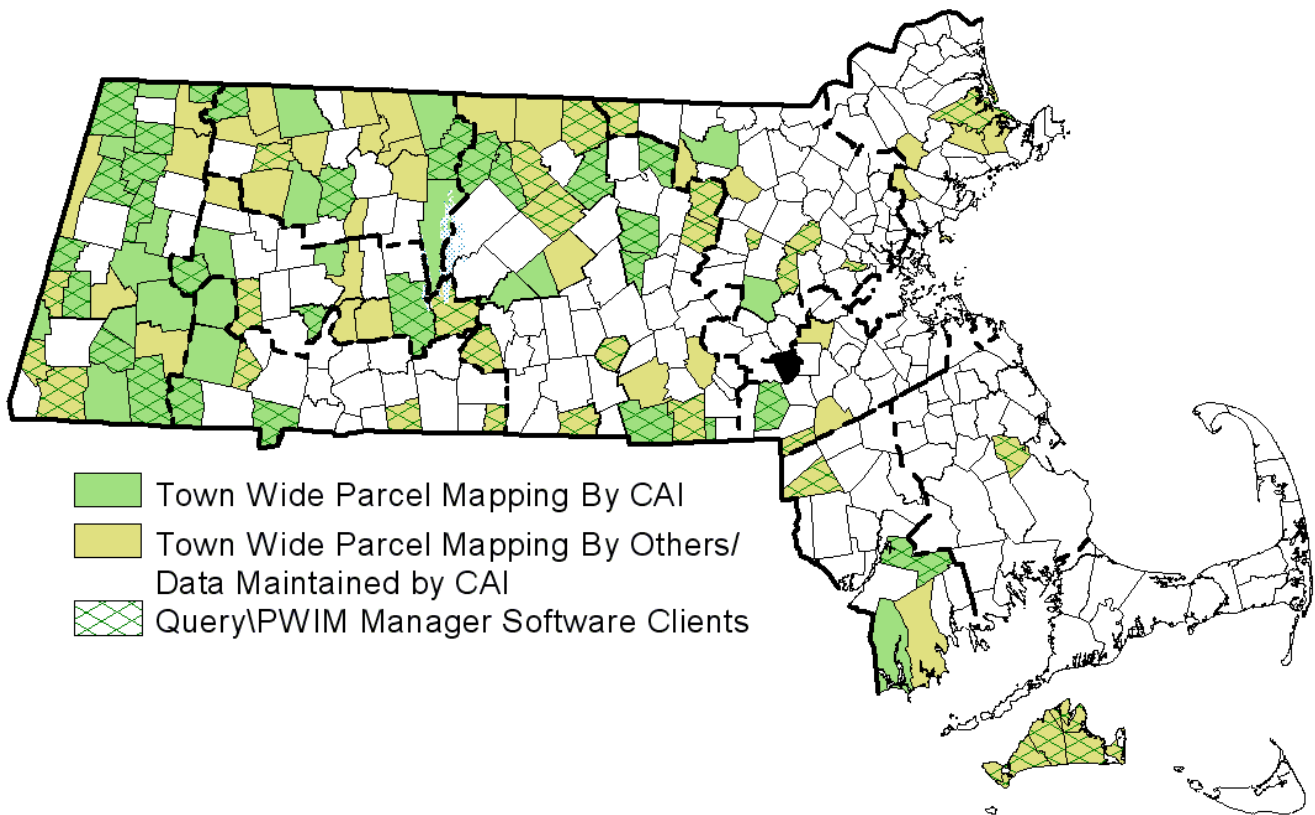# PROPOSAL FOR
GPS DATA COLLECTION AND PUBLIC WORKS INFORMATION
MANAGEMENT SYSTEM DEVELOPMENT SERVICES
FOR THE
TOWN OF MILLIS, MA

August 30, 2012

Town Wide Parcel Mapping By CAI
Town Wide Parcel Mapping By Others/
Data Maintained by CAI
Query\PWIM Manager Software Clients

CARTOGRAPHIC ASSOCIATES, INC.
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CARTOGRAPHIC ASSOCIATES, INC.

