Project Plan

Off the Map Consulting

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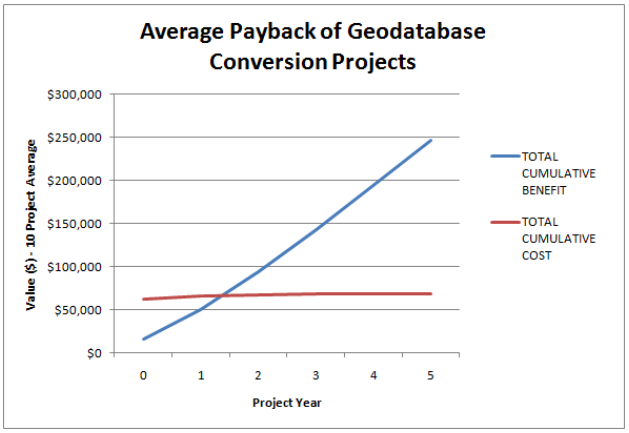
Project Title: Pole and Pole Attachment Geodatabase Design **Project Sponsor:** Lori Brown
Project Manager: Jimmy Kroon, 302-270-7611, jck224@psu.edu **Date:** Sept 3, 2009

Proposed Start Date: Nov 2, 2009 **Projected Finish Date:** Feb 23, 2009
Projected Budget: $52,669

Overview

This project plan is a response to the City of Philadelphia's RFP for geodatabase design services. The finished product will store pole and pole attachment data currently used by the Dept. of Streets and stored in shapefile format. The geodatabase will use the latest ESRI geodatabase model with normalized database tables and use appropriate business rules and logic through domains and relationships. It will be compatible with standard work order management software and allow the City to meet GASB 34 requirements. Current City shapefile data will be migrated to the completed geodatabase.

Off the Map is commited to quality in our projects. We will use quality control techniques to maintain the integrity of migrated shapefile data and assure that the final geodatabase provides the City of Philadelphia with the functionality and cost savings it needs. An analysis of 10 similar projects completed by Off the Map indicates the City can expect a payback period of 1.5 years and a return on investement of over 300% by year five.



This plan will outline the scope, schedule, and budget that Off the Map is proposing as a solution for the City of Philadelphia. It will also review the unique considerations that Off the Map will account for during the project. We outline our plans for quality assurance, especially regarding maintaining data integrity during migration and ensuring and verifying the geodatabases fitness of use after the project is complete. We also identify and rank project risks, and we present detailed strategies to proactively deal with three that we believe pose the greatest threat to project success and client satisfaction.

Scope

Off the Map Consulting will review the City's existing shapefile data, structure, and documentation to create an initial system model. Then, in conjunction with City stakeholders, will define business rules for the new system model, including data domains and relationships. A new system model will then be creating using the new business rules and geodatabase best practices. Finally, the existing and new models will be compared to create a conversion plan for moving existing data into the new system.

During system analysis, special attention will be paid to integrating the system with work order management software and achieving GASB 34 requirements.

To assure a smooth transition the the new system, Off the Map will also provide the City GIS office with initial technical support and training with delivery of the geodatabase.

We will also manage quality throughout the project to assure the geodatabase contains accurately migrated data and provides the City the functionality it expects.

Stakeholders

City of Philadelphia	***Off the Map Consulting***
• City Leadership Representative • GIS Office • Maintenance Office • Assets Office	• Sponsor • Project Team Members

