Date: December 9, 2016

SPECIAL COMMISSION ON UTILITY & MUNICIPAL COORDINATION
REPORT TO THE GENERAL COURT

PREFACE

To The Honorable Members of the Massachusetts General Court:

The Special Commission on Utility & Municipal Coordination ("Special Commission"), acting under the authority of Chapter 259 of the Acts of 2014, Section 61 ("Section 61") is pleased to present to you its final Report.

The Massachusetts General Court enacted Section 61 and established the Special Commission to investigate and study ways to improve coordination among utility providers and municipalities to reduce unnecessary or duplicative roadway construction related to underground utilities. Widespread concern over the cost of uncoordinated underground utility work and incidents where municipalities repave a road only to have the new surface reopened shortly thereafter to further repair an underground utility prompted the enactment of Section 61. The Special Commission was charged with determining the extent of the problem, identifying best practices and management systems to minimize the problem, and recommending approaches for improving coordination among underground utility providers and municipalities.

In furtherance of its statutory mandate, the Special Commission held a series of public meetings to collect information, solicit input from key stakeholders and the public, identify and discuss issues and solutions, and develop best practices and recommendations. The Special Commission's meeting minutes are attached as Appendix A.

The Special Commission would like to thank the following groups and individuals for their participation and input into this Report:

- *The cities and towns of Acton, Bedford, Beverly, Boston, Brookline, Burlington, Cambridge, Everett, Framingham, Lawrence, Leominster, Lexington, Lowell, Medford, Natick, Needham, New Bedford, Plymouth, Springfield, Walpole, West Springfield, Westborough, Woburn, and Worcester*
- *Boston Water and Sewer Commission*
- *Steve Bryant, President, Columbia Gas of Massachusetts*
- *Mark Cardarelli, Supervisor of Utility Compliance and Coordination, Boston Public Works Department*
- *Columbia Gas of Massachusetts*
- *Eversource Energy*
- *Michael Kinson, Boston Public Works Department*
- *Erica Kreuter, Director, MassWorks Program, Executive Office of Housing and Economic Development*
- *Massachusetts Department of Environmental Protection*
- *Massachusetts Department of Public Utilities*
- *Massachusetts Department of Transportation*

- *Massachusetts Municipal Association*
- *Massachusetts Water Works Association*
- *Metropolitan Area Planning Council*
- *The Middlesex 3 Coalition*
- *National Grid*
- *Representative Carolyn C. Dykema*
- *Senator James B. Eldridge*
- *Paul Taylor, Senior Data Processor Systems Analyst, Boston Public Works Department*
- *Nathaniel Thomas, Executive Office of Housing and Economic Development*
- *Utility Contractors Association of New England*

Using the information received from stakeholders, the general public, and Special Commission members with subject matter expertise, the Special Commission finds that improved and formalized coordination among underground utility providers and municipalities will minimize the issues that prompted the enactment of Section 61. By improving coordination among private and public utility owners, various underground utilities may be simultaneously replaced or upgraded while reducing unnecessary or duplicative roadway construction, achieving significant cost savings, and minimizing disruptions to the public.

The Report that follows sets forth a collection of best management practices that the Special Commission believes will improve the coordination of underground construction work. The Special Commission recommends that each municipality and utility develop multi-year capital improvement plans and establish regular planning meetings where this information, as well as maps, records, and drawings, can be shared and reviewed by the stakeholders. Municipalities and utilities should establish designated coordinators to serve as the point person for managing planning and coordination on behalf of their respective organizations. Utilities and municipalities should clearly identify the points of contact for coordination on their respective websites. And finally, municipalities should explore developing or procuring technology solutions to facilitate permitting and the coordination of underground utility work.

The Special Commission hopes that this Report will be a valuable guide to underground utility providers and municipalities. The Special Commission recognizes that every city, town, and private utility company is different and that there is no one-size-fits-all solution. As a result, each municipality and utility should determine which solutions best fit their individual needs and circumstances. By adopting, tailoring, or further developing these best practices, municipalities and utilities can save significant time and money, reduce inconvenience, drive economic growth, and better serve the public.

Respectfully submitted,

The Special Commission:

Angela M. O'Connor, Department of Public Utilities (Chair)
Eric Bourassa, Metropolitan Area Planning Council

Michael Lenihan, Utility Contractors Association of New England
Guy Rezendes, Massachusetts Department of Transportation
Steven McCurdy, Department of Environmental Protection
John P. Sullivan, Boston Water and Sewer Commission
Diane Stokes, Massachusetts Water Works Association
Eric Johnson, Massachusetts Municipal Association
Amy Smith, National Grid

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I. INTRODUCTION

A. Legislative Authority

On August 6, 2014, An Act Improving Drinking Water and Wastewater Infrastructure, Chapter 259 of the Acts of 2014, was signed into law. Chapter 259, Section 61 ("Section 61") established the Special Commission on Utility & Municipal Coordination ("Special Commission") to investigate and study ways to improve coordination among utility providers and municipalities to reduce unnecessary or duplicative roadway construction related to underground utilities. See Appendix B – Section 61. Section 61 also requires the Special Commission to report the results of its investigation to the General Court as well as its recommendations, if any, together with drafts of legislation necessary to put its recommendations into effect.

The appointed members of the Special Commission are as follows:

Special Commission Member	Organization Represented	Appointed By
Angela M. O'Connor	Department of Public Utilities	----
Eric Bourassa	Metropolitan Area Planning Council	Senate President
Michael Lenihan	Utility Contractors Association of New England	Senate President
Guy Rezendes	Massachusetts Department of Transportation	Governor
Steven McCurdy	Department of Environmental Protection	Governor
John P. Sullivan	Boston Water & Sewer Commission	Governor
Diane Stokes	Massachusetts Water Works Association	Governor
Eric Johnson	Massachusetts Municipal Association	Governor
Amy Smith	Gas Utility (National Grid)	Governor

B. Investigation Process

The Special Commission convened its appointed members on March 2, 2016.[1] At that meeting, the Special Commission reviewed its charge under Section 61 and discussed the issues it is tasked with addressing as well as the root causes of poor coordination and unnecessary or duplicative roadway construction. In addition, the Special Commission began to identify potential best practices that municipalities and utilities could implement to address these issues.

Separate from but related to the activities undertaken by the Special Commission, the Department of Public Utilities ("Department") hosted a workshop on April 27, 2016 that brought together the Massachusetts Executive Office of Housing and Economic Development, municipalities, and utilities, to discuss the processes for interconnecting gas and electric services, the opportunities for expediting interconnections, and the opportunities for better utility–municipal coordination. This was a unique opportunity; it may have been the first time these groups were able to meet and share their perspectives while also acknowledging the challenges and concerns regarding interconnection issues. A total of 24 cities and towns from across the Commonwealth were represented at this workshop, along with National Grid, Eversource Energy, and Columbia Gas of Massachusetts ("Columbia Gas"). The workshop provided the Special Commission with valuable information and insight into the different perspectives. A summary of the issues, concerns, and possible solutions expressed at the

[1] On February 19, 2016, the Special Commission informed the Legislature of the appointed members of the Special Commission, and of the Special Commission's intent to file its report by December 31, 2016. See Appendix C – Special Commission Letter to the Legislature (February 19, 2016).

workshop was provided to the Special Commission and is attached as Appendix D – Interconnection Workshop Summary.

The Special Commission met again on April 29, 2016. At this meeting, Mark Cardarelli from the Boston Public Works Department ("Boston PWD") presented a detailed overview of the City of Boston Utility Coordination Software ("COBUCS"). The COBUCS system is a centralized database to coordinate all construction work on city-owned streets, cross-reference planned work and maintenance, and reduce conflicts among ongoing projects. The Special Commission identified tools such as COBUCS as a possible best practice to address coordination issues. The benefits, limitations, and applicability of using COBUCS or similar programs to address coordination issues are discussed in Section III.G below.