PROPOSAL FOR
GPS DATA COLLECTION AND PUBLIC WORKS INFORMATION
MANAGEMENT SYSTEM DEVELOPMENT SERVICES
FOR THE
TOWN OF MILLIS, MA

August 30, 2012

Cartographic Associates, Inc., a New Hampshire corporation with its office located at 11 Pleasant Street, in Littleton, NH 03561, hereinafter called CAI, proposes to Town of Millis, a municipal corporation located in Norfolk County, at 900 Main Street, Millis, Massachusetts 02054, hereinafter called the TOWN, to provide GPS data collection and Public Works system mapping services according to the specifications, terms, and conditions below written:

I.   PROJECT UNDERSTANDING

CAI has successfully completed several projects of similar scope and has over sixteen years experience serving the Town's mapping needs. CAI's experience and background make us uniquely qualified to successfully complete this project. As a result of this project, the TOWN will have valuable public works GIS dataset made up of highly accurate spatial data that will be incorporated into the TOWN's GIS database. This will allow for, providing that the appropriate GIS software is implemented in the future, the ability to retrieve, analyze, and maintain associated system data. Further, the data will be structured in a manner that will allow for future expansion of the TOWN's GIS.

II. SCOPE OF SERVICES

1. Public Works Data Collection, Integration, and Mapping

   The objective of this project is to GPS collect and map water, sanitary sewer and drainage system features for the TOWN as outlined below. CAI understands the importance of collecting all features in the Massachusetts State Plane Coordinate System NAD 83 format and, along with all associated attribute data, delivering in a format compatible with current industry standards.

   CAI assumes that all pertinent and necessary digital and hardcopy maps, database & spreadsheet files, plans, drawings, and data will be made accessible to us.

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Collection of all features and associated attributes will be performed using ESRI ArcGIS and Trimble GPS Analyst; a collection of software applications developed by CAI and ESRI for use with the Trimble ProXH GPS Receiver. CAI has developed a robust custom application that facilitates the capture and management of field collected data.

a. WATER SYSTEM – GPS Locate and Map Water System Features (excluding curb stops)

   Using a Trimble ProXH GPS receiver, CAI shall spatially locate all of the following water system features within the TOWN serviced area:

POINT FEATURES	LINE FEATURES
Aeration Tower	Hydrant
Air Release	Lateral
Butterfly Valve	Main
Cap	
Cistern	
Contamination Source	
Deflection	
Dry Hydrant	
Gate Valve	
Hydrant	
Hydrant Valve	
Junction	
Manhole	
Meter Pit	
Pipe Reducer	
PPR Station	
Pressure Reducing Valve	
Pump Station	
Storage Facility (Water Tank)	
Temporary	
Treatment Facility	
Unknown	
Well	

   1. CAI shall GPS collect the location of all existing water features within the TOWN. The TOWN has estimated the project area to cover forty four (44) miles.

2. The Horizontal Dilution of Precision (HDOP) setting shall be less than or equal to four (4) to ensure spatial accuracy in the field collection.

3. CAI shall work closely with the TOWN during GPS collection and attribute data input. This will include the requirement that the TOWN provides staff that will accompany CAI's field data collector and has knowledge of where all Water System features are located, as well as determining specific attributes of said features in the field. This may require multiple people and/or different staff throughout the project. Typically, the hours required for TOWN staff will coincide with the normal staff work schedule. However, CAI will coordinate with the TOWN and specific staff to determine the most effective schedule for this project.

Recommended Typical Attributes

POINT FEATURE ATTRIBUTES	LINE FEATURE ATTRIBUTES
Comment	Comment
Condition	Diameter
Cover Condition	From/To Structure ID
Cover Shape	Location Inspector
Discharge	Ownership
Flow	Pipe Condition
Location Date	Pipe ID
Location Inspector	Pipe Material
Location Method	Street/Intersecting Street
Ownership	System Identifier
Primary/Secondary Material	
Street/Intersecting Street	
Structure ID	
System Identifier	

4. All field inspection information will be linked to each GPS collected feature.

Important Note: Due to the dramatic increase in field time required for removal of man hole covers and inspection of structures, that service is not included as part of this proposal.

