

Travel Burden Estimation for 8.5 Million Veterans Health Administration Enrollees

Mark F Guagliardo, PhD and Duane Flemming, PMP

Veterans Health Administration
Office of Enrollment and Forecasting
Office of the Assistant Deputy Undersecretary
for Health for Policy and Planning



ESRI Federal User Conference
February 18, 2010, Washington, DC

Overview

- The mission
- Past methods
- New approach
 - Strengths
 - Challenges
- Future plans

Background

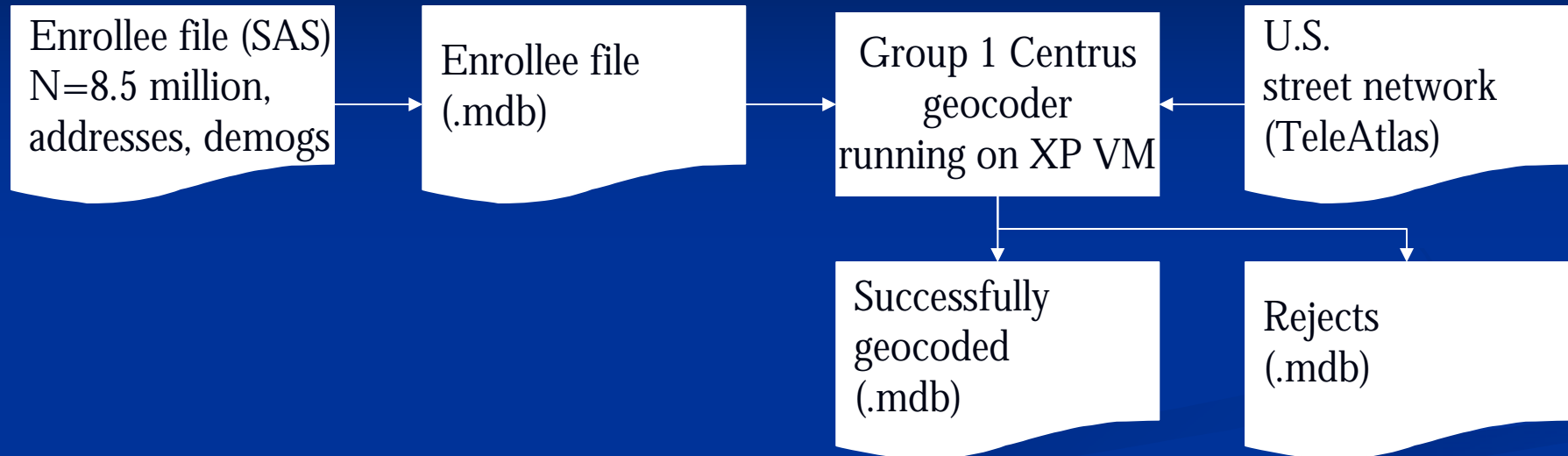
- Veterans Health Administration (VHA) is the nation's largest integrated health care system
- Over 1,100 facilities
- Serves 7.8 million enrolled veterans
- Mission: Collaborate with decision makers to advance system effectiveness
 - Entails strategic planning based on an understanding of spatial relationships between resources and enrollees

Background (cont.)

Must identify geospatial gaps in healthcare access

- Point location of service sites
- Point location of potential service users
- For each potential user, estimate travel “cost” or impedance to nearest “X” sites

Process and Data Flow



Geocoding Performance, FY2009

- 8,509,747 mailing address records input
- 57,258 (0.67%) not geocodable
- 22 hours
 - 6,524 / minute
 - 109 / second

Geocoding Diagnostics

- Rejects make sense?
 - Browse table
 - Frequency distribution of address fields
- Precision comparable to previous years?
- Mapped locations look reasonable?
 - Anybody in the ocean?
 - All of a given state inside that state?