The Special Commission held its next meeting on June 1, 2016. At this meeting, Steve Bryant, President of Columbia Gas discussed a paving pilot and shared-savings agreement that Columbia Gas entered into with the City of Lawrence, Massachusetts. Mr. Bryant's presentation is attached as Appendix E – Columbia Gas Presentation. The shared-savings agreement is discussed in Section IV.B below. At the June 1, 2016 meeting, the Special Commission also identified and discussed other best practices, many of which are included in this Report.

On July 20, 2016, the Special Commission asked Mark Cardarelli to present the COBUCS tool to several cities and towns from across the state. The purpose of this meeting was to gauge the level of interest in COBUCS and gather information about impediments to its widespread adoption. The meeting was also an opportunity to obtain information about the

challenges that specific municipalities face with respect to coordinating with utility providers and to hear about best practices that communities employ to address those challenges. Mr. Cardarelli's presentation is attached as Appendix F – City of Boston COBUCS Presentation.

On August 25, 2016 the Special Commission met to discuss Critical Energy Infrastructure Information ("CEII") and whether the sharing of CEII between utility providers and municipalities is necessary to improve coordination and reduce unnecessary roadway construction. The Special Commission also discussed an outline and work plan for drafting its Report and findings.

During the months of September to December 2016, the Special Commission met several times to discuss, draft, refine, and revise this Report. The Special Commission adopted this Report as final on November 30, 2016.

C. The Importance of Coordination

The Special Commission's mandate to investigate ways to improve coordination among utilities and municipalities to reduce unnecessary or duplicative roadway construction is directly influenced by the significant amount of aging utility infrastructure buried beneath the Commonwealth's streets. Aging public works infrastructure is a national concern that has been evaluated by the American Society of Civil Engineers ("ASCE") for over ten years.[2] These

[2] The ASCE has been releasing report cards for America's infrastructure every four years for over a decade, the most recent of which was released in 2013. Drinking water and wastewater infrastructure, which is critical for good public health, were given a grade of D. A significant portion of this infrastructure is piping that lies beneath public streets and also received a grade of D. See ASCE Infrastructure Report Card, http://www.infrastructurereportcard.org/ (last visited Nov. 15, 2016).

subsurface utilities are easy to ignore until there is a catastrophic failure, such as a water main break.[3] As discussed below, laws requiring the expedited replacement of aging gas infrastructure, an aging water and sewer infrastructure, and a recent uptick in new building construction due to an improving economy have increased the need to excavate and then repave or rebuild public streets. Thus, the goal should be to rebuild streets, by starting with the underground utilities and infrastructure. To accomplish this goal, effective coordination of projects between utility companies and municipalities is essential. When underground utility construction is not well coordinated, the result is otherwise preventable project delays, impacts to the surrounding community and nearby businesses, inconvenience to the traveling public, increased safety risks, damage to newly constructed roadway surfaces, duplicative paving and roadway construction, and unnecessary expenses.

Massachusetts has over 23,000 miles of natural gas mains and over 10,000 circuit miles of electric distribution lines beneath its streets. Massachusetts also has thousands of miles of municipally-owned and privately-owned underground drinking water,[4] wastewater, and stormwater pipelines, with a significant portion of these systems far past their expected useful

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[3] See Senator James B. Eldridge and Representative Carolyn C. Dykema, Our Aging Water Infrastructure is Buried, But Must Not Be Forgotten, 28 (Vol. 1) Municipal Advocate 12, 13 (2010) ("[T]he results of neglected mains are immediate and urgent, such as burst water mains.").

[4] There are an estimated 21,000 miles of water pipes in Massachusetts. Water Infrastructure Finance Commission, Massachusetts's Water Infrastructure: Toward Financial Sustainability 36 (2012).

lives.[5] This issue was extensively evaluated by the Massachusetts Water Infrastructure Finance Commission ("WIFC") and a final report that was released in 2012 estimated a funding gap of over $20 billion over the next 20 years.[6] Other important infrastructure that lies beneath public streets includes telecommunications, Internet, and broadband cables. There are also networks of underground steam pipes in some areas. These complex networks of underground infrastructure are often located in close proximity to one another, and there is considerable demand to work in a finite space.[7] In order to maintain that infrastructure and provide essential services to the public, utilities and local agencies need to excavate municipal streets and state highways. Furthermore, given the complexity of these utility systems and the number and variety of stakeholders involved, it is essential to maintain accurate record

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[5] The City of Cambridge, for example, is responsible for 250 miles of sewer and stormwater pipelines, 180 miles of water distribution system piping, and 11 miles of large diameter (30 to 63 inches) water transmission main piping. Much of this infrastructure lies beneath 125 miles of public streets. See http://www.cambridgema.gov/~/media/Files/budgetdepartment/FinancePDFs/FY17%20Adopted%20Budget.pdf (last visited Nov. 15, 2016). Note: In some communities, service lines are owned by the property owner and not the utility.

[6] The Water Infrastructure Finance Commission ("WIFC") was created by Chapter 27 of the Acts of 2009, Section 149. The funding gap includes estimates of needed capital investment, repair and replacement, operations, maintenance and debt service. See http://www.senatoreldridge.com/legislation/wifc (last visited Nov. 16, 2016).

[7] For example, the City of Boston (while at the high-end) averaged 5,155 street excavation permits a year (3,548 for planned work and 1,607 for emergencies) between 2012 and 2015. During this same time period, the City of Cambridge averaged 1,100 excavation permits annually, the majority (approximately 73 percent) of which were for private development projects, and about ten percent due to emergencies.

information of underground infrastructure and facilitate coordination among the utilities and municipalities.

Massachusetts also has one of the oldest natural gas distribution systems in the United States. In 2014, the Legislature passed an Act related to natural gas leaks, St. 2014, c. 149 (the "Gas Leak Act"). The Gas Leak Act authorized gas companies to accelerate the replacement of the state's aging gas infrastructure. Pursuant to the Gas Leak Act, seven gas companies proposed Gas System Enhancement Plans ("GSEPs") to replace all their aging gas infrastructure.[8] The Department reviewed and approved these programs on April 30, 2015. As a result, an unprecedented amount of gas pipe will be replaced over the next two decades.

Despite the challenges presented by the increased volume of replacements under the GSEPs, there is a unique opportunity for municipalities and gas companies to schedule a predictable stream of public and private utility work because GSEP jobs are planned in advance. Ideally, municipalities would schedule aging water and sewer infrastructure replacement to coincide with GSEP work and then reconstruct and repave the roadway after all work is complete. However, many municipalities do not have the funding or resources to keep pace with the gas infrastructure replacements under the GSEPs. In addition, less predictable work in the field, such as emergency repairs, replacements, and new service interconnections,

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[8] The Berkshire Gas Company, Columbia Gas, Fitchburg Gas and Electric Light Company, Liberty Utilities, and National Grid's Boston Gas Company and Colonial Gas Company received approval for replacement under a 20-year timeframe. Eversource Energy's NSTAR Gas entity received approval to replace its aging natural gas infrastructure over a 25-year period. Municipal gas and light departments are not eligible to participate in the GSEP program.

further complicates coordination efforts between municipalities and utilities. Therefore, it is imperative that municipalities and utilities take advantage of every opportunity to coordinate their work.

The Commonwealth is also experiencing a building boom in the residential and commercial real estate markets. At the end of 2015, an estimated $7 billion worth of construction was underway in the City of Boston alone.[9] This new construction means more demand for natural gas, electricity, water, wastewater, stormwater, cable, and telecommunications. Coordination of utility work and the cooperation of planning boards in notifying all relevant parties of the planned new construction, are essential for ensuring that economic growth is not inhibited by an inability to deliver new infrastructure quickly and safely.

