METROGIS

POTENTIAL ENHANCEMENTS TO REGIONAL DATA SOLUTIONS

DATA IMPROVEMENT PLAN

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1 OVERVIEW

1.1 BACKGROUND

Over the past 15 years, as part of its ongoing mission to promote GIS data sharing and collaboration in the Minneapolis-St. Paul Metropolitan Area, MetroGIS has endorsed and helped to coordinate several regional data solutions. These data solutions are widely used in the region and provide value to many different types of end-users (local and county government, education, private/non-profit, etc). The following link will provide details of these datasets: http://www.metrogis.org/data/index.shtml

In December 2010, MetroGIS performed a *Shared Needs Assessment* survey and workshop in order to gather input about unmet geospatial needs that MetroGIS should consider addressing. In particular, ample feedback was collected regarding the usefulness of the current regional data solutions, and potential enhancements to them. These enhancements were combined and refined down to a list of 26 discrete potential enhancements that became the basis for this project. This refinement process was aimed at removing redundancy of comments (i.e. similar comments were combined into one), and identifying the enhancements that had a clearly stated goal.

1.2 PROJECT SUMMARY

This project was carried out in two phases:

1. An initial web-based survey was conducted to gather prioritization information on the suggested data enhancements. (see appendix for summary of results)

2. Once these priority enhancements were determined, an online collaboration forum (*Tricider*) was used to gather input on how best to achieve the candidate enhancements through actionable items.

Given limited budget and resources available, and taking into account the priorities and input gathered during this project, this document lays out a proposed work plan aimed at gaining the most enhancements and largest benefits for the MetroGIS community. Due to limited resources and other competing MetroGIS responsibilities outside of the regional data solutions, it may not be feasible to pursue all items in this plan. It will however be critical that for any of the items that are pursued, that there are willing and able MetroGIS stakeholders to act as "champions" to help usher the initiative to success.

An important added benefit of this project was the evaluation, testing, and experience gained about the ***on-line collaboration tools*** used throughout the project. This document also describes important lessons learned regarding the utility and effectiveness of these tools. Further use of these tools can be an important component for future MetroGIS collaborative endeavors.

2 PRIORITY DATA ENHANCEMENTS

The first phase of this project was to prioritize the 26 potential enhancements to regional data solutions identified as part of the the initial *Shared Needs Assessment* process. This was done via an online survey. Using the survey results, the 26 items were further refined down to 13 "top priority" items based on the survey responses (see appendix) . Generally speaking, the items that were deemed important by the most participants were considered "top priority" (details about this can be found in the Standard Procedure

document). Below is a summary of the top priority items that came from this survey. Please note, these are *not* listed in order of priority, but rather are grouped by dataset:

- **Parcels**
  - Develop address information for multi-unit parcels
  - Improve Geocoding Results
  - Standardize and Improve quality/completeness of attribution
  - Increase Frequency of Updates
- **Centerlines and Address Ranges**
  - Improve Address Ranges
  - Improve Spatial Accuracy and Completeness of Features
  - Include additional information such as right of way boundaries, bike lanes, pedestrian crossing, etc.
  - Make Centerlines fully routable with one way segments digitized in the direction of traffic
- **County/MCD Boundaries** (Minor Civil Division)
  - Extend to Statewide
  - Improve Accuracy (resolve annexation and record title conflicts, apply field boundary positions, make consistent among all organizations)
- **Land Cover**
  - Increase Resolution
  - Include Statewide Coverage
- **Census Geography**
  - Aggregate local improvements to 2010 census TIGER lines

Two of the candidate enhancements, making parcel data and street centerline data accessible to Non-Profit/Private organizations, are not included in the list above as they are in progress at this time. Parcel agreements have language added to allow distribution of historical data to Non-Profit/Private organizations, and these agreements are in the final stages of approval as they expire December 31, 2011. The *Road Centerline Maintenance Model* project is aimed at making centerlines publically available.

