

County Surveyors and the High Accuracy Reference Network (HARN)

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Indiana county surveyors are playing, and will continue to play, an integral part in the realization of the Indiana High Accuracy Reference Network. As of March 18th, 61 new HARN points have been pledged by 36 county surveyors on behalf of their respective counties. With a little more help from those same surveyors, we may yet see the 92 point HARN (one HARN point, on average, per county).

Indiana county surveyors can continue to support the HARN in two ways. First, the 36 supporting county surveyors can help us spread the good word regarding the HARN. It is clear from the results of our questionnaire that not everyone yet understands the benefits of the HARN. However, that may just be because people have not had it explained to them in simple enough terms. Help us do that. Become a HARN champion. Second, county surveyors can begin performing those tasks necessary for the proper design and implementation of such a complex network of control points.

HARN Champions

The Indiana Office of the State Geodetic Advisor (OSGA) has attempted to query all Indiana counties, through their county surveyor, regarding the HARN. This was done through a letter of December 4, 1995 which asked the county surveyor whether or not they were interested in sponsoring a local HARN point. The results so far have been mixed. As mentioned previously, 36 counties have pledged support for 61 new points. That is two thirds of our 92 point goal. However, these points are clustered in only about one third of all counties. So while some counties will have sufficient access to the HARN, many others will not.

We need your help reaching those counties who have not responded to our questionnaire. The attached list contains the names of counties who have pledged support of a HARN point. It is the names not on this list that we need to contact. And you can help us reach these counties in a number of different ways.

First, you can network while here at Road School. Identify someone who has yet to return their HARN questionnaire and talk to them. Tell them why the HARN is important to you and your county. Help educate them as to the benefits of having a high accuracy reference monument within their county which can be used as the reference point for all

surveys. Explain to them that a survey performed in their county, with respect to the HARN, will then match up with surveys performed in adjacent counties when they are referenced to their respective HARN points. And also explain to them that geographic information systems (GIS) will be in most everyone's future and that the HARN will serve as a common, consistent, highly accurate reference network to which all geographically related data can then be referenced.

If you do not have a chance to speak to your fellow county surveyor while here at Road School, pick up the phone when you get home. Call someone not on the list and explain the benefits of the HARN, as outlined above. And do not be concerned if you are not a registered land surveyor or an expert on the HARN. Often lay people with good understandings of the HARN make very good advocates.

Remember, the Indiana HARN is a cooperative effort. It requires input, and help, from many different entities. Indiana county surveyors are in a key position to help Hoosiers realize a dense, well spaced, network of control points which will serve their needs into the 21st century.

Pre-GPS Survey Tasks

Along with the pledge of financial support for a HARN point comes the responsibility for performing a number of surveying related tasks. These are what have been referred to as 'pre-survey' or 'pre-GPS survey' related tasks and are required prior to the actual high accuracy GPS survey tentatively scheduled for Spring '97. These tasks are as follows:

- ◆ Fill out and return the HARN questionnaire if you have not already done so.
- ◆ Find existing horizontal and vertical control points in close proximity to where you would like to see a new HARN point.
- ◆ Determine which, if any, of those existing control points are suitable as a HARN point. Refer to the National Geodetic Survey's Guidelines for Site Selection of Federal Base Network Points mailed along with the December 4, 1995 HARN questionnaire and Memorandum of Agreement.
- ◆ If any of the existing control points are suitable as a HARN point and are located as to provide suitable access to county residents, choose one or more of them as your new HARN point(s). Use the Site Selection Guidelines to choose from multiple suitable points.
- ◆ If no existing control points are suitable as a HARN point, find a location suitable for a new HARN point (see Site Selection Guidelines to help choose this location). Such a location must be publicly accessible, GPSable (that is, it should have a clear horizon 20° above the horizon, stable, clear of the path of future development, etc. Such a location should also be relatively close to an existing vertical control point, or bench

mark, to facilitate the establishment of an elevation of the new HARN point.

