required.

The current records management system being used by the MFES is, as previously stated, working very well for the personnel who use it on a daily basis. The current MFES training records are available for other authorized municipal staff in the existing format.

As a strategy to enhance the level of succession planning, in particular efforts directed at officer development within the MFES, the Markham Learn Centre could be an excellent means to provide access to non-fire related education opportunities. Some examples of this would be situational leadership, human behaviour and other programs targeted at developing future managers and fire officers within the Town of Markham.

As a strategic priority of the MFES and to further develop succession planning, consideration should be given to the use the Markham Learn Centre as a resource to increase officer development directed at current and future officer candidates within the MFES.

6.7 Training Facilities

The MFES is currently utilizing a decommissioned fire station located at 438 John Street as an interim training centre. This facility provides classroom training space, required for firefighter recruit training classes, and facilities for limited hands-on training activities. This facility also houses the 'Command Simulator' designed for Company Officer Training.

MFES has been allocated a one-acre training area at Toronto Buttonville Airport, solely for use by the fire and emergency service. Airport training exercises held in this area can make use of an airport simulation system that facilitates mock-up aircraft fire evolutions for suppression training purposes.

Because the MFES does not have a training structure in which to conduct live fire training, alternate arrangements are made to provide the required training. Markham has been paying to use the live fire training facilities of other departments. In the past, MFES has made use of the Scarborough and Richmond Hill fire department training facilities and have been granted access to the Greater Toronto Airport Authority structures to facilitate live fire training.

Attending a training facility outside the Town of Markham's municipal boundary reduces the number of apparatus and crews available for emergency response. Typically, when conducting training at locations outside of the Town of Markham, two of the three attending apparatus will remain available on a delayed response. This increases the time delay for first response and depth of response capabilities of these responding units, and impacts the overall MFES emergency response resources available, during these live fire training sessions.

In comparison to the Town of Markham, the majority of full-time fire departments with a fire suppression staff complement the size of Markham Fire and Emergency Services have access to their own live fire training facility. A summary of peer comparators is included in ***Table 6.1***.

Table 6.1: Peer Comparison of Live Fire Training Facilities

Municipality	Department Type	Population (2006 Census)	Live Fire Training Facility
Toronto	Full Time	2,503,000	Yes
Ottawa	Composite	812,000	Yes
Mississauga	Full Time	668,500	Yes
Hamilton	Composite	504,500	Yes
Brampton	Composite	434,000	In progress
London	Full Time	352,000	Yes
Markham	Full Time	261,500	No
Vaughan	Composite	239,000	No
Kitchener	Full Time	204,500	Yes – Regional Facility
Burlington	Composite	164,500	Yes
Oakville	Full Time	165,500	Yes
Richmond Hill	Full Time	163,000	Yes
Thunder Bay	Full Time	109,000	Yes
Ajax	Full Time	90,000	Yes

Table 6.1: Peer Comparison of Live Fire Training Facilities			
Municipality	**Department Type**	**Population** (2006 Census)	**Live Fire Training Facility**
Oshawa Whitby Clarington Durham College (partnership)	Full Time Full Time Composite College	141,500 111,000 77,820 n/a	Yes – Shared Facility

Live fire training units provide realistic fire training simulations under safe and controlled conditions. With relatively low volumes of fire calls it is important that the MFES provides access to fire suppression staff to simulate safe and effective fire suppression operations in an appropriate training facility. As well, live fire training can provide opportunities to remain current on ever-changing technologies and techniques for fire suppression. Live fire training facilities can provide simulated heat, humidity, restricted vision and smoke conditions. It is recommended that MFES investigate its particular need for a live fire training facility. The first step would be a needs assessment to determine the potential benefits and identify any specialized / unique training aids that would best-suit fire-related MFES calls.

As MFES aims to achieve NFPA standards, it is recommended that *NFPA 1402: Building Fire Service Training Centres*, be referred to for the selection and implementation of a live fire training structure. As well for live fire training, the Training Division should reference *NFPA 1403: Standard on Live Fire Training Evolutions*. The Division does have a Standard Operating Procedure in place for conducting live fire training.

6.8 Summary and Recommendations

Under the leadership of the Chief Training Officer, MFES develops an appropriate Annual Training Plan that responds to the relevant legislative training requirements. MFES uses a range of strategies to deliver training including the use of “temporary / on-shift instructors”. This strategy appears to be working very well for the MFES.

The MFES has a well-developed records management system for all training records. Procedures and responsibilities are in place to ensure that all training records are submitted and up to date. Further consideration of strategies targeted at succession planning and officer development would assist the MFES in preparing for the future both from a perspective of staff turn-over as a result of retirements and due to growth within the municipality.

The current training centre is insufficient for the training activities that a large, full-time fire service such as MFES requires. The current strategy of using live fire training centres in other municipalities is an appropriate short-term solution, however there is a financial impact to renting these facilities, and a negative impact on the number of emergency response resources available within the Town of Markham when on-duty fire suppression staff and apparatus attend training centres outside its boundaries.

6.8.1 Recommendations

The following recommendations relate to MFES' Division of Training:

- Consideration should be given to attaining recognition of 'equivalency" from the OFM for the current MFES training program. The OFM is the organization recognised as having overall legislated responsibility for monitoring the delivery of fire protection in Ontario.

- In light of the high risk involved with the specialized emergency responses requiring technical training (i.e. hazardous materials, confined space rescue, ice/water rescue, high-angle rescue, etc.), consideration should be given to including the Town of Markham Council in the decision-making to determine level of service delivery that the Markham Fire and Emergency Service will ultimately provide for these types of incidents.

- In determining the levels of technical response to specialized calls the MFES should also consider opportunities for partnerships and/or strategic alliances with other adjacent municipalities or agencies. This could include sharing of equipment, coordinated training sessions or the implementation of automatic aid agreements to provide first response or additional support.

- Consideration should be given to establishing an acting position to fill the role of Chief Training Officer during absences, for succession planning purposes.

- Consideration should be given to the opportunity to utilize the Markham Learn Centre as a resource to increase officer development programming directed at current and future officer candidates, and succession planning activities within the MFES.

- It is recommended that MFES investigate its particular need for a live fire training facility. The first step would be a needs assessment to determine the potential benefits and identify any specialized / unique training aids that would best-suit fire-related MFES calls.

- Consideration should be given to explore internal, private and public partnerships in the research and development of a training facility also to include potential revenue generating opportunities.

- Ongoing consideration of the strategic priorities of the division is required to ensure staffing resources within the Division of Training are appropriate to maintain the current level of efficiency and effectiveness. This will be particularly relevant as the MFES expands to meet municipal growth and increased needs.

7.0 DIVISION OF APPARATUS AND EQUIPMENT

The Division of Apparatus and Equipment (also commonly referred to as the 'Mechanical' Division) is responsible for the maintenance and repair of Markham Fire and Emergency Services' (MFES') vehicles. This includes the small vehicle fleet as well as the heavy, specialty fire apparatus fleet. The division conducts routine and required maintenance. The division also conducts or coordinates annual testing and certification, such as pump and ladder testing or Periodic Mandatory Commercial Vehicle Inspections (PMCVIs) of apparatus.

The Division of Apparatus and Equipment is responsible for carrying out duties as listed in the Establishing and Regulating By-law:

- *"Assist the Chief in the preparation of specifications for the purchase of apparatus and equipment,*
- *Maintain and keep in repair all existing firefighting, rescue and salvage apparatus of the Department,*
- *Be responsible for the supervision, testing and repair of apparatus and equipment including fire hose,*
- *Be responsible for the modification of apparatus and equipment to ensure that such modifications are consistent with recognized practices referenced by the fire service of Ontario,*
- *Be responsible for keeping records of maintenance and test results of apparatus and equipment including fire hose,*
- *Prepare the annual report and budget of the Division of Apparatus and Equipment, to be submitted to the Division of Administration."*

7.1 Mechanical Staff

A Deputy Fire Chief oversees the Division of Apparatus and Equipment. The division includes two mechanical staff assigned directly to the MFES. In addition, the division receives support from the Town's Fleet Supervisor.

The current demand for mechanical repairs and servicing is impacting the capacity of the current MFES staff resources. The current depth of resources within this division has remained the same throughout two major community growth cycles, and significant growth in the number of MFES vehicles and small equipment requiring repair and service. Where possible, MFES in consultation with the Town's Fleet Supervisor uses external services for major repairs. This strategy assists in workload management, but not sufficiently enough to address the increasing demand for mechanical services.

The current MFES organizational structure has both mechanics reporting directly to one of the Deputy Fire Chiefs. The Deputy Fire Chief responsible also coordinates with the Town's Fleet Supervisor to manage the overall MFES fleet needs. This includes new purchases and maintenance requirements.

To address the current and future workload capacity of the division consideration should be given to utilizing the Ontario Youth Apprenticeship Program (OYAP). Implementing the position of apprentice mechanic within this division would provide added depth of resources, particularly in dealing with the smaller fleet repairs and equipment repairs. In addition to being a cost-effective strategy, adding an apprentice would introduce succession planning within this division.

There is evidence of a strong working relationship between the two MFES mechanics and the Town's Fleet Supervisor. This is an important factor in the efficiency that the division has been achieving, and the relationship should continue to be supported. One strategy that may add even further value to this working relationship and provide clarity to the MFES organizational reporting structure would be the identification of a "working supervisor" within the MFES Division of Apparatus and Equipment.

Revising the roles and responsibilities of the two current mechanics positions within the MFES to identify a working supervisory role would provide a number of efficiencies including a single point of contact for the Town's Fleet Supervisor in coordinating efforts, a single point of contact for the Deputy Fire Chief in assigning priorities, and clarification of overall responsibilities within the division.

7.2 Current Apparatus and Equipment

In 2002 the MFES received support from Council to implement a Fleet Standardization Plan. The plan approved a process to select a single-source supplier for MFES firefighting apparatus. The selection process resulted in Safetek Emergency Vehicles, the Canadian sales distributor for Smeal Fire Apparatus Company Incorporated, being chosen as the MFES apparatus supplier for a period of five years. This agreement has the option of extending the purchase agreement for an additional five-year period.

The benefits of the single-source purchasing agreement were assessed in 2009 with a decision by Council to implement the extension component of the agreement for a further five-year period. The single-source purchasing agreement has provided the opportunity for a major overhaul of the large apparatus fleet since 2002 to its current condition.

The standardization strategy has proven to be a very effective means for the MFES to improve the efficiency and overall effectiveness of the Division of Apparatus and Equipment. The current fleet reflects the use of high quality designs and materials while also providing fire suppression staff with standard apparatus. This facilitates firefighters' ability to move between different stations and apparatus assignments with confidence, knowing that the apparatus will operate the same way and that equipment will be stored in the same locations and configurations.

MFES has implemented similar life cycle planning and replacement strategies for all major equipment such as firefighter bunker gear, breathing apparatus and fire hose. The equipment procedures assessed meet industry best practices and seem appropriate for the services delivered by the MFES.

A Company Officer within the Division of Fire Suppression is responsible for the MFES air management program and coordination. This officer and his crew are certified to conduct testing and repairs on all MFES self-contained breathing apparatus. From a health and safety perspective the maintenance, repair and replacement of self-contained breathing apparatus should be considered one of the highest priorities of a fire and emergency service. Under the leadership of this officer, and with the support of the MFES management team, the current MFES air management program is meeting best practices in this area.

Our review indicates that the Town of Markham uses a pro-active life cycle planning and replacement program for all major corporate assets. In addition to being a prudent financial planning strategy the results provide staff across the municipality with quality workplaces and equipment that, in turn, improves the overall efficiency and effectiveness of the targeted service delivery.

The existing and planned fleet is identified and described in ***Appendix B***.

7.3 Reserve Fleet Considerations

Life cycle planning is a core component of the fleet standardization strategy. The current replacement cycle in place for MFES is approximately eight to 10 years for front run service for the large fire suppression apparatus (i.e. engines and aerials). The two year variable in replacement age is necessary to accommodate the fact the some fire vehicles can have significantly higher motor usage as a result of "pump usage" at fire scenes. The current replacement cycle includes an additional five years of service as a reserve apparatus.

