

GIS Development Plan

Red Wing, Minnesota

SEH No. A-RWING0405.00

March 18, 2005

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RE: GIS Development Services
SEH No. A-RWING0405.00

Brian Peterson
Planning Director
City of Red Wing
419 Bush Street
Red Wing, MN 55066

Dear Brian,

The purpose of this GIS Development Plan is to guide the city for the next several years in developing Geographic Information System (GIS) technology. The plan includes background information, a review of departmental needs, goals, benefits and recommendations.

GIS technology will provide more accurate and complete information than is available today. It can be used very effectively to place aerial photography, parcel mapping, parcel records, zoning, and other information within the departments that need that information. Interdepartmental coordination will also be significantly enhanced.

The plan confirms many of the initiatives the city has begun and recommends efforts to suit a multitude of users.

It is recommended that the GIS Committee review this plan, and if appropriate, we can make a presentation to the City Council.

Sincerely,

Wayne J. Becker
Project Manager

WJC

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1.0 Introduction

1.1 Purpose

Project objectives included:

- Establishing a city GIS Committee of interested or affected city departments.
- Determine each department's requirements for mapping and geographic information.
- Advance current digital mapping and GIS activities towards an enterprise scale system
- Recommend a plan for an organization-wide coordination and phased implementation
- Maximizing city, county and consultant resources by working in a collaborative manner.
- Developing a GIS Plan.

1.2 Project Background

1.2.1 History of Red Wing GIS

The city has been discussing a GIS implementation since 1992 with limited results. The Goodhue County Surveyor and Land Records Office have initiated a GIS implementation, but have suffered delays due to staff vacancies.

1.2.2 Current Status

Current initiatives are as follows:

- CAD base mapping and associated special purpose maps in engineering.
- GPS in public works for data collection of utility features.
- A Cartograph implementation in Public Works.
- Planning has 2 copies of ArcView 3.x, which get limited use due to training and time constraints.
- Planning just upgraded with 1 copy of ArcGIS 9.

Current initiatives are continued in the plan and we want to build on those investments.

The above-mentioned activities are good and work well, however, they tend to be on different systems and are not accessible by other users. However, there is interest in sharing data sets and a need to do so.

2.0 Benefits

The GIS parcel data set to be developed by the City will have many benefits:

- The data set will provide more accurate and complete parcel information than what is available today. (i.e. mailing labels for notices can be prepared accurately in minutes.)
- Develop better presentation graphics.
- Address maps can be created and/or updated electronically from the textural database with increased quality.
- The engineering department will be able to better manage permits for road cuts and spend less time updating county tax maps.
- Better tools for housing development and management issues.
- An official zoning map, over the parcel map, will ease answering zoning questions and add accuracy to that answer.
- Finance will be able to better manage current, remaining and deferred assessments plus accurately calculate mowing bills.

Other benefits include:

- GIS as a technology will allow staff to provide better service to its customers, save time, and enable decisions to be made based on more accurate information.
- Provide an easier way to fill map and data requests from city staff and outside organizations.
- GIS can efficiently produce maps, perform queries and display.
- Interdepartmental coordination will be significantly enhanced.
- Have the ability to share data to avoid redundant efforts.
- DataView can be used effectively to place aerial photography, parcel mapping, and parcel records within the departments that need that information.
- Capturing the knowledge since many senior staff will be retiring in the next several years.
- Provide a basis for GASB 34 inventory and valuations.
- Enhance utility records and utility billing

3.0 Plan

3.1 Vision Statement

It is recommended that the city may wish to adopt a vision statement such as, “the city will develop a GIS to efficiently access a multitude of data layers, to help the city staff be more efficient, to make better informed decisions and serve the public better.”

3.2 Consolidated Goals

The goals with the greatest impact on all departments in the parcel mapping area are:

- Ease rental property license program management.
- Allow for accurate mapping of City Owned properties.
- Automating the addressing process.
- Use in citing new facilities.
- Provide a base for zoning map.
- Provide a base for facilities plan.
- Easy access to current property owners.
- Aid in crime investigation and mapping.
- Provide buffers for homeland security.
- Map complaints.
- Develop an index of the County LiDAR data that has been purchased.