- ◆ Should a new point be set, it shall conform to the National Geodetic Survey's standards and specifications for bench marks. NGS currently uses two types of stainless steel rod driven into the ground with a brass cap connected to the exposed end. These standards are available from OSGA upon request.
- ◆ Once you have tentatively selected the site of your new HARN point(s), using either an existing control point or a completely new point, please let us know. You can mark the approximate location on a map, describe it in terms of identifiable land marks, or send us a point description if it is an existing control point. We are interested in both the relative and the absolute positioning of proposed HARN points. That is, we are interested in seeing where your point sits in relation to other proposed HARN points in the vicinity. We are also interested in the individual site characteristics of each specific HARN point (are they accessible enough, far enough out of harms way, etc.).
- ◆ The OSGA will attempt to visit each proposed HARN point this summer to help assure site suitability. By that time most, if not all, proposals for HARN sponsorship will have been received. Upon approval from OSGA, a local sponsor can proceed with the remainder of their 'pre-survey' tasks with minimal risk. There will, however, always be the risk that the federal government does not find the money to proceed with their portion of the network.
- ◆ Local HARN sponsors should select a site and submit it to OSGA as soon as possible. This will give OSGA as much time as possible to visit all proposed sites and proceed with the preliminary network design.
- ◆ Upon approval of the proposed HARN point, a site sketch should be prepared. This sketch, which will include a written description with direction on locating the point, can be used by others to help locate the HARN point on the ground. Specifications for the site sketch will be provided upon request.
- ◆ Ties between the HARN point and existing control points will also be needed. This includes both horizontal and vertical ties. Should the proposed HARN point already have an elevation, (because it is an existing bench mark) only a horizontal tie will be necessary. Should the proposed point have horizontal coordinates, (because it is a horizontal control point), an elevation will be needed. If it is a new point, both horizontal and vertical ties will be necessary. So you can see that by reusing existing points, one can minimize the amount of survey work required by the local HARN sponsor.
- ◆ Both horizontal and vertical tie requirements are governed by various NGS standards and specifications. Horizontal ties must meet C-order criteria (C-order is the new grouping for the earlier 1st, 2nd, and 3rd order surveys) while vertical ties must meet 3rd-order criteria. These criteria are described in either the Geometric Geodetic

Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques by the Federal Geodetic Control Committee, Version 5.0, Reprinted with Corrections August 1, 1989 or the Standards and Specifications for Geodetic Control Networks also by the Federal Geodetic Control Committee, Reprinted August 1993. These documents are available from the National Geodetic Information Center, 301-713-3242.

- ◆ It will not be necessary that 'pre-survey' field work be conducted or supervised by a registered land surveyor. However, the work must be blue booked and submitted to NGS for review. The procedures for blue booking are on order from NGS and will be made available as soon as possible.
- ◆ All 'pre-survey' field work must be completed prior to the actual GPS survey. NGS currently anticipates performing the HARN survey during the Spring of 1997. Adjustment of the network will take at least eight months and possibly longer.

Highway Extension and Research Project for Indiana Counties and Cities (HERPICC)
Toll Free in Indiana: 1-800-428-7639. Outside of Indiana: 317-494-2164.

Local HARN Sponsorships by County
Status as of March 18, 1996

<u>County</u>	<u>Status</u>	<u>County</u>	<u>Status</u>
ADAMS	Undecided	MARION	Yes
ALLEN	Yes	MARSHALL	Yes
BARTHOLOMEW	Undecided	MARTIN	Undecided
BENTON	Undecided	MIAMI	Yes
BLACKFORD	Undecided	MONROE	Undecided
BOONE	Yes	MONTGOMERY	Yes
BROWN	Yes	MORGAN	Undecided
CARROLL	Yes	NEWTON	Undecided
CASS	Yes	NOBLE	Yes
CLARK	No	OHIO	Undecided
CLAY	Undecided	ORANGE	Undecided
CLINTON	Yes	OWEN	Undecided
CRAWFORD	Undecided	PARKE	Undecided
DAVISS	Undecided	PERRY	Undecided
DEARBORN	Undecided	PIKE	Undecided
DECATUR	Yes	PORTER	Undecided
DEKALB	No	POSEY	Undecided
DELAWARE	Undecided	PULASKI	Undecided
DUBOIS	Undecided	PUTNAM	Yes
ELKHART	Undecided	RANDOLPH	Undecided
FAYETTE	Undecided	RIPLEY	Yes
FLOYD	Yes	RUSH	Yes
FOUNTAIN	Undecided	ST. JOSEPH	Yes
FRANKLIN	Undecided	SCOTT	Undecided
FULTON	Undecided	SHELBY	Undecided
GIBSON	Undecided	SPENCER	Undecided
GRANT	Yes	STARKE	Yes
GREENE	Undecided	STEBEN	Undecided
HAMILTON	Yes	SULLIVAN	Undecided
HANCOCK	Yes	SWITZERLAND	Undecided
HARRISON	Undecided	TIPPECANOE	Yes
HENDRICKS	Undecided	TIPTON	Yes
HENRY	Yes	UNION	Undecided
HOWARD	Undecided	VANDERBURGH	Yes
HUNTINGTON	Undecided	VERMILLION	Yes
JACKSON	Undecided	VIGO	Undecided
JASPER	Undecided	WABASH	Yes
JAY	Undecided	WARREN	Yes
JEFFERSON	Undecided	WARRICK	Undecided
JENNINGS	Undecided	WASHINGTON	Undecided
JOHNSON	Undecided	WAYNE	Yes
KNOX	Undecided	WELLS	Yes
KOSCIUSKO	Yes	WHITE	Yes
LAGRANGE	Yes	WHITLEY	Undecided
LAKE	Yes		
LAPORTE	Undecided		
LAWRENCE	Yes		
MADISON	Undecided		