The current fleet standardization strategy and life cycle plan is consistent with best practice in the fire service. There is a range of replacement cycles used by other municipalities that are shorter and longer than those adopted by the Town of Markham. It depends on a number of factors including emergency call volumes.

At present the fleet standardization and replacement plan does not include a specific strategy to develop and sustain a complement of reserve apparatus. MFES has been able to develop some reserve apparatus capacity by extending the life cycle of some apparatus. With an existing front run large apparatus complement of eight engines, two aerial ladders, one air light apparatus and one tanker apparatus, sustaining a reserve complement should be considered a priority for the MFES. Currently, the reserve capability is three engines and one aerial ladder, some of which have exceeded the target life cycle replacement age of 15 years of service (combined front run & reserve status).

Our review of the current apparatus replacement program and the corporate asset management program indicates that developing a reserve apparatus fleet program should be achievable with additional capital funding. The strategy should consider the current apparatus scheduled for replacement over the next five-year period, additional apparatus that will be required for new stations over the next 10 year period. This can be achieved through reallocation of funds within the 10-year capital budget.

The complement of large front run apparatus will continue to grow as a result of new fire stations (one is already approved and additional fire stations are recommended). The reserve fleet should, wherever possible, be consistent with the specifications of the fleet standardization plan for front run apparatus.

7.4 Antique Apparatus and Equipment

The MFES maintains a small complement of antique apparatus and equipment including a 1949 Mercury M155 / Marsh engine, 1936 Chevrolet engine, and a 1932 Rugby / Darley engine. These apparatus are in good condition and include some of the smaller equipment that would have been used in the same era as the apparatus.

Maintaining this type of equipment adds value to public education and community relations for a fire and emergency service. These units are available for community events and parades and provide a unique snapshot into the history of the MFES. Currently these apparatus are stored at Stations 96 and 97.

7.5 Maintenance Facilities

The Division of Apparatus and Equipment currently operates from the Corporate Fleet Maintenance Facility located at 555 Miller Avenue. MFES shares this facility with other Town of Markham departments responsible for vehicle repairs and maintenance.

Given the limited space at this facility the MFES has access to only one drive-through bay and some adjacent floor space for storage of equipment, supplies and a small office. This current space limitation is creating a significant challenge for completing repairs to the larger aerial ladder apparatus. The length of the bay is too short and the height of the bay is insufficient to fully extend the ladder section of this apparatus. This makes maintenance and repairs very difficult to complete in the winter months. One of the large entry doors must be opened to allow full extension of the ladder. This is not an efficient method for repairing and maintaining this type of vehicle.

Overall, the current space allocation for this division and its activities is too small and therefore inappropriate for use. Ideally, the Division of Apparatus and Equipment would be housed in a larger facility with a minimum of two bays of varying length, and sufficient height and length in a minimum of one bay to fully extend the large ladders. This size of facility would accommodate the fleet increases that are likely to occur over the coming years. In order to accurately size and scope the facility, it is recommended that MFES conduct a needs assessment study for a new facility to house the Division of Apparatus and Equipment.

7.6 Records Management

As indicated earlier records management should be considered a core function and high priority to ensure that the MFES and the Town of Markham are responding to legislated requirements, and for internal performance review.

Mechanical staff currently use a computer-based records management system. The current system should be upgraded to take advantage of additional cost-saving features. Opportunities exist to improve both the functional capabilities of mechanical staff and record-keeping if enhancements and hardware associated with the current system could be made.

Consideration should be given to conducting a detailed review of the current functional capabilities of the Division of Apparatus and Equipment. Opportunities to enhance the accessibility to other MFES and corporate programs should be considered, such as parts inventory, vehicle maintenance records, etc. The provision of laptop computers should also be considered a priority. New apparatus and small vehicles are all using computer technology for systems diagnostics and set up. The mechanics require laptop computers and associated software programs to connect directly to these vehicles. Currently they are borrowing computer resources from other Town departments for this purpose.

In addition to improving capabilities for analysis and set-up, laptop computers and associated software programs would provide additional records management efficiencies for the MFES, as mechanical staff could directly input and have access to records and data into the MFES RMS.

7.7 Summary and Recommendations

The Town of Markham has adopted a proactive life cycle planning and asset management system. In addition to being a good financial planning tool this system is providing an effective process for the management and replacement of all major corporate assets, including those within the MFES.

The MFES Fleet Standardization Plan approved by Council in 2002 is also proving to be a valuable strategy towards maintaining an effective, modern fleet of fire apparatus. As the MFES continues to grow a strategy should be considered for sustaining reserve apparatus within the MFES Fleet Standardization Plan.

Further consideration of the organizational structure and supervisory requirements of this division should be made. Ideally, this would be done in tandem with a review of current staff workload and the potential of adding a position of "apprentice mechanic" to the division. Assessing the current staff resource needs, in addition to planned growth within the MFES, and opportunities to enhance the efficiency of the division through increased use of technology (e.g. laptop computers and diagnostic software), should provide an effective strategy in managing the needs of this division into the future.

7.7.1 Recommendations:

The following recommendations relate to MFES' Division of Apparatus and Equipment:

- Consideration should be given to conducting a review of the organizational reporting structure, supervisor requirements and workload of this division. Options should be considered to implement a "mechanic supervisor" position and create an "apprentice mechanic" position utilizing the benefits of the Ontario Youth Apprenticeship Program.

- The reserve fleet should, wherever possible, be consistent with the specifications of the fleet standardization plan for front run apparatus.

- Identifying options for providing a larger apparatus repair and maintenance facility should be considered a priority for the MFES. The facility should include a minimum of two bays of varying length and sufficient length and/or height in a minimum of one bay to fully extend the large ladders. It is recommended that MFES conduct a needs assessment study for a new facility to house the Division of Apparatus and Equipment.

- Consideration should be given to conducting a detailed review of the current functional capabilities of the Division of Apparatus and Equipment. Opportunities to enhance the accessibility to other MFES and corporate software programs, such as parts inventory, vehicle maintenance records, etc., should be considered. The provision of laptop computers should also be considered a priority when assessing equipment and technology needs.

8.0 DIVISION OF COMMUNICATIONS

Reporting directly to one of the Deputy Fire Chiefs, the Dispatch Supervisor is responsible for the administration and operation of the MFES Communications Centre The latter is housed within Fire Station 95, located on Main Street in Unionville. The Communications Centre includes a dispatch alarm room and a communications equipment room.

Planning is currently underway within the MFES to relocate the Communications Centre to the Markham Fire and Emergency Services (MFES) facility at 8100 Warden Avenue. Our review of the current operations and space at the existing Unionville location supports revealed that additional physical space is required to accommodate the current needs and future plans for this division.

The Division of Communications has a set of core responsibilities, listed within the Establishing and Regulating By-law, as follows:

- "*Answering and dispatching the appropriate agency to an emergency incident,*
- *Maintaining the communications systems of the Department,*
- *Preparing specifications for new communication systems and for the addition to existing communications systems,*
- *Maintaining and updating emergency contact records of all premises where practical in the Town,*
- *Preparing the annual report and budget of the Division of Communications to be submitted to the Division of Administration.*"

8.1 Emergency Communications and Dispatching

The primary function of the Communications Centre is to:

- receive calls from the public and other agencies, typically through the 911 call system,
- determine the nature of the emergency, and
- dispatch the appropriate emergency response apparatus and staff as defined by predetermined protocols.

A GEAC (now EnRoute Emergency Systems) computer aided dispatching (CAD) system is used by MFES for automated dispatching of fire suppression apparatus in response to emergency calls. The GEAC CAD system was originally installed in 1989 and allows Alarm Room Operators to record information, determine the ability of fire suppression apparatus to respond, and initiate a dispatch.

The CAD system is text-based with menus requiring interface through a keyboard. It does not have any mouse controls or advanced graphical user interface (GUI). Two IBM workstations are installed in the dispatch alarm room each have multiple monitors to provide Alarm Room Operators with a view of the GEAC/ EnRoute application screens and maps. A recent upgrade to the GEAC/ EnRoute system also provides Automatic Vehicle Location (AVL) functionality which tracks vehicle position for all of Markham's fire suppression apparatus and displays apparatus locations on the map. This feature assists Alarm Room Operators in verifying apparatus locations when responding to calls.

Nice (formerly Thales/Racal) call recording software is used by staff on workstations in the alarm room. This software records all calls received by dispatch staff and stores digital audio files on the call recorder for retrieval and playback at a later date. A stand-alone Thales/Racal call recording server is located in the equipment room, with inputs from the various voice lines which are recorded. This type of call recording system is suited for small to medium commercial call centre operations with less than 32 channels/telephone lines. Therefore this meets MFES' current needs. The call recorder stores audio files on two rewriteable DVD RAM drives. This provides adequate storage for Markham's needs; however, the current call recorder does not provide connectivity from other locations. This means that senior staff are not able to access audio files remotely, when required.

The telecommunications and IT equipment room is located in the lower level of Station 95 and houses the technology infrastructure for the station. For the GEAC system this includes two rack-mounted IBM servers located in the equipment room; one for the GEAC dispatch and RMS applications and one for the GEAC mobile application (AVL). These servers are installed in a small cabinet. A USB memory stick is utilized for nightly data backup from the servers, however no application redundancy is built into the system.

Dedicated uninterruptible power supplies (UPS) provide power to the servers as well as the equipment in the alarm room. In the event of an extended power outage the UPS will bridge the gap during the initial outage to allow for the station's 20 KVA[4] natural gas generator to start and maintain power. A second 15 KVA[1] generator supplies power to rest of the station. The generator and UPS are scheduled to be upgraded when the Communications Centre is relocated to 8100 Warden Avenue.

In addition to the Communications Centre, all other fire stations are equipped with a GEAC/ EnRoute workstation and printer which links to the main GEAC system server located in Station 95. These workstations will automatically print out incident information through a dot matrix printer at each fire station.

All fire stations use a 1 Mbps[5] leased telecommunications service from Bell for inter-office local area network (LAN) communications. The 8100 Warden office has a 1 Gbps[6] fibre optic leased line service from Atrium for connectivity to the Town of Markham head offices. It was noted that there were initial plans to upgrade all stations to the 1 Gbps service to provide additional bandwidth.

[4] kVA refers to Kilovolt-Ampere, a unit of apparent power

[5] Mbps refers to **megabit per second**, a unit of data transfer rate equal to 1,000,000 bits per second

[6] Gbps refers to **gigabit per second**, a unit of data transfer rate equal to 1,000,000,000 bits per second

8.1.1 Redundancy – Disaster Recovery

In terms of disaster recovery for the dispatch and alarm room, two main options exist for continuing to provide dispatch services. Two communications workstations are located at Station 98, which have access to the GEAC CAD system and can be used to continue CAD operations. This assumes that the GEAC servers installed at Station 95 would still be accessible via the Bell telecommunication link. In this case voice and radio calls would not be recorded from Station 98 and station alerting/paging would also not be available due to the absence of equipment at this station. Adding redundant equipment to Station 98 to allow for call recording and station paging would make this option more consistent with a complete back-up dispatch facility. The second option for disaster recovery is to redirect 911 calls from Station 95 to Richmond Hill Fire Communications, who have the ability to dispatch MFES' apparatus from their location.

8.1.2 Technical Support and Maintenance

EnRoute Emergency Systems (EnRoute) provides technical support for MFES CAD software 24 hours per day, seven days per week. In addition, they provide on-going annual maintenance to MFES software installations. MFES also has a contract for technical hardware support from IBM. .

Two members of the Division of Communications staff are trained to perform limited maintenance work. Technical support and maintenance support is also provided to MFES through the Town of Markham's Information Technology Services Department, during regular business hours (Monday to Friday, 8:30 AM to 4:30 PM).

All MFES fire suppression apparatus, including the command vehicles, are equipped with Mobile Data Terminals (MDT's) and touch screen monitors. These provide a map display to assist fire and emergency services staff with location information. Along with the MDT, each apparatus has a GPS modem installed which is configured with GEAC/ EnRoute Mobile AVL software.

