

**EXAMINATION OF GIS AND CURRENT INFORMATION
SYSTEM PLANS AND RESPONSIBILITIES**

**UNDER COLLABORATIVE RESEARCH AGREEMENT
BETWEEN
STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION
AND
UNIVERSITY OF DELAWARE**

by

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Introduction: Focus of the Investigation

An examination of geographical information systems (GIS) for the Division of Planning actually covers most information system concerns. The majority of information managed and maintained by the Division is spatial data. The data they expend substantial resources to maintain, is all GIS data and includes the Road Inventory, Accident Database, Travel Demand Forecasting Model, Traffic Counts, Official DelDOT Maps, the Highway Performance Monitoring System, Traffic Impact Studies, and several other programs and information. Throughout its existence the Division of Planning's applications and data maintenance responsibilities are for the most part about, and depend on, spatial data.

When undertaking an examination of GIS in the Division of Planning, there is a need to think broadly about needs and issues. Rather than considering primarily what GIS software or interface will be used or how GIS data will be stored and organized as would be the dominant concern in a typical GIS Strategic Plan, what is needed is to look at specific applications and their needs, as well as personnel, organizational, and operational issues. Past and future changes in personnel and information systems upgrades require an investigation such as this to set priorities on where resources will be spent and what issues can be addressed in the near term (next 2 years). Previous studies have outlined what the Division of Planning does with information systems and general issues. This study seeks to be much more specific. In the following pages the term GIS may notably be missing. Instead, specific data sets, applications, and needs will be addressed. This is primarily about the Division of Planning and their mission, not about a type of software or data.

The first section of this report discusses specific near term concerns that need to be addressed. Each of the topics will be presented in a plain and concise manner.

The second section addresses more general topics and issues related to GIS and information systems.

The third section attempts to summarize priorities and propose rough timelines for efforts.

Section 1: Issues To Address And Plan For In The Short Term

1.1 Impacts and Concerns Related to Accident Section Information System Upgrades

Over the past years, three staff members in the Accident Section have been focused on entering and geocoding hard copy accident reports from the State Police. Accident reporting is becoming automated and at this point 80% of accident records are received fully digitized in computerized formats. There are still requirements to present accident reports on occasion and to examine the data received, and in some cases the data provided is still in need of correction, but most of the job of inputting accident and traffic data is no longer necessary. Transitioning staff resources to other areas in the Division needs to be considered and begun.

There is potentially a large amount of data input and development work that could be accomplished to support planning in other ways. Most notably as discussed further on in the report, efforts could begin to input a large amount of past and present traffic impact and traffic count data into information systems. Currently traffic impact data is and has been delivered in hard copy formats and reusing or referencing the information is difficult. Opportunities exist as well to support other groups in Planning with data preparation. The focus would first be on identifying similar types of data input work that accident section staff has done, but some of the new potential work areas have a much larger potential for career growth and acquisition of new skills.

1.2 Upgrade of DelDOT Cartographic Section

The cartographic section within the Division of Planning for many years has produced the official Delaware road maps using MicroStation CADD software. The road layers and other map data have always been independent of any GIS product at DelDOT. Due to the cartographic requirements, the time investment to date, and general success of the group in producing high quality map products, the task of replacing the CADD process with one using GIS software and data layers has not been undertaken as it has in most departments of transportation around the country.

With the potential for personnel changes and the availability of important cartographic tools now in the latest version of ARCGIS, Planning staff has recently spent substantial time in the cartographic section learning the requirements of the products and methods for preparing the data toward replacing the operation with a GIS based product. The roadway layer in the cartographic map has always been maintained separately (redundantly) from any GIS road layer. If the map products could be produced from the DelDOT centerline file and other GIS base map layers, then the update process would be more efficient and a higher-quality consistent base map could be made available to all GIS applications at DelDOT. Currently ESRI (manufacturers of ARCGIS) have agreed to go through the process of converting the DelDOT cartographic map to a GIS based product to demonstrate the capabilities of the software. This provides an opportunity to go through the process with minimum cost. The Division of Planning should follow through with the testing and if all goes well convert the process over the next year.