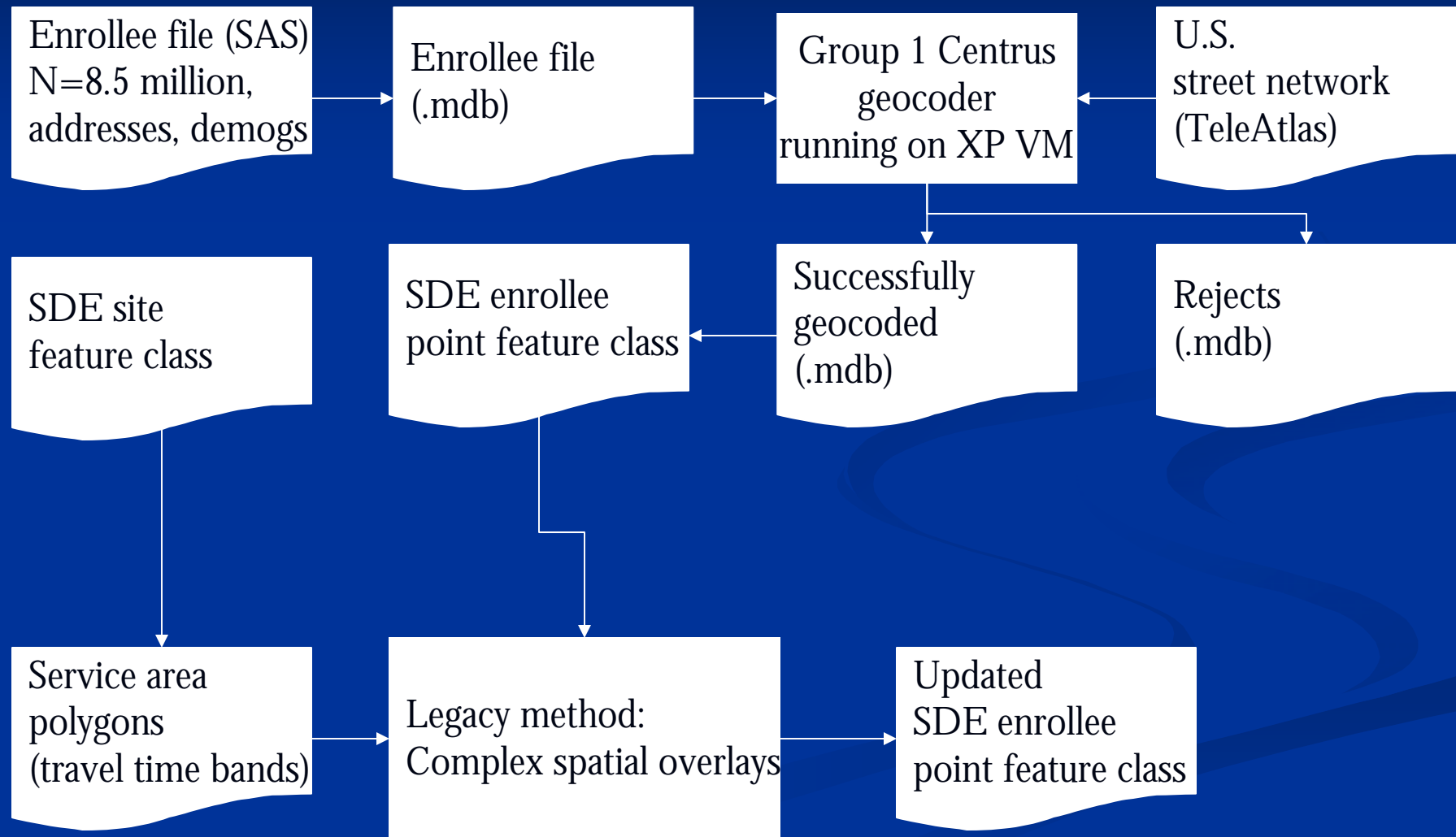
Geocoding Precision, FY 2009

	N	%
address level	7,079,749	83.2
street center	38,850	0.5
ZIP+4 center	254,579	3.0
ZIP+2 center	179,947	2.1
ZIP (5 digit)	899,091	10.6
not geocoded	57,258	0.7

Geocoding Surprises

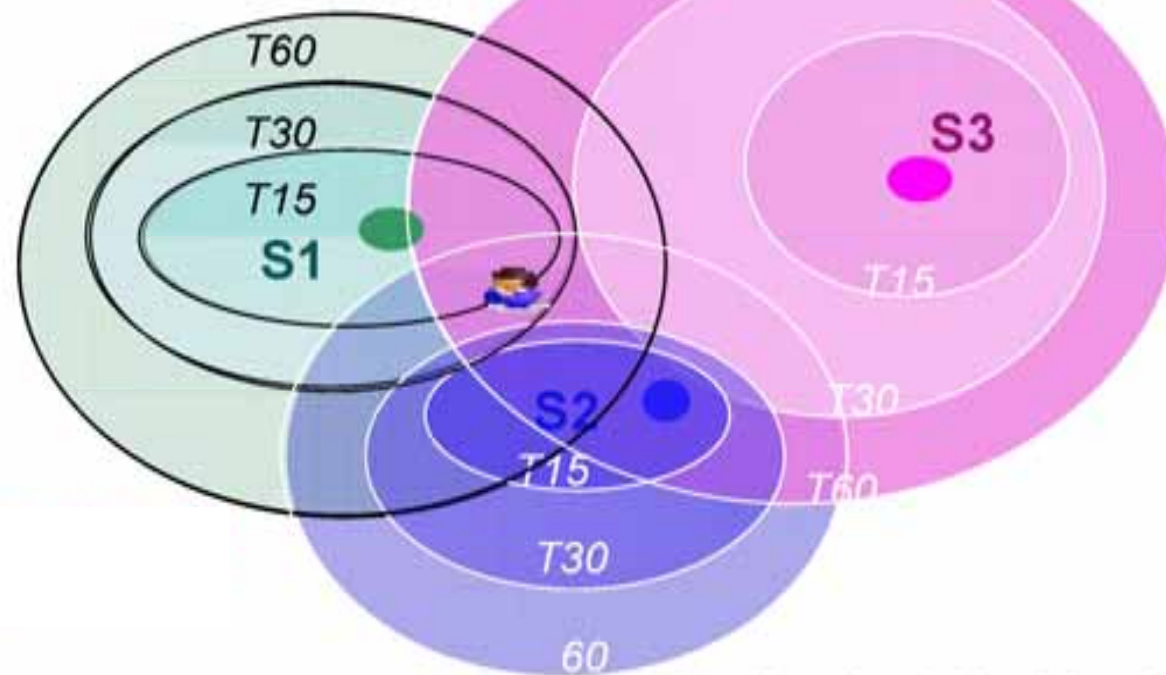
- Foreign postal codes = ZIP codes
- Legit addresses geocoded to ZIP
- 814 cases in Atlantic Ocean (FPOs)

