



  
**ADVANTICA**

**STONERSOFTWARE™**

**SynerGEE - ESRI Integration**

**For City of Leesburg**

**April 22, 2008**

**Engineering A Better Return On Assets®**

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## Executive Summary

The City of Leesburg Electric Utility (Leesburg) was established in 1926 and serves approximately 16,300 residential customers and 3,200 commercial customers. The Electric department has 236.6 total miles of Overhead Primary Lines, 130.26 total miles of Underground Primary Lines, and 6,540 Transformers. The system includes five sub-stations and distribution facilities which cover a total area of fifty square miles.

Advantica is providing this proposal to Leesburg's electric department for services to build a solution that will extract, transform and load facilities data from ESRI ArcGIS to the SynerGEE Electric MiddleLink data format. As such, the scope of work described within this proposal will focus around the standard DataPrep/MiddleLink integration approach that Advantica has implemented successfully at over 50 client locations.

The benefits of this data integration include:

- Utilizing facilities data stored in their GIS significantly reduces the cost of creating analysis models.
- Automated transfer of data will permit Leesburg to eliminate redundant data entry and allow system planners to focus their attention on system design issues, rather than data maintenance issues.
- Model updates can be performed consistently using a standardized and configurable extraction methods from one update to the next.

Advantica is uniquely qualified to assist Leesburg in achieving these benefits. Advantica has been providing industry leading network analysis tools to distribution utilities for over 30 years. Our experience with the ESRI environment, combined with our vast experience in model development will ensure a successful integration of Leesburg's GIS and related data stores with SynerGEE network analysis.

## GIS Integration Services

Leesburg has requested that Advantica provide a proposal for developing a set of procedures and tools for building and maintaining detailed electric distribution system models from their ESRI GIS environment. This section presents our understanding of Leesburg's needs and provides Advantica's recommended procedures for model building. Advantica's goal for implementing the integration solution at Leesburg is to develop a process that requires minimal effort from the end user to develop engineering models.

### DataPrep-MiddleLink-SynerGEE

The standard Advantica GIS-to-SynerGEE integration approach is a time tested solution that consists of two applications known as DataPrep (a custom application) and the MiddleLink module of SynerGEE (an off-the-shelf Advantica product offering).

DataPrep is an Advantica custom application that allows the user to identify the portion of the distribution system within the GIS that will be modeled and to extract the data in a format compatible with MiddleLink. Essentially, DataPrep will process Leesburg's spatial data, extracting and forwarding the facilities data to MiddleLink for further processing. The actual output of the DataPrep application contains the GIS facilities data, including such attributes as conductor type, length, system connectivity, facility location and characteristics, etc.

MiddleLink is an Advantica commercial off-the-shelf product that is a module of SynerGEE. The MiddleLink module provides the capability to build SynerGEE models from pre-formatted text data (e.g. DataPrep output). Once the model is built in SynerGEE, the process provides data validation, and default value assignment for invalid data in the SynerGEE model.

An overview of the DataPrep-MiddleLink-SynerGEE facilities model generation process follows:

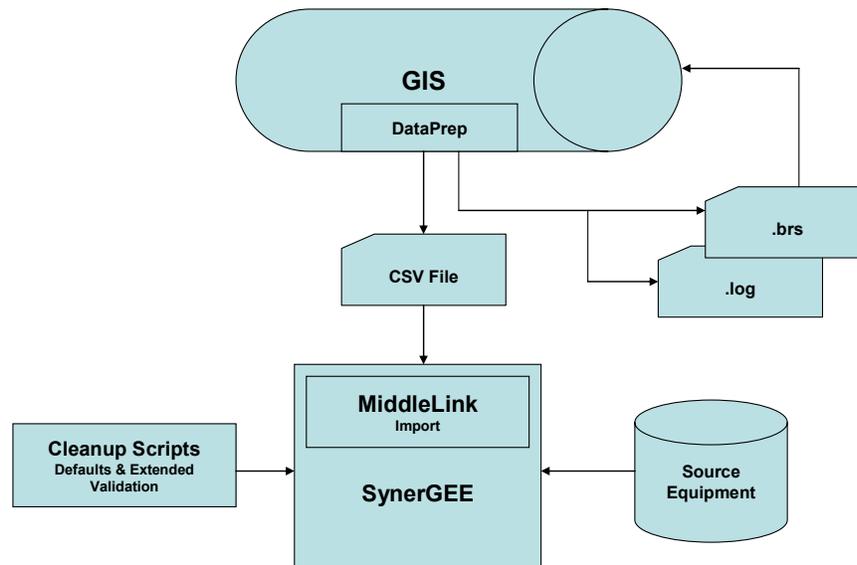
1. **Identification of the Area of Interest:** The user defines the data set from within the GIS environment that is to be transferred to SynerGEE (e.g. all facilities for the entire service area, facilities within a specified selection set, etc.).
2. **Data Extraction:** The required spatial and facility information data is extracted from the GIS and formatted for MiddleLink.
3. **Data Validation:** MiddleLink adds default values for missing parameters, validates required parameters, identifies looped segments with the same from and to nodes, and creates data deficiency reports. Many clients have found that the robust error checking and reporting provided by both DataPrep and MiddleLink have served as a valuable tool for identifying errors in their GIS data.
4. **Facility Model File Creation:** MiddleLink creates network facilities model that is ready for use with SynerGEE.
5. **Distribution Analysis:** Perform analysis using SynerGEE to generate modeling results.