Further, standardizing parcel attributes is an ongoing process and the parcel agreements contain language to this effect, stating that Counties are encouraged to "Fully populate incomplete or missing attribute fields in the Regional Parcel Dataset, to the extent the subject attribute data are maintained for internal business purposes by the County". It is important to make clear to the data end-users what "maintained for internal business purposes" actually means in terms of available information within each county. This information differs from one county to the next, which creates the perceived lack of standardization of attributes.

3 PROPOSED WORK PLAN OVERVIEW

With the prioritized list determined, and keeping available budget and resources in mind, the next step is to develop a work plan that achieves as many of these enhancements as possible. Depending on the nature of the specific enhancement, the action may be a policy change, or to build a workgroup, or to develop a web application. These action items can (and should) be pursued in parallel.

Action items for addressing the priority enhancements can generally be broken down into four categories:

1. Budget Items that have already been planned for
2. Items requiring coordination and policy change
3. Items requiring a Collaboration/Workgroup to perform additional planning and determine next steps
4. Items related to the ongoing *Road Centerline Maintenance Model* project

The table below provides an overview of the proposed data improvement work plan, including the category of action needed, and the enhancements that action will address.

PROPOSED WORK PLAN OVERVIEW (*Details provided in the next section*)		
CATEGORY	**ACTION**	**ENHANCEMENTS ADDRESSED**
1. Budget Items These items have already been budgeted for. The planning and implementation can begin as soon as the budgets are available (2013)	Develop an online address editing tool	Parcels - Develop address information for multi-unit parcels
		Parcels - Improve Geocoding Results
	Develop an improved 2010 block polygon dataset	Census Geography – Aggregate local improvements to 2010 census TIGER lines
2. Items requiring Coordination and Policy Change These items will require some form of policy change, which will come only following discussion, coordination and consensus among those involved. MetroGIS will need to be an advocate for the policy change, and help to foster the discussion.	Coordination and Process Improvement of Parcel data update procedures	Parcels - Increase Frequency of Updates
	Advocate for revised Municipal Boundary Adjustment Unit map requirements	County/MCD Boundaries - Improve Accuracy
3. Items requiring Collaboration/Workgroup to determine next steps These items will require further investigation and discussion before actions can be taken. The next step is to begin collaboration, with planning and implementation to follow as resources and budget allows	Develop working group to collaborate with MnGeo	County/MCD Boundaries - Extend to Statewide
	Develop Land Cover working group	Land Cover - Increase Resolution
		Land Cover - Include Statewide Coverage

PROPOSED WORK PLAN OVERVIEW (*Details provided in the next section*)		
CATEGORY	**ACTION**	**ENHANCEMENTS ADDRESSED**
4. Items related to the *Road Centerline Maintenance Model* project These items overlap to a certain extent with the work currently being done for the *Regional Collaborative Maintenance Model For Road Centerline Data* project.	Continue work on the *Regional Collaborative Maintenance Model For Road Centerline Data* project. Ancillary data (such as routing, right-of-ways, sidewalks, etc) will require collaborative workgroups, and should be pursued after the *Centerline Maintenance Model* plan is complete.	Centerlines and Address Ranges - Improve Address Ranges - Improve Spatial Accuracy and Completeness of Features - Include additional information such as right of way boundaries, bike lanes, pedestrian crossing, etc. - Make Centerlines fully routable

4 PROPOSED WORK PLAN DETAILS

This section describes the details of the proposed work plan items listed in the table above.

It is important to note that there are limitations of this process, and these are described below:

1) The enhancements suggested represent only a small portion of the needs of MetroGIS. Thus, the items in this work plan will be competing for limited resources with other critical MetroGIS responsibilities.

2) Some of the suggested enhancements from the initial *Shared Needs Assessment* survey and workshop that were brought into this process were not clearly defined or articulated, making it difficult to determine clear next steps.

3) The validity of the suggestions may or may not have been vetted within the organization prior to starting this process.