Process and Data Flow



Access evaluation – legacy method

Enrollee is within 15 minutes of S1



Enrollee is within 60 minutes of S2 and S3

Access evaluation – old method

Typical output records

ID	30-minute access	60-minute access	•	•
1	757,757GD,757GC,757GB,541GD	538GD,757GA,552GD	•	•
2	757,757GD,757GC,757GB	541GD, 538GD,757GA,552GD	•	•
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•

Access evaluation – new method

Target record output: precise estimates

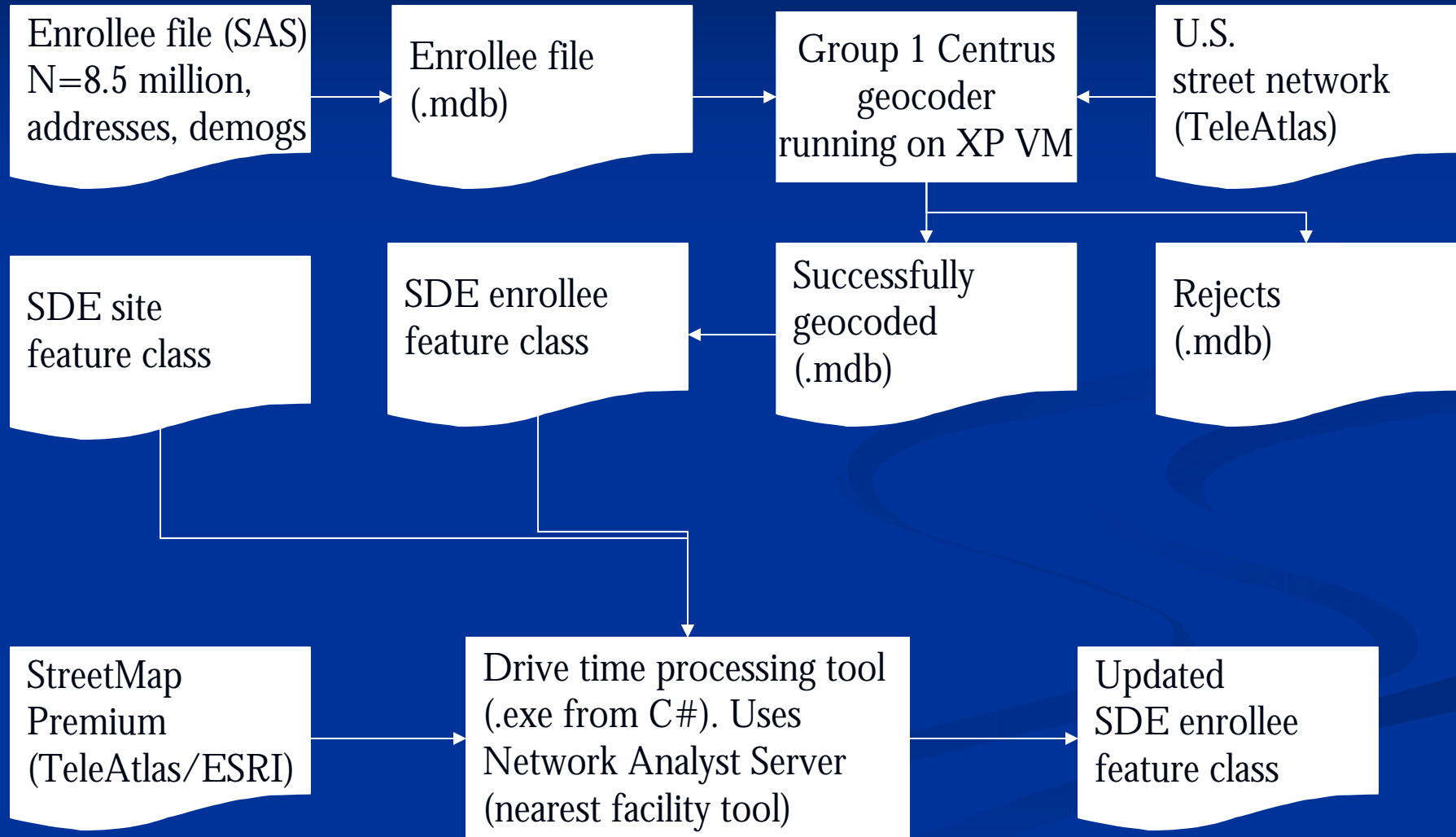
[illegible]

