ALPHA
SURVEY GROUP

WATER & WASTEWATER

PROJECT EXPERIENCE

BETA Group/Town of Milton: Water System Improvements Project including Blue Hills and Chickatawbut Storage Tank sites, and 500 LF of Metropolitan Ave at Summit St

Alpha provided survey services for base plan preparation of three sites in Milton, MA in support of Town-wide water system improvements. Two of the sites included the area surrounding water storage tanks and the access roads to them. Both tank sites were located within the Blue Hills Reservation and required coordination with the Town of Milton and DCR for site access. GPS was utilized to reference all three sites to the Massachusetts State Plane Coordinate system (NAD 83). Due to their remote location, the two tank sites were vertically referenced to the NAVD88 utilizing GPS. The Metropolitan Ave site was referenced to the Boston City Base based on sewer invert data provided by the Town of Milton Engineering Department. Existing Conditions surveys were performed at each of the tanks to assess site conditions for tank repairs and the installation of a security fence. An existing conditions survey was performed on Metropolitan Avenue at Summit Street at the municipal boundary with the City of Boston for the citing of a proposed water pressure regulator station. Although located within a residential setting, the site contained an MWRA Meter Station including 12", 16", and 20" water lines, a BWSC 12" water main, and BWSC sewer and drain lines. Street ROW line determination was of importance, and the existing conditions survey was extended onto the abutting properties and included house locations. An existing conditions plan was prepared in AutoCAD format based on Alpha's CAD layer naming and symbology standards. The project timeline required 100% complete engineering plans approximately one month from NTP, resulting in an expedited survey schedule.

Dewberry/Massachusetts Water Resources Authority On-Call Contract: Boston Low Service, Beacon Street line 48" Water Main – Beacon Street, Brookline, MA

Alpha performed base plan preparation services in support of Dewberry's access pit design in conjunction with the MWRA's inspection of approximately 3000 LF of water main. The proposed access pits were located on Beacon Street at the intersection with St. Paul and St Mary's Streets, including the MBTA's Green Line Stations and requiring MBTA Safety Trained Personnel. The two sites consisted of 300' by 100' areas encompassing the MBTA Stations and Beacon Street. Utility research was performed with the Town of Brookline and the City of Boston (St. Mary's is located at the municipal boundary), as well as with other utility companies with utility lines in the project area. Research was also performed with the MBTA to obtain utility and ROW information with regards to the two stations. The field survey was based on survey control and existing conditions information from a parallel sewer separation project performed for the Town of Brookline, which was referenced to the Massachusetts State Plane Coordinate System (NAD83) and Boston City Base vertical datum. Alpha recovered existing survey control from the prior project and densified it as needed. With the assistance of MBTA personnel, Alpha surveyed the stations and obtained inverts on the utility structures lying within. Inverts were also obtained for gravity structures outside of the MBTA's ROW. The project deliverable consisted of an existing conditions survey prepared in AutoCAD in accordance with the MWRA's layering and symbology standards and contours, with one-foot contours and utilities compiled within the project area.

North Easton Village Sewers Design – Main, Mechanic, and numerous secondary streets, Easton, MA - Woodard & Curran/Town of Easton

Alpha performed base map preparation services in support of a sewer design project encompassing 4500 LF of roadway topographic/planimetric detail location, boundary and ROW determination. Alpha performed research with the Town of Easton Assessor and DPW Departments, the Bristol County Registry of Deeds and the utility companies servicing the area. The project was required to be established in the Massachusetts State Plane Coordinate System (NAD83) and in the NAVD88 vertical datum. Alpha utilized GPS to reference the project to the two datums and for establishing project control. An extensive traverse network was established and adjusted by use of the Least Squares method. The base mapping survey included the accumulation of topographic and planimetric data of the roadway features, houses with sill elevations, utility locations with invert elevations on gravity structures, and location of ROW and boundary monumentation.

