FINAL REPORT

1999 Project Abstract
For the Period Ending June 30, 2001

TITLE: Aquaculture, Hydroponics, and Greenhouse Research Lab/ Living Classroom
PROJECT MANAGER: Jeff Lindeman
ORGANIZATION: Chisago Lakes High School
ADDRESS: 29400 Olinda Trail Lindstrom, MN 55045
WEB SITE ADDRESS: None
FUND: Future resources fund to the commissioner of agriculture
LEGAL CITATION: ML1999, EE61 Aquaculture, Hydroponic, and Greenhouse Research Lab, Sec. 16, Subd. 11(011o)

APPROPRIATION AMOUNT: $100,000.00

Overall Project Outcome and Results

A 30' X 60' 8mm Polycarbonate free standing greenhouse was constructed. The greenhouse has 2 sections. The front section is 20' X 30' and houses the aquaponics tanks. Both rooms are independent from each other. The environment is controlled for light, temperature, and humidity. Students also installed downspouts and water lines in the greenhouse. Students in the Agri-Science classes built individual student growing benches, constructed the ebb and flow growing benches, landscaped, moved supplies and materials, and cleaned up the construction site. The students installed floor drains in the smaller section of the greenhouse. Students helped in the construction of concrete forms and the installation of concrete and finishing - 2 pads around a center drain in the 20'x 30' area. In finishing the outside of the greenhouse, students formed and poured 16 yards of concrete for curved sidewalks in the front and back of the greenhouse. Students installed 100 feet of brick paver edging, 300 square feet of fabric, 500 fabric staples, and wheeled and installed 50 yards of rock inside and outside the greenhouse. Students also spread 84 yards of topsoil, fertilized, seeded, and rolled the areas around the greenhouse to restore the lawn around the construction site. Students set up benches and began in the planting portion of the project. We are presently growing wild flowering plants in cooperation with the Master Gardeners in the area. Wild native flower seeds were collected by the master gardeners in the area. The students are germinating the seeds and then the plants will be used for the restoration of the Chisago Lakes Historical Building and the Shafer Town Hall/ Old School House sites. Over 600 students worked with some phase of construction.

Students in the agriscience department experienced all phases of the greeenhouse's construction. The greenhouse provides a community lab for students and community members to see and experience aquaponics, aquaculuture, and aquaponics as the project evolves. Many projects, in cooperation with the science department, Master Gardeners, community education, and others will be part of the ongoing use of the facility. Many wild plants that are harvested wild will be started in the greenhouse and transferred to the outdoor living classroom area in raised beds.

The greatest result, I believe, is yet to be achieved as funds are obtained to finish the aquaponics/ aquaculture - hydroponics part of the project. This will be a site where research and new science will be applied by young people. The construction of this, the operation, management, research, and results will be totally conducted by students. This will be the only place like this in the U.S.

Project Results Use and Dissemination

The students will be gathering the input information for the assembly and use of the aquaponics lab. The students and staff will prepare the documentation of project success through coursework, grad standard completion in specific areas relating to the project, and the end product of plants, vegetables, fruit, seedlings, flowers and fish will be carefully documented and available to the public.

The greenhouse aquaponics lab has been available for viewing by the public. As the aquaponics portion is developed, constructed and put into use, this will be used by students in the fish and wildlife, greenhouse management, and plant science courses. The research which will take place in the future as the lab is implemented will be ongoing with the plant ebb and flow beds removing ammonia (N) from the fish tanks.

As stated above we are working with the Master Gardeners. We have plans for use besides in the school with community education courses, extension service, starting a variety of plants and trees for use by the community and in conjunction with the outdoor living classroom in raised beds. We are planning an open house at the beginning of the school year when the aquculture tanks and aquaponics lab is operational. Many agricultural science instructors from approximately 20 schools have viewed the progress as well as school and community members.

Date of Report: JULY 1, 2001
LCMR Final Work Program Report

LCMR Work Program 1999

I. PROJECT TITLE: Aquaculture, Hydroponics, and Greenhouse Research Lab

Project Manager: Jeff Lindeman
Affiliation: Chisago Lakes High School
Mailing Address: 29400 Olinda Trail, Lindstrom MN 55045

Telephone Number: 651-213-2582
E-Mail: JLindeman@chisagolakes.k12.us
E-Mail: jmlindeman@tiesfamily.net

Fax: 1-651-213-2550 **Home phone:** 651-257-5577

Total Biennial Project Budget:

$LCMR Balance:	$100,000	**$Match:**	$15,000
-$LCMR amount Spent:	-$100,000 **$100,000**	**$Match Amount Spent:**	-$15,000 **$15,000**
= $LCMR Balance:	$0.00	**= $Match Balance:**	$ 0.00

A. Legal Citation: ML1999, EE61 Aquaculture, Hydroponics and Greenhouse Research Lab, Sec. 16, Subd. 11(011o)

Appropriation Language: This appropriation is from the future resources fund to the commissioner of agriculture for an agreement with Chisago Lakes High School to design and construct a greenhouse, hydroponics, and aquaculture facility to support an outdoor living classroom.