Contracting Assistance Needed

Penobscot Bay Media, aka PenBay

- Mike McDonald – project director
- Ben Knight – C# programmer
- Caleb Carter
- Michael Mannion (Mannion Geosystems)
- Matt Partridge

Process and Data Flow



Enrollee Drive Time Processor

The screenshot shows the 'Enrollee Drive Times Processor' application window. It features several configuration sections on the left and a status/processing area on the right.

Database Connection Settings:

- Server:
- Database:
- User Name:
- Password:

ArcGIS Server Settings / Working Tables:

- Server:
- Map Service:
- Facilities: ...
- Enrollees: ...
- Total number of Enrollees:
- Failed:
- Status:

Processing Settings:

- Number of Threads:
- Enrollee Miles to Road:
- Enrollee DriveTime Cutoff: minutes
- Use Hierarchy: ☐
- Clear Unlocated Enrollees: ☐
- Clear No-Facility Enrollees: ☐
- Process Facilities - Qty**
 - Primary: ☒ 0
 - Secondary: ☒ 0
 - Tertiary: ☒ 0

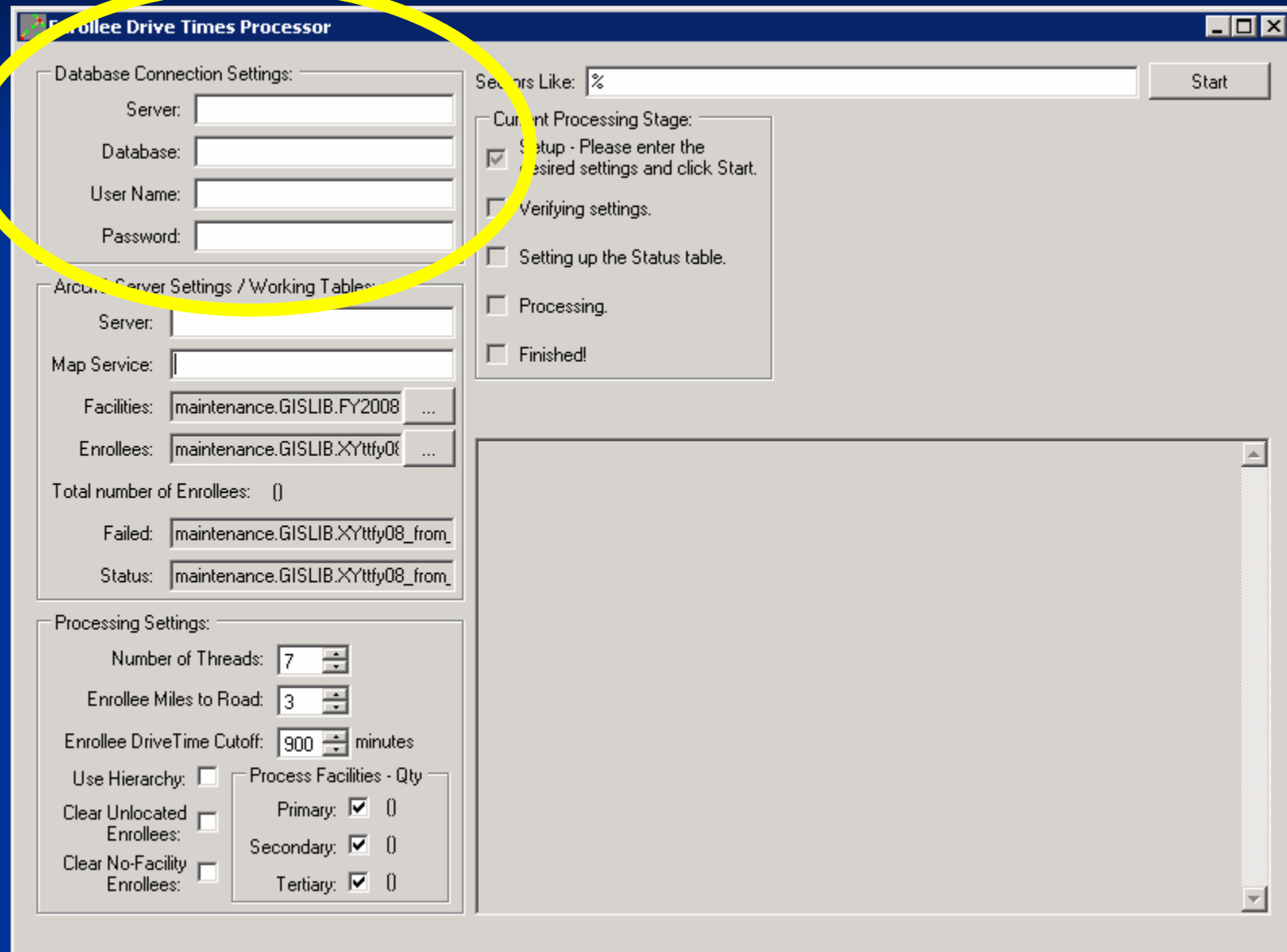
Sectors Like: **Start**

Current Processing Stage:

- ☒ Setup - Please enter the desired settings and click Start.
- ☐ Verifying settings.
- ☐ Setting up the Status table.
- ☐ Processing.
- ☐ Finished!

The right side of the window contains a large, empty rectangular area with a vertical scrollbar, likely for displaying a log or results.

Enrollee Drive Time Processor



The screenshot shows the 'Enrollee Drive Times Processor' application window. A yellow circle highlights the 'Database Connection Settings' section, which includes fields for Server, Database, User Name, and Password. Other sections include 'ArcGIS Server Settings / Working Tables' with fields for Server, Map Service, Facilities, Enrollees, Total number of Enrollees, Failed, and Status. The 'Processing Settings' section includes a 'Number of Threads' spinner set to 7, 'Enrollee Miles to Road' set to 3, 'Enrollee DriveTime Cutoff' set to 900 minutes, and checkboxes for 'Use Hierarchy', 'Clear Unlocated Enrollees', and 'Clear No-Facility Enrollees'. A 'Current Processing Stage' section shows a list of stages with checkboxes: 'Setup - Please enter the desired settings and click Start.' (checked), 'Verifying settings.', 'Setting up the Status table.', 'Processing.', and 'Finished!'. A 'Start' button is located at the top right.

Enrollee Drive Times Processor

Database Connection Settings:

Server:

Database:

User Name:

Password:

ArcGIS Server Settings / Working Tables:

Server:

Map Service:

Facilities: ...

Enrollees: ...

Total number of Enrollees:

Failed:

Status:

Processing Settings:

Number of Threads:

Enrollee Miles to Road:

Enrollee DriveTime Cutoff: minutes

Use Hierarchy: ☐

Clear Unlocated Enrollees: ☐

Clear No-Facility Enrollees: ☐

Process Facilities - Qty

Primary: ☒ 0

Secondary: ☒ 0

Tertiary: ☒ 0

Current Processing Stage:

☒ Setup - Please enter the desired settings and click Start.

☐ Verifying settings.

☐ Setting up the Status table.

☐ Processing.

☐ Finished!

Start

Enrollee Drive Time Processor

Enrollee Drive Times Processor

Database Connection Settings:

Server:

Database:

User Name:

Password:

ArcGIS Server Settings / Working Tables:

Server:

Map Service:

Facilities: ...

Enrollees: ...

Total number of Enrollees:

Failed:

Status:

Processing Settings:

Number of Stages:

Enrollee Miles to Road:

Enrollee DriveTime Cutoff: minutes

Use Hierarchy: ☐

Clear Unlocated Enrollees: ☐

Clear No-Facility Enrollees: ☐

Process Facilities - Qty

Primary: ☒ 0

Secondary: ☒ 0

Tertiary: ☒ 0

Sectors Like:

Current Processing Stage:

☒ Setup - Please enter the desired settings and click Start.

☐ Verifying settings.

☐ Setting up the Status table.

☐ Processing.

☐ Finished!

Enrollee Drive Time Processor

Enrollee Drive Times Processor

Database Connection Settings:

Server:

Database:

User Name:

Password:

ArcGIS Server Settings / Working Tables:

Server:

Map Service:

Facilities: ...

Enrollees: ...

Total number of Enrollees: {}

Failed: ...

Status: ...

Processing Settings:

Number of Threads:

Enrollee Miles to Road:

Enrollee DriveTime Cutoff: minutes

Use Hierarchy: ☐

Clear Unlocated Enrollees: ☐

Clear No-Facility Enrollees: ☐

Process Facilities - Qty

Primary: ☒ 0

Secondary: ☒ 0

Tertiary: ☒ 0

Sectors Like:

Current Processing Stage:

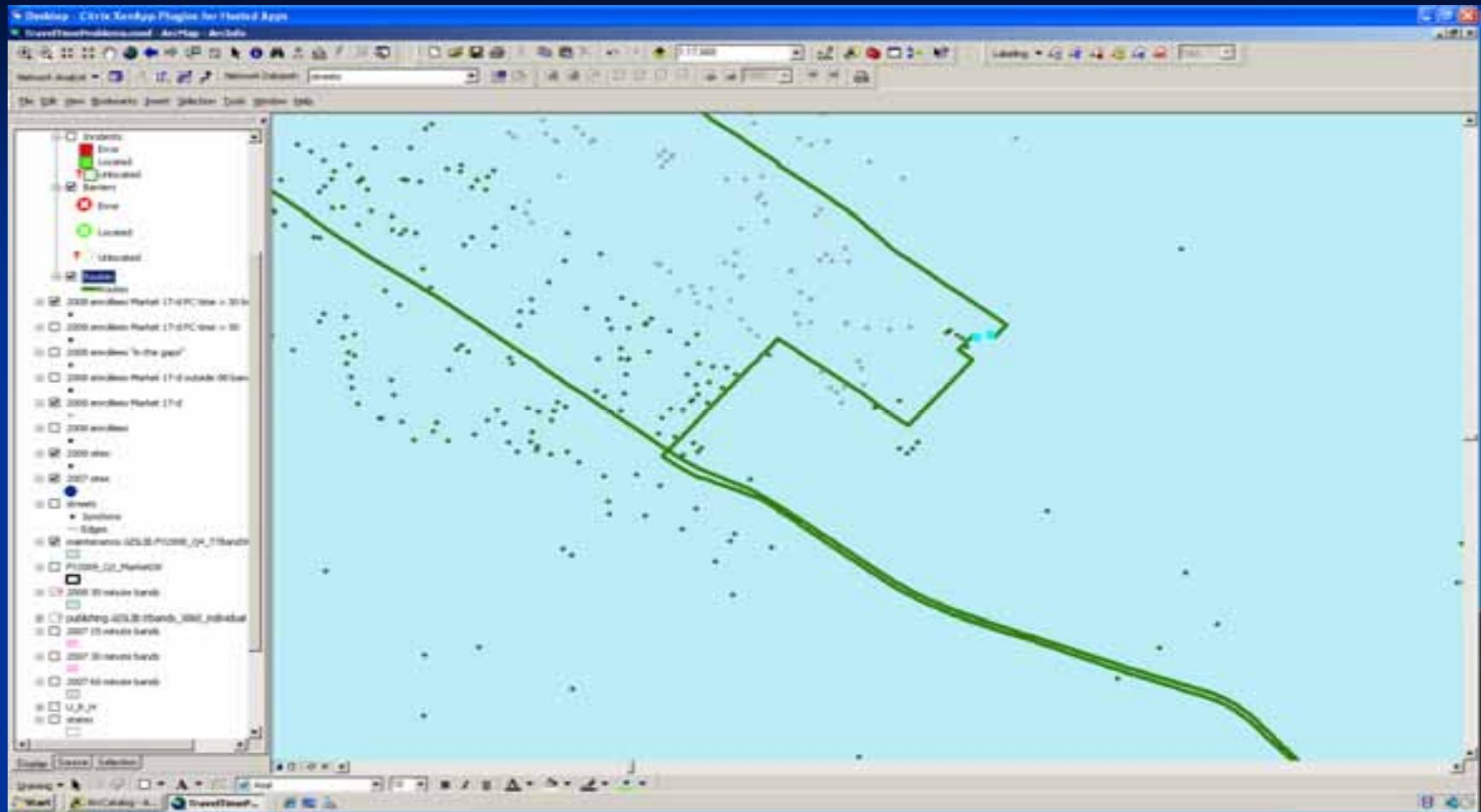
☒ Setup - Please enter the desired settings and click Start.