4.1 BUDGET ITEMS

The following items have already been budgeted for in 2012. For these items, accomplishing the improvement is simply a matter of continuing with the steps that have already been determined.

4.1.1 Develop an online address editing tool

An online address editing tool will be developed for address point data maintenance and sharing. This tool will address two of the critical data enhancements: both the creation of an address points dataset that includes a point for every address in a parcel and an association to the parcel, and (with this dataset created) improved geocoding results.

The prototype design and development of an online address editing tool has been completed. Full development and implementation of the tool is in the MetroGIS budget for 2012 ($15,000).

4.1.2 Develop an improved 2010 block polygon dataset

Metropolitan Council has planned for budget in 2012 ($50,000) to contract with a consultant to create a 2010 Census Bureau block polygon dataset for the Minneapolis-St. Paul Metropolitan Area based on local data. The 2010 census blocks will be adjusted so that they are coincident with the NCompass Technologies (NCT) Street Centerline and Landmarks databases.

4.2 POLICY CHANGE ITEMS

The following enhancements can be accomplished only by determining and enacting some sort of policy change. Achieving this will require communication and discussion among stakeholders and decision makers to come to an agreement on the policy change needed to address issue.

4.2.1 Process Improvement of Parcel Data Update Procedures

Increasing parcel update frequency will require communication and agreement by the counties and MetroGIS, and ultimately a policy change. Typically, for a policy change to take place at MetroGIS, first a workgroup endorses a change, then the workgroup proposes the change to the MetroGIS Coordinating Committee, then the Coordinating Committee proposes the change to the Policy Board, and finally the Policy Board officially endorses the change.

To increase frequency of parcel updates, the counties and MetroGIS will need to reach an agreement and change the current policy (quarterly updates) so that counties are providing parcel updates more frequently. It is understood that asking for more frequent updates will affect staffing resources within all participant organizations, and that these resources may have limited capacity to devote additional time to the MetroGIS data updates. To help encourage and support the policy change, MetroGIS should work with the counties to improve the process of providing parcel updates so that it is more streamlined and straightforward. This may include the sharing of data conversion modeling tools, ETL (Extract, Transfer, and Load) procedures, and the use of web-based data submission tools. Collaboration will be needed to determine the best methods for improving the update process. Initially, it will be worthwhile to test out any procedures and modeling tools with selected counties as a pilot project, and then roll out these tools to the rest of the community.

At the December 2011 Coordinating Committee meeting, the “County Data Producers Workgroup” was delegated to further investigate the issue of parcel update frequency and boundary accuracy (next section). This workgroup should perform the following general steps:

1. Gain a clearer understanding of the needs
    a. How many organizations have each need?
    b. What are the perceived issues within each (ex: inaccuracies in municipal boundary data)?
2. Determine whether it is justified to proceed further?
3. Identify a champion (or lead organization) for each effort.
4. Understand current county procedures for data updates
5. Understand data aggregation by Metropolitan Council
6. Gather input/ideas on process improvements and feasibility
7. Determine whether it is justified to proceed further.
    a. Are changes realistic?

b. Are resources available?

8. Test any process improvements with a pilot group. Refine as needed.
9. Propose any needed policy changes to the MetroGIS Coordinating Committee

The above outline can be used as a template for other working groups as well (mentioned in section 4.3)

4.2.2 Revise Municipal Boundary Adjustment Unit map requirements

To achieve better accuracy in the County/MCD Boundaries, the state's Office of Administrative Hearings Municipal Boundary Adjustment Unit (MBAU) (http://www.mba.state.mn.us/) could consider revising the MBA filing map requirements whereas all MBA filings would be required to have an accompanying geographic file. These filings, reviewed by the MBAU, are the source for boundary adjustments within the state and are disseminated back to the local and county level, and ultimately to MetroGIS. Ideally, boundary changes made are based on the county parcel dataset and would be submitted in an agreed-upon format with proper spatial reference information (shapefile/KML/WKT format). Specifics of the data format and structure would need to be determined by the MBAU, ideally with input from local and county government as well as MetroGIS. Because this policy change would need to be made at the state level, MetroGIS's action can only be to advocate for the change, and help to facilitate the discussion. MetroGIS may also be able to help encourage collaboration to refine and streamline the movement of data between the various agencies and levels of government.