b. <u>SEWER SYSTEM – GPS Locate and Map Sewer System Features</u>

Using a Trimble ProXH GPS receiver, CAI shall spatially locate all of the following sewer system features within the TOWN service area:

POINT FEATURES	LINE FEATURES
Cap	Force Main
Clean Out	Lateral
D–Box	Main
Deflection	
Discharge	
Drop Inlet	
Grease Trap	
Junction	
Lagoon	
Leaching Area	
Manhole	
Other	
Pump Chamber	
Pump Station	
Pump Station Inlet	
Pump Station Outlet	
Septic Tank	
Temporary	
Tight Tank	
Treatment Building	
Unknown	

CAI shall GPS collect the location of all existing sewer features within the TOWN. The TOWN has estimated the project area to cover forty one (41) miles. Further, it is estimated that all of the sewer system is coincident with the TOWN's water system.

1. System connectivity shall be determined in the field with assistance from TOWN staff.

2. The Horizontal Dilution of Precision (HDOP) setting shall be less than or equal to four (4) to ensure spatial accuracy in the field collection.

3. CAI shall work closely with the TOWN during GPS collection and attribute data input. This will include the requirement that the TOWN provides staff that will accompany CAI's field data collector and has knowledge of where all Sewer System features are located, as

4

well as determining specific attributes of said features in the field. This may require multiple people and/or different staff throughout the project. Typically, the hours required for TOWN staff will coincide with the normal staff work schedule. However, CAI will coordinate with the TOWN and specific staff to determine the most effective schedule for this project.

Recommended Typical Attributes

POINT FEATURE ATTRIBUTES	LINE FEATURE ATTRIBUTES
Comment	Comment
Condition	Diameter
Cover Condition	From/To Structure ID
Cover Shape	Location Inspector
Discharge	Ownership
Flow	Pipe Condition
Location Date	Pipe ID
Location Inspector	Pipe Material
Location Method	Street/Intersecting Street
Ownership	System Identifier
Primary/Secondary Material	
Street/Intersecting Street	
Structure ID	
System Identifier	

4. All field inspection information will be linked to each GPS collected feature.

Important Note: Due to the dramatic increase in field time required for removal of man hole covers and inspection of structures, that service is not included as part of this proposal.

c. DRAINAGE SYSTEM – GPS Locate and Map Storm Water Drainage System Features.

Using a Trimble ProXH GPS receiver, CAI shall GPS locate the following public open and closed Drainage System features located on an estimated fifty five (55) miles of roads within the TOWN.

POINT FEATURES	LINE FEATURES
Auxiliary Catch Basin	Culvert
Cap	Lateral
Catch Basin	Main
Catch Basin with a Hood	
Catch Basin/Curb Inlet	
Catch Basin/Drop Inlet	
Clean Out	
Culvert Inlet	
Culvert Outlet	
Curb Inlet	
Dam	
Deflection	
Drop Inlet	
Dry Well	
Junction	
Manhole	
Other	
Outfall	
Pipe End Inlet	
Pipe End Outlet	
Retention Pond	
Sediment Collector	
Swale	
Temporary	
Unknown	

1. System connectivity shall be determined in the field with assistance from TOWN staff.

2. CAI shall work closely with the TOWN during GPS collection and attribute data input. This will include the requirement that the TOWN provides staff that will accompany CAI's field data collector and has knowledge of where all Storm Water System features are located, as well as determining specific attributes of said features in the field. This may require multiple people and/or different staff throughout the project. Typically, the hours required for TOWN staff will coincide with the normal staff work schedule. However, CAI will coordinate with the TOWN and specific staff to determine the most effective schedule for this project.

3. The Horizontal Dilution of Precision (HDOP) setting shall be less than or equal to four (4) to ensure spatial accuracy in the field collection.

4. All available attribute information shall be automatically attached to each corresponding GPS-located feature for ease of linking in the GIS database.