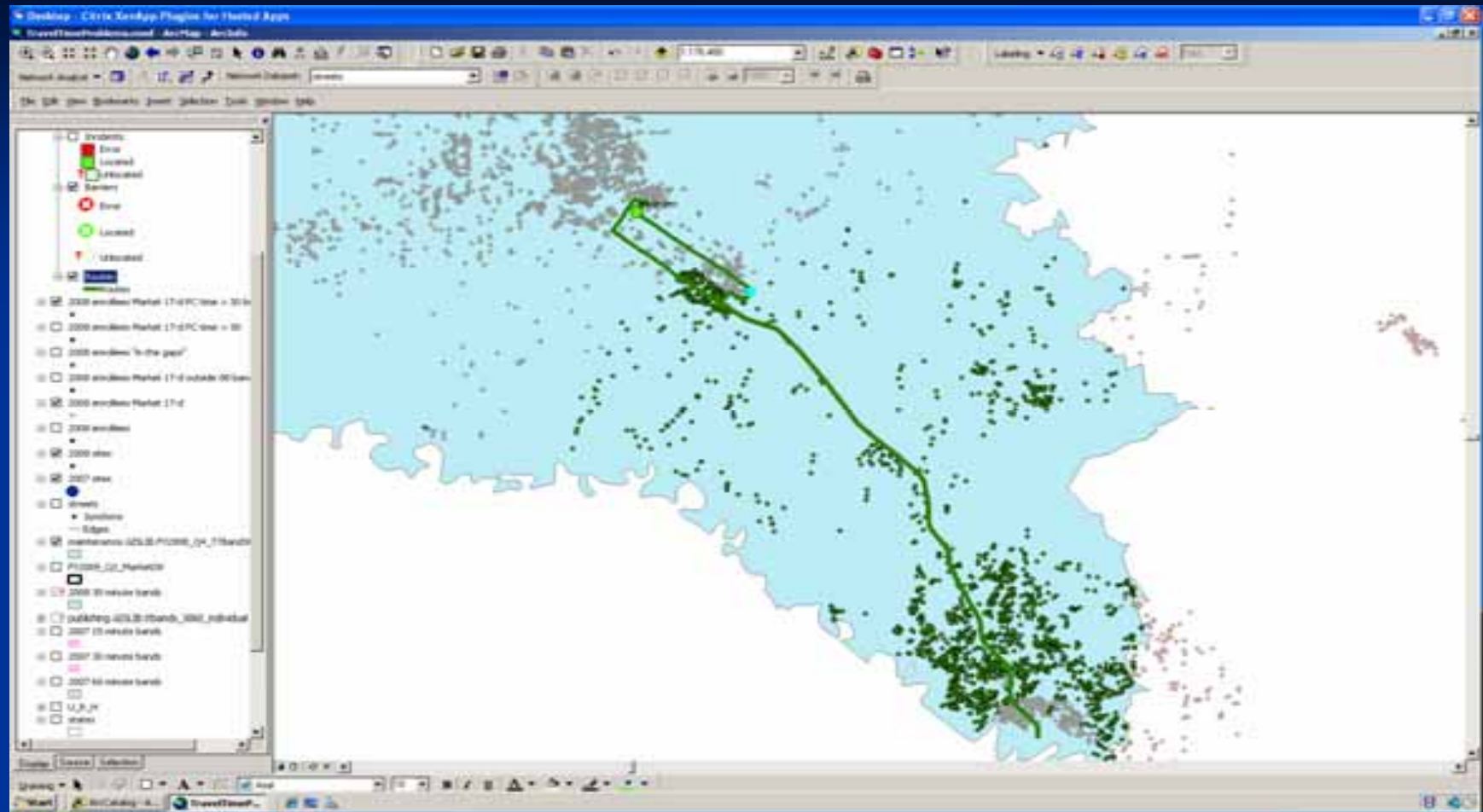
☐ Verifying settings.

☐ Setting up the Status table.

☐ Processing.

☐ Finished!





Enrollee Drive Time Processor

Enrollee Drive Times Processor

Database Connection Settings:

Server:

Database:

User Name:

Password:

ArcGIS Server Settings / Working Tables:

Server:

Map Service:

Facilities: ...

Enrollees: ...

Total number of Enrollees:

Failed:

Status:

Processing Settings:

Number of Threads:

Enrollee Miles to Road:

Enrollee DriveTime Cutoff: minutes

Use Hierarchy: ☐

Clear Unlocated Enrollees: ☐

Clear No-Facility Enrollees: ☐

Process Facilities - Qty

Primary: ☒ 0

Secondary: ☒ 0

Tertiary: ☒ 0

Sectors Like: **Start**

Current Processing Stage:

- ☒ Setup - Please enter the desired settings and click Start.
- ☐ Verifying settings.
- ☐ Setting up the Status table.
- ☐ Processing.
- ☐ Finished!

Enrollee Drive Time Processor

Sector chunks assigned: 7/8624

Database Connection Settings:

Server: vhapssql2
Database: publishing
User Name: gislib
Password:

ArcGIS Server Settings / Working Tables:

Server: vhapssgis2
Map Service: VHA_NA
Facilities: GISLIB.facilities_wgs1984
Enrollees: GISLIB.enrollee_wgs1984
Failed: GISLIB.enrollee_wgs1984_Failed
Status: GISLIB.enrollee_wgs1984_Status

Processing Settings:

Number of Threads: 7
Enrollee Miles to Road: 3
Enrollee DriveTime Cutoff: 240 minutes
Use Hierarchy: ☐
Clear Unlocated Enrollees: ☐
Clear No-Facility Enrollees: ☐
Process Facilities:
Primary: ☒
Secondary: ☒
Tertiary: ☒

