

Date: April 15, 2003

Subject: MR-RST Technology Exchange Meeting
WisDOT Round Table Discussions
By Ken Brockman, P.E.

1. **BUSINESS UNIT FUNCTIONS AND PRIORITIES.** All photogrammetric mapping products in WisDOT are provided by the Surveying and Mapping Section. We have the overall responsibility for assuring the production, the accuracy, the completeness and the timeliness of all photogrammetric products and services to our eight transportation districts. We do all the aerial photography with our Cessna T210 turbo engine aircraft and our Zeiss LMK 1000 aerial camera. We use a CCNS GPS flight navigation system and Win MP/CCNS preflight planning software. We have a state-of-the-art photo lab for processing our film. We have one primary aerial photographer and two alternate aerial photographers. All of our aerial photographers are trained to plan and execute any aerial photography mission and to process the photography.

We have three analytical triangulation specialists. A Zeiss P2 is used for mensuration and two Wild Pug IV and one Wild Pug III are used for optical correlation. The AT photo control is passed on to the stereocompilation staff electronically for mapping. The stereocompilation is achieved by four analytical stereoplotters operating two shifts. We have two Zeiss P3s, one Leica SD 3000, and a Kern DSR 14. All of the analytical stereoplotters are interfaced to MicroStation using DAT/EM Capture software on Windows NT platform.

The majority of our compilation is mapping and DTM collection from 1:3600-scale photography. The popularity of orthophotography is increasing and we provide that product for about 20 percent of our projects.

2. **CURRENT PROGRAM AND FUNDING.** Our in-house capacity for stereocompilation is about 2000 models per year. Our workload generally ranges between 2000 and 3500 models per year. We contract out our excess workload to our three in-state consultants. All of our consultant cost and in-house cost for our services, including staff time, are charged back to the improvement project.

The ground control for our mapping projects is the responsibility of our eight transportation districts. As some of you may be aware, WisDOT has undertaken a massive statewide initiative called the Height Modernization Program. This program is intended to establish a three-dimensional control network with a 2-cm positional accuracy at 6 to 8 km intervals. In the area where this control is established, the districts use their RTK GPS systems to establish control on the targets. (WisDOT uses targets rather than image points for photo control.) In the areas where we do not yet have this densified control, we hire consultants to establish project control. The districts then establish control on the targets using RTK GPS or conventional survey methods.

3. **NEW INITIATIVES AND DRIVERS.** We are really involved in three new initiatives at this time. They are the Height Modernization Program, Softcopy Photogrammetry, and LIDAR

The Height Modernization Program will develop a new three-dimensional geodetic network of 2-cm positional accuracy statewide. The driver behind this initiative is to update our vertical network that is quite inadequate in Wisconsin and to support the use of RTK GPS positioning on transportation projects. We have been involved with this project for approximately 5 years and expect that it will take 6 to 8 more years to complete. This project is being funded by federal earmark funds and state funds at approximately one and a half million dollars per year.

We are just entering the world of Softcopy Photogrammetry. The driver behind this initiative is to reduce the time in analytical triangulation and to migrate to this new technology in compilation. Our first phase of this will be to purchasing a scanner, an analytical triangulation workstation and three to four compilation workstations this spring. This will enable us to do the analytical triangulation and

recognize the saving in manpower as well as eliminate our second shift for compilers. We will continue to use our analytical stereoplotters until they wear out or become functionally obsolete. At that time, we will replace them with softcopy compilation workstations.

LIDAR is another new technology we will be using for the first time this year. We have contracted with Woolpert LLP to do a project with LIDAR and we hope to obtain a digital terrain model (DTM) with an accuracy of 0.3 ft. We will be doing extensive field checks to determine if this accuracy can be achieved. The driver behind this initiative is to test LIDAR and to see if we can achieve the accuracies that we need. We feel that this would be a great tool that would enable us to provide a DTM outside of our normal narrow environmental window of opportunity for aerial flights that we use for conventional photogrammetry.

4. **SUCCESSFUL STRATEGIES.** The following are some of the things that work for us:
 - Hiring and keeping exceptional staff.
 - A successful cross-training program that allows us to shift personnel to our highest and best use at the time.
 - A successful partnership with consultants. We have three in state consultants that we have under contract at this time to take up our excess workload. In addition, we have contracted with Woolpert LLP for their expertise in LIDAR.
 - We are the clearinghouse for all photogrammetric products and services in WisDOT. This assures quality control, standardization, resource management and fair pricing.

5. **BARRIERS TO IMPLEMENTING REMOTE SENSING.** The following are some barriers to implementing remote sensing for us:
 - Competing Priorities.
 - Lack of funding and staffing.
 - Buy in from upper management and political support.
 - Communication, understanding, and education of our customers, including districts.