B. Status of Match Requirement: Visions for Change Grant on July 1997 for $10,000.00 extended to December 1999 and School to Work Grant for 5,000.00 on April 1998.

II. and III FINAL PROJECT SUMMARY.

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of concrete and finishing - 2 pads around a center drain in the 20'x 30' area. In finishing the outside of the greenhouse, students formed and poured 16 yards of concrete for curved sidewalks in the front and back of the greenhouse. Students installed 60 feet of brick paver edging, 300 square feet of fabric, 500 fabric staples, and wheeled and installed 50 yards of rock inside and outside the greenhouse. Students also spread 84 yards of topsoil, fertilized, seeded and rolled the areas around the greenhouse to restore the lawn around the construction site. Students set up benches and began in the planting portion of the project. We are presently growing wild flowering plants in cooperation with the Master Gardeners in the area. Over 600 students worked with some phase of construction.

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IV. OUTLINE OF PROJECT RESULTS:

Result 1: Construction of a 30' x 60' greenhouse in support of an outdoor living classroom to serve 3500 students and the Chisago Lakes Community.

LCMR Budget: 100,000.00 Match: $15,000.00

LCMR Balance: $ 0.00 Match Balance: 0.00

Completion Date: June 30, 2001

Result 2: A 1000 gallon aquaculture tank with integrated and sustainable hydroponics growing stations.

LCMR Budget: 00.00
LCMR Balance:0.00

Completion Date: June 30, 2001 The aquaculture portion of the project is funded and will be funded with other monies. Because of unexpected cost overrun on the electrical, the complete aquaculture system could not be purchased. Parts were purchased and when other funds are available the lab will be completed.

The results that we want to achieve from the completion of the aquaponics

project will be ongoing. i.e. allowing hands-on experiences for our students, increasing the agricultural/natural resource/environmental I.Q. of our students and community, and aiding in the development of our agroforestry/horticultural growing area, as well as partnership development.

V. DISSEMINATION: The students will be gathering the input information for the assembly and use of the aquaponics lab. The students and staff will prepare the documentation of project success through coursework, grad standard completion in specific areas relating to the project, and the end product of plants, vegetables, fruit, seedlings, flowers and fish will be carefully documented and available to the public and LCMR. I hope to receive technical support from Ying Ji. I have received technical support from Don Josco at Rough Brothers and from technicians at Aquatic Eco-Systems in Apopka, Florida - where our aquatics materials came from.

VI. CONTEXT

A. Significance: This aquaponics project will be the first to my knowledge to be totally assembled, operated, to be in existence and use by high school students. It will be an integrated system between the growing of fish and alternative/ agroforestry/horticultural crops. Because of the uniqueness of this project it will be the first of its kind at this scale. There are many small hydroponic demonstrations and aquaculture projects in Minnesota High Schools but there are not any that combine to make aquaponics; the growing of plants from and fish symbiotically. The project will provide invaluable information to the future combination of aquaculture and hydroponics both from a production/economic aspect and as a learning station for students. This will be a pilot site for other educational facilities to view and provide technical information to bring aquaponics to use by other students and community members.

B. Time: The project to the point of financial assistance will be completed in two years with additional work completed as resources dictate, but the affects will be indefinite. Additional time will be needed for the full impact of the lab due to cost overruns beyond the project managers control.

C. Budget Context: There has been funding and research in the areas of hydroponics and aquaculture. There has been little research in the integration of the two systems into an aquaponics system. Project A29 Sustainable Aquaculture Development in Minnesota has also been funded and we will collaborate and share in the development and dissemination of information for this system.

1. BUDGET

Personnel: 0.00

Equipment: $100,000.00 to purchase a 30' X 60' greenhouse, installation of foundation, shade, cloth, utilities, and construction. Purchase of a 1000 gallon aquaculture tank and equipment and greenhouse beds for the aquaponics facility in the greenhouse.