Roles and Responsibilities

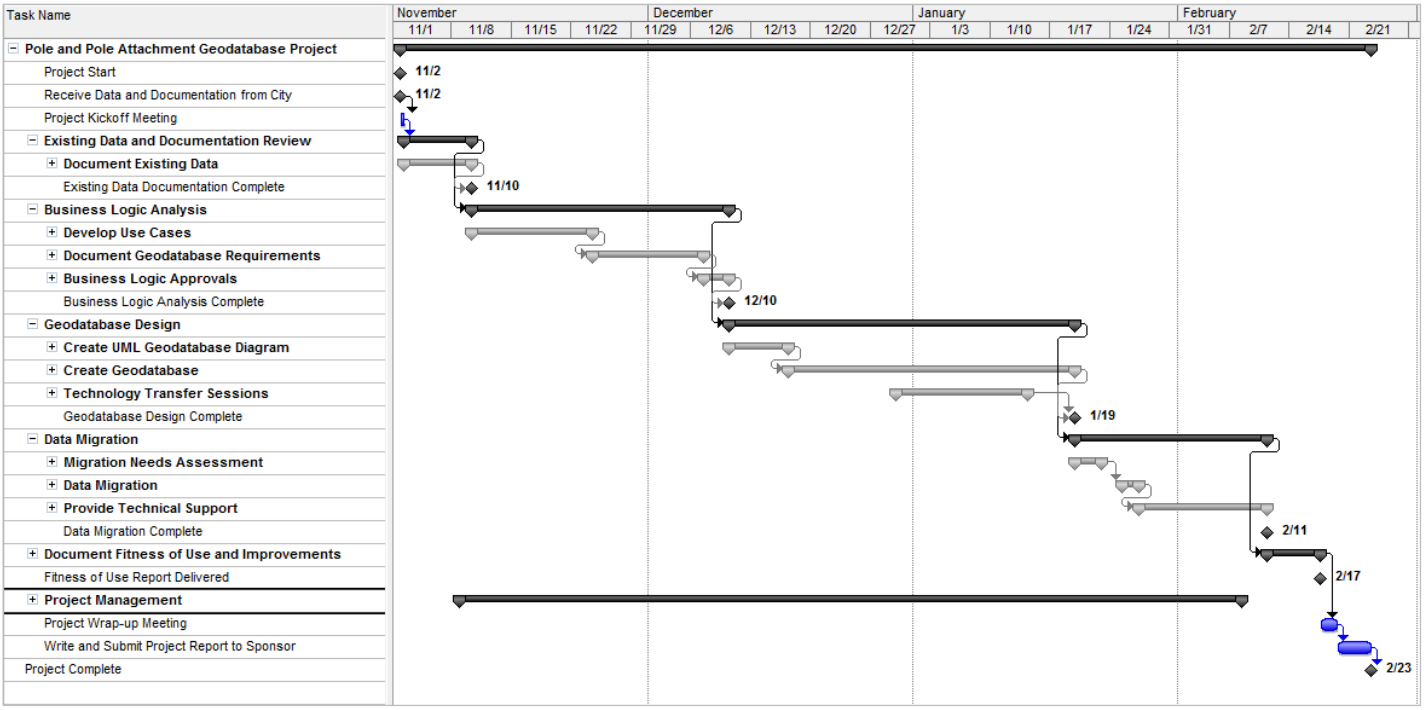
Name	Organization	Position	Role	Responsibility	Contact Information
Lori Brown	Off the Map	Owner	Sponsor	Provide staff, funding, project guidance and support managing high-level stakeholders	lbrown@otm.com
Jimmy Kroon	Off the Map	Manager	Project Manager	Manage project, review deliverables, update stakeholders	jkroon@otm.com
Irma Ann Alyst	Off the Map	Senior GIS Analyst	Team Member	System modeling, write VBA scripts, data and fitness quality review, monitor training sessions, data migration	ialyst@otm.com
Tony van der Wielen	Off the Map	GIS Analyst	Team Member	System modeling, run VBA scripts, data and fitness quality review, lead training sessions, data migration	twielen@otm.com
To be assigned	City of Philadelphia	City GIS Office Rep.	Project Coordination / Provide City Staff	Provide data and system information, attend meetings and training sessions, review and test intermediate deliverables	
To be assigned	City of Philadelphia	City Maintenance Office Rep.	Work Order System Integration	Assistance integrating system with work order management software	
To be assigned	City of Philadelphia	City Assets Office Rep.	GASB 34 Compliance	Assistance determining system requirements or GASB 34 compliance	

Schedule and Budget

We project that the project take 16 weeks and cost $52,669. Based on a start date of Nov. 2, 2009, the project will be finished on Feb 23, 2010. Below are time frames for project phases, due dates for milestones, and a budget breakdown.

The project manager will monitor progress using earned value management techniques, keeping stakeholders informed of deviations from this plan and working with them to discover the causes and find solutions.