The significant amount of utility infrastructure below ground, combined with the aggressive replacement of aging infrastructure and a construction boom, results in a high volume of requests to excavate city and town streets. These streets are valuable public assets that local governments and the state hold in trust for the citizenry, and utility pavement cuts decrease the useful life of these assets. In addition, construction work in the public ways can adversely affect the economy by disrupting traffic flow, limiting access to local businesses, and negatively impacting residents who live in proximity to construction work sites by creating noise, vibration, dust, and parking and property access issues. Finally, it is a waste of money

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[9] NECN Business, http://www.necn.com/news/business/Celebrating-Bostons-Building-Boom-328126461.html (last visited Oct. 24, 2016).

and resources to unnecessarily excavate streets due to poor communication and coordination. Therefore, it is in the public interest for utilities, municipalities, and the Commonwealth to minimize street cuts and reduce unnecessary roadway construction by improving coordination, beginning in the planning phase and continuing through the engineering design, public bidding, and construction phases of underground utility projects.

After concluding its investigation, the Special Commission recommends a variety of best practices in this Report that would improve coordination and reduce unnecessary roadway construction. The Report is organized into three main sections. The first section of the Report identifies barriers and constraints to effective coordination between municipalities and utility providers. The second section offers a selection of best practices to address these barriers and improve coordination. Finally, the third section recommends methods for implementing the recommended best practices, including potential funding and legislative solutions.

II. BARRIERS TO EFFECTIVE COORDINATION

A. Introduction

The Special Commission's investigation identified several barriers to effective coordination between utility providers and municipalities. These barriers generally fall into four categories: (1) Resource Constraints; (2) Process Constraints; (3) Information Constraints; and (4) Organizational Constraints. Despite some overlap of issues, categorizing the barriers into one of these four constraints provides a useful framework for the discussion and identification of ways in which best practices will address those constraints.

Every utility provider is different and, due to the size of some municipalities and the extent of their underground infrastructure, the barriers and constraints discussed below may not apply to all municipalities and utility companies. In fact, some of these barriers may have already been addressed by particular companies and municipalities. Nevertheless, the Special Commission finds that the following barriers are present for many utilities and municipalities.

B. Resource Constraints

A resource constraint generally exists when a municipality or utility cannot keep up with demand. In the utility-municipal coordination context, resource constraints may be a lack of experienced staff or financial resources needed to efficiently plan, schedule, and manage the number of underground construction projects. Insufficient staffing and/or funding makes it difficult for municipalities or utilities to effectively coordinate on planned or unplanned projects. Furthermore, public works construction projects are challenging, and having properly trained staff and the organizational structure to support that staff is critical. For example, the Town of Framingham reorganized and expanded its Engineering Department in 2009 to dedicate experienced staff to planning, designing, and constructing underground utility and roadway projects.[10] The City of Somerville has similarly reorganized.[11]

In many towns, decisions regarding street work are made by one department; in very small towns, these decisions are made by one individual (i.e., the municipality's Department of

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[10] See http://www.framinghamma.gov/140/Capital-Improvement-Program (last visited Nov. 16, 2016).

[11] See http://www.somervillema.gov/departments/capital-projects-and-planning (last visited Nov. 16, 2016).

Public Works Director). While there are benefits to having a single point of contact to coordinate all the work, it can also be limiting if that individual has several other duties and responsibilities. A lack of staff resources to manage the volume of underground construction requests can create a bottleneck, and opportunities to coordinate street openings and infrastructure replacement or maintenance among multiple parties can be lost. Furthermore, although a number of municipalities would prefer to upgrade their aging infrastructure (i.e., water, wastewater, and stormwater utilities) in conjunction with the GSEP programs, many times there is a lack of capital improvement funds that would allow for simultaneous infrastructure improvements.

C. Process Constraints

A process constraint can be created by both policies and laws. As discussed below, process constraints often serve legitimate and necessary purposes but may complicate or impede coordination within and between organizations.

In order to protect newly surfaced or reconstructed streets, many cities and towns in the Commonwealth institute street-cut or excavation moratoriums for a period of time following construction. Moratorium policies on newly paved roads usually range from two to five years, but in some instances are longer, depending on the surface restoration method (i.e., mill and overlay, road reclamation, or full depth road reconstruction), and typically include an exception that allows excavation in case of emergency.[12] Generally speaking, street-cut

[12] See e.g., Town of Arlington, Department of Public Works, Street Occupancy & Trench Permitting Regulations 19 (Feb. 27, 2013) ("Any person making excavations in streets must guarantee their permanent restoration work for a period of two years from the

moratoriums provide cities and towns with the ability to protect street pavement integrity and minimize disruptions to traffic flow as well as inconvenience to the public and local businesses. However, street-cut moratoriums do not address the underlying problems of aging infrastructure and inadequate planning and coordination. In the event of an emergency (e.g., a water main break), a portion of a street must be cut to repair the damaged utility and any surrounding damage caused by the emergency, regardless of whether or not there is a street-cut moratorium. Improved coordination prior to street resurfacing could reduce these unplanned excavations in newly paved roads.

It is also significant that the 351 cities and towns in Massachusetts do not have consistent moratorium policies and timeframes. This patchwork of policies increases the complexity of project planning by requiring utilities to keep track of, and adhere to many different policies. In addition, because a contractor or utility may divert resources to another project that extends past a moratorium period, necessary utility work beneath the street subject to a moratorium may be delayed for longer than the moratorium period. As a result, a moratorium may negatively affect infrastructure repair and upgrades for a significant period of time. In view of these challenges, the Special Commission suggests that more uniformity in moratorium policies would simplify project planning. Therefore, the Special Commission recommends that municipalities explore drafting a model moratorium policy in the context of a

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date of acceptance of the permanent restoration by the Engineer."); Town of Norton Massachusetts, Road Moratorium, http://www.nortonma.org/highway-department/pages/road-moratorium (prohibits street-cutting on newly constructed or re-constructed pavement less than five years old except in cases of emergencies).

regional planning agency,[13] a municipal association, or other similar group (e.g., Metropolitan Area Planning Council, Massachusetts Municipal Association, the Middlesex 3 Coalition, etc.).

Another key barrier to coordination stems from the permitting processes in some cities and towns. In certain municipalities, the permitting process for street excavation projects can be lengthy and unpredictable, as it involves multiple meetings, public hearings, and approvals from different departments. There is also considerable variability in the permitting process from municipality to municipality. Some municipalities employ a paper-based system that is largely manual, while others have electronic permitting. This variability and complexity makes the scheduling of projects very challenging and limits the pace of infrastructure repair, replacement, and upgrades.

The procurement and contracting procedures required by Massachusetts law create a process that protects the public but that inhibits the ability of municipalities to quickly complete projects due to its length and complexity.[14] Massachusetts law requires a lengthy advertising and bidding process for "horizontal" public construction projects, such as the repair of roads, water mains, and sewers.[15] As a result, it is challenging for municipalities to coordinate the work with a private utility company that is not bound by public construction laws and can

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13 There are thirteen regional planning agencies in Massachusetts. http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/rpas.html.

14 See G.L. c. 30, §39M; G.L. c. 30B. See generally G.L. c. 149.

15 G.L. c. 30, §39M.

move more quickly on capital projects. While the Special Commission does not recommend changing public procurement and construction laws, this process constraint highlights the importance of improving coordination and providing sufficient advance notice of projects, so the municipalities and utilities can synchronize their infrastructure work whenever possible.

An additional process constraint is that paving schedules are sometimes changed by the paving contractor with little to no advance notice to affected parties. These schedule changes not only harm municipalities' planning efforts but also affect utilities by reducing lead time, inhibiting their ability to conduct repair surveys, and impacting their ability to adjust gas gates,[16] valves, valve boxes, manholes, or other utility access points in the street. Furthermore, many municipal paving contracts do not provide legal recourse when paving schedules are adjusted. To address this issue, municipalities could include a minimum lead time provision in their paving contracts.