Recommended Typical Attributes

POINT FEATURE ATTRIBUTES	LINE FEATURE ATTRIBUTES
Comment	Comment
Condition	Diameter
Cover Condition	From/To Structure ID
Cover Shape	Location Inspector
Discharge	Ownership
Flow	Pipe Condition
Location Date	Pipe ID
Location Inspector	Pipe Material
Location Method	Street/Intersecting Street
Ownership	System Identifier
Primary/Secondary Material	
Street/Intersecting Street	
Structure ID	
System Identifier	

5. All field inspection information will be linked to each GPS collected feature.

Important Note: Due to the dramatic increase in field time required for removal of man hole covers and inspection of structures, that service is not included as part of this proposal.

III. TOWN RESPONSIBILITIES

1. The TOWN shall appoint a contact person to serve as project liaison between the TOWN and CAI.

2. The TOWN shall provide CAI with any requested information within fifteen (15) days of its request, as well as access to existing TOWN maps, plans, digital and/or hardcopy.

3. The TOWN shall aid CAI in GPS data locations and attribute information gathering.

4. The TOWN shall provide a vehicle and personnel, knowledgeable as to the locations of the features to be GPS located, to assist and guide the GPS crew during the data collection process.

5. In the event of delays experienced in the performance by the TOWN, the cost and timing of the project may be subject to change.

IV. PROJECT DELIVERABLES

1. CAI shall provide the TOWN with a copy of all GPS collection data, differentially corrected, in Massachusetts State Plane Coordinate System, NAD 83, including attribute data, attached to each uniquely numbered feature, in ESRI geodatabase and shapefile format on CD-ROM(s).

2. CAI shall deliver two color plots of each system mapped as part of this project.

3. CAI shall deliver a PDF formatted system map of each system mapped as part of this project.

V. ANTICIPATED PROJECT TIMING

Anticipated timing for this project is Spring through Fall 2013. Project timing contingent on acceptable weather conditions for fieldwork GPS data collection and the availability of TOWN staff to accompany CAI in the field. Typically, the hours required for TOWN staff will coincide with the normal staff work schedule. However, CAI will coordinate with the TOWN and specific staff to determine the most effective schedule for this project.

VI. COST

The cost for the GPS Data Collection, Integration and Mapping of all systems (Water, Sewer & Drainage Systems) at the same time is $26,400.00.

VII. PAYMENT

Payment shall be due within 25 days of invoicing, said invoicing to be done as follows:

1. 10% upon receipt of a duly executed contract

2. Balance shall be invoiced monthly based on the portion of work completed and reported to the TOWN.

VIII. GUARANTEE

CAI shall guarantee all deliverables generated against any errors or omissions for one (1) full year from the date of delivery. Any errors detected by the TOWN and brought to CAI's attention shall be immediately corrected at no additional cost to the TOWN. This guarantee does not include any changes due to data not made available under the terms of this proposal or any new information that is made available subsequent to the delivery date.

ADDITIONAL OPTIONAL SERVICES:

OPTION 1 – Public Works Information Management (PWIM) Desktop Software

I. Scope of Services

A. Public Works Information Management (PWIM) Desktop Software

1. CAI shall provide a copy of the PWIM Data Management Desktop software to the TOWN.

Said software shall include the following features:

a. Create and Update Structure Connectivity
This feature provides tools that allow the user to map pipes and other linear features between two existing structures. It also allows the user to change the flow direction of any existing mapped linear feature representing system connectivity (e.g. pipes, ditch lines, etc.).

b. Modify Attributes of Public Works Data
This tool provides an intuitive and effective interface for modifying and viewing public works GIS attributes. Generally, this tool allows the user to change most non-spatial attributes of both structures (e.g. Hydrants) and pipes (e.g. Water Mains).

c. Create/Manage Multiple Views of GIS Data
This feature allows the user to create and modify multiple thematic legends for all public works data. Once created, a user can view a specific GIS dataset (i.e. Drainage Catch Basins) in several preset colors and/or symbols. This feature makes it very easy for users to display the maps in different ways to facilitate management and use of the data.

d. Locating Utility Features Query
This tool provides an easy-to-use interface for selecting utility features by location and/or attribute(s). Additionally, it provides access to extended attribute information from external data that is linked to said features.

    e. Area of Interest Manager
This function allows the user to record spatial reference extents to important areas throughout the Municipality and provides a quick, convenient mechanism to return to that location. This is very useful if several projects are going on throughout the community and users of the GIS frequently need to zoom into those project areas for the generation of maps or while editing data.

    f. Theme Management Tools
Since ArcView offers very complex theme management tools; our application provides GIS users with a consolidated, comprehensive mechanism to easily manage their mapping data and its presentation. This tool allows for the setting of theme level attributes – legends, display order, visibility, active status, etc. The application also allows users to add additional mapping data to their projects.