Project Schedule



ACTIVITY	HOURS	BUDGET
Total Project Budget	**821**	**$52,669**
Project Kickoff and Existing Data Review	**76**	**$4,611**
Business Logic Analysis	**242**	**$14,703**
Develop Use Cases	*138*	*$9,290*
Document Geodatabase Requirements	*72*	*$4,805*
Business Logic Approvals	*32*	*$608*
Geodatabase Design	**228**	**$14,555**
Create UML Geodatabase Diagram	*68*	*$4,339*
Create Geodatabase	*148*	*$8,464*
Technology Transfer Sessions	*24*	*$1,752*
Data Migration	**88**	**$6,072**
Migration Needs Assessment	*40*	*$2,656*
Data Migration and Technical Support	*48*	*$3,416*
Document Fitness of Use and Improvements	**36**	**$2,040**
Project Management and Reports	**152**	**$10688**

Quality Plan

Quality will be managed throughout the project. This plan outlines our strategy to ensure quality during the Pole and Pole Attachment Geodatabase Design project and within the final products. OTM will use the following steps to manage the quality of migrated shapefile data and to assure the fitness of use of the final geodatabase.

Accurate Data Migration

Upon receiving the existing shapefile data, OTM will verify its integrity, spatial reference and documentation. Discrepancies will be discussed with the City before proceeding.

Review attribute field formats, documentation, and intended use with City GIS staff. Search data for missing, out-of-range, and out-of-format values which would trigger errors during scripted migration. We will present any errors found to the City for correction at the first meeting and discuss solutions.

After completing the initial geodatabase design, we will document the steps to convert each attribute from its shapefile format into the new geodatabase format. This information will be compiled into a conversion plan.

The conversion plan will be used to migrate data into the sample geodatabase. A script will randomly select enough shapefile records to be 95% certain that it contains all the variation present in the full dataset. This dataset will be migrated using VBA scripts and error checked before presenting it to the City for training. This way, the sample geodatabase will both train City staff and test the data migration plan. We will also request that the City verify the data integrity as part of their training. Any errors will be used to modify the conversion plan and scripts.

This conversion plan will be updated as the geodatabase design evolves and revised scripts will be used to migrate sample data into each new sample geodatabase version. OTM and the City will error check each new geodatabase version. The City will confirm that the data has migrated into the geodatabase correctly as part of its acceptance of the approved geodatabase design. At this point we will have complete, tested, and verified VBA scripts to use during data migration.

After final migration is complete, a new sample (with 95% confidence) of geodatabase records will be compared with original shapefile data. Additionally, VBA scripts will be written to search for errors such as missing data, poles without attachments, attachments without poles, and violations of business logic rules.

Assuring Fitness of Use

Ensuring fitness of use in the final product requires understanding the shortcomings of the current system. The City has acknowledged several shortcomings of the shapefile system, including:

- Data maintenance and updates is too time consuming for staff.
- Report generation – in response to attachment requests, to determine upgrade needs, and to show asset maintenance levels for GASB34 – is too time consuming.
- Shapefile data is unable to use domains and other rules to automatically validate data, reducing data integrity.
- Failure to maintain data and respond to report requests can subject the city to monetary penalties.

During initial interviews and training sessions we will use Pareto charts to show shapefile system problems as well as similar charts illustrating task costs and repetition frequency. OTM will use this create an improvement priority list that will help us and the City focus on improvements that will produce the greatest benefits for the City. This analysis will also create benchmarks to measure improvements in the final geodatabase.

OTM will estimate methods and costs for improvement list items and create a cost / benefit analysis. We will work with the city to decide which to pursue.

OTM will review documentation and interview City GIS technicians and management to identify all tasks that will be completed using the new geodatabase. These will be developed into a comprehensive set of use case models. The use cases will form the foundation for the new system design, helping OTM design an efficient database using object-oriented design techniques. The discipline of object-oriented design will help eliminate table design errors (Whitten 2007).

These first three items will be completed and presented at the second business logic meeting with the City.

OTM will review the use cases during the geodatabase design phase to verify that the geodatabase is capable of performing the tasks the City requires. During the training sessions, City staff will use the sample geodatabase to perform exercises derived from these use cases. During the three training sessions, each use cases will be tested at least once. Errors will be used to modify the design and exercises generating errors will be repeated during later training sessions. Where appropriate, we will also design the exercises to test items from the improvement priority list. The City will confirm that all use case exercises have been correctly executed as part of its acceptance of the final geodatabase design.