Another process constraint is that municipalities are funded on a fiscal year basis that runs from July 1st through June 30th. As a consequence, state and municipal funding generally does not line-up well with the construction season (typically April to November),

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[16] Gas gates are valves that allow the gas in a specific pipe to be turned off or on. To access the gate valves, there is a gate box that extends to the pavement surface. Before a road is repaved, the gate boxes must be raised to the new level of the street so they remain accessible when needed during an emergency or gas-company maintenance. Alternatively, if a gas gate is raised in anticipation of repaving and the contractor reschedules the work, a gas company may be forced to lower the gate box.

because government capital projects are not funded until the middle of the season.[17] Local governments also rely on the state's Chapter 90 program for reimbursement of public expenditures used to improve public roadways.[18] Chapter 90 funding comes from general obligation bond issuances and is provided to cities and towns at the beginning of the fiscal year. Similar to the fiscal year versus construction season issue, the timing of Chapter 90 funding does not coincide with the construction season, and this can make planning and coordinating utility projects a challenge. Moreover, to the extent that Chapter 90 authorizations are delayed, cities and towns can fall behind in the bidding and procurement process, which further impacts coordination. Finally, with the increased level of municipal and utility construction, availability of police details is an emerging issue that must be addressed.

D. Information Constraints

Coordination between utilities and municipalities is impossible without effective communication and the accurate exchange of information. There are currently gaps in communication and information flow between utilities and municipalities that lead to increased street cuts and unnecessary or duplicative roadway construction. The Special Commission notes that, by law, municipalities must notify the gas company with sufficient lead time when

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[17] Generally speaking, paving work cannot be done in the winter because materials cannot be properly laid owing to the moisture and cold. Thus, most paving plants do not operate during the winter months.

[18] See G.L. c. 90 (creating a program to reimburse cities and towns for capital improvement projects on public roadways).

undertaking significant projects that expose confirmed natural gas infrastructure to allow time to survey the area for gas leaks.[19] Nonetheless, gas companies have reported that they are not always given advance notice when municipalities open up their streets to perform work on municipal infrastructure (e.g., sewers, water lines, street lights, etc.). While utility companies will be notified of excavation plans pursuant to the Massachusetts DigSafe statute and regulations, the notification often occurs less than 30 days before construction begins.[20]

Similarly, although the GSEP programs require gas utilities to provide three-year rolling capital improvement plans, municipalities have reported that they are often not furnished with advance notice (i.e., more than one year) of a utility's infrastructure replacement plans. This lack of communication and failure to exchange information eliminates a valuable opportunity for utility companies and municipalities to coordinate the repair or replacement of infrastructure while a street is open for work prior to resurfacing. In addition,

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[19] Chapter 149 of the Acts of 2014, § 2 (codified as amended at G.L. c. 164, § 144(c)).

[20] The Massachusetts DigSafe statute and regulations require every natural gas pipeline company, petroleum or petroleum products pipeline company, public utility company, cable television company, municipal utility company or department that supplies gas, electricity, telephone, communication or cable television services or private water companies within the city or town to comply with the excavation notice, premarking and marking, and excavation requirements. G.L. c. 82, §§ 40 – 40E; G.L. c. 164, § 76D; 220 C.M.R. § 99.00. Thus, prior to digging, a DigSafe notification must be made at least 72 hours in advance (not including weekends and holidays). When the location is cleared, a DigSafe ticket number will be issued. Municipalities require DigSafe ticket numbers on excavation and trench permit applications. Municipal water and sewer departments are not required to, but may voluntarily comply with the Dig Safe requirements.

the lack of coordination may result in cast-iron natural gas pipe encroachment issues that require the utilities to reopen a street and replace pipe after work has been completed.[21]

In addition, both utility companies and municipalities have reported that they do not always know the location of the other party's existing infrastructure. In some instances, stakeholders have not exchanged any information (e.g., drawings) about the locations of existing infrastructure. In other cases, infrastructure was installed 100 or more years ago, and the facilities are not clearly identified or marked on record drawings. Also, some of the state's private utility companies have either acquired or merged with several smaller utilities that may not have maintained good records of their infrastructure. In each case, this lack of quality information can result in the discovery of unexpected infrastructure after a capital project has already begun. For example, a gas or electric company may open a street and find abandoned (out-of-service) water mains that were not clearly marked on any drawings or discover facilities that have been built on top of or encasing utility pipe and conduit.

The lack of reliable information in the planning phase may require a project to be redesigned or relocated, resulting in much longer disruptions to the public way and increased costs. Shared knowledge in advance of construction work regarding the location, depth, age,

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[21] "Cast-iron pipe, eight inches or less in nominal diameter, that is exposed and undermined by a trench crossing the pipeline shall be replaced immediately: (a) When there is less than 24 inches of cover; or (b) When there is 24 inches or more of cover and the trench widths set forth in Table 1 are exceeded." 220 CMR 113.06(1). "Cast-iron pipe eight inches or less in nominal diameter, that is adjacent to parallel excavation shall be replaced immediately, provided that the excavation exceeds eight feet in length and a condition exists as set forth in 220 CMR 113.07(2), (3) or (4)." 220 CMR 113.07(1).

and other important attributes of underground infrastructure minimizes conflicts and enables stakeholders to design and engineer work around existing facilities. This, in turn, can minimize or eliminate costly delays and unnecessary excavation. However, this shared knowledge must be balanced with concerns about limiting the exchange of sensitive information for security purposes (e.g., CEII).

Private utility companies and local municipalities also may not regularly hold pre-construction meetings, progress meetings during the construction season, or field checks during construction. Furthermore, even if meetings are held, the correct attendees may not be present, or those that are invited may not attend due to staff resource constraints. Moreover, it was reported to the Special Commission that at times meetings are held without a planned agenda or any advance discussion about what materials to bring (i.e., capital plans, drawings, etc.). Consequently, poorly planned meetings result in little, if any, useful collaborative effort. In addition, utilities and municipalities often do not share or discuss their short-term (i.e., three-year) capital plans with one another. These practices discourage coordination and often lead to unnecessary roadway construction.

E. Organizational Constraints

Organizational constraints may be created by the structure of an organization or by rules and practices that limit interactions between different organizations. In many cities and towns, decisions regarding utility and paving projects are made in multiple disconnected departments. For example, permitting departments are often separate from the building division and the department of public works. In addition, some cities have a separate

redevelopment authority or traffic department. The utility companies may also have disconnected departments that do not regularly communicate. As a result, inter-organizational coordination can be inherently difficult due to the involvement of multiple parties and departments. Moreover, this structure often leads to inefficient or failed coordination because there is no oversight or accountability for the process from beginning to end (i.e., no single person is responsible for coordination as a project winds its way through each department). The lack of inter-organizational coordination also adversely affects coordination with external parties, because there is no predictability regarding the timing or status of the necessary approvals. As a result, external parties are not able to plan and schedule their capital projects with any surety. As mentioned in Section II.B., the Town of Framingham and the City of Somerville have reorganized to clearly identify a department and staff responsible for capital improvement projects.

Difficulties in finding the right contact at the utility companies and municipalities can also create coordination issues. The Special Commission discovered that stakeholders were not always able to easily identify the correct person at a municipality or utility to discuss capital projects. In addition, stakeholders report that a municipal or utility contact person can change multiple times within an organization over the course of a project. Such changes, especially when they are not communicated to outside parties, prevent stakeholders from developing relationships that are vital when it comes to coordinating projects.

III. FINDINGS AND BEST PRACTICES

A. Introduction

After concluding its investigation, the Special Commission finds that there are multiple best practices that municipalities and utilities can adopt to overcome the barriers detailed in Section II above. The Special Commission recognizes, however, that each municipality and utility is different in size, resource availability, and staffing and that some of the best practices may need to be tailored to the specific needs and capabilities of individual municipalities and utilities. Because it is the municipalities' responsibility to ensure that their streets are not subject to unnecessary and costly roadway construction, it is essential that municipalities take the lead on driving the implementation of best practices in partnership with utility providers. The Special Commission believes that municipalities can collaborate with utility companies to take control of the coordination process and reduce unnecessary roadway construction by implementing one or more of the best practices in this Report.