### DataPrep MiddleLink Model Build Flow Chart

The following flow chart shows how data will move from the GIS to the SynerGEE database. The DataPrep box inside the GIS is the customized code that will be developed by the project team for this project. The MiddleLink component will process DataPrep's output (csv files) and augment the data as needed. Data anomalies found during DataPrep or MiddleLink are reported in the log files. Leesburg's engineers report issues, when appropriate, to those persons responsible for maintaining the GIS data so that corrections/enhancements can be made in the GIS to ensure that the issue does not resurface.

A diagram of the process is shown in Figure 1.

### SynerGEE Electric GIS Integration Overview The DataPrep/MiddleLink Approach



**Figure 1**

Following the import of the data into SynerGEE via the MiddleLink module (which focuses on data validation and integrity checking), a series of data cleanup scripts provided within the SynerGEE product are applied to the data to establish default values for missing data as well as additional model validation logic. The result is a ready to use SynerGEE electric distribution system facility model.

## Implementation

Advantica proposes to provide Leesburg with services that will result in a fully tested process for creating SynerGEE electric distribution system facility models from the ESRI GIS system. SynerGEE's MiddleLink module is the software tool that Advantica proposes to provide to generate the SynerGEE database. Advantica will provide these services in a two tier approach:

**Tier 1:** Those efforts consistent in scope from one implementation to another, including data review, functional requirements review, data mapping from GIS to SynerGEE, and primary data extraction programming (DataPrep), documentation, acceptance testing, and training.

**Tier 2:** Those efforts required unique functionality or data manipulation, such as acquisition of customer demand information from other non-GIS data sources, special parsing or translation logic which may be required to map data from a client-specific data model into SynerGEE and model clean up scripts and SynerGEE recipes.

Advantica will provide the following DataPrep MiddleLink implementation services:

## Tier 1 Services

1. Advantica will conduct a Project Kick-off meeting with Leesburg to discuss software delivery, the project plan and the project schedule. The Kick-off meeting will be conducted via conference call between Advantica and Leesburg.
2. Advantica will conduct a design workshop with Leesburg to prepare a DataPrep Design Document that details the GIS to MiddleLink data mapping. The design workshop will be conducted via conference call between Advantica and Leesburg.
3. Leesburg will develop equipment file data including conductor impedance, switch ratings etc. that are required for system analysis. Sample templates of this data are included in the sample model included with SynerGEE v3.7. A review of this data will be completed during the DataPrep Design Workshop. Leesburg will be responsible for delivery of a completed equipment database within three weeks of completion of the design workshop.
4. Advantica will develop a custom application, DataPrep, for processing facilities data and graphic data in the GIS for export to MiddleLink.
5. DataPrep will be developed to support the Windows XP operating system and ESRI 9.x version.
6. Leesburg will assist Advantica in setting up the GIS/Oracle development environment similar to their environment.
7. DataPrep will be developed in .NET.
8. Load Modeling will be developed through the use of distribution transformer connected kVA and the association of customers to transformers.
9. The application will be built on one GIS data set provided by Leesburg, if additional data sets are required to be loaded by Advantica, system set up fees will be charged.
10. The DataPrep application will utilize the ArcFM Feeder Manager for the selection of circuits to extract. Selection of extracted circuits will be by feeder only. Feeder Manager does not support selection by substation or local area office. DataPrep will not extract partial circuits or areas of a circuit that have changed since a previous DataPrep extraction.
11. Advantica will provide a User's Manual for DataPrep detailing the procedures involved with installing and running the application.
12. Advantica will develop and test the DataPrep MiddleLink solution using a set of test data agreed upon by both Leesburg and Advantica. Leesburg's acceptance of the solution will be solely based on the application's performance on this test data set. The set of test data will be selected by Leesburg and is limited to 10 circuits.
13. Advantica will develop and deliver, in cooperation with Leesburg, acceptance-testing criteria.
14. Advantica will deliver and train Leesburg on the use of these processes.
15. At the completion of these services, Leesburg will be able to operate MiddleLink, DataPrep and related procedures in its environment.