4.3 COLLABORATION AND WORKGROUP ITEMS

The following items will initially require some form of collaboration/working group to perform further planning, investigate options and determine next steps. These workgroups should be initiated depending on priority, and availability of willing participants and leaders.

4.3.1 Develop working group to collaborate with MnGeo

The potential enhancement to extend County/MCD Boundaries statewide will undoubtedly require collaboration with the state. MnGeo maintains a statewide CTU (cities, townships and unorganized territories) boundary dataset that is updated annually and could potentially be integrated with MetroGIS data to create a statewide dataset. It would also be beneficial to be sure that MetroGIS data improvements are being passed back to the state-level dataset. Workflows will need to be established to coordinate the regular transfer and standardization of data.

4.3.2 Develop Land Cover working group

The two enhancements related to Land Cover, "Include Statewide Coverage" and "Increase Resolution" will also benefit from an initial working group to recruit interested parties, investigate options, and determine next steps. Some ideas were collected through the online collaboration forum, but collaboration between remote sensing and photo-interpretation subject matter experts and those that actively use the Land Cover data will ensure that all requirements are understood and that all technical options are examined. For example, it was suggested that in order to expand the Land Cover data set to cover the entire state, the solution might be to convert the annual Cropland Data Layer from USDA to make a simple statewide land cover dataset. Experienced users of the USDA and land cover end-users will need to investigate this and other options to determine the best course of action prior to any data development. Likewise, it was suggested that in order to increase resolution, a collaborative process be established to update/improve

the land cover inventory of the metro area. This type of process would involve numerous government agencies (local, county, state, and federal), NGO's, environmental firms, and might potentially incorporate crowd-sourcing tools and processes. Once again, a working group would be helpful for determining what this process would entail, and what the key roles would be.

4.4 STREET CENTERLINE ITEMS

The *Regional Collaborative Maintenance Model For Road Centerline Data* project began in 2010 and is investigating shared processes, systems, and data to support many of the enhancements related to the centerline data. When completed in spring 2012, the *Centerline Maintenance Model* planning phase will result in a work plan that will then lead to implementation of the centerline maintenance model, which includes identifying key roles, establishing workflow policies and structure, building a public-domain, authoritative centerline file, and developing a working system prototype. Implementation is anticipated to begin in Fall 2012.

The potential road centerline enhancements identified as part of this project overlap with the ongoing *Centerline Maintenance Model* effort. It is important that the *Centerline Maintenance Model* project and this data improvement plan be kept on the same path, with the same goals in mind, and avoid duplication of efforts. It is also important that implementation of the *Centerline Maintenance Model* project has begun prior to investing in building ancillary datasets, such as routing, ROW, and alternative methods of transportation.

The following list includes the Street Centerline enhancements identified via this *Enhancements to Regional Solutions* project. These enhancements will be further considered during the planning and implementation stages of the *Centerline Maintenance Model* project.

- **Improve Address Ranges** and **Improve Spatial Accuracy and Completeness of Features**
  - The *Centerline Maintenance Model* project includes a workflow model for data maintenance and improvement.
- **Include Additional Information** such as Right of Way, Sidewalks, Skyways, Bicycle Paths, Rail Lines
  - One of the steps laid out in the *Centerline Maintenance Model* work plan is to determine a suitable data model for centerline storage. This model will enable the integration of extensions to the core centerline data for such features as Rights of Way, additional modes of transportation, routing**,** etc.
- **Make Centerlines fully routable**
  - The *Centerline Maintenance Model* project has specifically identified routing as a separate issue and collaboration on routing initiatives will happen outside the scope of that project.
  - A collaborative working group should start by investigating options, such as utilizing MnDOT data for routing.