At the completion of data migration, City staff will repeat all exercises designed to test use cases to evaluate the final product's fitness of use. We will also select actual tasks that the GIS office previously completed using the shapefile system (representative of the range of their work). They will repeat these tasks using the geodatabase and compare the results. During

these tests, we also reevaluate the geodatabase according to the problems and priority improvements identified at the beginning of the project. These steps will assure that the geodatabase provides the City with the functionality and performance improvements that it needs.

We will document the fitness of use and performance tests and provide this document to the City at project completion. This document will quantify the improvements in terms of decreased time, costs, or error rates. Since some improvements may be impossible to measure immediately, we will also request that the City provide us with long-term information during the months after completion.

Risk Assessment

Every project has inherent risks that can threaten the budget, schedule and quality of the project. But proper identification and planning for these risks can both reduce the incidence of these problems and the impact of problems that do occur. Proper risk management helps project managers and sponsors understand the potential needs of a project under consideration and assists them make decisions regarding which projects to pursue.

We have identified 13 risks associated with the Pole and Pole Attachment project for the City of Philadelphia. Identified risks were categorized according to probability and impact, and ranked so that team members and sponsors understand which risks require the most attention. Mitigation strategies will be presented for the risks most likely to impact the costs, schedule, or quality of the project.

Risk Identification

The project team identified potential risks through brainstorming, interviewing experienced colleagues, and reviewing reports from similar projects that our firm has completed. After compiling a comprehensive list, project members independently categorized risks according to probability of occurrence and potential impact. A simple low, medium, high categorization scheme was used. Each member's categories were reviewed by the team to create a final risk matrix. Team members wrote mitigation plans for the highest ranked risks. This risk plan allows us and the project sponsor to make an informed decision to proceed. The project manager will refer to use this plan during the project to watch for developing problems. If detected early, the potential for these problems to cause delays or extra costs will be greatly reduced. The table below contains the final list organized in decreasing priority.

Potential Project Risks

Description	Owner	Probability	Impact	Rank
Lack of knowledge of geospatial system capabilities keeps City from properly identifying its needs	Consultant	High	High	1
Training sessions fail to transfer knowledge to City employees	Consultant	Medium	High	2
New system fails to meet GASB34, work order system integration, or cost savings requirements	City	Medium	High	3
City attempts to increase project scope	City/Consultant	High	Medium	4
City staff resist the new system or do not provide necessary support	City/Consultant	High	Medium	5
City hardware or software needs upgrades	City	High	Medium	6
City users are too busy to get involved with project	City	Medium	High	7
Project data and documentation delivered late	City	High	Medium	8
Schedule / cost estimate is too optimistic	Consultant	Medium	Medium	9
Data formats create migration errors	Consultant	Low	High	10
New GIS Analyst is inadequate	Consultant	Low	Medium	11
Key staff (OTM or City) become sick or leave employment	Consultant	Low	Medium	12
Weather or disaster delays project	External	Low	Low	13

Risk Strategies

Here we have written mitigation strategies for three risks that we believe have the most impact on this project and the City's satisfaction with the geodatabase product. Risk #3 (Geodatabase does not meet requirements) is addressed thoroughly in the quality plan.

Risk Rank 1: Training sessions fail to transfer knowledge to City employees
Strategy: Training sessions will include information about the project process and expected benefits to increase staff interest. City staff will conduct exercises during them that are derived from the use case models and explained in detail in the quality section of this plan. Exercise deliverables will be reviewed by the senior GIS analyst and used to evaluate knowledge transfer. Since successful exercise completion is a requirement for the City to accept the final geodatabase design (see quality plan), the project will not proceed past that point unless the City is unable to complete all tasks correctly. The senior GIS analyst and project manager will monitor training sessions and conduct follow-up interviews to further ensure quality.

Risk Rank 2: Lack of knowledge of geospatial system capabilities prevents the City from properly identifying its needs.
Strategy: During the staff interviews at the start of the project, OTM will evaluate City staff knowledge. Pareto charts and task cost and repetition charts will illustrate the costs of the existing system so that City staff understand the opportunities for improvement. We will create use case models using City staff interviews, work shadowing, document reviews, and our own experience with similar projects to compile a complete list of geodatabase tasks. We will also use these sources to create an improvement priority list as described in the quality plan. Since OTM has completed similar projects for other cities, we can provide the City with examples and experiences from other project deliverables.