For data communications back to central systems, the AVL system uses leased telecommunications services from Telus on a 1X[7] wireless data network. The Telus connection provides adequate bandwidth for transmitting location information of the vehicles. The Telus wireless links also use NetMotion virtual private network (VPN) technology, which provides a private, segregated network for the Markham Fire and Emergency Services' Apparatus within Telus' 1X system. No other features are configured on the onboard equipment such as navigation and reporting capabilities. MFES fire suppression apparatus are also equipped with an Opticom traffic signal priority system which consists of an optical emitter installed on-board the vehicle to provide pre-emption at traffic signals when responding to calls.

[7] 1X refers to single carrier (1x) radio transmission technology, a 3G wireless technology based on the Code Division Multiple Access (CDMA) platform

8.2 Radio Technology

For data management and reporting, MFES has developed and customized its own records management system (RMS) using GEAC software along with Microsoft Access databases and Visual Basic scripts. The technical fire administrative coordinator, who manages the RMS functions and reporting, completed this custom program development. The GEAC EnRoute system stores performance metrics such as response times and incident records. Several custom scripts developed in-house extract data from the databases and allow various types of reports to be generated.

8.3 Information Technology

8.3.1 Records Management System

For data management and reporting, MFES has developed and customized its own records management system (RMS) using GEAC software along with Microsoft Access databases and visual basic scripts. The Technical Fire Administrative Coordinator, who manages the RMS functions and reporting, completed this custom program development. The GEAC EnRoute system stores performance metrics such as response times and incident records. Several custom scripts developed in-house extract data from the databases and allow various types of reports to be generated.

The features of the GEAC system are used for records management and include scheduling of staff and fire reporting. The GEAC RMS system is divided into two areas; RMS for staffing, scheduling, and RMS for Division of Communications (performance tracking, response times, etc). In addition to the GEAC system, customized Microsoft Access databases with scripts are used for work orders, training time records, master staff database, and vehicle inventory. The Microsoft Access databases are stored on the Town's Q-drive which is installed on a server at the Town of Markham main offices. The Q-drive server is standalone with no application redundancy, however, it does have daily data backup onto a tape drive system which will prevent significant data loss in the event of a server failure.

As described in the previous section, the GEAC GUI is text-based and very basic. For reporting purposes, data is extracted, and then imported into a database to manipulate and present it for reporting. Custom scripts have been developed to facilitate this import process. As an example, for payroll purposes, a three-step process is utilized which involves extracting staff records from the GEAC system into an Excel spreadsheet which is then imported into the Town of Markham's payroll systems. A custom script is used for this import process.

Training records are also stored in a customized Microsoft Access database and include a GUI which has been developed in-house. MFES Company Officers (Captains) have access to these training records through login privileges in their network security settings. Similarly, a GUI for work orders has also been created which allows anyone to create and follow up on any work orders within the MFES. It was noted that certain reports, such as daily summary of on-shift staff, would be desirable but is not currently configured in the system.

Given that RMS data is spread across several databases, a top level user interface with access to all functions would improve the data access and reporting process, especially for those personnel who are not familiar with the database structure and configuration. It was also noted that there is no backup personnel to maintain the RMS system, beyond the current technical fire administrative coordinator, nor is there reference documentation regarding the system configuration.

8.4 Staffing and Supervision

The Dispatch Supervisor is responsible for the management of Division of Communications' staff, which currently consists of 10 Alarm Room Operators who function as dispatchers / call-takers. Currently two Alarm Room Operators are assigned to each of the four platoons and two Alarm Room Operators fill floating positions, to accommodate vacation, sick leave, etc. The Dispatch Supervisor can act as an Alarm Room Operator as required (on-duty relief, sick leave, etc.).

The present Dispatch Supervisor is an 'Emergency Number Professional' (ENP), certified through the National Emergency Number Association (NENA). The Dispatch Supervisor is responsible for the coordination of staffing for the alarm room.

As MFES' call volume increases with growth, the Division of Communications will also be required to grow and expand. Adding one more full-time Alarm Room Operator would result in a staff of 12, including the Dispatch Supervisor. This would allow for three Alarm Room Operators to be assigned to each platoon. This model would likely include an on-shift supervisor position. The current floater positions work 14 fewer shifts per year than the rest of the Division of Communications' staff. The proposed staffing configuration would eliminate the floater positions.

8.5 Standards and Procedures

NFPA 1221 provides a standard for measuring performance of communication tasks. ***Figure 8.1*** summarizes the components and applicable standards for communication, according to NFPA 1221, from the time of the emergency event up to the time response units respond to the emergency. This diagram indicates that the alarm processing or dispatch component of the call should be completed within 60 seconds for 90% of all calls and within 90 seconds for 99% of all calls.

Figure 8.1: NFPA 1221 Alarm Timeline and Standard

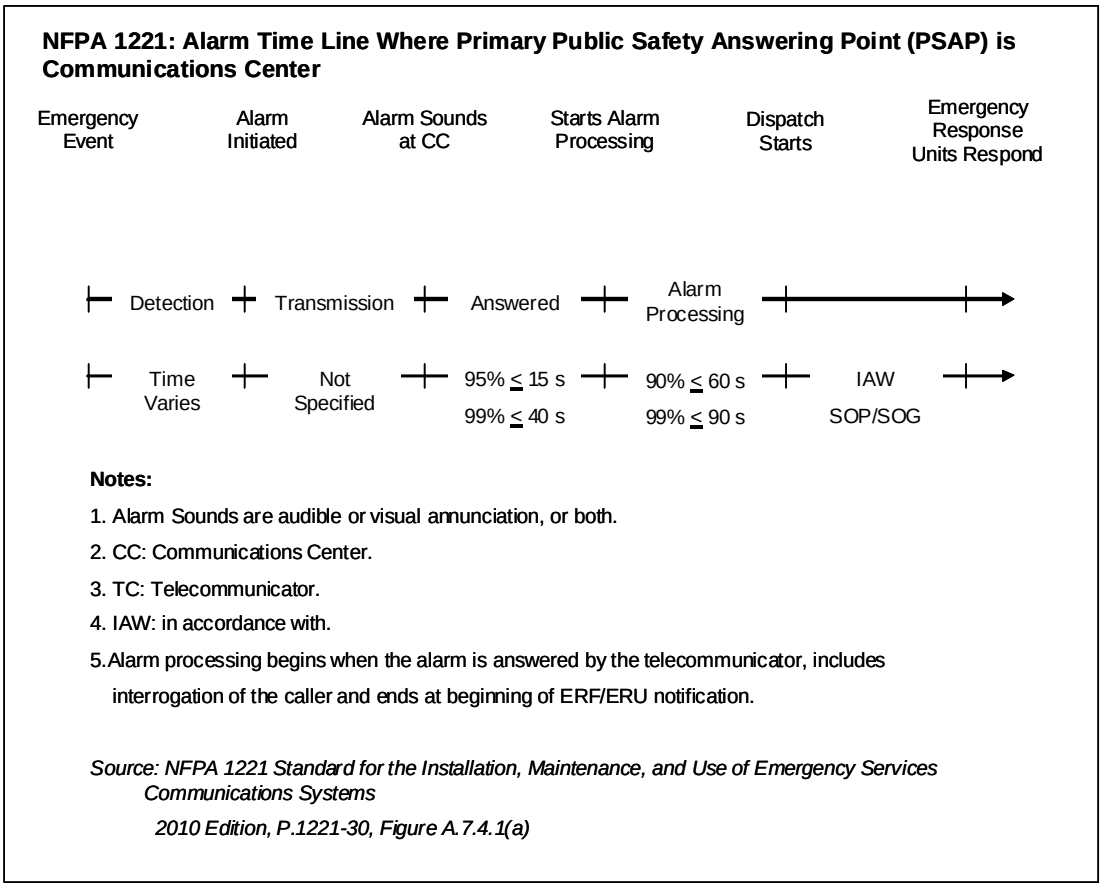
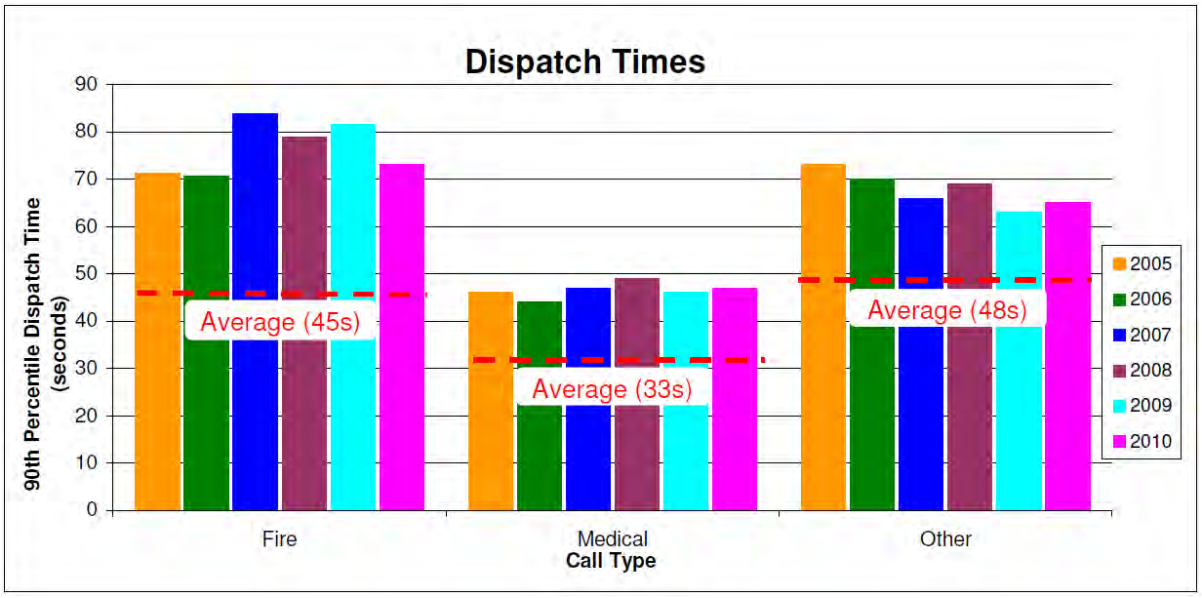


Figure 8.2 shows the historic 90th percentile dispatch times for fire, medical and other calls. In comparison to the NFPA 1221 standard, the MFES is slightly slower than the performance measure for emergency call dispatch time. Fire calls have historically had a 90th percentile time of slightly over 70 seconds, which is over the 60 second performance measure. Medical calls do not include the time for initial call taking, and therefore only includes the fire component of dispatching. These times however, are below the 60 second 90th percentile performance measure. Other calls have a decreasing trend for 90th percentile dispatch times, with the last four year of data showing 90th percentile times between 60 and 70 seconds. This is just slightly over the performance measure of 60 seconds. This data analysis shows that MFES is close to, but not currently meeting the NFPA 1210 performance measure for dispatch operations for fire calls and other calls.

Figure 8.2: Historical Dispatch Times by Type



The Town of Markham should review each step of the call handling and dispatching process to determine if there are any efficiencies which could improve this component of emergency response time. An improvement in any element of the call handling / dispatch times would be beneficial in moving MFES closer to the target dispatch time performance measure.

8.6 Summary and Recommendations

In comparison to industry best practices and the NFPA 1221 standard the Division of Communication is not meeting the performance targets for emergency call taking and dispatching. MFES should review each step of the call handling and dispatching process in order to identify efficiencies to improve the 90th percentile dispatch times. The efficiency and effectiveness of a number of the technology components of the call taking and dispatching system are and issue. Many are either reaching the end of their life expectancy, or no longer meeting the current and forecasted needs of a large urban fire and emergency service.

The current facility that houses the division has reached its life expectancy and no longer meets operational needs. Consideration of alternate locations is required. The MFES management team has recognised these challenges and is currently in the planning process to relocate the Division of Communications to 8100 Warden Avenue. The results of this analysis support this relocation strategy, and identify other areas such as technology architecture, redundancy/disaster recovery, and improved functionality that should be considered within any relocation planning.

8.6.1 Recommendations

The following recommendations relate to MFES' Division of Communications:

- MFES should work with the Town's Information Technology Services to develop a specific technology architecture and deployment plan for the fire and emergency service including:
    - technology linkages and overall architecture

- technology standards
- upgrade options and directions
- backup and redundancy procedures
- maintenance procedures

- A Review should be conducted to asses each step of the call handling and dispatching process to determine if there are any efficiencies which could improve this component of emergency response time.