1.3 Traffic Impact Data and Traffic Counts

Currently, pointing to a location on a map and getting an answer to the question “What traffic studies have been done in this area?” can be difficult. Traffic counts from traffic impact studies are always delivered as hard copy diagrams and filed in file cabinets alphabetically by development names that sometimes change. Procedures for capturing this information should be put in place. If the data is available in digital format from the vendor, procedures and facilities should be put into place to acquire it and use it. There had been an effort at one time to develop an intersection based data file that would be used to compile and view traffic count information but with changes in personnel, it was not implemented. The Division of Planning evaluates development proposals on an ongoing basis and there is a need to be able to specify a location and obtain relevant data that includes recent development plans and subdivision activity which is also difficult at this time to obtain. Staff previously occupied with data input of accident records could perhaps assist in data input of traffic count and related data.

Some traffic counts on the yearly traffic summary are seven to eight years old, and more counts are needed. More truck counts and summer counts are needed. There seems to be large sums of money spent on getting traffic counts for various reasons, and much of this data, once it is obtained, is used once and is difficult to reference or use again. There are cases where the same facilities are being counted more than once in the same time period. Also there are cases where the accuracy of the counts that are obtained is highly suspect. Understanding traffic is crucial to

the Division of Planning's mission and the many activities the Division is involved in including rerouting of vehicles, travel demand forecasting, minor capital improvements, HSIP, and evaluating development proposals. A change is needed in the way the data is gathered, tracked, stored, and made available. The whole manner in which traffic counts are conducted needs to be evaluated from an organizational as well as technical perspective.

1.4 Real Estate Section Needs

Real Estate Section personnel who have permission to view Real Estate data want the capability either through ARCGIS or possibly a web browser to zoom into any part of the county and display tax parcels that are owned or partially owned by DelDOT. They want a "DelDOT property" layer that requires the least amount of update, preferably generated dynamically from a query of REM (oracle) database. They want the ability to incorporate this with other reference data and make simple maps in some cases symbolizing land areas according to categorical information in the REM database. They would like the capability of querying on any parcel of the DelDOT property layer and the capability to hyperlink to property documents for further description of the property or portion of the property owned by DelDOT. In addition, the Real Estate Group would like some basic capability to examine the REM table(s).

There is currently some duplication of effort, combinations of software that are causing problems, and duplicate entry necessary to do some of the maps. There appears to be a problem with Real Estate personnel getting access to the data they are entering. The basic map needs would seem to be satisfied by ARCGIS projects set up for them where queries were made to the Oracle databases. ARCGIS could allow for various adjustments and additions on occasion to the types of maps created and examination of some of their data. ArcGIS tools could be supported by current Planning staff. The DelDOT Office of Information Technology (OIT) has previously suggested an INFORM module to be built for Real Estate operations, and after an examination of alternatives and costs and benefits, this may or may not be the way to go.

1.5 HPMS

Recently a web-based application called the HPMS Console has been developed for the Planning section. This application (which is modeled on the DelDOT INFORM/ARCIMS module and

architecture) essentially imports the existing HPMS Microsoft Access database as map segments into the Console. Various types of data entry and queries can then be run from the application. Thematic mapping can also be performed within the Console where, for example, the user can depict sampled versus non-sampled roadway segments. The HPMS program is reliant on the DelDOT traffic count program, which has retained a new employee that is currently working on calibrating traffic counters throughout the State. At this time, there is no need for any new GIS development or applications within the HPMS section. There is a need, however, for additional staff time devoted to producing the annual Average Daily Traffic (ADT) maps (which are posted on the DelDOT website) and the development of annual truck percentage maps.

1.6 Road Inventory

The RIDE program that automates the collection of roadway inventory data through the use of mobile GPS hardware has greatly improved the accuracy and efficiency of the DelDOT road inventory program. RIDE data is typically uploaded into the Road Inventory Management System (RIMS) for validation and accuracy checks and then pushed out to an Oracle database where it is available for ESRI users throughout the Department.