4.5 ONLINE COLLABORATION FOR FUTURE METROGIS ENDEAVOURS

This project used two online collaboration tools (an on-line survey and a brainstorming forum) to gather information from stakeholders and allow participants to interact without having to attend a meeting or conference call. Details of the tools chosen, analysis of available tools, and processes used can be found in the *Standard Procedures* document that was written as part of this project. Using these types of online

interactive tools allows for maximum flexibility for participation, as people can interact at any time and schedule conflicts are no longer an issue. In addition, these types of on-line forums create a written and electronic record that helps document the initiative.

4.5.1 Best Practices and Lessons Learned

Overall, this project was a very informative learning experience, particularly in the realm of online collaboration tools. When undertaking a project of this nature in the future, if possible MetroGIS should aim to complete the brainstorming and idea clarification before the prioritization. It is critical that the ideas be vetted by MetroGIS prior to final prioritization and work plan development. This may not always be possible, and it may be necessary to iterate several times through prioritization and brainstorming in order to come to a final, credible, conclusion.

One of the key challenges of this project was handling misinformation during collaboration due to items being out of scope items, comments and ideas posted by those who may not be the authority on a given subject, and participants not being aware of recent developments. This will be an ongoing challenge of any project of this nature, particularly when using online collaboration tools where all participants can voice their opinion openly. This challenge makes the needs for an active, able "champion" even greater. This person can help to clear up inconsistencies or misinformation, prevent the collaboration from going in the wrong direction, and keep the focus on track and within scope.

Below is a summary of the best practices and lessons learned regarding the online collaboration tools used in this project:

- Online Survey (www.SurveyMonkey.com)
    - Be mindful of the frequency of survey requests to stakeholders, and as best possible attempt to gauge the willingness of potential respondents to respond prior to deciding to use a survey.
    - Clearly and succinctly articulate the purpose, expectations and results of the survey, so that respondents can make an informed decision about how much effort/detail to put into survey responses.
    - If appropriate, determine what would constitute a credible number of survey responses prior to publishing the survey. (ex: quorums of specific teams)
    - Be sure the survey questions and formats are straightforward and easy to understand
    - Keep the survey to a reasonable length. Use question skipping logic to cut down on the number of a questions a respondent sees (i.e. skip questions that are not applicable to them)
    - Be sure the tabular results that come from the survey are in a format that will allow the type of analysis desired. Test the output from a test set of responses prior to collecting survey responses from the entire audience.
    - Monitor the response rate and send survey reminders if need be
    - Evaluate the level of response and determine if valid results have been achieved based on the purpose of the survey.
- Brainstorming/Collaboration Forum (www.tricider.com/en/t/)
    - Be sure the chosen tool is user friendly and has a simple interface

- Clearly and succinctly articulate the purpose, expectations, procedures/rules and results of the exercise, so that participants can make an informed decision about whether to participate and how much effort/detail to put into comments.
- If appropriate, determine what would constitute a credible/valid number of participants prior to initiating the forum.
- Do a reality check. Can this process really achieve the desired result?
- Present each item/question in a straightforward manner so that the issue to be considered and discussed is clear to the participants.
- Be sure expectations and results of the brainstorming/collaboration are made clear.
  - Were the ideas that got the most votes the "official" decision, or simply ideas for further investigation?
- Review validity of results.
  - Were there enough participants? From appropriate MetroGIS stakeholder groups?
  - What the group decides in an informal manner may not be possible/feasible given resources, and may not match the overall goals and mission of MetroGIS.

4.5.2 Online Collaboration Tools

The table below lists various types of online collaboration tools, examples of each tool, and of the uses of each tool. This table will help MetroGIS make decisions of when each type of tool should be used in the future. It is likely that a combination of tools will be used for any single initiative. The *Standard Procedures* document contains additional analysis and information about the use of online collaboration tools.