- Consideration should be given to the installation of a redundant/ fail over server system for the CAD/ AVL/ RMS applications at a designated disaster recovery location.

- Consideration should be given to commencing planning efforts to upgrade or replace the current GEAC CAD / AVL / RMS system and Thales call recorder system.

- Consideration should be given to developing a succession plan to address ongoing staff resources required to support current and future IT systems within the MFES.

- Consideration should be given to the continued upgrade of the CAD/AVL functionality on board all fire suppression apparatus to include integrated mapping and reporting features and real time links to the central systems.

- Consideration should be given to adding alarm room staff as the Town grows and call volumes increase.

9.0 STUDY CONSULTATION

The Markham Master Fire Plan started with a project initiation meeting, held on May 10, 2010. As the study progressed, various forms of consultation activities were employed to engage the public and gather feedback from stakeholders and members of the community. Effective communication and consultation with stakeholders and the community is essential to ensure that those responsible for implementing this Master Fire Plan, and those with a vested interest, understand the basis on which certain decisions are made and why particular actions are required.

9.1 Steering Committee

Information and feedback was collected from members of the Project Steering Committee and key stakeholders via informal interviews held following the Project Initiation Meeting. This was an opportunity to gather background information for the environmental scan and input on strengths, opportunities, challenges and threats from the point of view of these key stakeholders. This was an essential stage in developing strategic goals and objectives for the Master Fire Planning process.

Steering Committee Members included:

- Fire Chief Bill Snowball;
- Deputy Chief Dave Decker (MFES Master Fire Plan Project Manager); and
- Deputy Fire Chief Phil Alexander.

9.2 Project Meetings

Throughout this study, the Dillon team met with the Steering Committee to keep them abreast of study progress. The following meetings took place:

- Project Meeting #1 Project Initiation – May 10, 2010
- Project Meeting #2 Present Preliminary Findings – September 9, 2010
- Project Meeting #3 Review Model Results – November 24, 2010
- Project Meeting #4 Present Draft Report to Steering Committee –April 20, 2011
- Present Final Report to Council – Scheduled for fall 2011

9.3 Stakeholders

Stakeholders can provide valuable input at each step of the process, providing information about context and background from different perspectives. This helps to identify issues and needs associated with the fire and emergency service. As well it provides information that is used for study analysis and recommendation phases. Engaging stakeholders and the community helps ensure that multiple perspectives can be brought to the master fire planning process.

9.4 Public and Stakeholder Consultation

The consultation approach was designed to gain as much feedback from study stakeholders as possible in the time available. Information was collected from key stakeholder during interviews with department personnel on May 10, 2010 and June 2, 2010, as well as through site visits to stations on June 2, 2010. In addition, study information was made available on the Town's website.

9.4.1 Stakeholder Interviews

Meetings with stakeholders were held to introduce the master fire planning process to the stakeholder group, and to gather feedback from key stakeholders regarding the strengths, weaknesses, opportunities and challenges of the Markham Fire and Emergency Services over the next 10 years, for consideration in the Master Fire Plan. Meetings were held on September 9, 2010 and November 24, 2010 with the following key stakeholders:

- Markham Professional Firefighters Association representatives
- Senior Human Resources Consultant – Sam Berton
- Commissioner Community & Fire Services – Brenda Librecz
- Town of Markham Treasurer, Joel Lustig

9.4.2 Public Open House

A Public Open House was held on November 24, 2010 to present the study to the broader public. Information provided included background material such as purpose and scope, and preliminary findings.

The consultation included information display boards and presentation providing an overview of the preliminary findings and opportunities. Copies of the display boards presented at this Open House are contained in ***Appendix C***.

10.0 SUMMARY OF RECOMMENDATIONS

10.1 Community Risk Profile

MFES has built risk management planning into the on-going planning that occurs within the municipality and the fire and emergency service. This is evidenced by the various divisional and department studies and plans that have been prepared by MFES. These include:

- Simplified Risk Assessment
- Municipal Fire Protection Information Survey
- Deployment Study 2001
- Vehicle Standardization 2002
- Training Survey and Needs Analysis 1998

The MFES Master Fire Plan (MFP) study is an extension of this risk management planning. It will provide Council and staff with a strategic long-term plan. The MFP has taken into account the planning and analysis completed within the previous deployment study.

Moving forward, MFES will maintain a proactive risk management planning process by ensuring the following:

- Continuous planning directed towards maintaining responsive approach to the changing needs of the community and local areas;
- Continuous review of divisional services provided and functions conducted by the MFES to confirm the objectives, as dictated by the Establishing and Regulating By-law are being achieved in accordance with the strategic plan;
- Continuous awareness of new and changing standards, evolving technologies, innovations, and other advances that would improve service delivery;
- Inclusion and accountability of personnel in risk management planning process; and
- Incorporation of pre-emergency planning into the overall risk management planning process.

These risks assist with the identification of the needs and circumstances of the community and should be taken into consideration when planning the future programs and resources for the MFES.

10.1.1 Recommendations

- Consideration should be given to implementing an ongoing process to update the community risk profile of the Town of Markham. Having readily available access to a current community risk profile can be a valuable asset to the MFES management team in guiding their strategic and daily decision-making.

10.2 Division of Administration

The following provides a summary of our recommendations drawn from the assessment of the Division of Administration.

The MFES management team lead by the Fire Chief has introduced a unique delegation of responsibilities within the fire and emergency services particularly at the Deputy Fire Chief level. In part this is due to the relatively short period of time during which the new management team has been in place. It was also an opportunity to use the transition period to try alternatives to the traditional fire service organizational designs and responsibility portfolios.

Overall the current management team is working well and has developed a positive working relationship amongst its members and within the MFES and the Town of Markham. The participative leadership style of the Fire Chief is a key component of the success the MFES management team has achieved.

10.2.1 Recommendations

The following recommendations relate to MFES' Division of Administration:

- In consultation with other Town departments, the MFES should consider options for the provision of additional office space and meetings rooms. This should be considered in conjunction with the relocation of the Division of Communication to the 8100 Warden Avenue location.

- Consideration should be given to implementing a formal Standard Operating Guideline Review Committee comprised of a cross section of department staff. Implementing a formal staff committee assigned with the responsibility of research, development, and regular review of standard operating guidelines will ensure that MFES maintains the level of documentation required to meet the department's need and regulatory requirements. Ensuring that Standard Operating Guidelines are developed approved and distributed for all areas of the Section 21 guidance notes which should be considered a priority.

- As part of assessing the effectiveness of the current "transitional" MFES management team roles and responsibilities consideration should be given to adding a third Deputy Fire Chief. In addition to adding to the overall depth of the non-union management team this resource would provide the required focus for the management team to implement the strategic priority of increasing public education and fire prevention activities within the MFES.

- Consideration should be given to providing additional administrative support to the MFES management team. Factors that should be considered include the addition of an assistant to the proposed third Deputy Fire Chief, and the immediate need for a redundancy strategy to support the current technical fire administrative coordinator position.

- In consultation with senior corporate staff the MFES should consider options for the provision of a human resource/labour relations staff person dedicated to supporting the MFES management team. In response to existing activities within this area and the planned growth within the MFES providing additional staff support within this area would be an effective strategy to mitigate and potentially reduce human resource costs within the MFES in the future.

10.3 Division of Fire Prevention & Public Education

With the support of Council, the MFES has clearly developed and implemented a public education and fire prevention program that is responding to the current needs and circumstances of the community. As the municipality continues to face further growth, and the community risk profile evolves, sustaining the effectiveness of the current programming will be essential. Where possible, MFES should consider introducing further activities to enhance the level of fire prevention and public education service provided. This will require MFES and Council to provide the necessary resources and funding to sustain the effectiveness that has been achieved.

10.3.1 Recommendations

The following recommendations relate to MFES' Division of Fire Prevention & Public Education:

- To achieve the targets of programs such as retrofitting of fire and life safety systems the workload of the Plans Examiners should be monitored to ensure sufficient resources are dedicated to these important activities, especially as the Town continues to undergo significant growth.

- Performance targets for the frequency of inspections can be directly related to the depth of staff resources available to complete these tasks. It is recommended that MFES include Council in the approval process of setting these performance targets.

- In conjunction with previous recommendations within this report, including the recommendation of adding a third Deputy Fire Chief, consideration should be given to reviewing the organizational structure, responsibilities and accountabilities within this division. Within this review, consideration should be given to the addition of another Senior Fire Prevention Officer. This resource would provide further depth to the division's supervisory requirements and workload management as well as adding depth to the overall management of the Division of Fire Prevention & Public Education.

- In order to work towards 100% compliance consideration should be given to a complete review and development of a new and enhanced Smoke Alarm Program. The new program should consider the goals and objectives established by the OFM and the needs of the Town of Markham, as well as the newly implemented zero tolerance policy, in order to provide the most effective solution to ensuring the safety of the Town residents.

- MFES should consider the implementation of a formal *"Community-Based Fire Protection Model"* in conjunction with the current organizational structure and reporting relationships within the Division of Fire Prevention & Public Education. This would provide further efficiencies within the division.

- The MFES management team has indicated that they will be requesting approval for an additional Fire Prevention Officer in their 2012 operating budget submission to Council. Subject to approval and re-assignments of the current Fire Prevention Officers, the MFES would have sufficient Fire Prevention Officers to implement the Community-Based Fire Protection Model within the nine fire stations that will include Station 99 opening in 2012. Consideration should be given to including a Fire Prevention Officer as part of the complement of staff hired for new fire stations.

- Our review indicates that only Fire Station 96 does not have the current capacity to provide office space for staff from the Fire Prevention and Public Education Division. Capital funds would be required to complete alterations to this station to accommodate the staff needs of a Community-Based Fire Protection Model.

- Consideration should be given to implementing a formal Standard Operating Guideline review process for the Division of Fire Prevention & Public Education Standard Operating Guideline.

10.4 Division of Fire Suppression

Fire suppression is the "third line of defence" within an overall community fire safety plan. Effective and efficient fire suppression capability is a critical component in ultimately protecting life safety and reducing property loss as a result of fire within a community.

The Town of Markham and the MFES have established an effective and efficient Division of Fire Suppression. With the support of Council, the MFES has identified NFPA 1710 "*Standard for the Organization and Deployment of Fire Suppression Operations*" as the "target" for emergency response performance.

With regard to the depth of resources, as identified within NFPA 1710, it is also important to consider the community risk profile in assessing the appropriate level of resources required. NFPA 1710 was developed in response to a very basic fire in a single family dwelling. The building stock profile of the Town of Markham confirms that there is a large component of the community that will require resources beyond those for typical single family dwelling fires to be deployed to achieve an appropriate depth of response, based on life safety and fire risk.

Our assessment revealed statistics for property loss (as a result of fire), and emergency response call volume that have remained relatively constant through an era of significant community growth. These are both strong indicators of the commitments the Town of Markham and the MFES have made to public education and fire prevention activities as the "first line of defence" in an effective community fire safety plan.

The historical call data analysis of the components of dispatch time, turnout time and travel time indicate that the MFES is below the 90th percentile for performance targets regarding dispatch time, turnout time, first response travel time and depth of response time / staffing combined. These response times and the procedures related to them should be reviewed in order to identify efficiencies which could be implemented to improve the times of these emergency response components and reduce overall emergency response times.