The project encompassed a primary roadway, for which an alteration had been prepared and accepted by the Town, but which had not been voted on for acceptance by the MHD. A significant portion of the project also abutted the Old Colony RR Line, and included portions of eight minor roads. Being an older section of Town, most streets had been accepted by formal Town vote, however they lacked acceptance plans or descriptions defining the ROW. Extensive research was performed of the Town's records, as well as with other survey firms having prepared plans (recorded and unrecorded) within the project limits. The streets were compiled based on the best available recorded and unrecorded information, including the abutting RR ROW, and reconciled with the limited amount of monumentation that could be recovered within the project area.

The project actually consisted of two parts, one being the survey of a pump station site and included the preparation of a topographic site plan, and a boundary and easement plan, along with a metes and bounds description of the easement area. The second part was the preparation of the base mapping survey for the project area. The field data accumulation had been performed utilizing feature coding that resulted in the data being plotted graphically in the client's specified layering and symbology conventions. Alpha prepared a 10-sheet plan set at a scale of 1"=20 feet depicting the planimetric and topographic features, re-established ROW lines and property lines compiled from the Town's GIS parcel layer, compiled utilities, houses with sill elevations, and one-foot contours. Alpha delivered both parts of the project to the client in digital format in conformance with the clients CAD layering and symbology standards, and included an AutoCAD drawing file and TIN of the surface model.

Abbott Run Valley Estates/Lincolnshire Road Area Drainage Study & Easement Creation, North Attleborough, MA - Town of North Attleborough, MA

Alpha provided survey services in support of a drainage study of a residential section of North Attleboro known as the Abbott Run Valley Estates, which had experienced a significant flood event in July 2010. The existing system consisted of approximately 2250 linear feet of drain main and approximately 25-30 drain structures of interest within the study area. The survey was to document the location and elevation of existing structures within this system in support of an engineering evaluation of the capacity of the existing system.

The Town's GIS was of sufficient horizontal accuracy for structure location, however, there were numerous benchmarks, on unconfirmed datums, within the project area which the Town desired to have tied together for comparison purposes. A series of level runs were undertaken to tie the known benchmarks together and reference them to a benchmark established on a known datum. The GIS data was used as the basis for confirming the current configuration of the drainage system and survey control was established throughout the survey area. The location of missing structures was observed from the survey control and inverts of all structures were recorded with drain line sizes. The final CAD deliverable consisted of the field location of the drainage system structures throughout the project area superimposed on the Town's GIS data. Rim and invert elevations, and pipe sizes, were also annotated on the drawing.

Alpha subsequently performed a follow-on Task for the Client consisting of the creation/modification of drainage easements in the Lincolnshire Area. Based on the initial survey, an engineering design was created to upgrade the drainage system running through this neighborhood. The residential neighborhood was created over a span of forty plus years (1961 to 2005) and is comprised of eight individual subdivisions. For this phase of the work, Alpha utilized GPS to horizontally reference a survey control network encompassing eight streets to the NAD83. The storm drainage system had originally been extended 'cross-country' through public ways and private property at various times by the developer(s) of the individual subdivisions.

The main challenge was to mathematically re-establish the eight individual subdivisions, and a predating bisecting Public Way, as one contiguous entity, and then to reconcile the record subdivisions with the accepted street ROW monumentation located in the field. Resolving the project area as one mathematically interconnected subdivision, resulted in avoiding the creation of gaps and/or overlaps in boundary lines between the abutting subdivisions. The final project deliverable consisted of recordable easement plans and metes and bounds descriptions of the easement areas.

Proposed Wastewater Infiltration System, Elm Street, Easton, MA - Woodard & Curran/Town of Easton

Alpha provided survey services of an approximately 16.5 acre site in Easton, MA. The site consisted of primarily cultivated farm land where the proposed infiltration system was to be located. However, in addition to cultivated farm and wood land, the site was bordered by a brook and surrounded on three sides by bordering vegetated wetlands. In addition, the Town of Easton/City of Brockton Municipal boundary bisected the site, and the Town of Easton wanted assurance that the Municipal Boundary line was accurately determined so as to keep the design within, and set-back from, the bordering municipality. The property boundary lines were researched with the Town of Easton and the Bristol County Registry of Deeds to obtain copies of record deeds and plans of the site and the abutting parcels.

