1991 LCMR WORK PROGRAM

I. BASE MAPS FOR THE 1990'S

PROGRAM MANAGER: DON YAEGER
LAND MANAGEMENT INFORMATION CENTER
STATE PLANNING AGENCY
300 CENTENNIAL BLDG.
ST. PAUL, MN. 55155
(612) 297-2490

A. M.L. 91, Ch 254, Sec 14, Subd 10(a)	Appropriated:	$1,900,000
	Allocated:	$1,900,000
	Balance:	$ 0

This appropriation is from the Minnesota environmental and natural resources trust account to the commissioner of state planning to provide the state match for a federal program to complete a major portion of the statewide air photo and base map coverage. The federal share is appropriated.

B. During the biennium ending June 30, 1993, the data collected by projects funded under this section that have common value for natural resource planning and management must conform to information architecture as defined in guidelines and standards adopted by the Information Policy Office. In addition, the data must be provided to and integrated with the Minnesota Land Management Center's geographic data bases with integration costs borne by the activity receiving funding under this section.

C. Match Requirements:

LCMR	$1,900,000
Federal Match	$1,900,000

The U.S. Geological Survey has already been contracted so that they can allocate their match funds for the next two years. Conversations to date have raised no problems in funding the federal match, but future federal budgets will have to be watched.

II. Narrative:

Minnesota's base mapping resource is now largely obsolete. Most air photo coverage is nearly 10 years old and the average topographic map is 19 years old. The explosion of Geographic Information Systems at all levels of government requires adequate base maps to assist data integration and compatibility. The project will produce base maps which should fill the State's need for the decade or longer. It should be remembered that this request is a coordinated effort between over thirty state, local and federal agencies.

III. Objectives

A. Obtaining products from the NAPP air photo flight

A.1. Narrative: LCMR has approved $336,272 of 1989 contingency funds for the state match required for a statewide air photo flight in the spring of 1991, as part of the National Aerial Photography Program (NAPP). This proposal would purchase some products from the flight for use by governmental agencies.

A.2. Procedure: Negotiations for the purchase of NAPP products is virtually complete. Products will be purchased from the USDA Aerial Photography Field Office, Salt Lake City, Utah.

A.3. Budget:	LCMR funds	Matching funds
a. Amount Budgeted:	$160,000	$160,000
b. Balance	0	0

A.4. Timeline:

	June 91	/ June 92	/ June 92
Flight	****		
Advisory Committee	****		
USGS quality control	**********		
Production of Photographs	**********		

A.5. Status: As previously reported, slightly over 80% of the state was flown during the spring of 1991; the remainder was flown in the spring of 1992. Complete state-wide coverage is now available for public purchase. In late 1992, samples of new photo products provided by the Salt Lake City USDA photo lab were evaluated by several state and federal air photo experts. Unanimous acceptance of these samples lead to a November, 1992, purchase order for two state-wide photos sets. The two sets will be housed at the Minnesota DNR and the Borchert Library, University of Minnesota. Final shipment of the more than 35,000 air photos ordered will be completed by mid-summer, 1993.

A.6. Benefits:

1. One of the major benefits of joining this program is that the US Geological Survey will handle all of the issues relating to program design, contracting, quality control and product delivery.

2. By joining the program, Minnesota can obtain the right for any state or local agency to purchase additional photo products at greatly reduced prices (many products at 50% of normal cost).

3. The products obtained under this objective are at a 75% reduction in costs. These products will be stored at a central

location for all public agencies to use. Before the final contract is written, interested state and local agencies will be asked if they want to purchase additional state-wide photographs as part of the initial contract.

4. Minnesota obtains the photos needed to produce both the orthophoto maps and the revised topographic maps described below, plus the ability to make digital terrain data produced by USGS. Initial discussions with USGS indicate that digital terrain data will likely be a by-product to the ortho production at no additional cost. If technologically feasible, this product will be included in any work agreement with USGS.

B. Production of Orthophotoquads

B.1. Narrative: A large number of state, local, and federal agencies perform routine resource inventories. A rapidly increasing number of agencies are entering this data into computerized Geographic Information Systems (GIS). Very few of these programs use uniform and consistent base maps. This often results in considerable expenses, at a later date, to precisely overlay the various inventories. The availability of state-wide orthophotoquads would greatly reduce this future problem for inventories at this scale (1:24,000 - same as the USGS topographic map set).