Risk Rank 4: City attempts to increase project scope
Strategy: The project manager will conduct weekly status meetings with OTM staff and report status to other stakeholders. During these meetings, the project manager and staff will review current project assignments to make sure that all work is in line with the technical scope. Any work outside the scope will be delayed until the project manager has been able to discuss the work with the project sponsor and/or City stakeholders. OTM prefers that objectives outside the original scope be included in a future phase of this project. This will leave the original geodatabase delivery date unchanged and include new ideas as revisions implemented and authorized under a new contract. However, to remain flexible for our client, OTM will consider increasing the scope of the current project under certain circumstances including newly discovered work critical to project success and opportunities with a high benefit to cost ratio. Any scope increase will be approved by the City with a revised contract which includes an updated budget and schedule.

Deliverables

Intermediate Deliverables

- Use case models – *Due at end of use case development (Business Logic Analysis)*
- Improvement priority list – *Due by second business logic meeting*
- Data conversion plan – *Due after completing initial UML diagram, updated as needed*
- Test geodatabase with sample data (three iterations) – *Due at knowledge transfer sessions*
- Exercises for training and geodatabase testing – *Due at knowledge transfer sessions*
- Final geodatabase for data migration – *Due at start of data migration*

Final Deliverables

- Geodatabase design rendered as a Visio Enterprise UML Diagram
- Personal Geodatabase schema rendered using ArcCatalog's CASE Tools
- Personal Geodatabase with geometry and attribute data migrated by City and quality assured by the City and Off the Map Consulting
- Geodatabase metadata and documentation
- Fitness of use and improvement report

Summary

We have presented a plan to provide geodatabase design services in response to a request for proposal from the City of Philadelphia. Our goal is to provide the City of Philadelphia a geodatabase product that has been developed in cooperation with their end users and managers so that it provides the cost savings and improved usability that they expect.

We have paid special attention to addressing the quality of the final product, both in terms of maintaining the integrity of data that the City will migrate into the geodatabase and ensuring that the product meets the Cities needs as stated in the RFP. Also, during the early phases of the project, we will help the City find further opportunities for improvement that it may wish to pursue.

Understanding that projects have inherent risks, we have included a risk assessment in this plan. The risks have been ranked by our staff and we have written strategies to deal with those where proper planning will have the greatest positive impact on the City's satisfaction with this project.

Finally, it is our intention to deliver this project, as stated in the scope, on-time and on-budget. We have included a detailed schedule and budget. Having created these in advance, we can assure the City that we fully understand the costs to complete the project. We also have a baseline to compare during the project, so we can determine early on if the project is experiencing schedule or budget variances.

INTEROFFICE MEMORANDUM

TO: JILL BERNHARD

FROM: JIMMY KROON

SUBJECT: PROJECT CHARTER REVIEW

DATE: 9/15/2009

CC: PAT KENNELLY

Thank you for taking the time to review the project charter. I appreciate the effort you put into critiquing it.

You expressed concern that the project schedule was too short and specifically that I had not included enough time for the Business Logic phase, which includes two stakeholder meetings. In this project plan I have included a much more detailed work breakdown structure. Since this schedule is based on cumulative, individual work assignments, it should be a much more accurate estimate of the requirements to complete the project. The total project length has increased from 10 to 16 weeks and the Business Logic phase has increased from 3 to just over 4 weeks. As you mentioned, the project will span the winter holiday season, so you'll be pleased to know that the project management software has already accounted for time off on those holidays and adjusted the schedule accordingly. It is possible, even likely, that City staff availability will be limited during regular work days during the holiday season. However, I believe that we will have to accept this risk since we cannot predict City employee leave schedules and because the impact on the project would be minimal. Should this become a problem, I will use my stakeholder contacts to negotiate a solution with the City.

Thank you again for providing input for the Pole and Pole Attachment Project Plan.

INTEROFFICE MEMORANDUM

TO: MARK D. AURIT

FROM: JIMMY KROON

SUBJECT: WORK BREAKDOWN STRUCTURE AND BUDGET REVIEW

DATE: 9/15/2009

CC: PAT KENNELLY

Thank you for taking the time to review the project schedule and budget. I appreciate the effort you put into critiquing it.