10.4.1 Recommendations

The following recommendations relate to MFES' Division of Fire Suppression:

- As a "performance target" NFPA 1710 is an appropriate performance measure for the Town of Markham and the MFES. Consideration should be given to utilizing this performance measurement tool for the ongoing assessment of the level of emergency response services to be provided by the MFES.
- Planning projections indicate that the Town of Markham will continue to experience increased growth. Consideration should be given to developing strategies to match the number of personnel responding to incidents based on type and risk while responding to growth, an aging population and an aging building infrastructure profile.
- Existing residential occupancies in the community include townhouse, stacked townhouse, medium and high-density condominiums, and high-rise structures. These types of occupancies all have increased fire and life safety risks. Consideration should be given to the deployment of additional emergency response staff within the initial response to match the required depth of response resources based on the results of the community risk profile.
- Consideration should be given to the provision of separate storage rooms for firefighters bunker gear that includes a separate ventilation system.
- Consideration should be given to the provision of additional general storage in all MFES stations where possible, and when renovations and/or new construction are considered.
- To work toward the depth of resource targets continue with a plan to place a third ladder truck into service at Station 96 by 2014, along with the associated full time staff complement consistent with the background study.
- Consideration should be given to the addition of a 10th fire station to be located in the vicinity of the intersection of Warden Avenue and Highway 7. This station should be staffed with an additional front run apparatus and associated full-time staff complement. This station is identified in the background study for 2017.
- Consideration should be given to the addition of an 11th "satellite" fire station[8] to be located on the Yonge Street corridor. The timing for this station should be consistent with the intensification along Yonge Street and the Langstaff development. Call volume and type should be monitored to determine the timing for this station. As an interim measure, consideration should be given to additional, staffed, responding units at existing Station 91 and / or automatic aid agreements with the Town of Richmond Hill. It is anticipated that this would be undertaken within a five to ten year horizon. The satellite station should be staffed with an additional engine company and associated full-time staff complement.

[8] Satellite Fire Station: In comparison to the typical fire station design, construction and amenities of other existing fire stations within the Town of Markham, a satellite fire station would contain the same types of amenities to accommodate a complement of firefighters required to staff a front run apparatus. However, from a physical facility perspective a satellite fire station could be included within an existing or planned commercial/residential or industrial complex. Opportunities for partnership with the private sector and/or other agencies would be beneficial to this type of facility. The most critical factor should be location.

- With the addition of the stations, apparatus and staff listed above, consideration should be given to the reassignments of ladder trucks so that:
    - Ladder 966 (placed in service in 2014 at Station 96) moves to Station 97 once Station 90 is in operation (e.g. 2017);
    - Ladder 916 continues to be deployed from Station 91;
    - Ladder 956 moves from Station 95 to Station 90; and
    - Any new ladders should be designed based on similar specifications to Ladders 916 and 956 to benefit from standardized apparatus.

10.5 Division of Training

Under the leadership of the Chief Training Officer, MFES develops an appropriate Annual Training Plan that responds to the relevant legislative training requirements. MFES uses a range of strategies to deliver training including the use of "temporary / on-shift instructors". This strategy appears to be working very well for the MFES.

The MFES has a well-developed records management system for all training records. Procedures and responsibilities are in place to ensure that all training records are submitted and up to date. Further consideration of strategies targeted at succession planning and officer development would assist the MFES in preparing for the future both from a perspective of staff turn-over as a result of retirements and due to growth within the municipality.

The current training centre is insufficient for the training activities that a large, full-time fire service such as MFES requires. The current strategy of using live fire training centres in other municipalities is an appropriate short-term solution, however there is a financial impact to renting these facilities, and a negative impact on the number of emergency response resources available within the Town of Markham when on-duty fire suppression staff and apparatus attend training centres outside its boundaries.

10.5.1 Recommendations

The following recommendations relate to MFES' Division of Training:

- Consideration should be given to attaining recognition of 'equivalency" from the OFM for the current MFES training program. The OFM is the organization recognised as having overall legislated responsibility for monitoring the delivery of fire protection in Ontario.

- In light of the high risk involved with the specialized emergency responses requiring technical training (i.e. hazardous materials, confined space rescue, ice/water rescue, high-angle rescue, etc.), consideration should be given to including the Town of Markham Council in the decision-making to determine level of service delivery that the Markham Fire and Emergency Service will ultimately provide for these types of incidents.

- In determining the levels of technical response to specialized calls the MFES should also consider opportunities for partnerships and/or strategic alliances with other adjacent municipalities or agencies. This could include sharing of equipment, coordinated training sessions or the implementation of automatic aid agreements to provide first response or additional support.

- Consideration should be given to establishing an acting position to fill the role of Chief Training Officer during absences, for succession planning purposes.

- Consideration should be given to the opportunity to utilize the Markham Learn Centre as a resource to increase officer development programming directed at current and future officer candidates, and succession planning activities within the MFES.

- It is recommended that MFES investigate its particular need for a live fire training facility. The first step would be a needs assessment to determine the potential benefits and identify any specialized / unique training aids that would best-suit fire-related MFES calls.

- Consideration should be given to explore internal, private and public partnerships in the research and development of a training facility also to include potential revenue generating opportunities.

- Ongoing consideration of the strategic priorities of the division is required to ensure staffing resources within the Division of Training are appropriate to maintain the current level of efficiency and effectiveness. This will be particularly relevant as the MFES expands to meet municipal growth and increased needs.

10.6 Division of Apparatus and Equipment

The Town of Markham has adopted a proactive life cycle planning and asset management system. In addition to being a good financial planning tool this system is providing an effective process for the management and replacement of all major corporate assets, including those within the MFES.

The MFES Fleet Standardization Plan approved by Council is also proving to be a valuable strategy towards maintaining an effective, modern fleet of fire apparatus. As the MFES continues to grow a strategy should be considered for sustaining reserve apparatus within the MFES Fleet Standardization Plan.

Further consideration of the organizational structure and supervisory requirements of this division should be made. Ideally, this would be done in tandem with a review of current staff workload and the potential of adding a position of “apprentice mechanic” to the division. Assessing the current staff resource needs, in addition to planned growth within the MFES, and opportunities to enhance the efficiency of the division through increased use of technology such as laptop computers, should provide an effective strategy in managing the needs of this division into the future.

10.6.1 Recommendations:

The following recommendations relate to MFES' Division of Apparatus and Equipment:

- Consideration should be given to conducting a review of the organizational reporting structure, supervisor requirements and workload of this division. Options should be considered to implement a "mechanic supervisor" position and create an "apprentice mechanic" position utilizing the benefits of the Ontario Youth Apprenticeship Program.

- The reserve fleet should, wherever possible, be consistent with the specifications of the fleet standardization plan for front run apparatus.

- Identifying options for providing a larger apparatus repair and maintenance facility should be considered a priority for the MFES. The facility should include a minimum of two bays of varying length and sufficient length and/or height in a minimum of one bay to fully extend the large ladders. It is recommended that MFES conduct a needs assessment study for a new facility to house the Division of Apparatus and Equipment.

- Consideration should be given to conducting a detailed review of the current functional capabilities of the Division of Apparatus and Equipment. Opportunities to enhance the accessibility to other MFES and corporate software programs, such as parts inventory, vehicle maintenance records, etc., should be considered. The provision of laptop computers should also be considered a priority when assessing equipment and technology needs.

10.7 Division of Communications

In comparison to industry best practices and the NFPA 1221 standard the Division of Communication is not meeting the performance targets for emergency call taking and dispatching. MFES should review each step of the call handling and dispatching process in order to identify efficiencies to improve the 90th percentile dispatch times. The efficiency and effectiveness of a number of the technology components of the call taking and dispatching system are and issue. Many are either reaching the end of their life expectancy, or no longer meeting the current and forecasted needs of a large urban fire and emergency service.

The current facility that houses the division has reached its life expectancy and no longer meets operational needs. Consideration of alternate locations is required. The MFES management team has recognised these challenges and is currently in the planning process to relocate the Division of Communications to 8100 Warden Avenue. The results of this analysis support this relocation strategy, and identify other areas such as technology architecture, redundancy/disaster recovery, and improved functionality that should be considered within any relocation planning.

10.7.1 Recommendations

The following recommendations relate to MFES' Division of Communications:

- MFES should work with the Town's Information Technology Services to develop a specific technology architecture and deployment plan for the fire and emergency service including:
    - technology linkages and overall architecture
    - technology standards

- upgrade options and directions
- backup and redundancy procedures
- maintenance procedures

- A Review should be conducted to asses each step of the call handling and dispatching process to determine if there are any efficiencies which could improve this component of emergency response time.

- Consideration should be given to the installation of a redundant/ fail over server system for the CAD/ AVL/ RMS applications at a designated disaster recovery location.

- Consideration should be given to commencing planning efforts to upgrade or replace the current GEAC CAD / AVL / RMS system and Thales call recorder system.

- Consideration should be given to developing a succession plan to address ongoing staff resources required to support current and future IT systems within the MFES.

- Consideration should be given to the continued upgrade of the CAD/AVL functionality on board all fire suppression apparatus to include integrated mapping and reporting features and real time links to the central systems.

- Consideration should be given to adding alarm room staff as the Town grows and call volumes increase.

11.0 FINANCIAL IMPLICATIONS

11.1 Implementation

Recommendations resulting from this analysis were derived to form an action plan for implementation, shown in ***Table 11.1***. The evaluations of level of service for the station, staffing and equipment options assessed are summarized in ***Table 11.2***. As described earlier, Option 4 was determined to provide the best level of service for the Town of Markham. Option 4 includes the addition of Station 99, addition of Station 90 (a proposed new station at the intersection of Warden Avenue and Apple Creek Boulevard) and the addition of a proposed satellite station at the intersection of John Street and Yonge Street. This also considers the relocation of the three aerial units, to the modelled optimal locations. The new stations would be staffed with four full-time firefighters and aerials would be located at Station 90, Station 91 and Station 97.

The costs resulting from this master fire plan are shown below. These are estimates for planning purposes only and are based on current rates.

Table 11.1: Implementation Plan

Item	Plan Year	Description	Proposed Costs	
			Operating	Capital
1	**2012**	Add third Deputy Fire Chief position	$ 120,000	-
2		Administrative support. Succession planning should be completed to address ongoing staff resources required to support current and future IT systems within MFES	$ 35,000	-
3		One Fire Prevention/Education Officer for Station 99 Cornell (Community Based Fire Protection Model)	$ 86,000	-
4	**2013**	Redundant/fail over server systems should be installed for the CAD/AVL/RMS applications at a designed disaster recovery location	-	$ 50,000
5		Develop IT technology architecture and deployment plan for Division of Communications	-	$ 75,000
6		Complete assessment for the Regional Radio System changes scheduled for 2014	-	$ 50,000
7		Mechanical Facility Needs Assessment	-	$ 50,000

Table 11.1: Implementation Plan				
Item	**Plan Year**	**Description**	**Proposed Costs**	
			Operating	**Capital**
8	**2014**	Upgrade or replace the current GEAC CAD/AVL/ Records Management systems and Thales call recorder system	-	$ 500,000
9		Purchase Ladder Truck for Station for 96 and add 20 Firefighters (Included in existing DC background study)	$ 2,100,000	$ 1,200,000
10	**2015**	Add 2nd Senior Fire Prevention Officer position	$ 100,000	-
11		Retrofit Station 96 to accommodate a Fire Prevention/Education Officer for Community Based Fire Protection Model	-	$ 75,000
12	**2016**	Continue to upgrade CAD/AVL functionality on board the fire trucks to include integrated mapping and reporting features and real time links to the central systems	-	$ 150,000
13	**2017**	Station 90 + 20 Firefighters + 1 Fire Prevention/Education Officer (Community Based Fire Protection Model - included in existing DC background study)	$ 2,100,000	$ 4,500,000
14		Purchase Engine 901 and equipment for Station 90	-	$ 800,000
15	**2019**	Add Satellite Station to Langstaff high density development in Thornhill. One Engine + 20 Firefighters (to be added to next DC background study)	$ 2,000,000	$ 3,000,000
16		Purchase Engine for Satellite Station and equipment	-	$ 800,000
		TOTALS	***$ 6,541,000***	***$ 11,250,000***

Implementing the recommendations resulting from this master fire plan will help maintain MFES' strong record for fire and emergency service provision and allow it to prepare for the next decade of municipal growth. By the final year of the plan, operating costs will increase by $6.5 million per year. The total estimated capital costs will be $11.3 million by 2020.