Alpha researched the municipal boundary lines through the MassDOT to find the original Report of the Town lines and monuments. The two closest stone monuments along this line were recovered and were over 7,000 feet from either end of the site. Utilizing GPS, Alpha established a baseline within the vicinity of each monument and one on the site. Multiple observations were taken of each of the three baseline endpoints, and the monuments were then located by conventional survey methods from the baselines. Based on these observations, the Municipal Boundary line was then re-established through the site. Elevations were then established in NAVD88 by GPS observations to control points established by Alpha for an associated project in Easton which was referenced to benchmarks with elevations published by NGS and MassDOT. Alpha then performed a conventional survey for obtaining site topography, establishing elevations on existing groundwater monitoring wells, and the location of the delineated wetlands. The data was reduced, adjusted, analyzed and plotted. Alpha prepared an existing conditions plan depicting the site topography (with one-foot contours), wetland delineation, monitoring wells and other relevant features. The boundary lines were compiled from the record information, which in this instance, was extremely vague and lacking for monumentation given the bordering wetlands. The client was provided with an AutoCAD2009 Land Desktop drawing file prepared utilizing the Client's specified CAD layering and symbology standards, and a TIN of the elevation surface. A stamped and signed hard-copy of the plan was also provided to the Client.

Sewer Line Reconstruction Ashland, MA - Haley & Ward, Inc./Town of Ashland

Alpha provided survey services for base plan preparation of over 5200 linear feet of various streets and cross-country runs in Ashland in support of the design of sewer main reconstruction. The project required confirmation of existing structures, pipe sizes, and invert elevations of the main line and did not require survey of planimetric and topographic detail, sill elevations, full utility compilation, etc. Alpha contracted with an aerial mapping firm to obtain topography of the site which was 47 acres in extent. Alpha utilized GPS to establish coordinate values in NAD83 and NAVD88 datums of the photo-control points needed by the photogrammetrist to prepare the base mapping. Alpha performed an on-the-ground survey to obtain the locations of sewer and drain structures, water and gas gates, utility poles and select pavement locations. A complete inventory, including invert elevations, and pipe sizes and material, were obtained in the field. The survey information was super-imposed onto the base mapping, and rim and invert elevations and pipe sizes were added to the drawing. The client received a set of hard-copy plans and a digital file containing the survey data and base mapping.

Sewer and Water Improvements Downtown Framingham, MA - Beta Group, Inc./Town of Framingham

Alpha provided survey services for base plan preparation of approximately 2770 linear feet of various streets in downtown Framingham in support of the design of sewer and water main improvements. Alpha expanded and densified survey control from previous projects which had been established horizontally in the Massachusetts State Plane Coordinate System (NAD83) and vertically in the National Geodetic Vertical Datum of 1929 (NGVD29). The project did not require the re-establishment of ROW lines or compilation of abutting parcel lines and underground utility lines.

A ground survey was performed to establish additional survey control and for performing the existing conditions survey. Detail was obtained within the project area including streetscape features (curblines, walks, edge of pavement, etc.), buildings and sill elevations, visible evidence of utilities, and rim and invert elevations on gravity systems. The data was obtained in conformance with MassDOT data collection and symbology standards while utilizing the Client's CAD standards.

A base map was prepared at a scale of 1inch = 20 feet consisting of the streetscape features (curblines, walks, steps, etc.), buildings with sill elevations, compilation of gravity and water lines based on field location and record information, rim and invert data on the gravity structures, and one-foot contours. The final project delivery consisted of an AutoCAD digital file of the base mapping prepared in conformance with MassDOT and Client conventions and a TIN of the surface model for the project site. In addition, Alpha delivered plans stamped and signed by a Professional Registered Land Surveyor.