I agree that the MS Project file would be more useful with the total hours and budget easily visible. To fix this, I added a Level 0 task to the Gantt chart so that the hours and budget for the entire project are summed automatically. You can find these totals in the budget section of the project plan.

I did not make any changes to the project management tasks. Truthfully, I was not entirely sure what you were requesting, but I will explain my own thoughts here. The project management tasks are already occurring throughout the project. They are only separated on the Gantt chart for organizational clarity. There are two items in the project management section: weekly status meetings with my project team and weekly time for me to update stakeholders. The status meetings occur every Monday morning. Time for me to update stakeholders is an estimate which may not occur at a specific time each week. Nevertheless, I needed to be sure that there was time scheduled to update stakeholders each week, and that this time was included in the project budget. Placing these tasks together on the Gantt chart allowed me to schedule them easily as recurring tasks.

Also, I did not place these tasks within the other project phases because they related to the project as a whole, not to any one particular phase, therefore their scheduling is not dependant on other tasks. On the other hand, notice that I have included phase-specific project management tasks for myself (i.e. reviewing documents and project deliverables) within the other sections of the Gantt chart.

If you have any further questions about this, please do not hesitate to contact me. Thank again for providing input for the final project plan.

INTEROFFICE MEMORANDUM

TO: JILL BERNHARD

FROM: JIMMY KROON

SUBJECT: QUALITY PLAN REVIEW

DATE: 9/15/2009

CC: PAT KENNELLY

Thank you for taking the time to review the Pole and Pole Attachment Project Quality Plan. As always, I appreciate your input and the effort you put into responding. I have made substantial revisions of the quality section in response to your input. I'll briefly describe the changes below.

Data Migration Quality
I have removed parts that did not specifically address data migration quality. Instead we will create a detailed data conversion plan at the beginning of the project. The sample geodatabases used for knowledge transfer will be populated with randomly selected sample data which has been migrated into the geodatabase following the conversion plan. This data will then be tested during training sessions using exercises derived from this project's use cases. This way, we and the City will interact with the sample data and have opportunities to find errors. Errors will result in conversion plan changes for each new sample geodatabase version. This should result in a well-tested data conversion plan to use during the actual data migration.

After data migration, the City will again perform exercises based on use cases as well as tasks that they have previously performed using the shapefile system. The outputs will be examined for differences. This, along with statistical sampling and scripted error checking, should assure the quality of migrated data.

Fitness of Use
I have again removed sections that did not specifically address fitness of use. I have added the creation of an 'Improvement Priority List.' This list will be created from documented problems, Pareto charts of errors, and data gathered from interviews regarding error rates, task costs and repetition. Also, a comprehensive set of use cases will be generated encompassing all tasks that the City will use the geodatabase for. During training sessions using the sample geodatabase, the City will perform exercises based on these use cases and the improvement list. This will allow us to evaluate early geodatabase versions for fitness and correct shortcomings.

Shortcomings of the shapefile system will also be quantified. At the end of the project, we will measure improvements using the same metrics and provide a report to the City showing how the geodatabase improves on the shapefile system in terms of errors, time, and costs.

Thank you again for taking the time to review the quality plan.

INTEROFFICE MEMORANDUM

TO: TONY J. VAN DER WIELEN

FROM: JIMMY KROON

SUBJECT: RISK PLAN REVIEW

DATE: 9/15/2009

CC: PAT KENNELLY

Thank you for taking the time to review the project charter. I appreciate the effort you put into critiquing it.

I have removed redundant risks as you suggested, resulting in a more manageable 13 risks instead of 19. I also reorganized this list according to rank with the most critical risks at the top of the list. I believe this is a more readable way to present the information.

I understand why you may have been confused that there were risk strategies for only eight risks, however, space limitations prevent us from addressing every risk. Also, the purpose of this section is not to address every risk, but to address the risks that will have the most importance to our client. To this end, I have reduced the strategies to three risks, but have elaborated on the strategies for those remaining. The three risks I selected – knowledge transfer failure, City lacks GIS knowledge, and scope creep – are ranked 1, 2, and 4 (#3 – fitness of use – is covered in the quality plan). I believe these represent the risks where proper planning will have the greatest positive impact for our client.

Again, I appreciate your input for this project plan.