The Special Commission therefore recommends that each municipality and utility develop three- to five-year capital improvement plans and exchange this information at regular planning meetings. In addition, the Special Commission recommends that utilities and municipalities establish designated coordinators to manage planning and coordination, post contact information for designated coordinators on their websites, and consider including enforceable paving schedules in their paving contracts. Finally, the Special Commission recommends that municipalities explore technology solutions that may assist in the permitting and excavation clearance process.

The best practices presented below are not intended to be an exhaustive list. Thus, the Special Commission recommends that the municipalities and utilities continue to explore how to best improve coordination and reduce unnecessary or duplicative roadway construction.

B. Multi-Year Capital Improvement Plans

In order to address the information constraints (i.e., poor planning and communication, and the inaccurate identification of underground infrastructure) discussed in Section II.D above, the Special Commission recommends that both utilities and municipalities develop, at a minimum, three- to five-year capital improvement plans ("multi-year capital improvement plans").[22] The development and sharing of multi-year capital improvement plans will provide both parties with important information to assist in planning and synchronizing their construction, road resurfacing, and projects relating to infrastructure replacement and improvement.[23] The utilities could also use the multi-year capital improvement plans to inform municipalities of street locations where they do not intend to work or where they do not have facilities.

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[22] The Special Commission also recommends that all municipalities develop comprehensive asset management plans, in which a capital improvement plan is a key component. An asset management plan includes, among other things, an inventory of assets, documenting the locations of all assets (e.g., GIS maps, record drawings, etc.), an assessment of the condition of assets, a maintenance plan, a capital improvement plan, and a funding plan.

[23] The City of Cambridge, for example, has a Five Year Street & Sidewalk Reconstruction Plan that helps facilitate the coordination of projects schedules. See http://www.cambridgema.gov/theworks/ourservices/engineering/aboutengineering/fiveyearplandescription (last visited Nov. 18, 2016).

The Department has also approved each natural gas utilities' GSEP, which provides advance planning for the replacement of aging gas infrastructure. The rolling three-year capital plans in these filings provide a valuable opportunity for gas utilities to discuss and share this information with municipalities, and to coordinate projects.[24] Further, excluding emergency events, municipalities have the authority to determine when and where utilities may open streets to work on the underground infrastructure. As a result, if municipalities develop and make available their multi-year capital improvement plans, utilities and contractors would be able to coordinate their work to coincide with these plans.

However, there are concerns regarding the reliability of multi-year capital improvement plans given the difficulty in accurately identifying construction projects multiple years in advance and the range of events that could alter such a plan.[25] Thus, to the extent that utilities and municipalities develop and share their multi-year capital improvement plans, the parties reviewing the plans must recognize that project priorities and resource allocations could change throughout the term of the plan, and that these plans are not implied promises to execute work at a given date and time.

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[24] On or before October 31st of each year, the companies may submit annual GSEPs for gas pipeline replacements during the following calendar year. These filings are publicly available on the Department's website at http://web1.env.state.ma.us/DPU/FileRoom/dockets/bynumber. For example, the docket number for National Grid's 2016 GSEP is 16-GSEP-03.

[25] For example, a gas main break in a location that was not scheduled to receive updates or improvements for another five years may require resources to be diverted from scheduled projects identified in the capital improvement plan.

Based on its investigation, the Special Commission finds that the development and sharing of multi-year capital improvement plans is the first and most important step in improving coordination and reducing unnecessary roadway construction and will specifically address the information constraints (i.e., poor planning and communication, and the inaccurate identification of underground infrastructure) discussed in Section II.D, above. Thus, the Special Commission recommends that utilities and municipalities agree to develop and share multi-year capital improvement plans.[26]

C. Planning Meetings and Exchange of Information

1. Annual Planning Meetings

In order to address the information constraints (i.e., poor communication between municipalities and failure to share accurate information) and organizational constraints (i.e., disconnected departments within a utility or municipality and problems with identifying the correct points of contact) discussed in Sections II.D and E, the Special Commission recommends that, at a minimum, utilities and municipalities hold annual planning meetings to improve coordination and reduce unnecessary roadway construction. Annual planning meetings will facilitate face-to-face communication and coordination between the utilities and municipalities, allow for the in-person exchange of information, and encourage relationship building. An additional benefit of regular planning meetings is that the utilities and

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[26] The Special Commission notes that Chapter 40N of the Massachusetts General Laws sets forth a Model Water and Sewer Commission statute. In those cities and towns that adopt the statute, there is a requirement to "prepare a proposed capital improvement program for the next three succeeding fiscal years..." G.L. c. 40N, § 9(f).

municipalities will be able to compare information and provide detailed explanations that might not occur over the phone or through emails. As a result, the Special Commission recommends that annual planning meetings be used to discuss broad strategies for coordination and set the groundwork for pre-construction or project-specific coordination meetings.

The Special Commission also recommends that, to the extent necessary and practical, municipalities and utilities have more frequent and detailed planning meetings, especially during the construction season. According to a recent study by The Metropolitan Area Planning Council ("MAPC") and Home Energy Efficiency Team ("HEET"), about half of the Massachusetts municipalities surveyed have regular planning meetings with gas utility companies during the construction season.[27] The City of Cambridge, for example, has weekly planning meetings and requires attendees from all the utilities, the major universities, and large developers.[28] Similarly, the City of Worcester has monthly meetings where all utilities attend and notify each other of future plans for underground infrastructure repair and replacement.[29] These established and frequent meetings allow all the relevant parties to plan for upcoming projects and coordinate construction in a particular area, which helps decrease the likelihood of unnecessary roadway construction and duplicative street cuts.

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[27] Fixing Our Pipes – Coordinating Natural Gas Main Replacement between Local Governments and Gas Companies, at 45, *available at* http://fixourpipes.org/Fixing%20Our%20Pipes_MAPC%20HEET_10-2016-FINAL.pdf (last visited Nov. 17, 2016) [hereinafter *MAPC/HEET Study*].

[28] *MAPC/HEET Study*, at 25.

[29] *MAPC/HEET Study*, at 53.

As discussed in Section II.D, it was reported to the Special Commission that some of the planning meetings that are being held are ineffective for a number of reasons. The Special Commission recommends that all meeting attendees should understand in advance: (1) the objectives for the meeting, (2) what they should be prepared to talk about, and (3) what materials they need to bring. A meeting agenda, distributed in advance, is perhaps the most important tool in ensuring a successful and productive meeting. A sample agenda that municipalities and utilities could utilize at the annual coordination meeting is attached as Appendix G – Sample Annual Coordination Meeting Agenda. The meeting planner should ensure that all the correct attendees have been invited to the meeting and he or she must ensure that all follow-up items are recorded and later completed.

Due to the sensitive nature of some utility information, the municipalities and utilities should come to an agreement as to what information will be disseminated during the annual planning meetings. The Special Commission also recommends that municipal and utility coordinators (discussed in Section III.D below) attend each annual planning meeting. Furthermore, the Special Commission recommends that the designated municipal coordinator is in the best position to organize and chair these meetings. By this approach, a well-understood process for coordinating projects (both internally and externally) may be developed and conveyed to all impacted parties when multiple municipal departments or disconnected utility divisions are involved.

While the Special Commission encourages municipalities and utilities to meet more often than once per year and to hold pre-construction or coordination meetings on specific

projects, a minimum of one annual planning meeting will encourage an open dialogue and exchange of information, improve coordination, and reduce unnecessary roadway construction. The Special Commission further recommends that subsequent to any emergency repair work, the affected utility and municipality circle back to discuss whether that emergency repair has caused a change or adjustment to the long-term capital plans in the area of the repair.

2. Exchange of Information

In order to address the gaps in communication and information flow identified in Section II.D above, the Special Commission recommends that utilities and municipalities collaboratively review capital plans and infrastructure maps/drawings, to extent practicable, at annual planning meetings and throughout the normal course of project planning.

