Anthony Calcagni, Massachusetts Trig-Star Champ, takes Third at Nationals

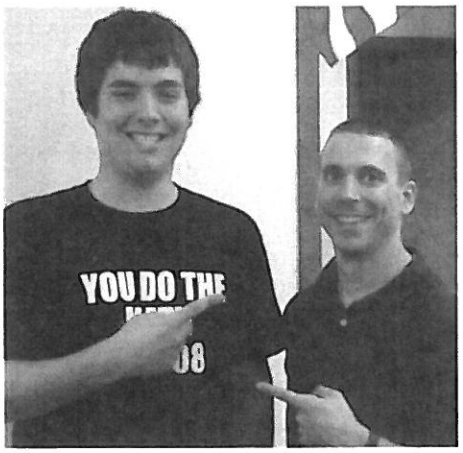
Anthony Calcagni, a student in the Hudson High School Class of 2009, won the Massachusetts Trig-Star Exam and took Third Place in The Richard E. Lomax National Trig-Star Scholarship Contest.

Anthony was awarded $250 by MALSCE and will receive $500 from NSPS. His teacher at Hudson High School, Nathan Meleo, will receive an award on his recognition of excellence in education.

All of the top participants received a score of 92, as there was one question that no one correctly answered. The awards were given based on how quickly the top scorers completed the test.

Anthony's interests include running and tennis. He is taking mostly AP Classes and is due to graduate in the fall.

Thanks to Susan Sullivan of Zanca Land Surveying for administering the Trig-Star Exam at Hudson High School.



Anthony Calcagni and teacher Nathan Meleo

If you are interested in administering the Trig-Star Exam to the high school in your area, please contact our Trig-Star Coordinator, Cliff Robert, at rsurvey@aol.com.

Surveying a Town's Boundaries

By Richard J. Leslie, P.L.S.

History

Early in 2007 Bay Colony Group, Inc. was asked by Ernest G. Hirsch to assist the Town of Foxborough in the perambulation of the Town's boundaries. It was Mr. Hirsch's hope that, through the use of modern surveying equipment, specifically Global Positioning System (GPS) equipment, we would be able to locate and plot the original town corners/monuments. The benefits as well as the limitations of using GPS equipment to locate the original corners/monuments were then discussed.

It was obvious from the beginning that, by far, the greatest benefit of using GPS equipment/methods as opposed to traditional surveying equipment/methods would be the reduction in time and manpower. GPS provided the ability to leapfrog from monument to monument forgoing the need for the long traverse baselines required when using traditional surveying equipment. In addition, monument location could be accomplished using a single operator and GPS receiver as opposed to the traditional two or three person survey crew. Although the potential reduction in time and manpower was significant, it wasn't without limitations.

When using state of the art GPS equipment in conjunction with a locally established reference station network, a GPS survey can provide highly accurate results. A limitation of the equipment and, therefore, results is the impact of obstructions upon the data being collected. Since Foxborough is a rural town, the majority of the corner

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Surveying a Town's Boundaries *continued from page 2*

monuments are located in wooded areas. As a result the main obstructions would not be buildings, but rather vegetation and leaf cover. Determining the accurate location of these monuments was a concern, but when put into perspective with the projects' main objective, which was to recover, locate and graphically depict the Town boundaries, it was decided that the benefits of using GPS equipment/ methods far outweighed the limitations.

It was agreed that Bay Colony Group would assist the Town in its endeavor to recover and locate the Town corners/monuments. In addition, we would prepare a boundary map for the Town that would graphically depict the Town boundaries and corner/ monument locations. It was explained that the Town corners are controlled by the original monuments called for in the governing Atlas and that the physical location of these original monuments would govern over all other descriptions or calls for corner locations. Therefore, neither bearings/ distances, longitudes/ latitudes nor coordinates of any type would be shown on the map.

Planning

Using as a basis Mr. Hirsch's immense personal knowledge of the Town's history and corner locations, Bay Colony Group undertook an investigation of the Town's boundaries in preparation of the survey. This investigation included a detailed review of the 'Commonwealth of Massachusetts Harbor and Land Commission Atlas of the Boundaries of the City of Newton, Middlesex County and Towns of Dedham, Dover, Foxborough, Medfield, Needham, Norwood, Sharon, Walpole, Wellesley and Westwood, Norfolk County' dated: 1904. It also included a review of the Foxborough-Walpole line change as shown on a plan entitled, "Plan of Alterations in Foxboro-Walpole-Sharon Town Lines", prepared by: Massachusetts Department of Public Works, Division of Waterways and Public Lands, dated: December 1938 and corresponding letter from Richard K. Hale, Director, Department of Public Works Division of Waterways dated: February 1, 1939. A review of the governing Atlas provided not only graphical depictions of the corners/monuments but also written locations and very detailed descriptions of the monuments marking the corners. With regards to the aforementioned plan, although there were no written descriptions, the mathematical information derived in terms of directions and distances proved to be extremely valuable. Armed with a plethora of information it was time to move the survey from the office to the field.