Longer Term Goals:

- Redo the street centerlines
- Map utility rights-of-way
- Map easements
- Scan in all record drawings
- Expand the use of the LaserFiche system to all departments.
- Develop site plans with utilities for HRA properties
- Map/inventory of soils borings

An initial listing of goals and/or applications is listed in Section 6 and a summary of the departmental meetings is in Appendix A.

3.3 Concept

To accomplish these goals, the parcel map must be completed. It is envisioned that the city will request proposals to SEH will complete the

parcel mapping in the first second half of 2005 and the county will assume parcel maintenance at that point.

3.3.1 Proposed Software Requirements

The existing copies of ArcView 3.3 should be upgraded to ArcView or ArcGIS 9 over the next year. A custom application, such as DataView will place GIS data sets in the hands of the casual users who need the information. AutoCAD will continue to be used in engineering and Public Works. Note: Planning Department has upgraded to ArcGIS 9.

3.4 System Administration/Staffing

3.4.1 Current GIS Staffing

One GIS position resides in Public Works. That person will be busy for at least the next 2 years working on the needs of that department.

3.4.2 Systems Administration

The following table lists various GIS administration-type tasks that must be performed. A combination of the GIS committee(s), GIS coordinator, departmental users, and consultants in aggregate can fulfill these roles. The GIS coordinator’s position does not currently exist within the city.

GIS Activities	Committee	GIS Coordinator	Department Users	Consultant
Set General Priorities and Schedule	τ	τ		
Develop Budget/Arrange Financing	τ	τ		
Planning/Implementation Assistance		τ	τ	τ
Education and Training/Ongoing	τ	τ	τ	τ
Technical Assistance/Mentorship		τ	τ	τ
Coordination of Efforts		τ	τ	
Communication	τ	τ	τ	
Build Data		τ	τ	τ
Maintain Data		τ	τ	
Distribute GIS Data		τ		

In addition to the activities listed in the table, the GIS coordinator could also:

- Be a first call for help from city GIS users
- Be the technical lead for GIS technology
- Serve as a first-line resource for mapping software/hardware issues
- Provide over-the-counter GIS services to most departments for their intermittent requests and mapping needs.

3.4.3 Proposed GIS Staffing

A GIS coordinator position should be created. The position can be placed in several different departments such as Engineering, Public Works and/or Planning. Given our understanding of the City's GIS needs, placing the GIS coordinator in the Planning department makes the most sense. It appears that placing the position in the Planning Department and coordinated with the Engineering Department makes the most sense. A half time position could be established in the second half of 2005 with funding for a full time position in 2006. In 2005, funding could be made available from funds saved by not filling back Tom Conway's position in the first half of 2005.

3.5 Data Methodology

All GIS graphic information is based on a geodetic reference. The current county coordinate system should continue to be used. As we move forward with data, the following table was prepared to show which maps should remain in AutoCAD and which ones are better suited for GIS. The table was prepared using 2 basic premises:

1. If the map relies on the tax parcel base, such as zoning and government buildings, it should be in GIS.
2. Since utilities are going to be managed in Cartegraph, after they are GPS'ed, given the attributing, they are better suited for GIS.

The CAD users will need a CAD copy periodically, but it is very easy to export GIS files to CAD. The table assumes the checked column will be the source data and the one that gets updated.

Red Wing Maps

Map Destinations	GIS	AUTO CAD
Aerial Photo Index	BOTH	BOTH
Bike Paths	EITHER	EITHER
Bridges		X
City Parks	X	
Garbage Routes		X
Government Buildings	X	
Hotels	X	
Hunting Zones		X
Hydrant Map	X	
Hydrant Pressure Zone Map	X	
Ice Rink	X	
Lift Station and Pump Station	X	

Map Destinations	GIS	AUTO CAD
Overlay Maps		X
Pedestrian X-ings		X
Police Sectors	X	
Snow Removal Map		X
State Aid Routes		X
Storm Water Maintenance	X	
Street Lighting	X	
Sub Division	X	
Urban-Rural Services	X	
Utility Location	X	
Voting Precincts	X	
Water Pressure Zones	X	
Zoning	X	