B.2. Procedures: All of the production work will be done under contract with the US Geological Survey. Orthophotoquad maps are made by computer-processing air photo maps which cover the same area as a USGS 1:24,000 topographic maps. The photos are processed to remove locational error by removing the influence of topographic displacement. Geographic coordinates and selected place names are also placed on the maps. It is proposed that the State obtain the 15 inch by 25 inch image as photographic film. This would allow the greatest flexibility for producing other photographic products as needed by public agencies.

B.3. Budget:

	LCMR funds	Matching Funds
a. Amount Budgeted:	$1,540,000	$1,540,000
b. Balance:	0	0

B.4. Timeline:

July 91 / Jan 92 / June 92 / Jan 93 / June 30, 1993

Advisory Committee ****
Pilot program *********
Contract for Production **

Production **********

Because of the massive amount of work required to produce this product, the U.S. Geological Survey estimates a total production time of 3 years after the photographs are delivered. Thus, during this biennium, approximately 2/3 of the State will be started.

B.5. Status: When this LCMR proposal was first being organized (early to mid 1990) and presented, there was basically one orthophoto product available. This was a 1:24,000-scaled photo image produced by photographic means. At that time, another product was just coming out of experimentation, the digital orthophoto. For this product, the orthophoto image is stored as a computer file which can be displayed in most Geographic Information Systems (GIS). It can also be processed on to photographic film to make a more traditional photograph. The digital orthophoto has now gotten national emphasis because the U.S. Soil Conservation Service has a proposal to produce this product for all agricultural lands (nearly two-thirds of the nation) during the 1990's. While no additional federal funds were allocated for this USDA proposal, the national SCS office is actively seeking internal funds for future years. This digital product would be used by SCS as the base map for all future soil mapping and would become the base maps for field acreage records in each county office.

Because of the importance of digital orthophotos for any future GIS applications, and the possibly of addition federal money toward the end of this multi-year program, we funded a test project. With 50-50 state-federal match we produced a 15 quad test area of digital images. The test area covers most of Olmsted County and small parts of Winona and Wabasha. This area was selected because of both the interest and the ability to use this digital data by county, state, and federal agencies, as well as within LMIC. While this testing caused a delay in the multi-year plan for this imagery, it was felt that the better definition of the product was too important to ignore. The data has been delivered and continues to be reviewed. LMIC produced a "Digital Ortho Sampler" data disk for distribution to potential users. Reaction to the demonstration has been very positive. The data sampler has been reproduced and distributed nation-wide by several federal agencies to show the usefulness of orthophoto products.

Several federal agencies have mounted a very large campaign for the nationwide production of digital orthophoto products. LMIC has sent written statements to the two leading federal agencies that Minnesota is prepared to discuss a two-way or three-way funding arrangement to obtain state-wide coverage.

On November 25, 1992 LMIC and the SCS state office submitted a proposal to the SCS national office. We propose using this biennium's ortho funding to produce state-wide digital coverage. SCS national

office would then add additional funding to reach the 50-50 match requirement for a cooperative program with the US Geological Survey. A similar arrangement would be used to produce photographic copies of the data during the next biennium. Initial response by the national SCS office was very positive. Unfortunately, on January 29, 1993, we received a letter from the national SCS office declining to be part of our proposal. This information was provided to LCMR staff at that time. As a result the project went back to the original proposal of direct contract with USGS for jointly funded production of orthophotos. Priorities were developed to start production and a contract was signed in early April. In anticipation of this contract USGS had already started collecting field data and developing private sector evaluations for the actual production work. Because of the long production timeframe for the nation's largest cooperative orthophoto project, first delivery of products will begin in 1994.

In setting priority for production, it was discovered that several federal agencies are planning to produce digital orthophoto products for 6 to 8 counties and the two national forests in Minnesota. Therefore the contract with USGS specifies that our state-federal match program will do work in other areas. Highest priority is the east half of the state, followed by the west half from north to south. The funds available for this biennium are expected to complete about the two-thirds of the state as originally projected.

B.6. Benefits:

1. A major cost of building any Geographic Information System (GIS) is collecting and digitizing the data. Having new ortho base maps for government agencies at all levels would greatly enhance data exchange and reduce the need to redelineate data on new base maps at a later date.