Acquisition $0.00

Development $0.00

Other: **fish** 0.00
plants 0.00
permits 0.00

TOTAL: $100,000.00

2. Budget Detail See Attachment A

VII. COOPERATION:

YING JI - Aquaculture Coordinator, Minnesota Department of Agriculture
Joel Larson - Agriculture/Agribusiness Education & MN FFA State Advisor
Mark Lauer - Albert J. Lauer Greenhouse Construction
Don Josko - Regional Sales Manager Rough Brothers Inc.
Dr. Scott Josiah - University of Minnesota, CINRAM
Dan Adair - Manager of the greenhouses at the University of Minnesota
Technicians at Aquatic Eco-Systems

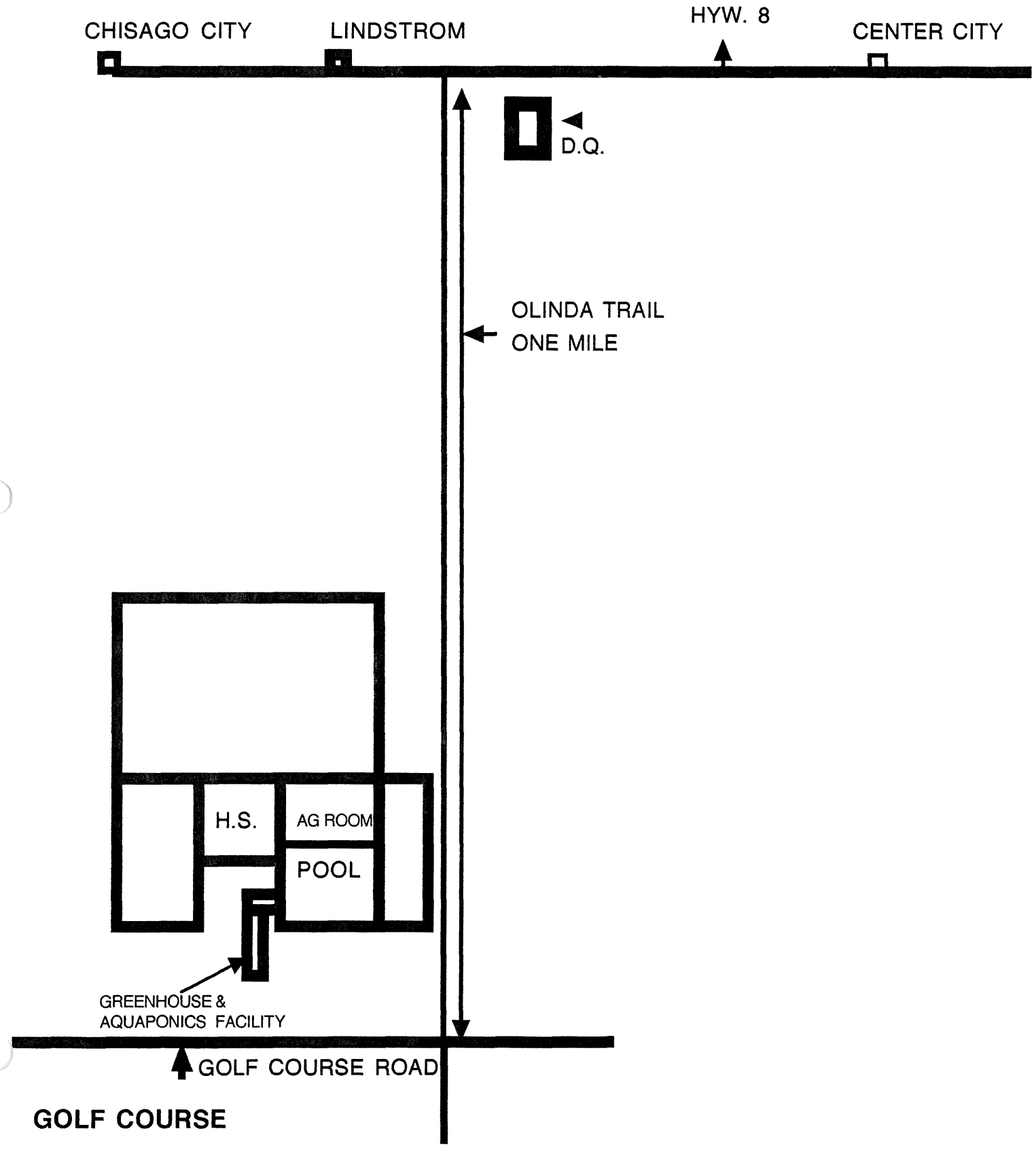
VIII. LOCATION: The Aquaponics/Greenhouse site will be allocated in Chisago County, Lindstrom, MN 55045 at the Chisago Lakes High School. See the attached map.