3.6 Parcel Mapping

The City has 7,202 - 7,658 tax parcels and includes 259 mobile homes. The GIS file from the county has 6,046 tax parcel. This leaves 1,156 – 1,612 to be completed. While many of the parcels are in platted areas, it appears many are in metes and bounds descriptions and are the most time consuming to map. SEH intends to use the following methodology to complete the mapping:

- We will obtain the current city CAD parcel base file, county GIS file and an extract of city properties from the County AS 400 tax database.
- Determine the CAD and GIS parcels that are completed and what remains. (Over the course of the last year, it appears both files have been updated separately.)
- Incorporate digital plats that the County has.
- Complete the remaining parcels, working closely with County staff and City Engineering staff to maximize efforts and avoid redundancy. (We will likely require assistance with deed research.)
- Deliver the completed parcel mapping to the County and a copy for the City to use.

A parcel mapping project like this has many unknowns. At this time, we are unable to come up with an exact count of the remaining parcels to be mapped. Our estimate to complete the parcel mapping is \$50,000. If City or County staff is available to work on any portion of the project, the costs would be reduced.

Once the parcel mapping is completed, the City may want to discuss an interface agreement with the County.

3.7 Interrelated technology

There are many existing softwares at the City, which may be extracted or linked to GIS. These include:

- LaserFiche
- Firehouse which is FoxPRO based
- PermitWorks based on FoxPRO
- Cartegraph in SQL Server
- County CIS in SQL Server
- PLAN IT
- Cemetery management in PONTEM
- Tree database in Access
- Several Excel applications for Downtown – Main St, assessments and a Index of paper building plans

Users of these softwares, in concert with the GIS coordinator and/or IT staff, may identify needs or the desirability to interrelate their data with GIS. Each of those should be completed on a case by case basis.

3.8 Funding Sources

A GIS implementation can be an expensive endeavor. While portions of the costs or implementation are undertaken to better manage citywide activities, the completed data sets also have a wide use by a multitude of users. One funding source is, fee for service. You are already charging for printed-paper maps, plats, copies of plats, etc. As additional GIS efforts are completed, other data will be created and available for sale such as zoning and utility mapping in paper or digital formats.

3.9 Systems Components and Costs

Costs include:

- Staffing per Year (w/ benefits)\$60,000
- Software and Training per Year.....\$3,000
- Consultant services to complete the parcel mapping.....\$50,000
- DataView\$3,000
- PDA Technology\$1,000

Costs per year include:

- 2005.....\$30,00087,000

- 2006.....\$67,000
- 2007.....\$70,000

4.0 Recommendations

4.1 Committees

It is strongly recommended that the city establish two GIS committees. A Technology Committee steering committee including Department Managers, Commissioners and the GIS Coordinator will set general policies/priorities, develop the vision, and allocate resources. This Committee could also develop policy concerning other technology needs of the City. The second committee would be a rowing committee (or GIS Users Committee) made up of departmental users. This group would share their progress, coordinate upcoming activities, and also be able to share technology. It is recommended that the steering committee continue to meet monthly, perhaps into the fall. The rowing committee would probably begin meeting in March April '05, if the previously mentioned timetable remains as published.

4.1.1 Privacy Issues and Telephone Numbers

Many departments have information, which is private and must be protected.

Public safety organizations have a telephone database, which has been accumulated over a period of time from a variety of sources. It may be desirable to have these telephone numbers coded as public information (i.e., came from the telephone directory), which any of us can call and order a copy, versus those telephone numbers that are unlisted or resulted from a criminal investigation.

4.2 Considerations

4.2.1 Departmental Plans

In the preparation of this GIS development plan, departments such as Engineering and Public Works have many tasks to perform in order to carry out their individual departmental goals. It may be necessary for limited consultant assistance to further refine the implementation plans within those departments.

4.3 Data Sharing

The following table shows seven (7) data sets along with who is responsible for maintaining each of those data sets.

	Parcel	Owner	Address	Value	Zoning	PLSS	Utilities
County	τ	τ		τ		τ	
Engineering			τ				
Planning					τ		
Public Works							τ

4.4 Update the Plan Annually

Our goal is to write a plan for a several years. The following areas are difficult to forecast:

- Advances in technology
- Resources available
- Unexpected opportunities

It is recommended that this plan be a living document with annual review and revisions made as appropriate.