B. GIS Software (ArcView 10.x)

    1. CAI shall provide the TOWN with one (1) licensed copy of the most current version of ArcView 10.x.

    2. The TOWN shall own the ArcView license.

C. System Installation/Training (1 Day)

    1. CAI shall install and configure the PWIM Manager software on one (1) computer in the Department of Public Works Office.

    2. CAI shall install and load spatial and attribute databases on one (1) computer in the Department of Public Works Office.

    3. CAI shall test all installation work to ensure that the PWIM Manager is installed and operating correctly.

    4. CAI shall provide on-site training in the PWIM Manager.

       CAI suggests not more than two (2) users be assigned to any one computer for the training.

    5. Training shall be in accordance with ESRI protocols and a training manual shall be delivered to each trainee.

D. User Support

    1. CAI shall provide one (1) year, unlimited telephone, fax, and e-mail support for one principal department user.

    2. Said support shall commence on the day after the first day of training.

II. TOWN Responsibilities

A. The TOWN shall designate a project liaison person who will be CAI's main contact during the course of the project, and who will be responsible for all TOWN related obligations in this contract.

B. The TOWN shall provide and authorize CAI to acquire all necessary data for the successful completion of the project. This shall be done within fifteen (15) days of its request by CAI to assure the project's timetable.

C. The TOWN shall provide functionally adequate computer hardware and peripherals for the successful operation of the PWIM Manager.

D. The TOWN shall provide office space and computers for the training portion of the program.

E. The TOWN shall maintain the most current version of the ESRI ArcView software.

III. Time of Commencement and Completion

A. CAI shall commence on the project upon receipt of a fully executed contract.

B. All work, except the on-going support and some of the system management, shall be completed within one hundred twenty (120) days of completion of the GPS data collection and system mapping project and receipt of fully executed contract.

IV. Compensation

A. The TOWN shall pay a total amount of $6,200.00 under this proposal as follows:

    1. CAI PWIM Manager Software $3,500.00
    2. Arcview 10.x Software $1,500.00
    3. Installation and Training (1 workstation) $1,200.00
    4. Telephone/Email Support (First year) $ 0.00
       ($500.00 annual support after the first year.)

B. Payment to be made as follows:

1. Ten percent (10%) upon invoicing, after execution of the contract.

2. Monthly payments based upon work reported, in progress reports, up to ninety percent (90%) of total contract amount.

3. Final ten percent (10%) upon completion of on-site installation and training.

OPTION 2 – QUERY MANAGER ONLINE

I.   Summary

### A. Query Manager Online Product Overview:

Query Manager Online is an Internet-based service for communities and businesses that want to publish their GIS online. Query Manager Online is a cost-effective option to distribute GIS data and utility to multiple staff in multiple physical locations as well as to the general public.

Query Manager Online clients pay no software fees, no annual software maintenance fees, and very low setup costs. Query Manager Online even provides the web server. By relieving most of the expense, Query Manager Online enables the people behind the data to focus on why their GIS is on the Internet in the first place.

Query Manager Online is helping communities put their parcel data online, enabling homeowners and real estate professionals to print maps from their own computers, supporting economic development projects, providing a platform for police and school collaboration, and creating a connection between TOWN government, local businesses, and communities.