Sectors Like: 01-a-1-%

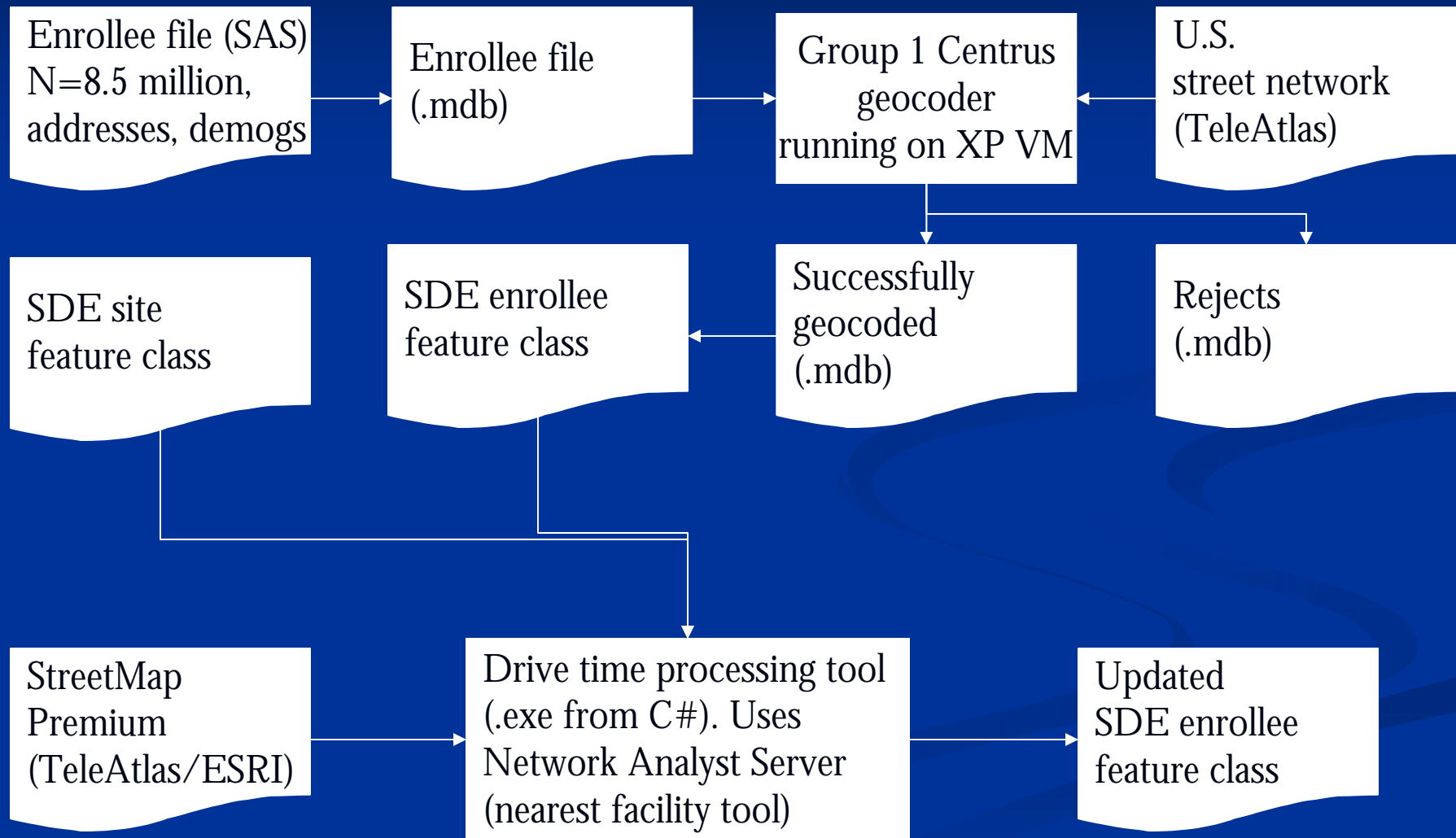
01-a-1-A,5
01-a-1-A,4
01-a-1-A,3
01-a-1-A,2

01-a-1-A,1
01-a-1-B,2
01-a-1-B,1

9/22/2009 11:05:05 AM Processing settings.
DBServer : v08sql93d
Database : publishing
UserName : gislib
AGSServer : cheyenne
MapService : VHA_NA
Enrollees : publishing.GISLIB.enrollee_wgs1984
Facilities : publishing.GISLIB.facilities_wgs1984
Sectors Like : '01-a-9-%' and chunk = 5 and sector <> "
Num Threads : 3
MilesToRoad : 3
Cutoff Time : 240
ClearUnlocated : False
ClearNoFac : False
ProcessPri : True
ProcessSec : True
ProcessTer : True
UseHierarchy: False

9/22/2009 11:05:06 AM Getting the sectors that need processing. If the Status table does not already exist this could take 4+ hours.
9/22/2009 11:05:08 AM 01-a-9-C,5 Processing
9/22/2009 11:05:08 AM 01-a-9-A,5 Processing
9/22/2009 11:06:48 AM 01-a-9-C,5 Pri - No facilities could be found for these enrollees : 1943145, 2053892
9/22/2009 11:06:48 AM 01-a-9-C,5 Primary Facilities Complete!

Process and Data Flow



Future Plans

- Improve geocoding precision
- Reintroduce “multiple opportunity” measures of access
- Explore ways to improve relevancy of travel time analysis
- Reduce time required for travel time analysis

Questions for Audience

- Can we use ESRI StreetMap Premium Data and ArcGIS for geocoding on this scale?
- Have you experienced “use hierarchy” problems?
- What is taken into account by ArcGIS “nearest facility” tool and StreetMap Premium data?
 - Average traffic light cycle?
 - Smoothing between rush hr and non-rush hr conditions?

Thank you.