Smith Street Water Main Replacement Project, North Attleborough, MA - Town of North Attleborough, MA

In response to an RFP, Alpha was awarded a contract for base map preparation of Smith Street, located in the central part of North Attleborough, beginning at an intersection with MA State Highway Route 1 and continuing southeasterly to its terminus with Mount Hope Street. The survey was extended up to 50 feet down each of ten (10) intersecting side streets along the approximately 5500 linear foot length of Smith Street. The project requirements for the base map preparation included the location with elevation of: street pavement, curbing, driveways, sidewalks, retaining walls, visible evidence of utility structures (i.e. gates, manholes, etc.) with inverts on gravity structures; water, sewer, and drain lines (all delineated by the Town), and other underground utilities as delineated by the respective utility companies, the fronts of all existing structures, and other relevant features. Although the project was specifically in support of the replacement of an existing water main, the Town required sill elevations of all the residential dwellings. There was not an existing accepted layout plan with a mathematically defined ROW for Smith Street, therefore ROW and property lines were shown per GIS data provided by the Town. There were existing drainage easements benefiting the Town and crossing abutting private property, which were requested to be shown on the base plan with pipe sizes and invert elevations.

Alpha utilized GPS to reference the project horizontally to NAD83 and vertically to NAVD88 datum by localizing to an existing Town-wide benchmark system. A base map was prepared at a scale of 1inch = 20 feet consisting of the streetscape features (edge of pavement and/or curblines, walks, steps, walls etc.), buildings with sill elevations, other pertinent features located in the field, compilation of gravity and water lines based on field location and record information, rim and invert data on the gravity structures, and one-foot contours. The final project delivery consisted

of an AutoCAD digital file of the base mapping, prepared in Alpha's CAD layering standard and symbology, and a TIN of the surface model for the project site. In addition, Alpha delivered plans stamped and signed by a Professional Registered Land Surveyor.

WATER TREATMENT PROJECT FOR THE SWANSEA WATER DISTRICT

The Swansea (MA) Water District was embarking on a water treatment system where ground water obtained from existing wells located on Vinnicum Road was to be combined with water drawn from the Palmer River, a tidal influenced river emptying into the Narragansett Bay. The two sites are separated by approximately 2.2 miles, with the proposed desalinization plant lying between the two, and approximately 1200 LF from, a proposed pump station on the Palmer River. The majority of the proposed water main connecting the three sites was through existing public ways and detailed survey was not required. Alpha provided survey services in support of three significant components of the project including: topographic and boundary survey of the proposed desalinization plant; a boundary and monumentation survey for a +/- 1500 LF section of water main to be located within an easement on two privately owned parcels; and a survey for the proposed Palmer River pump station.

- **Desalinization Plant – Boundary and Topographic Survey, Old Providence Road – Mount Hope Engineering/Swansea Water District, Swansea, MA**

  Alpha performed a boundary and topographic survey of the former Mason Barney School which occupies a 5 acre parcel of land located on Old Providence Road and obtained by the Town in 1936. Alpha performed research with the Town of Swansea Assessor and Public Works Departments, the Swansea Water District, and with the Bristol County Registry of Deeds to obtain parcel ownership, ROW plans, and record deeds and plans. Final boundary determination was also dependent upon an unrecorded plan prepared for one of the abutters and upon finding enough ROW monumentation along Old Providence Road to re-establish the 1903 State Highway layout lines. A topographic and boundary site plan was prepared referenced to the 1903 record bearing system and to NGVD29 and delivered in AutoCAD format to the design engineer. In addition a recordable "Land Acquisition Plan" was prepared in conformance with the Commonwealth of Massachusetts requirements regarding public water supply property and the Registry of Deeds.