B. Query Manager Online Functionality Overview:

The following image displays the typical interface that Internet users would initially see in their web browser. This interface provides easy access to all available tools and functions.
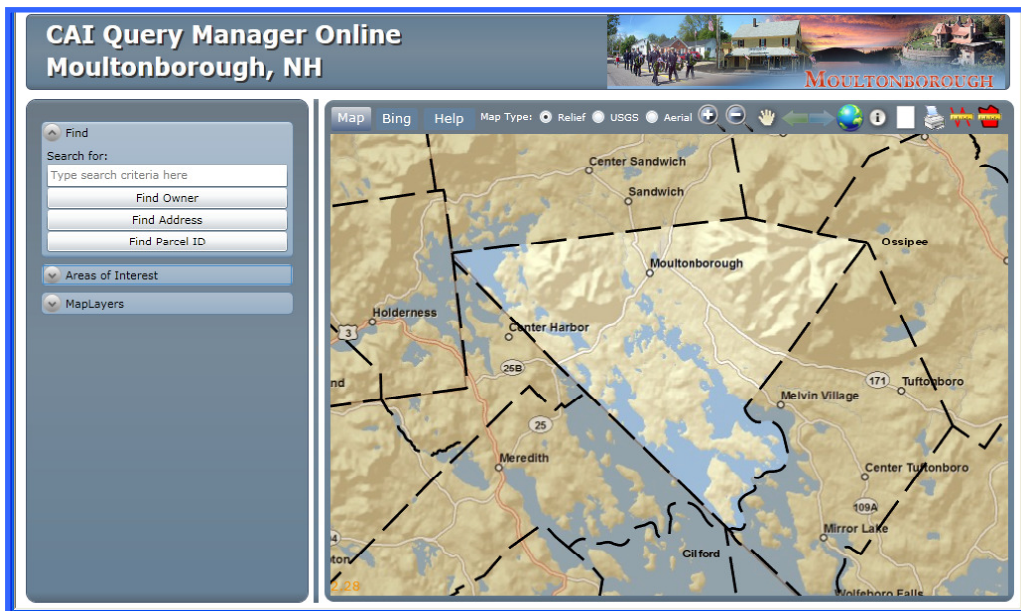
The TOWN's Query Manager Online website will include the
following tools:

Zoom-In Tool allows the user to focus on a specific, smaller
area on the map. Click and drag a rectangle surrounding the
area you want to zoom into.

Zoom-Out Tool allows the user to focus on a larger area on the
map. Click the Zoom-Out tool and then click on the map near the
center of the larger area you are interested in seeing.

Pan Tool allows the user to click and drag the view of the map
in any direction.

Zoom Previous Tool allows the user to quickly zoom to the
previous map extent.

Zoom To Full Extents Tool allows the user to quickly reset the
map view to the original map extent.

Identify Tool allows the user to click on a parcel and receive
information about that parcel. This tool is useful in receiving
ownership information.

Clear Selection Tool allows the user to clear the selected map
features(s).

Print Map Tool allows the user to generate a printable PDF map.

Measure Area Tool allows the user to click three or more
locations on the map to identify the area between clicks.

Measure Line Tool allows the user to click two or more locations
on the map to identify distances between clicks.

Find Property Function enables the
user to find parcels by owner name, by
address or by parcel identifier,
depending on the data available. The
user types the information in the
Search for dialog box and clicks the
appropriate button to execute the
search.