## Tier 2 Services

1. Special parsing or translation logic which may be required to map data from a client-specific data model into SynerGEE.
2. Development of Model CleanUp scripts and SynerGEE Recipes

## Assumptions

For GIS Integration Advantica assumes the following:

- The City of Leesburg has implemented ESRI 9.2 and ArcFM Version 9.2.1 and the integration will be based on those versions.
- Advantica will work closely with Leesburg throughout the project to help Leesburg understand the data requirements for a convergent model; however Leesburg will need to closely review the newly generated SynerGEE models for connectivity errors, missing data, etc.
- Verification of models to actual field conditions will not be performed as part of this project.
- Advantica assumes that the data is appropriately topologically connected, and no attempt, by Advantica, will be made to correct inaccuracies in the data as part of this project.
- Advantica assumes that each electric network possesses the connectivity that enables all conductor segments and electrical devices to be associated correctly to one another. If the association does not exist the electrical devices will be assigned to the closest section.
- Advantica assumes that Leesburg will update and provide SynerGEE equipment database.

## Acceptance

Advantica will develop Acceptance Criteria for DataPrep. The purpose of the Acceptance Criteria is to provide guidelines for Leesburg's User Acceptance Test and its execution. The Acceptance Criteria will be based on the functionality described in the scope of work, DataPrep Design Document and Leesburg's SynerGEE planning model.

The Acceptance Criteria must be realistic in terms of the scope of this project and the resources available. All of the functionality of DataPrep should be included in at least one test with effort concentrated on the functions that are a priority to a successful DataPrep extract. The Acceptance Criteria will be limited to DataPrep's graphical user interface, the GIS to SynerGEE data mappings, successfully importing a SynerGEE model and the successful phase updates in GIS.

Any questions, concerns, or problems found during testing will be logged, discussed and resolved by the lead engineers for this effort. Logged issues requiring software changes will be grouped together and addressed together for a new version delivered at a scheduled date. This will normally be after the client has completed an initial run through of the full set of acceptance tests. Once the new version has been delivered the user acceptance tests will be repeated.

## DataPrep

User Acceptance Testing will occur during the time 20 days immediately following the delivery of DataPrep and will conclude with written acceptance from Leesburg or a list of items failing to comply with agreed specifications. If acceptance notification or a written list of discrepancies is not received, Advantica will assume formal acceptance 20 days following Leesburg's receipt of the application.

DataPrep will be ready for acceptance when:

- All aborts in the software have been resolved.
- All items outlined in the Acceptance Criteria pass.
- The status of all outstanding issues has been agreed upon. This will include agreeing whether issues can be regarded as closed or as enhancements to be addressed outside of this proposal.

## Deliverables

The following deliverables will be provided:

### DataPrep-MiddleLink-SynerGEE

- Data Requirements Documentation
- Kickoff meeting
- Project design workshop
- DataPrep Design Document and Acceptance Testing Criteria
- The DataPrep application for processing the GIS data. The DataPrep source code will be provided for this application. DataPrep is for Leesburg's internal use only and remains the intellectual property of Advantica.
- DataPrep Installation and User Documentation
- SynerGEE Recipes (Macro files for application automation) and Model CleanUp scripts
- Documentation and 1/2 day of WebEx training for DataPrep and MiddleLink solution

## Client Responsibilities

Involvement of Leesburg staff throughout this project is essential for the timely completion of this project. It is important that Leesburg designate a representative who will have authority to transmit instructions, receive information and enunciate Leesburg's policies and decisions. This will include tasks involving the model conversion, model integration, system administration, technical support, data deliveries, and other model and GIS integration specific efforts.

While it is not possible to foresee or delineate in advance all the specific contributions that will be required, the following is offered to provide an indication of the scope of the anticipated contributions:

- Assistance and cooperation in completing the work in a timely and effective manner.
- Convey information about Leesburg's specific desires with regard to model formulation and processes for SynerGEE model updates.
- Provide all data identified as required in this proposal.
- Perform acceptance testing

For the successful and timely completion of this project it is essential that Leesburg execute its responsibilities in responding to data requests as outlined in this document, project schedule, and as will be required during the course of the project.