2. Even if data collection programs did not intend to enter data in a GIS, inventories on maps of similar scale and format are still beneficial for unautomated data exchange.

3. The ortho maps are useful alone as an update for the state's aging topographic map series. Many existing topographic maps are twenty or more years old. No other source of new information is available at this scale.

4. As part of this contract, the State could obtain one complete set of reproducible prints of the orthophotoquads. This product would replace the very popular 1:24,000 reproducible aerial photo products the state obtained in the late 1970's.

C. Topographic Map Revision

C.1. Narrative: From the mid-1960's through the late 1970's, Minnesota invested over $5 million dollars to produce complete

state-wide coverage of topographic maps. A majority of this money was supplied by LCMR. The U.S. Geological Survey matched each state dollar on a 50-50 basis. However, since the mid-1980's, no monies have been spent by either party to maintain this investment. Thus today, the average topographic map in Minnesota is 19 years old (a status map will be shown at the project hearing). Some of the most obsolete maps in the State are on the edge of the Twin Cities metropolitan area. These maps are probably the most commonly used base map used for resource analysis, including LCMR-funded research programs. The age of these maps is limiting their usefulness.

C.2. Procedure: On September 7, 1990, the State Planning Agency called a meeting of a mapping advisory group. At that meeting, a priority scheme was developed to spend the funding for this objective. Basically, with the funding provided under this program, the US Geological Survey will be able to produce about 140 revised maps covering nearly all of the major cities over 10,000 people in the state.

C.3. Budget:	LCMR Funds	Matching Funds
a. Amount Budgeted:	$200,000	$200,000
b. Balance:	0	0

C.4. Timeline:

July 91 / Jan 92	July 92 / Jan 93	June 30, 1993
Advisory Committee ***		
Contract ****		
Production	**********	

C.5. Status: In December, 1991, a contract was completed with the U.S. Geological Survey to begin production of the approximately 100 quadrangle maps to be revised with this funding. The areas to be remapped are all of state priorities 1 and 2 (Twin Cities and 6 major out state urban areas) and a few of priority 3 areas (out state urban areas with old maps and sizable population increases). Production of the maps began immediately and nearly all should completed by the end of the biennium. As of this report, map compilation for a major portion of the Twin Cities has been completed and work is well underway in the remaining priority 2 areas. Printing of the Twin Cities revisions is now scheduled for summer of 1993. The priority 2 areas - Duluth, Rochester, St. Cloud, Mankato, Winona, and Moorhead - are scheduled for printing in August through December, 1993. In total, 71 new quad maps will be completed and 2 more started.

C.6. Benefits

1. Virtually every planning or resource mapping project done in Minnesota, either uses these maps or is greatly aided by having them available. In addition to state agencies, many regional, county and local governments benefit from these maps.

2. These maps are also heavily used by the general public. Many copies are purchased each year by Minnesota hunters, hikers and fishermen, boat owners, cabin owners, and private land managers.

IV. Evaluation

LCMR received letters of endorsement from nearly 40 state, local and federal government agencies for this proposal. These agencies recognize the importance of current and reliable base information. SPA has already received requests for production priority, indicating that the photos and maps will get heavy use. The payoff for this project will be spread over many years. Ease of data integration because of accurate base maps will be seen at all levels of government.

V. Context

A. A majority of the air photos and base maps used in Minnesota today are obsolete. This is partly because no state agency has been given the charge or the specific funding to continually maintain the base maps. The U. S. Geological Survey offers the states several different program with 50-50 match to accelerate production. All of the funds in this program will be transferred to the USGS match program.

B. With the explosion in the use of Geographic Information Systems (GIS) at all levels of government, modern base maps (such as these orthophoto maps) are critical to future data integration between GIS users. In the future, any LCMR-funded resource mapping inventory program, for which the scale of state and regional mapping is appropriate, should be required to use these maps to enhance locational accuracy, and reduce data interchange costs and problems.

C. Past Efforts

Air Photos: The State has totally financed two state-wide air photo flights in the past; in 1968-9 and 1977-8. Funding came from various funds and agencies, including LCMR. This proposal is the first to have such a great amount of federal match money available. The spring 1991 flight was originally designed as a 50-50 state/federal match program. However, the contract bids came in above estimate. The USGS will pay for any cost increases above the original estimate. Therefore, the final percentages will be about 41% state and 59% federal.