The planning information and maps shared by the utilities and municipalities should include details regarding future construction plans and accurate, timely, and appropriate information on existing infrastructure, and they should be periodically updated with as-built drawings. This will enable the parties to collaboratively identify inconsistencies, determine which information is the most accurate, and update their maps to reflect that information. A dialogue and exchange of information of this sort benefits all parties by decreasing the likelihood of project delays and accidents, and it will save money for the taxpayers and utility ratepayers.

In addition, to the extent that municipalities and utilities have agreed to share their multi-year capital improvement plans, attendees at the planning meetings should review these documents and provide any additional information regarding their plans for construction, road

resurfacing, or utility infrastructure replacement. Utility and municipal planners will be able to better coordinate schedules and align projects if they review multi-year plans together and discuss them in person. When new projects are commenced, there needs to be a commitment from all parties to ensure that accurate information on all underground infrastructure is shared and disclosed. Further, municipalities should provide continual updates on streets under moratoriums, including which streets have been added to the moratorium list and which streets are no longer subject to paving moratoriums. The City of Melrose, for example, has established a successful coordination program with National Grid Gas that relies on frequent meetings (both pre- and post-construction), and the sharing of data, information, and geographic information systems ("GIS") infrastructure maps.[30] These coordination efforts benefit the City of Melrose and National Grid Gas, increase the efficient replacement of underground infrastructure, avoid project delays, and reduce unnecessary or duplicative roadway construction.[31]

However, reviewing utility infrastructure record drawings, GIS coordinates and maps, or other potentially sensitive information, raises the issue of whether CEII will be shared and, if so, whether its dissemination is necessary for improved coordination. At its August 23, 2016 meeting, the Special Commission discussed this issue as well as whether municipalities

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30 *MAPC/HEET Study*, at 19.

31 *MAPC/HEET Study*, at 19.

have the ability to receive, store, and protect CEII.[32] The Special Commission found that the goals of improving coordination and reducing unnecessary roadway construction may be achieved without the disclosure and exchange of CEII. Therefore, the Special Commission recommends that utilities and municipalities work collaboratively to identify the type of information that qualifies as CEII and agree that such information generally will not be shared.[33] Further, the Special Commission recommends that infrastructure information not qualifying as CEII should be shared and used to improve coordination, as discussed throughout this Report.

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[32] The Legislature defines CEII as records, including but not limited to, blueprints, plans, policies, procedures and schematic drawings, which relate to internal layout and structural elements, security measures, emergency preparedness, threat or vulnerability assessments, or any other records relating to the security of safety of persons or buildings, structures, facilities, utilities, or other infrastructure located within the commonwealth, the disclosure of which, in the reasonable judgment of the record custodian, subject to review the supervisor of public records under subsection (b) of section 10 of chapter 66, is likely to jeopardize public safety. G.L. c. 4, § 7(26)(n).

[33] The Special Commission notes that there may be certain projects and coordination efforts that require sharing CEII. In these instances, the parties involved should come to an agreement as to how the information will be shared and protected. In these instances, the parties involved should come to an agreement as to how the information will be shared and protected. The Department of Public Utilities has an established protocol for how to protect CEII that may be used as a model. An entity filing CEII with the Department must: (1) physically segregate the pages containing CEII; (2) mark each page with "Contains CEII -- Do not Release"; and (3) include a statement of justification for claiming CEII.

D. Utility Construction and Paving Coordinators

1. Municipal Coordinator

As discussed in Section II.E, the Special Commission finds that road resurfacing projects and construction related to underground utilities often involve and affect multiple municipal departments, particularly in large cities and towns. These disconnected departments do not always effectively communicate or coordinate during the planning stages of construction or road resurfacing projects. As a result, the Special Commission recommends that municipalities appoint a municipal coordinator or establish a coordination office to organize its departments and manage communications with external constituents.[34] A model job description for the municipal coordinator position is attached as Appendix H.

An official municipal coordinator or coordination office would make it easy for parties to quickly identify their counterparts and coordinate construction efforts with the municipality and would help alleviate the organizational constraints discussed in Section II.E, above. Examples of cities that have embraced this approach and established offices to coordinate all city infrastructure projects include the City of Chicago (Office of Underground Coordination) and the City of Austin (Utility Location Coordination Committee).[35] Other jurisdictions have set up coordination organizations at the state and regional level.[36]

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[34] The municipal coordinator could be an entirely new position within the municipality, or it could be an added job responsibility of a current municipal employee. Similarly, the Massachusetts Department of Transportation could designate a coordinator to respond to inquiries about coordination of utilities under state roads.

[35] See City of Chicago, Office of Underground Coordination, https://www.cityofchicago.org/city/en/depts/cdot/provdrs/construction_information/svc

A municipal coordinator or coordination office would be the established point of contact for all internal and external coordination, and any road resurfacing projects or construction related to underground utilities would have to be communicated through this office. Further, in lieu of multiple employees from separate municipal departments attending the annual planning meetings discussed above, a municipal coordinator could chair the meetings and ensure that each affected municipal department is made aware of the meeting results. The Special Commission also recommends that municipal coordinators require private utility companies to attend the planning meetings and facilitate the development and sharing of multi-year capital improvements plans, discussed above.

2. Utility Coordinator

Some municipalities have reported difficulty determining with whom to coordinate paving and construction projects at the investor owned utility companies or the receipt of similar requests from different utility departments, despite each utility having designated points of contact for communication and coordination with the municipalities.[37] Private utilities are

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s/office_of_undergroundcoordination.html; City of Austin, Utility Coordination, http://www.austintexas.gov/service/utility-coordination. Notably, in 2016 the Boston Planning & Development Agency initiated a collaborative study between city government and Boston's utility companies to develop new model for integrated planning among energy, transit, water, and communications utilities. See http://www.bostonredevelopmentauthority.org/news-calendar/news-updates/2016/10/24/boston-planning-development-agency-selects-aecom-t.

[36] See e.g., Washington (http://washington-ucc.org); Oregon (http://www.ouc.net/); Georgia (http://www.gucc.com/); South Carolina (http://www.scucc.org/); North Carolina (http://www.ncucc.org/).

[37] See *MAPC/HEET Study*, at 36.

often large companies, with many differing divisions, multiple points of contact, and regular staff turnover. Consequently, it may be difficult for municipalities to identify the correct person or division at the utility to contact. Furthermore, it is important that divisions within the utility are coordinating, so that municipalities can be assured that their construction and paving plans are being shared. Therefore, the Special Commission recommends that, to the extent such a position or division does not currently exist, utilities should establish a single point of contact for municipal coordination (e.g., a community manager or municipal relations division).[38] Finally, the Special Commission recommends that the utility companies analyze their current protocol for receiving and sharing municipal construction and paving information and develop a formal protocol for improving internal coordination on municipal projects, among the company's varying divisions. By taking these steps, utilities can address the concerns regarding disconnected departments discussed in Section II.E and avoid the potential for miscommunication discussed in Section II.D, above.

E. Utility and Municipality Contact Information

Throughout its investigation, the Special Commission explored whether establishing a statewide combined utility and municipality contact database would improve coordination between the utilities and municipalities. Although a statewide contact database could facilitate coordination, the Special Commission determined that such a database was not feasible from a funding and maintenance perspective. The Special Commission found that the time and

[38] To the extent that the investor owner utilities regulated by the Department have questions about best practices and how best to coordinate with municipalities, they may contact the Department's Director of the Consumer Division or the Chief of Staff.

financial resources to establish and continually update a statewide contact database would outweigh the benefits.

Nonetheless, the Special Commission recommends that each municipality and utility post up-to-date contact information on their websites for the employees and departments or divisions responsible for coordinating construction and maintenance projects. The contact information should include email addresses and phone numbers for the primary and secondary contacts. This information should be easily accessible on each municipality and utility website and should be regularly updated to ensure that utilities, municipalities, and contractors are able to identify the contact information for their counterparts and easily coordinate construction efforts. Publishing up-to-date and easily accessible contact information will also avoid the miscommunications and delays in coordination discussed in Sections II.D and E, above.