## Data Requirements

Leesburg will be required to provide Advantica with the appropriate information to execute the project. This information will include, but not be limited to a current ESRI database and the ArcFM data model and a pilot area of sample data.

Advantica recognizes that small inconsistencies in source data will inevitably appear and a reasonable number of these small deviations are anticipated and included in our cost and schedule estimates. However, major deviations in the quality, quantity, form, content or scope of the source data, or major delays in delivery of key data items, will have a significant impact on the project scope and completion

date. Examples of major deviations are: database schema changes, changes in the data content or field definitions and delays in data delivery of more than 2 weeks.

## Solution Support Plan (Optional)

This section describes an optional annual technical support scope for the DataPrep/MiddleLink implementations. The support service detailed here is comprehensive and covers all aspects of the custom software and services delivered by Advantica for the DataPrep/MiddleLink.

### Support Staff

Advantica will appoint a Support Manager who will be responsible for the co-ordination of all matters relating to the services provided by Advantica. All communications, documentation, and materials relating to this agreement will be sent as appropriate by the Support Manager to Leesburg. Advantica will notify Leesburg in writing promptly in the event of any proposed change to this appointment.

In addition to the Support Manager, Advantica will provide sufficient Support Staff to fulfill its obligations under the terms of this agreement. The Support Staff will be suitably trained and experienced to provide the Services in accordance with the terms of this Agreement.

### Support Services

Support services will be coordinated through the Support Manager and can be applied to any aspect of the Middlelink/DataPrep solution from software modifications to training. Support will be governed via the following:

### Installation and Training

Advantica will provide installation support via phone, email, or web conference software. Installation support will be provided initially as part of the implementation project, as outlined in this proposal. Upon completion of the implementation project, installation support will be handled as an inquiry and will be logged through the Technical Phone and Email Support process described in the section to follow.

SynerGEE product training is not covered by this support contract and will be priced separately, per day, for client site training.

### Technical Phone, Email, and WebEx Support

Technical phone, email, and WebEx support will be provided based on the following conditions:

- Support hours will be 8:00 – 5:00 Eastern US time. Support will be provided Monday thru Friday minus Advantica US holidays (a complete listing of these holidays can be provided upon request)
- Support inquiries will be logged and documented by the Support Manager. Leesburg will be responsible for providing the following information:
  - Description of the problem
  - Priority of the call
  - Data files that can be used to reproduce the problem

The Support Manager will log each inquiring and track the following information:

- Information provided by the Leesburg
- Support Staff that worked on the inquiry
- Description of the inquiry findings
- Hours required to address the inquiry

- When effort is expended, the Support Manager will provide Leesburg with a report summarizing the inquiry statistics. The report will include:
  - Number of inquiries to date
  - Status of each inquiry (Open or Closed)
  - Description of each inquiry
  - Hours of support logged to date
  - Total hours of support logged for term of the agreement
  - Remaining hours on the support contract
- Support will incorporate the total solution. Advantica will provide assistance in evaluating data as well as answering custom configuration/application related questions.

### Support Fee and Conditions

The support fee covers **25 hours** of support by Advantica's Support Staff. The support fee is invoiced in advance, and covers two years or 25 hours of support. It expires after two years or after 25 hours of support is reached. The technical support coverage will initiate upon completion of the training and deployment (outlined in the implementation services).

Support hours that result in the resolution of a software product malfunction will not be charged to the Leesburg.

### Schedule

We anticipate completing ESRI DataPrep implementation within 4 – 5 months of the project start date. We are prepared to start project work within one month of contract signature and receipt of data.

## Fees

This section provides the fixed priced services fee for those services previously described in this proposal.

### Services

ESRI Integration Services	Fee
SynerGEE – ESRI Integration	\$37,800

Optional Integration Services	Optional Fee
On Site Project Training	\$3,200
One Year or 25 Hours of (Post Implementation) Solution Support	\$3,960

Quoted prices shown above do not include expenses. All expenses (travel, additional software, etc.) incurred in delivery of this project will be billed at cost plus ten percent.

### Billing and Payment

All charges will be invoiced to the client at the end of the month in which the work is performed or in which outside expenses are incurred. Invoices are due thirty- (30) days from the date of invoice. A 1-1/2 percent per month late charge will be applied for all outstanding invoices not paid within thirty- (30) days.

Source data, compliant with the data requirements provided by Advantica, will be provided within one month of the contract approval. Should there be a delay of more than one month, the payment terms will be modified and 50% of the services fee will be invoiced immediately with the remainder invoiced at the end of the month in which the work is performed.

This proposal is valid through May 30, 2008.

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