5.0 Challenges/Implementation Issues

5.1 Accuracy

This is a challenge for many SEH clients'. However, both the county and city have made the necessary decisions and investments to provide an accurate base for the parcels.

5.2 Public Online Access

The GIS data could be placed easily on a walkup terminal within the City Hall or Library using view-only software.

Within two years, it is envisioned that a full GIS Internet application be implemented, likely by a consultant. The county is currently considering this and would allow users to also query the data geographically or spatially.

5.3 Aerials

The city has access to good aerials. The key is to get them to the users.

5.4 GPS

Public Works is using sub-meter GPS units very effectively. These units have a positional accuracy of within ½ meter.

5.5 LaserFiche

GIS lends itself to be used as a graphical index to retrieve LaserFiche records. (i.e. clicking on a utility pipe and retrieving the scanned record drawing or clicking on a tax parcel and retrieving the most recent building permit.) This is going to take effort on the part of the Clerks' office and the departments that maintain the data, however over time, this graphical retrieval can easily be accomplished.

5.6 Future of GIS

As we look at the future of GIS, we see the following directions being set:

-
- Web based technologies are being used effectively by many organizations. The technology is also getting easier to implement and administrate.
 - Simple, easy to access information is the direction moving forward.
 - PDA/handheld computers are increasing in power and availability. This allows staff to be more efficient and eliminate most clipboard data. The data is entered into the appropriate system and the device is synchronized with another computer.
 - Cellular and wireless technologies will allow for field staff being able to access, and/or change, data on the server.
 - GPS is being used at an increasing rate.

6.0 Goals and/or Applications

6.1 Application – Parcel Mapping

- Number of Users – 50+

Priority 1

Application Description:

- Complete citywide parcel and mapping.

Interfaces:

- County tax database.
- PLSS.

Functions:

- Tax parcels in a GIS format with a link to the tax roll.

Data Requirements:

- Tax parcels.

Benefits:

- Add the ability to do mailings more quickly and accurately.
- Staff can do their jobs more efficiently.
- Available for other users.

6.2 Application – Hire GIS Coordinator

- Number of Users – 50+

Priority 2

Functions:

- Serve as the first call for help from other departmental GIS users.

6.3 Application – Support All Departments with GIS Data/Maps

- Number of Users – 50+

Priority 3

Application Description:

- Place GIS data sets to the users and departments that require the information.

Interfaces:

- Network and server considerations.

Functions:

- Parcel data sets are the primary needs initially.

Benefits:

- Everyone will be looking at the same information.

Issues and Considerations:

- The GIS coordinator will play a key role in this initiative.

6.4 Application – ZONING MAP, as an Attribute to the Parcel Database

- Number of Users – 20

Priority 4

Application Description:

- Replace the current paper zoning maps with a layer in ArcView.

Assumptions:

- The GIS coordinator will be able to perform this task.

Benefits:

- More accurate information.
- More accessible information.

6.5 Application – Implement DataView or Similar Program

- GIS Users – limited
- Number of Users – 50+

Priority 5

Application Description:

- Provide read only access of GIS datasets to the users who need the information.

Assumptions:

- Adequate hardware and networking is in-place

Benefits:

- More accessible information.
- Time-savings.

6.6 Application – Implement Personal Data Assistant (PDA) or Handheld Computer Technology

- Users – Inspection and Planning

Priority 6

Application Description:

- Replace legacy clipboard data with handheld devices.
- May be interactive with GIS mapping through software such as ArcPAD.

Interfaces:

- GIS, spreadsheet, and database softwares.

Benefits:

- Manual data entry of the clipboard is eliminated.
- Time saving.
- Increased accuracy.

Issues and Considerations:

- Requires resources and programming staff who need the information.

6.7 Application – Public Access

- Number of Users – Unlimited

Priority 7

Application Description:

- Provide a walkup terminal in the city hall or the library.
- Provide web-based access in a GIS format, which allows spatial look-up, very similar to DataView.

Interfaces:

- Bandwidth to the Internet.

Data Requirements:

- Specialized software.