F. Enforceable Paving Schedules

As discussed in Section II.C, many municipalities contract with private companies to complete paving projects within their jurisdiction. Many of these contracts, however, do not include enforceable paving schedules or mandatory notification requirements, which can result in delays and the reallocation of resources, further straining coordination efforts between municipalities and utilities. Thus, the Special Commission recommends that municipalities explore including language in their paving contracts to solidify paving schedules and require contractors to provide a minimum amount of notice if a paving schedule needs to be adjusted. Some municipalities have already begun including language within their paving contracts that requires a minimum amount of lead time for schedule changes. While this contractual

language would not prevent schedule changes, if it were adopted as a best practice throughout the Commonwealth, both municipalities and utilities would have plans that are more reliable and a procedure in place for when a paving schedule must be altered.

The Special Commission declines to propose a model paving contract as part of this Report in light of the concern that it may be presumed to be universally valid, even though it may not cover all the necessary terms and manage all the risks that apply to a specific set of circumstances. The Special Commission recommends that these bilateral agreements be customized for each municipality and that they be drafted with the advice of legal counsel. If however, individual municipalities see a benefit to collaborating on a model contract, then the Special Commission recommends that it be done in the context of a regional planning agency, a municipal association, or other similar group (e.g., Metropolitan Area Planning Council, Massachusetts Municipal Association, the Middlesex 3 Coalition, etc.). Further, if a model contract is pursued by a group of municipalities, then the Special Commission strongly recommends that the group seek the assistance of legal counsel.

G. Coordination Software Programs

1. Introduction

Software programs can be developed or procured to facilitate coordination between municipalities, utilities, and contractors in the planning or pre-construction process. If designed and implemented correctly, such programs allow parties to enter the location and proposed dates of future road resurfacing or reconstruction projects, cross-reference the project with existing underground infrastructure, and obtain clearance to begin construction.

Coordination software programs are most successful when linked to a municipal permitting process. As a result, the Special Commission recommends that municipalities and utilities explore implementing coordination software programs, or other technological solutions, to help improve coordination and reduce unnecessary or duplicative roadway construction. If designed and implemented correctly, a coordination software program could address many of the process constraints (i.e., streets under moratorium, manual/inefficient permitting processes, and paving schedules), organization constraints (i.e., lack of inter-organizational coordination), and information constraints (i.e., coordinating and sharing construction plans and identification of future construction sites) discussed in Sections II.C, D, and E, above.

2. City of Boston Utility Coordination Software

At the April 29th and July 20th Special Commission meetings, the City of Boston gave a presentation on COBUCS, its coordination software program.[39] See Appendix F. COBUCS is an online system used to assist the Boston PWD with the coordination of all work in the public right-of-way.[40] The goal of the system is to ensure that the final paving of the roadway takes place after all the planned utility and development work on a street is complete. COBUCS is free to use, and the Boston PWD requires any entity planning to conduct work in

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[39] Information in this Report regarding the development, implementation, and success of COBUCS was derived primarily from the City of Boston's presentation at the April 29 and July 20, 2016 Special Commission meetings, and subsequent discussion.

[40] The City of Boston also requires utilities and contractors to use plastic color-coded pavement markers to identify the company responsible for a pavement repair or patch. Use of pavement markers creates accountability by making it easy to identify the party responsible for the pavement patch, and, as a result, may help improve the quality of the work.

a City of Boston right-of-way to enter their project information into COBUCS. The City of Boston also enters its proposed road resurfacing and reconstruction plans into COBUCS, and identifies any "guaranteed streets."[41] A permit for street excavation will not be issued without an approved entry for the project in COBUCS. In addition, companies who perform major excavation work throughout the City of Boston are required to use COBUCS to review and officially clear streets proposed for resurfacing or reconstruction.[42] To date, COBUCS has helped the City of Boston avoid over 10,000 conflicts between paving and scheduled utility work, for a savings that it estimated at $30,000,000.

While COBUCS has been very successful for the City of Boston in terms of increasing coordination and reducing unnecessary roadway construction, the cost and expertise needed to develop and maintain a similar program may be too much for other, particularly smaller, municipalities. Thus, each municipality should determine whether implementing a similar coordination software solution is appropriate and feasible for their city or town.

3. Other Software Solutions

a. Geographic Information Systems

GIS is a tool that allows municipalities and utilities to map their water, sewer, gas, and other underground utilities. GIS can also be used to map planned activity on municipalities' or

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41 Guaranteed streets are streets that have recently been resurfaced and, pursuant to municipal codes or regulations, may not be cut in to for a certain number of years.

42 Clearing a street indicates that there will be no excavation cuts into the pavement for utilities, drainage, telephone, gas, electric, etc. for a minimum of five years for resurfacing candidates and ten years for reconstruction candidates.

utilities' existing infrastructure or identify the locations of future infrastructure construction. GIS is in widespread use among municipalities and has database and analytical capabilities that may be used in conjunction with spreadsheets and relational tables to visualize a project and identify infrastructure. The Special Commission recommends that municipalities and utilities continue to utilize GIS to map underground utilities, and explore different ways of using GIS to improve planning and coordination efforts.[43]

b. Spreadsheets and Relational Tables

Spreadsheets and relational tables can be used by municipalities to clear construction projects with other planned projects and existing underground utilities. This approach, while not as technologically advanced as COBUCS, may be feasible for municipalities with fiscal constraints. Implementing a clearance process using spreadsheets and relational tables requires municipalities to: (1) assign unique identifiers to all streets and intersections within a municipality; (2) develop a list of all entities who perform excavation work within the municipality; and (3) maintain a list of all active, proposed, and completed projects, including estimated timelines, completion dates, and guaranteed streets (if applicable). Next, the municipality needs to develop a query system to identify any conflicts in dates of construction, location, or guaranteed streets. After the relational tables and query system are developed, utilities or contractors can cross-reference their project with any conflicts currently entered into the relational tables. Due to the amount of upfront work and subsequent ongoing maintenance,

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[43] Note: The National Pollutant Discharge Elimination System (NPDES) MS-4 permit has specific requirements for mapping stormwater infrastructure.

spreadsheets and relational tables can be error-prone and inefficient. Nonetheless, if implemented and maintained properly, the process can provide an effective means for identifying conflicts and clearing projects.

c. Third-Party Software Programs

Municipalities may also want to explore hiring a third-party software developer or procuring a commercially available coordination software solution. The benefit of using a third-party program is that it can come ready to use or be tailored to the specific needs of the municipality. A third-party program may also include features that are not available in COBUCS, such as a tie to police and fire department services. Use of a third-party software developer, however, may cost more than internally developing the coordination software. Furthermore, coordinating a specific municipality's needs and working with the developer to provide periodic updates may be challenging, as it requires ongoing communication and may involve long-term legal and financial obligations. In order to address these resource issues, the Special Commission recommends that the legislature direct an appropriate entity to conduct a comparative review of utility coordination software/technology that is currently available to municipalities, especially smaller municipalities. Such review should include, at a minimum, an evaluation of cost, training requirements, resource-intensity, ease-of-use, functionality, and compatibility with utility information and protocols. The Special Commission further recommends that the state investigate ways to assist with bulk procurement/licensing and funding for this technology for municipalities.

4. Conclusion

While it may not be feasible for every municipality to develop or procure a system similar to COBUCS, the Special Commission finds that even a basic software program, a database, or spreadsheets and relational tables can provide municipalities and utilities with a valuable coordination tool. Therefore, the Special Commission recommends that municipalities, in conjunction with the utilities in its jurisdiction, explore technological options to address the process constraints (i.e., moratorium streets, permitting processes, and paving schedules), organization constraints (i.e., lack of inter-organizational coordination), and information constraints (i.e., coordinating and sharing construction plans and identification of future construction sites) discussed in Sections II.C, D, and E.