Orthophoto quads: This the first program to produce orthophoto quads for the entire state. As part of the previous two state-wide photo programs, the state paid the total cost of a similar product which is now obsolete. New technologies of the past few years have made orthophoto quads available at a reasonable price, especially considering the 50-50 federal match.

Topographic Maps: From the mid-1960's to the late 1970's, the state spent over $5 millions dollars for topographic mapping. All of this money was matched 50-50 by the federal government. No state or federal dollars have been spent since the mid-1980's in Minnesota to maintain this heavily used product.

D. Not Applicable

E. Biennial Budget System Program Title and Budget:
1990 APID Number: 12000:34-13 Air Photo Program.
1991 APID Number: 16001:58-03 AID 084152
Base Maps for the 1990's

VI. Qualifications

Program Manager:

Don Yaeger
Planner/Analyst
State Planning Agency

Degree in Geography, University of Minnesota

Over the past twenty years, he has worked on a great variety of mapping projects. He has served as the Agency's major contact with the US Geological Survey. He is very familiar with the staff of USGS. He also has maintained contacts with the mapping community in the State.

In addition to the program manager, a review committee from the mapping and surveying community will be selected to oversee each of the three parts of this project. This would include people from MnDOT, DNR, federal, local, and others. However, no specific people have been selected as of today, but several contacts have been made.

VII. Reporting Requirements

Semiannual state reports will be submitted not later than January 1, 1992, July 1, 1992, January 1, 1993, and a final status report by June 30, 1993.

1991 RESEARCH PROJECT ABSTRACT
FOR THE PERIOD ENDING JUNE 30, 1993

This project was supported by the Environment and Natural Resources Trust Fund.

TITLE: MAPS FOR THE 1990'S
PROGRAM MANAGER: DON YAEGER
ORGANIZATION: LAND MANAGEMENT INFORMATION CENTER
LEGAL CITATION M.L. 91, Ch 254, Sec 14, Subd 10(a)
APPROP. AMOUNT: $1,900,000

STATEMENT OF OBJECTIVES: For this biennium, the project had three objectives. First, was to purchase two sets of state-wide aerial photography flown with funds from the previous biennium. Second, was to begin the process to obtain state-wide digital orthophotography. Third, was to remap the state's most obsolete USGS 1:24,000-scale topographic maps covering the largest urban areas. All three of these efforts were assisted by matching federal funds. Digital data collected in this project is compatible with and integrated into the Minnesota Land Management Information Center's data bases.

OVERALL PROJECT RESULTS: Based on the approved work program, funds were allocated for each of the three objectives. Originally, $180,000 was allocated to purchase the two sets of photography Because we were able to negotiate a price of only $160,000 for the photos, a $20,000 balance was transferred to the orthophoto program. Both sets of photography have been delivered. Orthophoto production was split into two parts. A $20,000 pilot project in the Olmsted County area was completed to determine final data products formats, and usefulness. A contract for $1,520,000 was then written to start the two-year production process for the southeastern half of the state. Products are schedule to be delivered in the second half of 1994. The final objective of this project was completed with a $200,000 contract to print revised USGS topographic quad maps for the State's seven largest urban areas (Twin Cities, Duluth, Rochester, St. Cloud, Winona, Mankato, and Moorhead). Final printed maps will be delivered in late 1993.

PROJECT RESULTS USE AND DISSEMINATION: The use and dissemination vary with each objective. One set of air photos for use by public agencies was delivered to the Minnesota DNR Library. The second set, for agency and public use, was delivered to the John Borchert Map Library at the University of Minnesota where they have become a major contributor to client traffic. The sets of photography have been used by both the general public and public agencies at all levels. Because of promotion by LMIC and other agencies, sales of photo products in Minnesota is higher than averages in other states. Data from the Olmsted County pilot has been distributed to GIS researchers at the federal, state and local level. As presently planned, digital data from the state-wide effort will be distributed by the United States Geological Survey at a very nominal cost. Hardcopy (photo images) will be available in Minnesota. The final products of this project, published quad maps of the urban areas, are sold to the public by both public and private map sellers. Free copies of each map will be distributed to major state agencies and all major public map libraries in the state through a process originally establish by LMIC.