Benefits:

- Customers can access the information at their convenience.
- Less staff time is required.

Issues and Considerations:

- Potential to reduce revenue.

Appendix A

Departmental Needs Assessments

Red Wing

Departmental Needs Assessment Summaries

Administration

Need

- If new ordinances are passed in 2005, rental property issues would benefit from a GIS.

Benefits

- Accuracy in mailings
- Better presentation maps
- Easily check residency for Mayor, Council and Commission members

Clerk

Responsible for elections, records management, licensing of pawn, liquor, tobacco, vendors and junk.

Need

- Mapping of City Owned properties
- Parcel mapping

Long-term Goals

- Expand the use of the LaserFiche system to all departments

Engineering

Responsible for maintaining or storing plats, aerials, and county tax maps. The department has a large format scanner. Index cards for water with a duplicate set at Public Works

Background/Status

- Use AutoCAD for plans and mapping. 4 copies plus 3 copies of AutoCAD LT for 7 users.
- Assessments are in Excel.
- Maintain AutoCAD maps for:
 - Address
 - Hunting
 - Sanitary, water and storm
 - Parks and trails
 - Zoning

- Land use
- State Aid map
- Wards and voting precincts

Need

- Automating the address mapping is the #1 priority.
- Street centerlines
- Utility rights-of-way
- Access to County LiDAR data
- Easements
- Map/inventory of soils borings

Long-term Goals

- Scan in all record drawings
- Be able to use the County parcel information
- Would likely only require display and query access to GIS data, rather than building and maintaining the GIS.
- Eliminate the index cards over the next 10 years.

Benefits

- Ease the filling of information requests
- Improve the quality and accessibility of addressing
- Better manage permits for road cuts – where to file?
- Spend less time updating County tax maps
- Notices/mailings

Challenges

- Time.

Finance

Responsible for budget, financial reports, bonds, investments and GASB 34.

Need

- Map of City owned property
- The ability to quantify assets and bonded assets

Benefits

- Better manage current, remaining and deferred assessments
- Calculate mowing bills
- Move assessments to Main Street software

Fire

Responsible for ambulance and fire. The ambulance area is far larger than the fire service area.

Background/Status

- Firehouse software is used for fire pre-planning. It uses FoxPro VB formats or dBase. This should be easily exported.
 - PREPLANS building info.
- EMSRB is transitioning to Image Trend for Ambulance reporting
- The County CIS is used for response times
- Have CAMEO software for HazMat issues including plumes

Need

- Fire flow database. The current one is outdated and in file cabinets.
- Hydrant locations and flows.
- Potential use in fire station siting.
- Maps
- Address
- Fire district
- PSA (Primary Ambulance Service Area)

Long-term Goals

- More robust pre-fire planning

Benefits

- Combining and acquiring fire related information would assist preplan development and data maintenance.

Challenges

- Time.
- Training
- Data Acquisition costs

Housing and Redevelopment Authority

Need

- Map their properties
- Map housing surveys
- Site planning

Benefits

- Present
- Grant app
- Assist with housing dev

Employee Services

Benefits

- Possibly in calculating response times from employees place of residence

Inspections

Responsible for commercial and industrial building plans; and historic permits, which are on paper indexes.

Background/Status

- Use Permit Works for inspection activities including planning, permits, reports and inspections. (On FOXPRO)
- The geodatabase feature contains an extract of parcel text
- Group also does code enforcement

Need

- Access to current property owners
- The group sees themselves as needing access rather than maintenance capabilities of the GIS data

Long-term Goals Convert

- Paper index of building plans to Excel
- Potential housing inspections will change the workload.

Information Technologies

Responsible for supporting all softwares. This can be a challenging expectation with a staff of 2.

Background/Status

- 125 CPU's and users with a variety of databases
- SQL Server is used in cardinal tracking (parking enforcement), and Cartegraph

Long-term Goals

- City-wide wireless network in 2005
- Transition to CONVERG communications by Nov. 15, 2004

Library

Background/Status

- Our library automation system is contracted with SELCO (Southeast Libraries Cooperating). It includes a patron database, bibliographic database and online resources.
- We add to the database with acquisition of materials, as well as new patrons. We also delete patron records and withdraw items; interacting with the database in daily transactions.