Table 11.2: Evaluation of Level of Service Options for the Future

	Horizon	*Existing / Approved*			*Future Proposed*				*Future Forecast (Beyond Study Horizon)*
Scenarios / Options	**Option**	**Seven Station Model**	**Add Station 93 (Eight Station Model)[4]**	**2012 Business as Usual (Nine Station Model)[4]**	**Future Option 1 Business as Usual (Nine Station Model)**	**Future Option 2 Add Station on Warden Ave. (10 Station Model)**	**Future Option 3 Add Aerial and Relocate Existing Aerials (10 Station Model)**	**Future Option 4 Add Satellite Station (11 Station Model) PREFERRED OPTION**	**Future 2031 Project Growth Outside Built Boundary**
	Service Area Modelled	**2010 Existing**	**2010 Existing**	**2010 Existing**	**2021 Future**	**2021 Future**	**2021 Future**	**2021 Future**	**2031 Future**
	Projected Implementation Year	**2010**	**2010**	**2012**	**n/a**	**2014**	**2014**	**2016**	**n/a**
	Description	**June 2010 existing conditions (seven fire stations & staff)**	**July 2010 existing conditions. Add Station 93 & staff, as built, to seven station model / staff**	**January 2012 forecast conditions. Add Station 99 & staff, as planned, to eight station model / staff**	**Stations and staffing as per 2012 business as usual**	**Add Station 90 & staff to business as usual stations & staffing**	**Add 1 aerial ladder & staff and relocate existing two aerial ladders & staff (Aerials at Stations 90, 91 & 97) to Option 2 stations & staffing**	**Add satellite station & staff to Option 3 stations & staffing**	**Stations & staff as per Option 4**
Service	**Additional Suppression Staff [1]**	None	20	20	None	20	20	**20**	None
	Additional Non-Suppression Staff	None	1 fire prevention officer	1 training officer & 1 fire prevention officer	None	1 fire prevention officer	None	**1 training officer**	None
	First Response 4 Firefighters in 4 minutes (NFPA 1710 Best Practice for 90% of calls, Urban Areas)	55%	63%	68%	68%	75%	75%	**77%**	71%
	Depth of Response (NFPA 1710, 15 firefighters (with aerial) in 8 minutes travel time - for 90% of calls)	43%	50%	54%	54%	64%	81%	**86%**	78%
	Effect on Suppression Operations	Baseline conditions.	Improves first response coverage by 8% and depth of response by 7% from baseline conditions.	Improves first response coverage by 13% and depth of response by 11% from baseline conditions. Improves first response 5% and depth of response by 4% from previous scenario.	Growth occurs within development boundary. Does not impact first response or depth of response, but resources will be stretched as probability of simultaneous calls will increase.	Improves first response coverage by 20% and depth of response by 21% from baseline conditions. Improves first response coverage by 7% and depth of response by 10% from previous scenario.	Improves first response coverage by 20% and depth of response by 38% from baseline conditions. Does not impact / improve first response coverage from previous scenario. Improves depth of response coverage by 17% from previous scenario.	**Improves first response coverage by 22% and depth of response by 43% from baseline conditions. Improves first response coverage by 2% and depth of response by 5% from previous scenario. This is the preferred option.**	First response coverage decreases by 6% and depth of response coverage decreases by 8%. Service area increases by 12% from previous scenario.
Cost[4]	**Capital Costs [2] (Stations Only, excluding land costs)**	None.	***$4,500,000***	***$4,500,000***	None	$4,500,000	n/a	**$3,000,000**	None.
	Apparatus & Equipment	n/a	***$800,000***	***$800,000***	n/a	$800,000	$1,400,000	**$800,000**	n/a
	Operating Cost[5]	No change.	***$2,000,000***	***$2,075,000***	No change.	$2,100,000	$2,100,000	**$2,100,000**	No change.
	Cumulative Additional Operating Cost	No change.	***$2,000,000***	***$4,075,000***	***$4,075,000***	$6,175,000	$8,275,000	**$10,375,000**	$10,375,000
	Overall[3]	NFPA 1710 performance measure target met in 55% of Town.	NFPA 1710 performance measure target met in 63% of Town.	NFPA 1710 performance measure target met in 68% of Town.	NFPA 1710 performance measure target met in 68% of Town.	NFPA 1710 performance measure target met in 75% of Town.	NFPA 1710 performance measure target met in 81% of Town. Only 9% below the performance measure target of 90% coverage.	**NFPA 1710 performance measure target met in 86% of Town. Only 4% below the performance measure target of 90% coverage.**	NFPA 1710 performance measure target met in 78% of Town under projected future conditions.

Footnotes:
1. It requires hiring 20 firefighters to keep 4 firefighters minimum staffing on-duty 24/7.
2. A portion of capital costs may be recovered from Development Charges.
3. Overall Performance: NFPA 1710 requires meeting either first response or depth of response component to meet the standard.
4. Highlighted costs represent previously approved resources and ***budgets***.
5. Future annual operating cost for 1 firefighter budgeted at $100,000

APPENDIX A

Standard Operating Procedures

Standard Operational Procedures and Guidelines

SUPPRESSION ADMINISTRATION - Table of Contents

DATE: March 23, 2006

TRAINING DIVISION - Table of Contents

DATE: September 6, 2011

SOP Number	Title of SOP
2001	Aircraft Rescue Firefighting -Team Performance Standards
2002	Pumping and Elevated Devices - Team Performance Standards
2003	Water/Ice Rescue - Team Performance Standards
2004	Vacations, Holidays, Floating Days and Management Time Bookings for the Training Division
2005	Live Fire Training Evolutions
2006	Entering Open Water for Training
2007	Use & Maintenance of Pitched Roof Ventilation Prop

FIRE PREVENTION DIVISION - Table of Contents

DATE: February 25, 2008

SOP Number	Title of SOP
3000	Notice to Building Owners
3001	Systems Out of Service
3002	Inspection Requests
3003	Inspection Procedure for Residential Building 2 Dwelling Units
3004	Daily Office and Related Prevention Division Procedures
3005	Propane, Flammable and Combustible Liquid Tank Inspections and Plans Review
3006	Legal Procedures
3007	Replacement of Sprinklers & Temporary Restoration of Wet Sprinkler Systems
3008	Fire Safety Plan Review
3009	Fire Code
3010	Fire Marshal's Orders - Guidelines for Various Types

Standard Operational Procedures and Guidelines

SOP Number	Title of SOP
3011	Hazardous Occupancy Alert Preplanning
3012	Distribution, Accumulation and Booking of Overtime
3013	Transfer of Staff in the Event of Long Term Illness
3015	Updating Property and Associated Files
3016	Updating Property and Associated Files
3017	Inspection Notes
3018	Inspection Requisition
3019	Notice of Violation and Fire Inspection Reports
3020	Business Information Form F:1062
3021	LLBO License Inspections
3022	Homes Containing 2 or More Dwelling Units
3023	Abandoned Buildings
3024	Uniform Dress Code for Fire Prevention Staff – Summer Months
3025	Temporary Charging of Discharged Dry Sprinkler Systems
3026	Temporary Caution Notes
3027	Documenting and Maintaining Permanent Caution Notes
3028	Fire Alarm Audibility
3029	Request for Fire Investigations/Fire Investigation to Determine Fire Cause and Origin
3030	Guidelines for the Use of the Sparky Costume
3031	Billable False Alarms
3032	Nightclub Inspections - FP

Standard Operational Procedures and Guidelines

COMMUNICATION DIVISION - Table of Contents

DATE: January 2010

SOP Number	Title of SOP	Date of SOP
4000	Manual Dispatching Guide	11/15/99
4001	Alerting Stations and Apparatus with 800mhz Radio System	11/06/07
4002	Dispatching Incidents	01/03/01
4004	False Remote Alarms	09/11/08
4005	Incident Response	01/13/10
4006	Map Books / Street Files	09/11/08
4007	Location Information Updating	09/11/08
4008	Operation of File Save	01/13/10
4009	Computer Data Entry	01/13/10
4010	Valuables	01/15/01
4011	Cleaning of Alarm Room Quarters	09/11/08
4012	Unusual Circumstance Report	01/15/01
4013	Malfunctioning Equipment	06/22/05
4014	Office of the Fire Marshall	09/11/08
4015	Changing Roster Information	06/22/05
4016	Shift Trades – Communications Division	06/22/05
4017	Bordering Fire Dept. & Private Agency Mutual Aid Resources	01/13/10
4018	Booking Station Tours	06/20/03
4019	Language Line Services	03/08/02
4020	Call-Taking for Multi-Unit Buildings	02/02/01
4021	Overtime Callback for Suppression & Communications Division	10/20/09
4023	Cover-Ups / Move-ups	11/06/07
4024	Portable Radio Battery Charging & Conditioning	06/20/02
4025	Standard Radio, Intercom, Printer and Station Alert Tests	11/03/09
4026	Communications Room Equipment Checks	01/13/10
4028	Radio / Battery / Station Alerting Problem Reporting	06/20/02
4029	Radio Procedures	06/09/03
4031	Dispatching – Two Communicators on Duty	07/18/02

SOP Number	Title of SOP	Date of SOP
4032	Temporary Caution Notes	06/16/02
4033	Documenting / Maintaining Permanent Caution Notes	09/12/08
4034	Temporary Charging of Discharged Dry Sprinkler Systems	09/12/08
4035	Overtime Callback for Communications Division	12/17/07
4037	Apparatus Out of Service / Back in Service	01/13/10
4039	Dispatching of Elevated Device	03/08/01
4040	Markham Fire & Emergency Services Desk Reference Guide	03/12/03
4041	Enroute911 (GEAC) Computer Emergency Repair	01/13/10
4042	Emergency Alert on 800 MHz Radio System	04/19/02
4043	Simplex Operation on 800 MHz Radio System	04/01/02
4044	Daily Operations & Incident Dispatching – 800 MHz Radio	01/13/10
4045	Processing Requests for CISM Team Response	01/13/10
4046	Back-Up Radio Procedure	07/08/02
4047	800 MHz Radio System Problem Reporting	07/15/08
4050	RACAL Data Recorder Emergency Repair	02/05/03
4051	Processing 9-1-1 Tiered Response from EMS	02/10/03
4052	Telephone Service Disruption in Alarm Room	01/13/10
4053	Shift Privileges – Communications Division	08/26/03
4055	Requests for MVC Reports from YRP / OPP	04/08/05
4056	Notifications – Platoon Chief, District Chief, On-Call Officer	11/17/06
4057	Fire Prevention / Training Personnel Calling in Sick	04/11/05
4058	Failure of Region of York Radio System	01/13/10
4059	Town of Markham Emergency Plan – Alerting System	04/08/05
4061	Documentation of Personnel Not Reporting for Scheduled Duty	05/11/07
4063	Flood Advisories – Toronto and Region Conservation Authority	09/12/06
4064	Emergency Management – ARES Contact Procedure	11/07/06
4065	Contacting Fire Prevention Officer – Business hours	02/11/08

RESPONSE GENERAL – Table of Contents

DATE : November 11, 2008

SOP Number	Title of SOP	Date of SOP
1101	Requests for Fire Investigations	07 15 05
1102	Replacement of Sprinklers and Temporary Restoration of Wet Sprinkler Systems	03 20 06
1103	Temporary Charging of Discharged Dry Sprinkler Systems	03 20 06
1104	Vehicle Firefighting	07 15 05
1105	Procedure at Remote Alarms	07 15 05
1106	Hydrant Water Supply	07 15 05
1107	Fireground Tactics	07 15 05
1108	Responses to High Occupant Load Facilities and Resetting of Fire Alarm Systems	07 15 05
1109	Hazardous Material Incidents	03 20 06
1110	Working with Other Agencies: Red Cross, Police, etc	03 20 06
1111	Air Ambulance- Helicopter Landing Procedures	07 15 05
1112	Staging	03 20 06
1113	Sectoring	03 20 06
1114	Utility Services Shut Off	07 15 05
1115	Incident Management Systems	03 20 06
1116	Vehicles Responding and Returning	11 20 06
1117	Response to Carbon Monoxide Incidents	06 12 08
1118	Clandestine Drug Laboratories	03 20 06
1119	Biological Threat Response	07 15 05
1120	Valuables	03 20 06
1121	Flammable Liquid Incidents	07 15 05
1122	Fire Protection at Buttonville Airport	03 20 06
1123	Water and Ice Rescue	07 31 08
1124	Vehicle Extrication	01 31 06