- **Boundary Survey and Monumentation for Permanent Water Main Easement on Private Property – Mount Hope Engineering/Swansea Water District, Swansea, MA**

  Alpha performed a boundary survey of the perimeter of #2533 GAR Highway (19 Acres) and #2555 GAR Highway (16 acres) for the creation of a permanent easement for the purpose of routing two 16" diameter water mains across privately owned land. The easement was required for the one 'cross-country' section of the approximately 2 miles of water main connecting the existing Vinnicum Road water well sites with the proposed Desalinization plant on Old Providence Road. This particular section was approximately 1500 LF and was to be located on privately owned land connecting the publicly owned I-195 and US Route 6 Rights-of-Way. Alpha performed research with the Town of Swansea Assessor and Public Works Departments, the Swansea Water District, and with the Bristol County Registry of Deeds to obtain parcel ownership, ROW plans, and record deeds and plans. Alpha performed an on-the-ground survey based on the existing project control to locate record property monumentation and evidence (fences, walls, etc.) of property boundaries. An easement plan was prepared in conformance with the Registry standards for the Water District to record at the Registry of Deeds. In conformance with the Town of Swansea requirements, the easement was monumented with a total of fifteen monuments including the installation of

seven (7) concrete bounds with brass disks. Alpha prepared bounding descriptions of the easements crossing the two privately owned parcels for the Client's use in their conveyance documentation.

- **Palmer River Pump Station at 'Pocket Park' - Property line & Right of Way Survey - Old Providence Road, Swansea, MA – Mount Hope Engineering/Swansea Water District, Swansea, MA**

  The proposed pump station was to be located on an approximately 1 acre parcel of land bordering the Palmer River, a tidal influenced river leading to the Narragansett Bay. The parcel is known as "Pocket Park" and is located on Old Providence Road approximately 1600 LF from the former Mason Barney School, the proposed site for the desalinization plant. The parcel is owned by The Swansea Land Trust and was the site where former street car rail lines diverted from Old Providence Road to a bridge crossing the Palmer River. Alpha performed research with the Town of Swansea Assessor and Public Works Departments and the Swansea Water District, and with the Bristol County Registry of Deeds to obtain parcel ownership, ROW plans, and record deeds and plans which involved tracing the deed back to 1901. An on-the-ground survey was performed, where in addition to locating ROW monumentation to re-establish Old Providence Road, remnants of the old railroad bed were also located as an aid in making the boundary determination. Alpha prepared a plan depicting the parcel boundary, and a subsequent subdivision plan for creating the Pump Station Parcel. Both plans were prepared in accordance with Registry Standards and provided to the Client for recording with the Bristol County Registry of Deeds. Alpha also prepared a bounding description of the Pump Station Parcel for the Client's use in their conveyance documentation.

Water Main Replacement Project Hoppin Hill Avenue, North Attleborough, MA - Town of North Attleborough, MA

Alpha provided survey and wetland resource delineation services for base plan preparation of approximately 4800 linear feet of Hoppin Hill Ave., a rural Town road in North Attleborough, MA in support of a water main replacement project. Utilizing existing Town-wide photo control, Alpha established survey project control referenced to the Massachusetts State Plane Coordinate System (NAD83) and vertically to the North American Vertical Datum of 1988 (NAVD88). ROW plans did not exist and the client requested the ROW and abutting parcel lines be compiled from Assessor's information. Utility research was performed with the utility companies providing service within the project area.

The wetland resource delineation was completed prior to starting the ground survey and included the preparation of a narrative report. Detail was obtained within the project area including edge of pavement, walls, fences, driveways, walks, buildings, visible evidence of utilities, rim and invert elevations on gravity systems, and delineated wetland resource areas.

A base map was prepared at a scale of 1inch = 40 feet consisting of the field located detail, delineated wetland resource areas, compilation of utilities based on the field locations and record utility research, rim and invert data on the gravity structures, and one-foot contours. The final project delivery consisted of a set of stamped and signed plans and an AutoCAD digital file of the base mapping prepared in Alpha's CAD standards and included TIN of the surface model for the project site.