Find Abutters Function enables the user to select properties that are located within a specific distance to a particular property. To perform the Abutters search, the user selects the subject property then enters the search distance and clicks the select button. The map will show the selected properties and the user can generate an Abutter Report and/or Mailing Labels formatted to Avery 5160 labels by clicking the appropriate button.
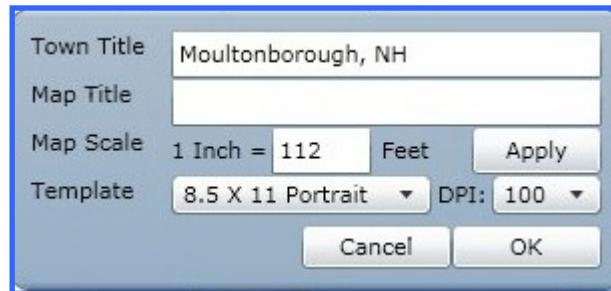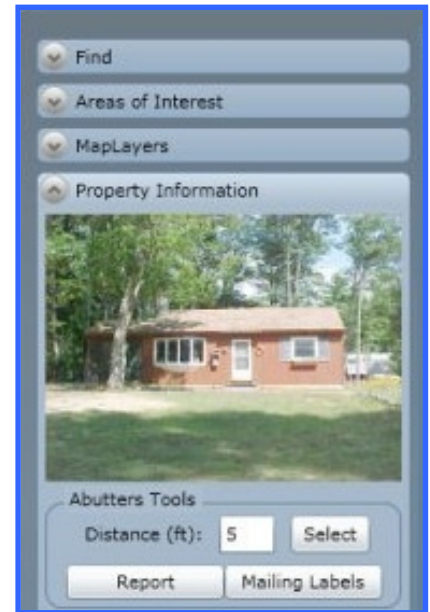
The **Map Layers** expander allows the user to turn on and off certain layers as needed. The user selects the checkbox next to individual layers to turn them on/off. The user also has the ability to access **"Quick Maps"** from the Maps Layers tab. This function provides quick and easy access to a set of predefined map layers that are already set up with display properties. The ability to utilize this function depends on the municipality's available data.
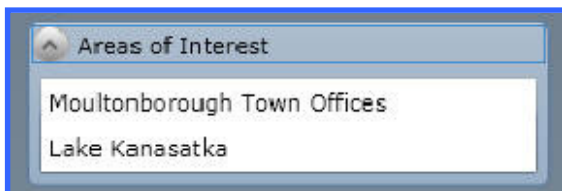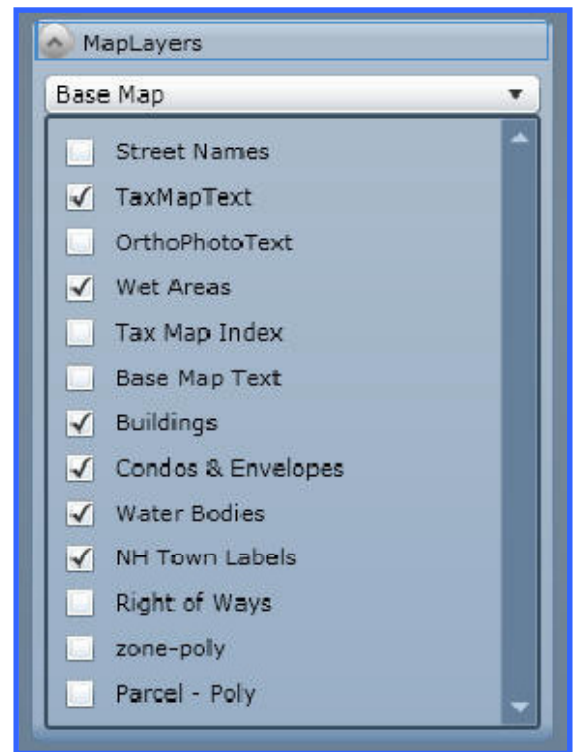
Area of Interest function provides the ability for the user to quickly zoom to an area on the map. Once the particular Area of Interest is selected, the map will refresh to that particular area of TOWN.

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There are several other notable features to Query Manager Online. These include:

- <u>Bing Maps Tab</u>: This function allow the user to access the Microsoft Bing Maps interface directly from within the Query Manager Online website.
- <u>Map Type Selector</u>: This function allows the user to select the type of background map to view in the Query Manager Online website. Depending on the map scale, the user can select a relief, USGS, Aerial or parcel background map.
- <u>Maps Printing Utility</u>: This utility allows the user to design the map prior to generating a PDF map to print or save to the local computer. The user can enter a custom map title, define the printed map scale and select the map print quality. The user also has the ability to select the map template to generate the map size of 8 1/2" X 11" or 11" x 17" with either portrait or landscape orientation.

- <u>Help Tab</u>: This window is designed to provide assistance to users while accessing the Query Manager Online website. This is an interactive website page that includes help topics for the functions within the user interface.
- <u>Building Photos & Associated Documents</u>: This function allows users the ability to access building photos and/or documents related to particular properties. This functionality depends on the available data for the TOWN, how it is stored and the data format. CAI can work with the TOWN to determine if and how this functionality can be used within the Query Manager Online application.