SOP Number	Title of SOP	Date of SOP
1125	Response to Potentially Violent Incidents	07 15 05
1126	Air Monitoring	07 26 05
1127	Confined Space/Trench Rescue	02 08 06
1128	Thermal Detection Devices	03 20 06
1129	Fires in Dust Collectors & Hoppers	05 22 08
1130	Search and Rescue Procedures	Under Revision
1131	Fall Prevention	12 03 10
1132	Elevator Response	03 04 11

HEALTH AND SAFETY – Table of Contents

DATE : March 21 2006

Policy Number	Title of Policy	Date of Policy
1201	Firefighter Accountability System	07 25 05
1202	Rapid Intervention Crew	07 25 05
1203	Lost or Trapped Firefighter	01 31 06
1204	Critical Incident Stress Management	07 25 05
1205	Cleaning Decontamination and Repair of PPE	03 21 06
1206	Supervising New Firefighters	03 21 06
1207	Self Contained Breathing Apparatus	03 08 06
1208	RESERVED	-
1209	Personal Protective Equipment	03 27 09
1210	Laundering Bunker Gear	01 31 06
1211	Wearing of Jewelry	07 25 05
1212	Firefighter Rehabilitation	07 26 05
1213	Working in Close Proximity to Vehicular Traffic	07 26 05
1214	Removal of Ground Ladders from Apparatus	07 26 05

Policy Number	Title of Policy	Date of Policy
1215	Operation of Elevated Devices and Hand Signals	03 21 06
1216	Hazardous Area Evacuation	02 07 06
1217	Lockout/Tagout (Draft)	09 01 06
1218	Life Safety Rope	09 18 06
1219	Training Safety Plan	04 20 10
1220	Asbestos and Other Fiber Exposure Policy	08 10

APPARATUS & EQUIPMENT – Table of Contents

DATE : March 21, 2006

SOP Number	Title of SOP	Date of SOP
1301	Safety Testing of Fire Hose and Cleaning of STORZ Couplings	07 11 05
1302	Small Engines and Portable Pumps	07 26 05
1303	Daily Report and Apparatus Check Sheet Form #1045	03 21 06
1304	Inspection and Maintenance of Ground Ladders	07 25 05
1305	Daily Inspection of Air Brakes	03 20 06
1306	Spare Apparatus	03 21 06

MEDICAL – Table of Contents

DATE : July 13, 2009

APPENDIX B

Existing and Planned Fleet

Existing Standardized Fleet

In 2002 the MFES received support from Council to implement a Fleet Standardization Plan. ***Table B1*** lists, depicts and describes the standardized fleet apparatus and associated minimum staffing.

Table B1: Existing Standardized Apparatus

Apparatus Type	Description	MFES Call Signs	Minimum Staffing
Engine Apparatus 	Spartan Gladiator 'LFD' (SMEAL) 8000 litre per minute Class A pump with 2724 litre water tank. Dual A and B Foam systems. E921, E931, E961, E971 have hydraulic rescue extrication equipment.	E911 E921 E931 E941 E951 E961 E971 E981	1 Captain 1 Driver 2 Firefighters
Ladder Apparatus 	Spartan Gladiator 'LFD' (SMEAL) 8000 litre per minute Class A pump with 1326 litre water tank. Dual A and B Foam systems. L916 and L956 have hydraulic rescue extrication equipment. Both trucks have a 32 metre ladder.	L916 L956	1 Captain 1 Driver 2 Firefighters

Existing and Planned Fleet

Apparatus Type	Description	MFES Call Signs	Minimum Staffing
Air Light Apparatus 	2009 Dependable Freightliner M2. The primary function of this apparatus is to refill breathing air cylinders during fire incidents and provide additional scene lighting. The secondary function is to be the prime mover for the HAZMAT trailer 928. This truck is equipped with a portable air cylinder cart to be deployed during high rise fires.	920	No minimum staffing (reserve)
HAZMAT Trailer 	HAZMAT Response Equipment.	928	N/A

Apparatus Type	Description	MFES Call Signs	Minimum Staffing
Command Vehicles  	The on-duty Command Officers (Platoon and District Chief) drive and function from the two command vehicles. The vans are GM Savanna Express models (2006 / 2007) Each van is designed and equipped to operate as a Command Post during incidents.	Chief 96 Chief 97	Chief 96 (Platoon Chief) Chief 97 (District Chief)

Existing and Planned Fleet

Apparatus Type	Description	MFES Call Signs	Minimum Staffing
Tanker Apparatus 	1991 Dependable MACK Water Tanker 9000 litre tank and 1000 L/min pump.	954	N/A
Spare Apparatus 	1990 Pierce Lang (SUPERIOR) 5000 litre per minute Class A pump with a 1200 litre water tank and a 15m ladder (To be decommissioned 2012).	S9833	N/A

Existing and Planned Fleet

Apparatus Type	Description	MFES Call Signs	Minimum Staffing
	1991 Spartan Barron (DEPENDABLE) 5000 litre per minute Class A pump with 2200 litre water tank. (To be decommissioned 2012).	E9841	N/A
	2003 Spartan Gladiator 'LFD' (SMEAL) 8000 litre per minute Class A pump with 2724 litre water tank. Dual A and B Foam system	E9871	N/A
	1998 International 4900 (DEPENDABLE) 5000 litre per minute Class A pump with 45000 litre water tank.	E9881	N/A

Future Fleet Considerations

MFES considers the ideal lifespan of a frontline apparatus to be approximately 8-10 years for an Engine, 10-12 years for a Ladder Truck and 15-20 years for a support vehicle (920/954). MFES will assign frontline apparatus, which have been replaced, into a RESERVE status for at least five years following its ideal lifespan. ***Table B2*** summarizes the recommended replacement of the existing and future apparatus based on condition assessment. Condition assessments are completed for Engines at after eight years, Ladders after 10 years and other apparatus after 15 years. Based on the schedule below the RESERVE apparatus fleet will consist of standardized apparatus by the end of 2012. The future apparatus included in MFES' current budgets and plans are listed in ***Table B3***.

Table B2: Remaining Service Years

Apparatus	Model Year	Planned Replacement	Remaining years (as of 2011)
Engine 911	2003	2011	0
Engine 921	2007	2015	4
Engine 931	2010	2018	7
Engine 941	2009	2017	6
Engine 951	2011	2019	8
Engine 961	2003	2011	0
Engine 971	2003	2011	0
Engine 981	2006	2014	3
Ladder 916	2002	2012	1
Ladder 956	2002	2012	1
Air/Light 920	2009	2024	13
Tanker 954	1991	2011	0

Table B3: Future Planned Apparatus

Apparatus	Planned Implementation	Planned Replacement
Engine 991	2012	2020
Engine 901	2017	2025
Engine 912	2019	2027
Ladder 966	2014	2022

Reserve Fleet

The current reserve fleet, listed in ***Table B4***, is comprised of four vehicles, three pumps and one aerial (squirt). Vehicles Pumper 9841 and Squirt 9883 are at the end of their service life as reserve vehicles. As of 2011, the reserve fleet will include Engine 951 and Aerial 956. This will improve the depth and age of the reserve fleet. One of the existing reserve vehicles will be decommissioned at that time.

A plan should be developed to build and maintain and updated reserve fleet. This will be improved through the standard fleet life-cycle plan.

Table B4: MFES Reserve Fleet

Apparatus	Model Year	20 Year Service Life	Remaining Years of Service
Pumper 9881 (spare)	1998	2018	7
Pumper 9871 (spare)	2003	2023	12
Pumper 9841	1991	2011	0
Squirt 9883 (spare)	1990	2010	-1

Small Vehicle Fleet

In addition to the full-size apparatus used by the fire and emergency service, a number of smaller vehicles are used by the MFES. The life cycle of these vehicles is usually five to six years. The existing 2011 small vehicle fleet, including model years and replacement years, for the MFES is listed in ***Table B4***.

Table B4: Markham Fire and Emergency Services Small Vehicle Fleet 2011			
Assignment	**Make/Model**	**Purchase/Life Cycle**	**Location**
Chief 91	Toyota Camry	2007/2013	8100 Warden
Chief 92	Toyota Hylander	2007/2013	8100 Warden
Chief 93	Toyota Hylander	2007/2013	8100 Warden
Chief 94	Toyota Camry	2007/2013	8100 Warden
Chief 95	GM Impala	2007/2013	8100 Warden
Chief 96	G3500 Savanna	2005/2013	Station 95
Chief 97	G3500 Express	2006/2014	Station 92
Public Education	Mercedez Smart Car	2006/2013	8100 Warden
Public Education	GM Uplander	2009/2014	8100 Warden
Fire Prevention	GM Pursuit G5	2008/2014	8100 Warden
Fire Prevention	Ford Escape	2009/2017	Station 93
Fire Prevention	GM Pursuit G5	2008/2014	Station 98
Fire Prevention	GM Pursuit G5	2008/2014	Station 98
Fire Prevention	GM Pursuit G5	2008/2014	Station 92
Fire Prevention	GM Pursuit G5	2008/2014	Station 92
Fire Prevention	GM Sunfire	2005/2012	Station 98
Fire Prevention	Chrysler Sebring	2005/2012	Station 93
Fire Prevention	Chrysler Sebring	2005/2012	8100 Warden
Training	Ford F250	2009/2016	8100 Warden
Training	Chrysler Caravan	2004/2011	8100 Warden
Training	GM Siverado	2008/2016	8100 Warden
Mechanical	GM 1500 Sierra	2008/2016	555 Miller
Mechanical	GM G30	2002/2012	555 Miller

APPENDIX C

Public Open House Display Boards

Markham Fire and Emergency Services
Master Fire Plan

DILLON CONSULTING

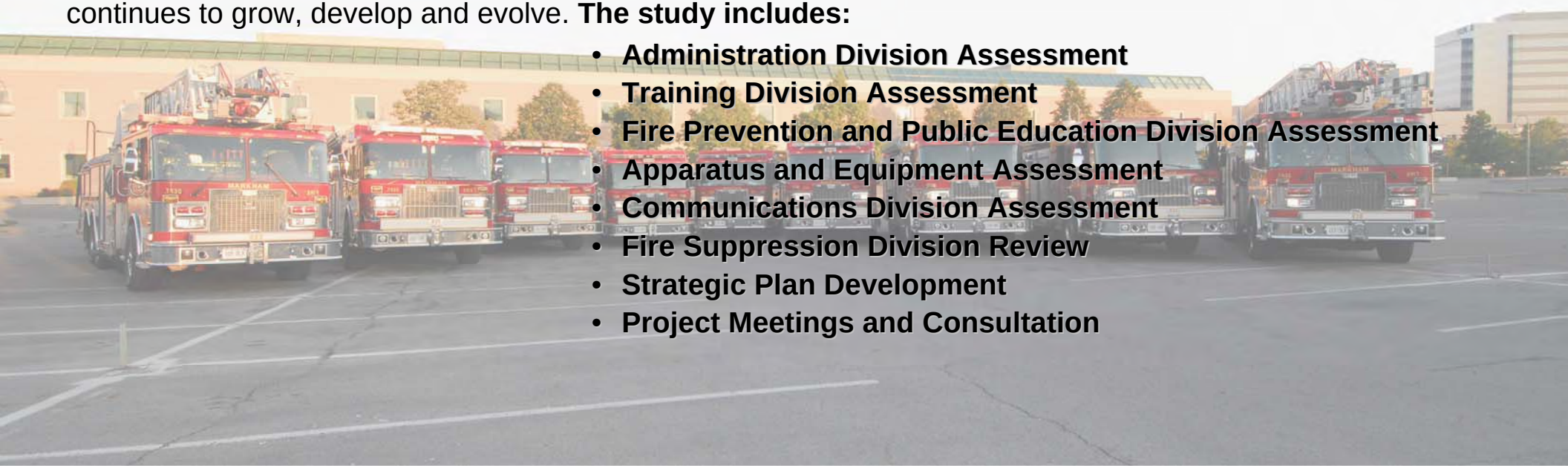
WELCOME

Markham Fire and Emergency Services welcomes you to this Community Information Open House.

We would like to hear what you think about this Master Fire Plan study and invite you to ask us questions and provide us with your comments. Please fill in a comment sheet provided and place in the box on the table or fax/email your comments on or before December 17, 2009.