Benefits

- The library as a department in the City of Red Wing might benefit from an operational GIS in terms of demographics and long range planning. As a separate automation system (not integrated with the City of Red Wing), however, our databases with SELCO are not available for GIS mapping.

Long-term Goals

- Better ways to collect library user data - utilizing new technology if it is practical, affordable and supportable.

Port Authority

Background/Status

- Current files are all paper
- Limited records on LaserFiche
- Store the deeds for Port Authority properties
- Manage 280 slips on the river

Need

- Site plans with utilities

Long-term Goals

- Enter the leases and developer agreements into LaserFiche
- Better records management

Police

Responsible for police matters with 25 sworn officers (18 on patrol) plus 12/13 reserve officers

Background/Status

- The PD is very information based
- Sarah at the County has been very helpful in preparing special purpose mapping from the County GIS data.
- Use County CIS for all reports and reporting. (In SQL server software)

Need

- Maps of the roads and buildings
- Special purpose mapping for crime investigation, courts, events such as the bike race, and grant applications
- Periodically publish crime mapping
- Possibly use GIS as a tool in sitting a sub-station
- Have the ability to look up the property owner, especially on narcotics investigations
- Create buffers for Homeland Security needs

Long-term Goals

- Add MDT's in 18 months
- Add a command vehicle in 6-8 months

Benefits

- Improve the availability of information
- Learning Red Wing, which is a difficult one.

Planning

Responsible for planning and zoning actions, subdivision ordinance, (and coordinate their review) park planning, historic preservation and many projects or special projects. Work with on the Sp Project Recreation board (school/City) Joint Powers Board. Also:

- Issue Land Use permits. (And the associated code enforcement)
- Coordinate the C I P with PLAN IT
 - Include maps in the plan
- City liaison to Main St group, Chamber and Red Wing 2020.

Background/Status

- Permit Works software with a FoxPro database is used.

- Currently have 2 copies of ArcView 3.x. This software has limited use due to training and time constraints.
- Have a downtown (Main St) database in Excel of all buildings

Need

- Official zoning map overlaid on parcels
- Easier access to data to fill information requests
- Special purpose maps for meetings

Long-term Goals

- Potentially have a GIS kiosk at the library
- Public access to information
- New FEMA floodplain mapping which is easily accessible.

Benefits

- An official zoning map, over the parcel map will dramatically ease answering zoning questions and will add accuracy to that answer.

Challenges

- Time.

Public Works

Responsible for operation and maintenance of city sewers, garbage collection and incineration, roll-of rental, pavilion rental, waters system, cemetery, streets, Airport (in Wisconsin) parks, trails and buildings. Staff of 75 full-time and 65 seasonal. Also maintain DOT signal lighting and City Owned lighting.

Background/Status

- Trees are on a 3-year old Access database
- Pavement management has been started in Cartegraph with street lengths and widths entered in.
- Fleet management is in Cartegraph.
- Currently collecting positional data with GPS using Patrick and 2 seasonal employees, and entering into Cartegraph
- Sanitary is 2/3 complete.
- Storm in Burnside is complete.
- Maintains striping on MSA streets
- Have 2 copies of AutoCAD Map and 2 of AutoCAD LT with 3 current users.

- Cemetery database is on PONTEM software.
- Use card files for sanitary; water, storm and curb stop boxes.
- Currently adding (Parcel Identification Number (PIN) on utility billing accounts
- Recreation scheduling is handled by the school district under the joint powers agreement
- Execute an annual street sweeping program.

Need

- Move all Cartegraph data to the SQL Server format.
- Complaints are on an Access database and it would be nice to have them on a map.

Long-term Goals

- Complete Cartegraph implementation with work orders by 2006.
- On a lower priority update/develop a trail and park plan for annual inspection.
- GIS based sign inventory.
- Tie to utility billing
- Auto Read meters are about 4 years away.
- Use the web to answer many economic development and developers questions

Benefits

- Capture the knowledge since many senior staff will be retiring in the next several years.
- Access to the knowledge and information.
- Basis for GASB 34 inventory and valuations.
- Enhance utility records and utility billing