IV. IMPLEMENTATION OF BEST PRACTICES

A. Memorandums of Understanding

The Special Commission recommends a number of best practices in this Report (e.g., annual planning meetings and the sharing of multi-year capital improvement plans) that could be implemented using memorandums of understanding ("MOU" or "MOUs"). The Special Commission recommends that municipalities and utilities explore using an MOU, or a set of MOUs, to provide ground rules and establish protocols for improving coordination and reducing unnecessary roadway construction.

MOUs may be structured as unenforceable guidance documents where the parties agree to a set of merely aspirational goals. Alternatively, MOUs could be structured as binding legal documents that require the parties to abide by the explicit terms and conditions of the

agreement. For example, parties may consider tying financial incentives to compliance with an MOU, agreeing to cost-neutral preferences for repaving, or implementing shared-savings agreements. There are benefits and drawbacks to each type of MOU. For instance, while a guidance MOU may not be legally binding, it could be developed, agreed to, and designed to cover a wide range of topics without the oversight and extended review necessary for legally binding documents. In contrast, while legally binding MOUs may be enforceable and effectuate a more reliable set of terms and conditions, they will take a longer time to develop and may be difficult to agree upon.

Because each community is different, there will be variability in the best practice or practices that are best suited to that individual community. Therefore, the Special Commission recommends that individual municipalities and utilities draft MOUs that are specifically tailored to the particular facts and circumstances. However, the Special Commission further recommends that if a group a municipalities, especially smaller communities, wishes to pool their resources to develop a model MOU, then it would be appropriate to do so in the context of a regional planning agency, a municipal association, or other similar group (e.g., Metropolitan Area Planning Council, Massachusetts Municipal Association, the Middlesex 3 Coalition, etc.). If municipalities are pursuing legally binding MOUs, the Special Commission recommends that they seek the advice of legal counsel.

B. Shared-Savings Agreements

The Special Commission also recommends that municipalities and utilities explore the use of shared-savings agreements, either through an MOU or a traditional contract. Shared

savings agreements are the byproduct of utility and municipal coordination, and may result in significant savings for both parties.

In 2015, the City of Lawrence asked Columbia Gas to relocate one of its gas mains to accommodate the remediation of an adjacent water main. The cost to relocate the gas main would have been approximately $1.5 million, while the incremental cost to replace the City's 60-year-old water main instead of remediating it was approximately $425,000. In order to mitigate the high cost of the projects, Columbia Gas and the City of Lawrence agreed to a successful shared-savings agreement. The agreement stated that the City of Lawrence would relocate its water main while Columbia Gas could leave its gas main in place. In return, Columbia Gas would pay the City of Lawrence up to $425,000 for the water main replacement. The shared-savings agreement saved Columbia Gas approximately $1 million in gas main service costs, while allowing the City of Lawrence to upgrade a 60-year-old water main with new construction at a reduced construction cost.

The City of Lawrence example demonstrates that a shared-savings agreement is a great vehicle for implementing a coordination arrangement—specifically tailored to the needs and circumstances of the parties involved—that saves both time and money. Thus, the Special Commission recommends that municipalities and utilities explore the feasibility of using shared-savings agreements, when the circumstances are right, to improve coordination and reduce unnecessary roadway construction.

C. Funding for Best Practices

Financially constrained municipalities are less likely to adopt some of the best practices recommended by the Special Commission if these require significant financial investments. For example, purchasing or developing a coordination software solution could be very costly. Therefore, the Special Commission recommends that municipalities and utilities explore alternative funding mechanisms for implementing the recommended best practices addressed in this Report.

There are a number of existing grant and funding programs in Massachusetts that municipalities may be able to use to fund, or that could be expanded to fund, some of the best practices suggested in this Report. For example, the Community Compact Cabinet, established by the Baker-Polito Administration on January 23, 2015 to improve partnerships between municipalities and the Commonwealth, established three separate funding programs: (1) the Best Practices Program; (2) the Efficiency and Regionalization Grant Program; and (3) the IT Grant Program.[44] In addition, the Massachusetts Department of Environmental Protection oversees a $400,000 grant for water infrastructure assessment and planning.[45]

The Massachusetts Department of Transportation ("MassDOT") also has two potential means for funding or assisting municipalities in implementing the best practices recommended

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[44] See Community Compact Cabinet, http://www.mass.gov/governor/administration/groups/communitycompactcabinet/ (last visited Nov. 18, 2016).

[45] See Water Infrastructure Assessment and Planning Grants, http://www.mass.gov/eea/agencies/massdep/water/grants/water-infrastructure-assessment-and-planning-grants.html (last visited Nov. 18, 2016).

in this Report. The Complete Streets Funding Program was launched by MassDOT on February 1, 2016 and allocates $12.5 million for the first two years of the Program (i.e., fiscal years 2016 and 2017).[46] The goal of the Complete Streets Funding Program is to reward municipalities with technical assistance and construction funding when municipalities demonstrate a commitment to embedding Complete Streets in policy and practice. MassDOT also oversees the Commonwealth's Chapter 90 Program, which allocates funds to roadway projects, such as resurfacing and related work, highway construction, and preservation and improvement projects that create or extend the life of capital facilities.[47]

Another possible avenue for funding may be for the legislature to make some of the best practices set forth in this Report eligible for Chapter 90 or other funding. For example, street reservation software programs, like COBUCS, that result in demonstrable paving cost savings could be made eligible for Chapter 90 funding.

The Special Commission recognizes the financial and resource barriers to implementing some of the best practices in this Report. The grant and funding programs described above are a small sample of the potential funding sources that municipalities should explore to determine whether they could receive financial or technical assistance in implementing any of the recommended best practices. The Special Utilities Commission further recommends that to the

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[46] See Complete Streets Funding Program Guide, http://www.massdot.state.ma.us/Portals/8/docs/CompleteStreets/FundingProgramGuidance.pdf (last visited Nov. 18, 2016).

[47] See Chapter 90 Program, http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/LocalAidPrograms/Chapter90Program.aspx (last visited Nov. 18, 2016).

extent existing grant and funding programs do not accommodate the best practices identified in this Report that they be expanded or that new grants be developed.

V. CONCLUSION

The coordination issues identified in this Report have very real impacts on costs, economic growth, public safety, and the public trust. Therefore, it is in the best interest of the stakeholders involved to take steps to improve coordination. State and municipal governments are responsible for maintaining access to public ways; as a result, these entities should have the primary responsibility for managing coordination with the utility companies and eliminating unnecessary roadway construction. However, it is imperative that the utility providers be partners in the development and execution of these coordination efforts.

The Special Commission recommends a number of best practices that, if implemented, will improve coordination between utilities and municipalities and reduce unnecessary roadway construction. The Special Commission recommends that each municipality and utility develop multi-year capital improvement plans and establish regular planning meetings where this information can be updated and exchanged among stakeholders. Municipalities should also attempt, whenever possible, to upgrade or replace their underground infrastructure (e.g., aging water and sewer infrastructure) in conjunction with gas line replacements occurring through the GSEP program. Maintaining accurate record drawings of newly constructed infrastructure is also critical for the reasons discussed in this Report. The Special Commission further recommends that municipalities explore options for developing a coordination software solution that may assist in the permitting and excavation clearance process. In addition, the Special

Commission recommends that the utilities and municipalities establish designated coordinators to manage planning and coordination and provide contact information for those coordinators on their respective websites.

The best practices offered in this Report are viewed by the Special Commission as a starting point for discussion. While some of these best practices are sufficiently developed for immediate implementation, further study and development is needed before others can be achieved. Moreover, the 351 cities and towns in Massachusetts are all different, and each one must determine which best practice or practices would be best suited to the circumstances in that individual community. This will vary based on the volume of construction in the particular municipality as well as on funding, staff resources, and other factors.

The Special Commission thanks the Honorable Members of the Massachusetts General Court for the opportunity to present this Report on improving coordination among utility providers and municipalities to reduce unnecessary or duplicative roadway construction related to underground utilities.