TOOL TYPE	TOOL EXAMPLE(S)	TOOL DESCRIPTION
Online Survey	Survey Monkey* www.SurveyMonkey.com Survey Gizmo www.surveygizmo.com	Used for Data Collection Specific survey questions are asked to a group of respondents to gather standardized information that allow for straightforward prioritization, analysis and decision making.
Online Collaboration and Brainstorming forum	Tricider* www.tricider.com/en/t/ IdeaScale www.ideascale.com	Used for Brainstorming/Idea Gathering Given a list of issues to resolve or questions to answer, participants can interact with each other in an online space, generate ideas, discuss pros and cons, and vote for proposed solutions.
Online Open Forum	Google Groups www.groups.google.com MediaWiki www.mediawiki.org	Used for Open Communication Allows for informal communication to share information and opinions on a subject. This type of tool is useful when the goal is to have an open dialog and allow users to share their ideas as open-ended comments.
Robust Online Project Collaboration tool	Microsoft Sharepoint http://sharepoint.microsoft.com Huddle www.huddle.com	Used for project interaction and content management A team of collaborators can share and edit project files, attend online meetings, manage project tasks and track project progress. This type of tool is most useful once a project has reached the implementation phase.

*Denotes the tools that were used in this project.

It is expected that MetroGIS will continue to use these types of tools for future initiatives. Below are some examples of ways that MetroGIS may decide to use online collaboration tools for the items outlined in this document:

- **Online Survey**
  - Send survey to MetroGIS community to gauge interest and recruit individuals who are willing to participate in one of the working groups or data initiatives.

- **Online Collaboration and Brainstorming forum**
  - Discuss possible methods for achieving Land Cover data improvements (section 4.3.2), weigh pros and cons, etc.

- **Online Open Forum**
  - Provide project status updates for:
    - 2010 Census Block Data Improvements (section 4.1.2)
  - Group communication and planning for:
    - Revised Municipal Boundary Adjustment Unit map requirements (section 4.2.2)
    - Collaboration with MnGeo on County/MCD boundaries (section 4.3.1)
    - Land Cover Working Group (section 4.3.2)

- **Robust Online Project Collaboration tool**
  - Use for detailed project collaboration for the implementation phases of:
    - Online Address Editing Tool Development (section 4.1.1)
    - Centerline Maintenance Model Project (section 4.4)
    - Process Improvement of Parcel and MCD data update procedures (section 4.2.1)

APPENDIX – SURVEY RESULTS

The tables below provide a summary of the prioritization survey results conducted at the beginning of this project.

Table 1: Participants by Type of Organization

The table below provides the number of survey participants by type of organization.

ORGANIZATION TYPE	NUMBER OF RESPONDENTS
City or Township	3
County	7
Metropolitan Government Entity	7
State of Minnesota Agency	4
Federal Agency	1
Academic (College or University)	1
Utility	2
Private sector	5
Private Non-Profit	3
Other	2
Total	**35**

Table 2: Summary of Prioritization Results

In the survey, participants were asked to rank the enhancements within a particular data solution. For example, they were given all potential enhancements for Parcels, and then had to assign each a rank (1 being the highest, most important and 5 being the lowest, least important). The column on right of the table below indicates where each enhancement fell in the ranking within that particular data solution.

Additionally, survey participants were also given a list of all potential enhancements and were asked to indicate which ones would have the most "Positive Impact" on their organization. Respondents were allowed to choose as many enhancements as they wanted, but were encouraged to choose only those that would be *most important* to their organization. A total of 31 respondents completed this question, and the percentages in the table below are based on that number. Results from this question are displayed in the two middle columns of the table below.

The following criteria was used to determine which items were considered "top priority".