IX. Reporting requirements:

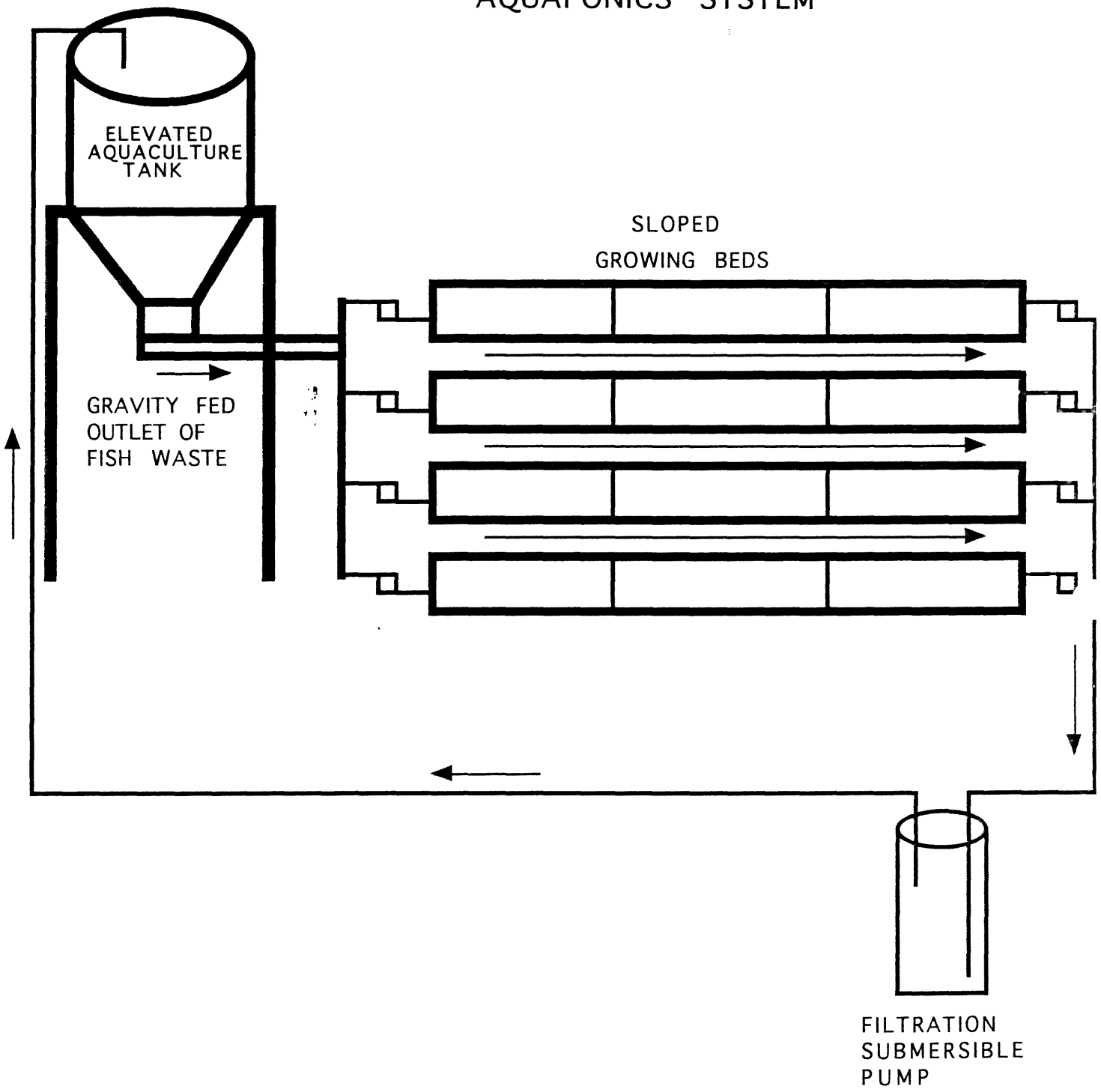
Periodic workprogram progress reports will be submitted not later than October 2000, January 2001, and May 1 2001

A final workprogram report and associated products will be submitted by or by the completion dated as set in the appropriation. Final Report sent 3-27-02.

MAP TO GREENHOUSE/AQUAPONICS LAB AT CHISAGO LAKES HIGH SCHOOL



CHISAGO LAKES HIGH SCHOOL
AGRISCIENCE DEPARTMENT
AQUAPONICS SYSTEM



Plan not to scale

For all of the items below break out each result. Use as many results as necessary. Landscaping to fit in all the columns may be helpful.

Attachment A Deliverable Products and Related Budget				
LCMR Project Biennial Budget		Objective/Result		
	Result 1 GREENHOUSE	Result 2 AQUAPONICS	Result 3, etc.	
Budget Item	e.g. Design and Engineering	e.g.Wetland Construction		ROW TOTAL
Wages, salaries & benefits – Be specific on who is paid $				
Space rental, maintenance & utilities				
Printing & Advertising				
Communications, telephone, mail, etc.				
Contracts				
Professional/technical				
Other contracts				
Local automobile mileage paid				
Other travel expenses in Minnesota				
Travel outside Minnesota				
Office Supplies				
Other Supplies				
Tools and equipment	$ 100,000.00			
Office equipment & computers				
Other Capital equipment				
Other direct operating costs				
Land acquisition				
Land rights acquisition				
Buildings or other land improvement				
Legal fees				
COLUMN TOTAL	100,000.00 $	$		$