Execution

The GPS survey would be conducted using Leica GX1230 dual frequency receivers equipped with cellular modems. The use of the cellular modems would provide a connection to the MTS SpiderNet, which is a local network of continuously operating reference stations (CORS stations). This network, which is managed by Maine Technical Source in conjunction with Leica, allows the user to receive processed data in real-time. The network is constantly receiving information from the CORS stations, processing/adjusting that information and sending it out to the GPS receiver. Since the information you are receiving is "real-time" post processed data it eliminates the time that would normally be spent at the office processing field data. In addition, it allows one to evaluate the accuracy of the data being collected and determine in the field whether to accept or reject it. Simply put, you are able to receive almost instantaneously very accurate positional locations for baselines as long as 30km. Of course, the usual factors inherent to GPS surveys would affect the results, such as: visibility (i.e. obstructions), network geometry and other miscellaneous factors. That being said, the use of high quality GPS equipment with a well maintained reference network system has proven to be a very successful and accurate method in determining locations. It should also be noted that we would use the XMTS Foxboro base station as the main base station for the survey. Since the XMTS Foxboro base station is mounted on the building of our office we had first hand knowledge of the base station's physical integrity. In addition, since our office is located, for the most part, in the geographical center of the Town, at the Town Common, it provided excellent geometry for our survey.

The first set of GPS observations were conducted on June 6, 2007. As expected, the dense vegetation and leaf cover during that time of the year proved to be a significant factor. Although we were able to obtain good

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TOWN-NAME TRIVIA QUESTION:

What town was formerly known as Black Horse Village?

Answer on page 19

Surveying a Town's Boundaries *continued from page 3*

positional quality (location) on monuments where there was good visibility, we were not as successful with the monuments in heavily wooded areas, such as the State Forest. In order to obtain more accurate locations for the monuments that had poor visibility the decision was made to postpone future survey work until the leaves had fallen and the trees were bare.

After a short fall and long winter, the second set of GPS observations were conducted on April 11, 2008. Although the gap between the two sets of observations was longer than expected, the results yielded from the second set of observations proved to be well worth the wait. Eleven out of the fifteen monuments that were located in the first set of observations were re-located. In all but two instances the positional quality (location) between the first and second observations improved by anywhere from 0.5' to as much as 5' +/−. Pleased with these new results, it was time to plot the data and begin preparing the boundary map.

Map Preparation

As a result of the previously discussed surveys, we were able to recover original monuments for fifteen of the sixteen total Town corners. Although the positional quality for six of these monuments was of survey grade, less than 0.05', the positional quality for the remaining monuments ranged from 1.5' to 4' +/−. In an effort to improve upon the location of these later monuments, a search of our data archives was conducted to obtain locations of these, as well as other monuments located at abutting Town corners during previous surveys. Surprisingly, this search not only discovered survey grade locations for five of the Foxborough corner monuments, but also provided extremely valuable and accurate survey data for three additional corner monuments for abutting towns. Sometimes you just have to look! Satisfied with the amount and overall accuracy of the data it was time to pull it all together. As always, a task that seemed so difficult at the beginning of the job became much easier when all of the pieces of information had been collected. As previously discussed the goal was to recover the original Town corner monuments/boundaries and prepare a graphical depiction of their locations. The final result is a plan prepared by Bay Colony Group, Inc. entitled, "Boundary Map of the Town of Foxborough Massachusetts Incorporated: June 10, 1778" dated: May 2008. Although this project took longer than expected, and required a significant contribution of time from office and field personnel, the general consensus at Bay Colony Group is that it has been a very worthwhile and informative project.

Richard J. Leslie is the Vice President at Bay Colony Group, Inc.

Electronically Transferring Information *continued from page 8*

which information is being released and used. Naturally, it would be wise to first consult with a competent attorney about the drafting of any such agreement. While an attorney can provide an Agreement with more complete terms and conditions, the following are just a few suggestions of certain points which should be considered:

A) Firstly, the Agreement should clearly state that any re-use of information, without the professional's agreement and approval, will be solely at the risk of the client or other third parties.

B) Secondly. The Agreement should also clearly state that the client shall indemnify and hold harmless the professional for all claims and losses which can develop from the re-use of such information. This is particularly important because of the potentiality of electronic information being modified, altered, or renovated, upon re-use by clients or other third parties, which can result in unwarranted claims against the professional.

C) Thirdly, the Agreement should clearly state that nothing in the transfer

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TOWN-NAME TRIVIA QUESTION:

What town was formerly known as Jericho Plantation?

Answer on page 19