II. Scope of Services

A. Initial Internet/GIS Setup Services

1. CAI shall incorporate selected TOWN data into the Query Manager Online Internet application. The total size of all data to be incorporated as part of this agreement shall not exceed 40 Gigabytes. Additional memory space may be purchased for $250 per 10 gigabytes per year.

B. Publish the Town's GIS to the Internet

   1. CAI shall publish the TOWN's GIS data to the Internet.

   2. CAI shall notify the TOWN of the Internet Address (URL). This address can be added to the TOWN's web page, if appropriate, or used internally over the TOWN's Intranet.

   3. After the TOWN has been notified that the Query Manager Online application is on-line, the TOWN has thirty (30) days from the date of notification to examine the site and to request changes.

   4. All GIS data published under this project shall be accessible using the current versions of Microsoft's Internet Explorer, Firefox or Safari web browsers over cable, DSL, or T1 (or greater) internet connections.

C. GIS Data Update:

   1. CAI shall refresh the GIS data on the Query Manager Online website annually. Should the TOWN be using CAI's annual parcel map maintenance services, this refresh of the GIS data shall be preformed upon delivery of the annual map update data.

D. Attribute Data Update

   1. CAI shall design and create a Data Processing Utility for the TOWN to use for periodic upload using an export file(s) from the CAMA system to a secure online database accessed by the Query Manager Online website.

   2. It is the TOWN's responsibility to maintain the Tabular attribute data, including a database table for any records to be excluded, for use by the Query Manager Online website.

E. General Conditions

   1. CAI shall provide the Query Manager Online service to the TOWN with commercially reasonable access to an Internet-based mapping application service provider (ASP) environment through which the TOWN can access the TOWN data.

2. In order to provide the TOWN with commercially reasonable access to the ASP environment, CAI shall periodically schedule the complete or partial shutdown of the ASP Environment for maintenance, bug fixes, updates or other reasons. CAI will make commercially reasonable efforts to perform Scheduled Maintenance during off-peak hours.

F. TOWN Support

1. CAI shall provide telephone, fax, and email support services concerning Query Manager Online to the TOWN. These services can be used to answer usage and technical questions.

2. CAI shall respond to any TOWN alerts concerning poor performance or lack of performance of the site, and provide verbal advisories as to how and when the site shall be corrected (if it is determined that the website and/or publication service is not performing properly).

III. TOWN Responsibilities

A. The TOWN shall designate a project liaison who will be CAI's main contact during the course of the project, and who will be responsible for all TOWN related obligations in this project.

B. The TOWN shall provide and authorize CAI to acquire all necessary data for the successful completion of the project. In order to ensure the project timetable, authorization shall be provided within fifteen (15) days of CAI's request.

C. After the TOWN has been notified that the site is on-line, it must advise CAI of any changes, modification, and enhancements to the data available within thirty (30) days.

D. The TOWN shall maintain the tabular attribute data for the Query Manager Online website.

IV. Time of Commencement and Completion

A. CAI shall commence on the project upon receipt of a fully executed contract.

B. All setup work and initial publishing of data to the Internet, except the on-going support and Internet availability of the TOWN's GIS data, shall be completed within one hundred twenty (120) days of completion of the GPS data collection and system

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mapping project and receipt of fully executed contract.

C. Internet access to the TOWN's Query Manager Online will begin within one hundred twenty (120) days of completion of the GPS data collection and system mapping project and receipt of fully executed contract and shall conclude on the last day of the twelfth month following.

V. Cost

A. Project Set Up (one-time cost) $ 1,500.00
   Standard cost is $2500. Receive
   $1000.00 discount if completed in
   conjunction with GPS data collection
   and system mapping project.

B. Twelve (12) Months Internet Service $ 1,800.00

                                   Total Cost $ 3,300.00

VI. Payment

A. Payment shall be made to CAI within 25 days of invoicing.

B. Invoicing to be done as follows:

   Set Up Fee ($1,500.00) upon receipt of a fully executed contract.

   $1,800.00 invoiced on the first full month of Internet availability.

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