- *The enhancement rated the highest importance within that individual regional data solution enhancement ranking*

  OR

- *At least 25% of respondents indicated that the suggested enhancement "would most positively impact" their organization in the overall ranking.*

The table below indicates the prioritization and ranking results used to determined which items would be "top priority". (listed by data solution, *not* in order of priority)

Potential Data Enhancement	Respondents Indicating "Positive Impact" from Enhancement (out of 31)	Types of Organizations That indicated the Enhancement would have a "Positive Impact"	Ranking within Data Solution (#1 – High; # 5 – Low)
Parcels			
Make Accessible for private/nonprofits	29.0% (9 respondents)	Academic (College or University) (1) County (1) Private Non-Profit (3) Private sector (4)	# 3
Develop address information for multi-unit parcels	38.7% (12 respondents)	City or Township (1) County (2) Metropolitan Government Entity (4) Private Non-Profit (1) Private sector (2) Other (2)	# 2
Improve Geocoding Results	29.0% (9 respondents)	City or Township (1) County (4) Metropolitan Government Entity (1) Private Non-Profit (1) State of Minnesota Agency (1) Utility (1)	# 4
Increase Frequency of Updates	25.8% (8 respondents)	City or Township (1) County (1) Metropolitan Government Entity (1) Private Non-Profit (1) Private Sector (1) Utility (2) Other (1)	# 5
Standardize and Improve quality/completeness of attribution	51.6% (16 respondents)	City or Township (1) County (1) Metropolitan Government Entity (5) Private Non-Profit (2) Private sector (4) State of Minnesota Agency (2) Other (1)	# 1 (Highest)
Centerlines and Address Ranges			
Make Accessible for private/nonprofits	19.4% (6 respondents)	Academic (College or University) (1) Metropolitan Government Entity (1) Private Non-Profit (2) Private sector (1) Other (1)	# 4
Improve Address Ranges	29.0% (9 respondents)	City or Township (1) County (3) Metropolitan Government Entity (2) State of Minnesota Agency (1) Other (2)	# 2

Potential Data Enhancement	Respondents Indicating "Positive Impact" from Enhancement (out of 31)	Types of Organizations That indicated The Enhancement would have a "Positive Impact"	Ranking within Data Solution (#1 – High; # 5 – Low)
Improve Spatial Accuracy and Completeness of Features	48.4% (15 respondents)	City or Township (2) County (4) Metropolitan Government Entity (2) Private Sector (2) State of Minnesota Agency (1) Utility (2) Other (2)	#1 (Highest)
Include additional information such as right of way boundaries, bike lanes, pedestrian crossing, etc.	29.0% (9 respondents)	City or Township (1) Metropolitan Government Entity (2) Private Non-Profit (2) Private Sector (1) Utility (1) Other (2)	# 3
Make Centerlines fully routable with one way segments digitized in the direction of traffic	25.8% (8 respondents)	City or Township (1) County (1) Metropolitan Government Entity (1) Private Non-Profit (2) Utility (1) Other (2)	# 5
County/MCD Boundaries (Minor Civil Division)			
Extend to Statewide	22.6% (7 respondents)	City or Township (1) County (1) Metropolitan Government Entity (1) Private Non-Profit (1) Private Sector (1) State of Minnesota Agency (1) Other (1)	# 2
Improve Accuracy	25.8% (8 respondents)	City or Township (1) County (3) Metropolitan Government Entity (2) Private Non-Profit (1) Other (1)	# 1 (Highest)
Land Cover			
Include Statewide Coverage	22.6% (7 respondents)	City or Township (1) County (1) Federal Agency (1) Private Non-Profit (1) Private Sector (1) State of Minnesota Agency (1) Other (1)	# 1 (Highest)
Increase Resolution	19.4% (6 respondents)	County (1) Federal Agency (1) Private Non-Profit (2) Private Sector (2)	# 2
Census Geography			
Aggregate local improvements to 2010 census TIGER lines	9.7% (3 respondents)	City or Township (1) County (1) Metropolitan Government Entity (1)	# 1 (Highest)