The Corporation of the Town of Markham has undertaken a Master Fire Plan Study to review municipal fire protection services and develop a 10-year master plan to guide the fire and emergency services as Markham continues to grow, develop and evolve. **The study includes:**

- **Administration Division Assessment**
- **Training Division Assessment**
- **Fire Prevention and Public Education Division Assessment**
- **Apparatus and Equipment Assessment**
- **Communications Division Assessment**
- **Fire Suppression Division Review**
- **Strategic Plan Development**
- **Project Meetings and Consultation**



Markham Fire and Emergency Services
Master Fire Plan

ONTARIO FIRE SAFETY & PROTECTION MODEL:
THREE LINES OF DEFENSE

1. **Public Education and Prevention**
   Smoke Alarm Program, school and seniors education, risk management, etc.
2. **Fire Safety Standards and Enforcement**
   Inspections, Occupancy Inspections, Licensing Approval, Violation Enforcement, Fire Investigations, etc.
3. **Emergency Response**
   - Ontario Fire Marshal's Office Guidance Notes
   - National Fire Protection Association
   - Standards (NFPA)
   - Ministry of Labour (Section 21 Guidance Notes)
   - Industry Best Practices

EMERGENCY RESPONSE TIME

Total time taken to react to a call including dispatch time, turnout time and travel time

PERFORMANCE MEASURES

- No legislative requirement / mandatory performance measure in Ontario
- Industry Guidelines include NFPA Standards and OFM Guidelines

Performance Measures	
Measure	**NFPA 1710**
Initial Arriving Company	• Minimum of 4 firefighters responding on an engine company • Responding within 4 minutes of "travel time" • To 90% of the incidents
Initial Full Alarm Assignment	• Minimum of 14 firefighters • 1 additional firefighter (aerial operations) • Responding within 8 minutes of "travel time" • To 90% of the incidents

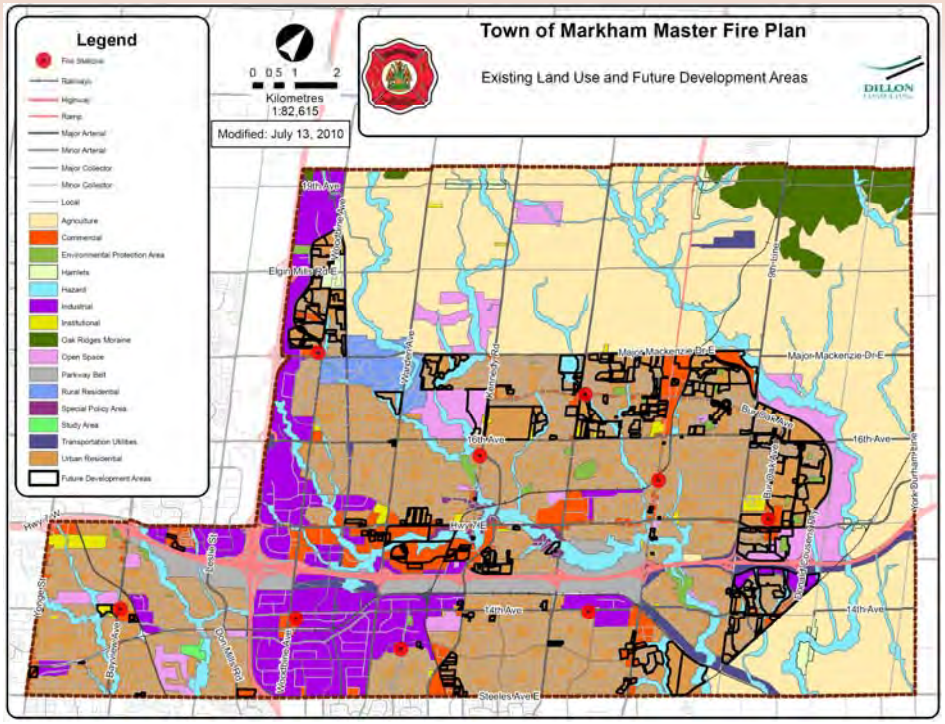
First Response

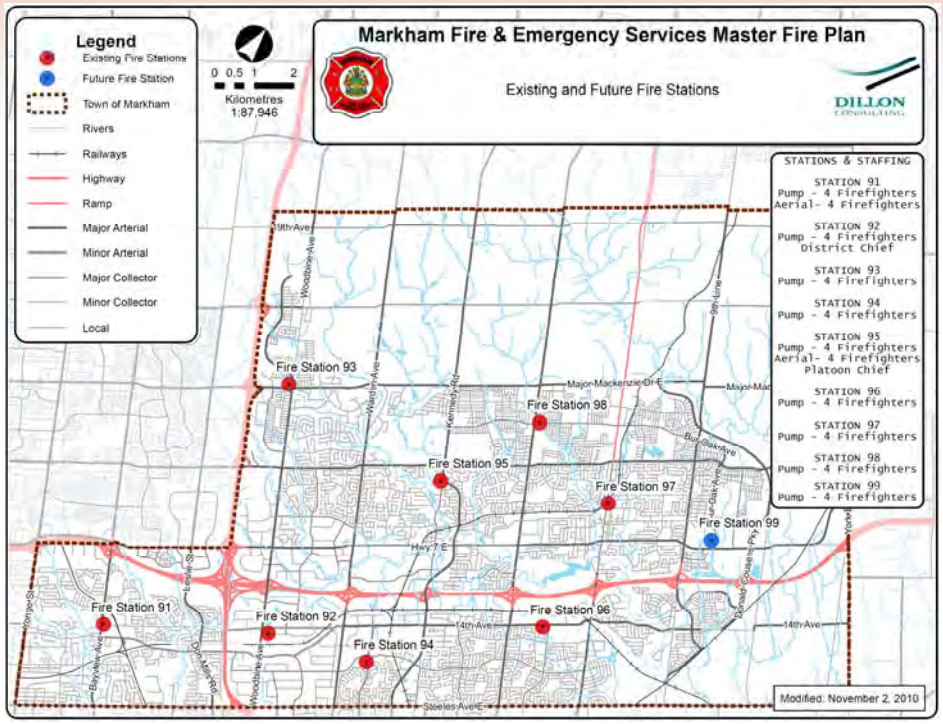
Depth of Response

Markham Fire and Emergency Services
Master Fire Plan

DILLON CONSULTING

BACKGROUND INFORMATION





Town of Markham

- Including the Communities of Thornhill, Milliken, Unionville, Markham, Cedar Grove, Cornell and Wismer
- Population of approximately 300,000
- Expected to grow to approximately 445,000 by 2031
- Rapid development and urban intensification
- Culturally diverse community
- Land area 213 square kilometers (urban and rural areas)
- 3 major shopping centres, 2 hospitals, over 1,000 business and corporate headquarters

Markham Fire and Emergency Services

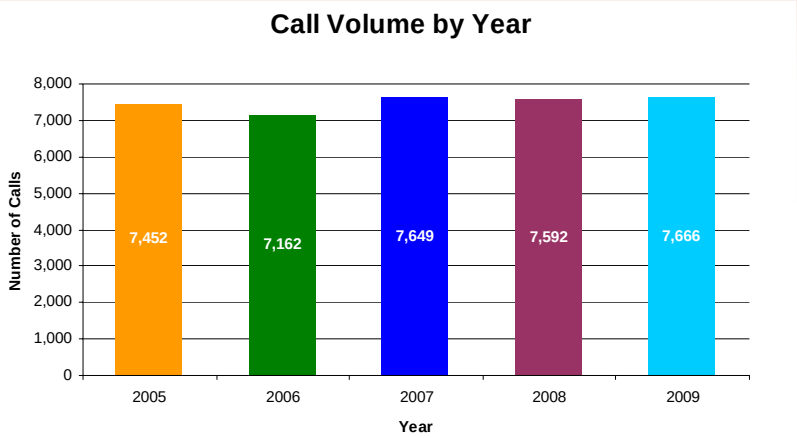
- Full Time Fire Service
- Eight existing fire stations
- Station 99 planned for opening in 2011

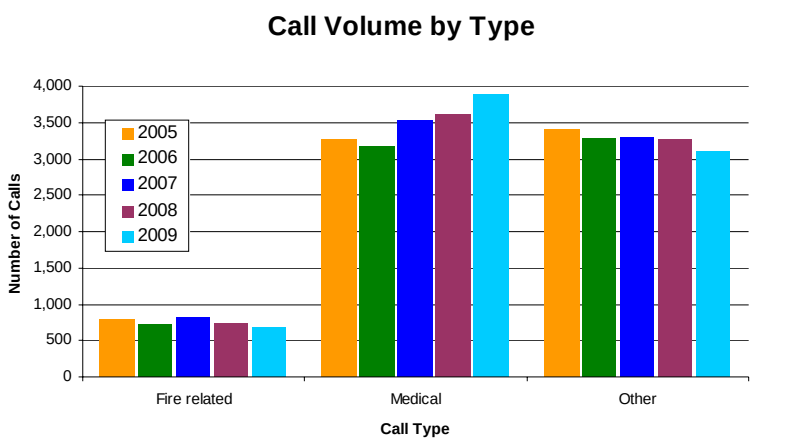
Mission Statement:

"Markham Fire & Emergency Services is committed to providing the highest level of life safety and property protection to those who live, work or play in our community. We will perform in a sensitive and caring manner, through the provision of excellent preventative, educational and emergency services."

Markham Fire and Emergency Services
Master Fire Plan

RESPONSE STATISTICS





DIVISIONAL REVIEWS

FIRE SUPPRESSION DIVISION

- Strong corporate support for asset management
- NFPA performance targets
- Opportunity to improve and expand risk based response
- Recommend separate, ventilated bunker gear storage in all stations
- Stations in good repair / well equipped
- Fire stations have accessible front entrance, for public safety
- Fitness program and equipment available to staff

ADMINISTRATION DIVISION

- Experienced historic turnover
- Administration role alignment and long-term direction of MFES
- Additional management positions / roles
- Additional administrative support and succession planning
- Organizational review of administrative support
- Space Needs Assessment for growth of division and MFES
- Review Committee to conduct annual reviews of Standard Operating Guidelines

Markham Fire and Emergency Services
Master Fire Plan

NON-SUPPRESSION SERVICES

FIRE PREVENTION AND PUBLIC EDUCATION DIVISION

- Division is proactive and effective overall
- Consider formal "Community-Based Fire Protection Model" Approach
- Clear commitment to Prevention and Education
- Innovative public education methods for diverse community
- MFES use of Amanda program is a model for other fire departments
- Division completes post-fire education (After the Fire Program)
- Perform fire investigations

TRAINING DIVISION

- Chief Training Officer and 4 Training Officers
- Requirement and opportunity for Training Facility
- Request equivalency review from OFM
- Opportunity to target career and succession planning with Company Officer Training Program
- Markham Learn Centre Project – opportunity to integrate training with Corporate initiative

COMMUNICATIONS DIVISION

- Develop architecture and technology plan to outline technology linkages, standards, upgrade options and directions, backup / redundancy procedures, and maintenance.
- Install redundant / fail over server systems for the CAD / AVL / RMS applications at designated location
- Upgrade or replace the current ENROUTE CAD / AVL / RMS system
- Address succession planning to support current and future IT systems
- Continue upgrade CAD/AVL functionality on fire trucks to include integrated mapping and reporting and real time links to central systems.

APPARATUS & EQUIPMENT

- Corporate Fleet Management and replacement program is effective and working well
- Maintain fleet reserve strategy
- Opportunity for new maintenance facility
- Consider apprentice position for growth and succession planning
- Fleet growth over previous decade and projected future growth
- Small equipment maintenance demands grown
- Good use of Asset management plan and life cycle planning

Markham Fire and Emergency Services
Master Fire Plan

DILLON CONSULTING

NEXT STEPS

- Consider stakeholder and public feedback
- Finalize divisional assessments
- Finalize recommendations, implementation plan and draft report
- Present Draft Master Fire Plan to Steering Committee

Public Input:

- *Are you satisfied with the level of service provided?*
- *Are there specific concerns related to Fire and Emergency Services?*
- *Are there ways that service delivery could be improved?*

WE THANK YOU FOR YOUR PARTICIPATION

Please fill in a comment sheet provided and place in the box on the table or fax / email your comments on or before December 17, 2010.