The Roadway inventory system provides crucial input data for the following DelDOT databases or programs:

- Centerline File
- Highway Performance Monitoring System (HPMS)
- Accident Analysis and Reporting System
- Municipal Street Aid Reimbursement Program
- Snow Removal Reimbursement Program
- INFORM

An essential aspect of the RIDE program is the ability to exchange and receive data from the enterprise geodatabase.

The program is collecting roadway surface and condition data that is not actually utilized by the DelDOT pavement management section. The pavement management section has developed its own process for identifying and prioritizing road segments that need to be included in the annual maintenance program. This issue should be investigated further to see whether there are any cost

savings that could be accrued either through improved coordination between the two sections or the possible elimination of this dataset from the road inventory program.

The DelDOT centerline file is one of the end products of the road inventory program. New Castle, Kent, and Sussex Counties also maintain tax parcel-based centerline files. OIT stores both the DelDOT and the County centerline files as ESRI SDE layers. The Cartographic Section also maintains road files for their maps. In many cases, the various County centerline files include updated residential or commercial road segments that have not yet been incorporated into the DelDOT road inventory program. There has always been a question as to whether there should be coordination in the maintenance of transportation road and other facility map layers.

1.7 HSIP

The DelDOT Highway Safety Improvement Program (HSIP) manager has needed a way to view HSIP data and documents via digital maps for several years. A Ph.D candidate intern from the University of Delaware was hired by the manager to create digital maps of HSIP locations using GeoMedia/ArcView and the DelDOT INFORM module. Permissions to customize the INFORM module have been revoked and the utility is not operational. The intern has since left DelDOT, but did leave detailed notes with his supervisor detailing the status of work he had completed. The overall process involved the HSIP manager providing a spreadsheet of project location information, which was then converted into points that contained hyperlinks, which could access PDF files that contained detailed maps, photos, and reports about each site. The manager is requesting a simple way in which he could review digital maps of HSIP project sites and update them as needed.

1.8 Management and Mapping of Development Agreements

As development plans go forward and are approved, many agreements between DelDOT and developers are established over time. Responsibilities are identified, and fees and conditions are set. When examining any one locale, it is vital to have a ready knowledge and access to the documentation of these agreements. To support planning, administration, and management, the agreements need to be tracked and spatially referenced to make spatial queries on an area possible. A significant amount of data input would be necessary to create a GIS layer for

development agreements. This may be an area where data input staff available from the accident section or other groups at Planning could make a big contribution.

Section 2: Discussion of Organizational and Other Issues

2.1 Division of Planning's In-House Information System Capabilities

A decision needs to be made as to the extent of information system capabilities that the Division of Planning will maintain. At one end of the spectrum, the Division of Planning could contract all information compilation, all transportation analysis, all studies and plans, and all presentations, and personnel would primarily spend their time managing contractors and determining policy and decisions on the results. At the other end would be a very self-contained agency that compiles and manages all the data they would use, performs all studies, plans, and analysis, and only seeks outside help for the most technical or larger efforts. While it is imaginable how either extreme might work, it's doubtful that either is completely practical. Ultimately the real decision about the level of in-house activity depends on organizational policies, the relative quality and cost of the work, and the amount of involvement necessary to maintain comprehensive and consistent management and policy. The approach the Division of Planning takes is important to clarify and consider when addressing plans for information systems.

The Division of Planning has a continual need to gather and study a diverse set of information from many, often unpredictable, sources. While outside groups such as OET and consultants can often be of great assistance, and while some investments can be made to assist in automating operations such as in the creation of standard reporting and data input tools, the Division of Planning still needs the support of in-house staff skilled in analysis, data manipulation, and the appropriate use and operation of a range of software. An "information and analysis" section could be developed within the Division that could play a larger role in studies and with data access and maintenance. This small group could be charged with developing a more organized approach to processing information requests, understanding and providing technical support for the Divisions applications, understanding and foreseeing Planning's information system's needs, and managing the information. Depending on the relative costs and other features of doing studies in-house versus contracting, a case might be made for larger investments in information staff and facilities, and this is worthy of future consideration.

Even in a case where most work is contracted, an organized approach and a minimal staff is needed to support systems in the Division and to manage the specification, production and receipt

of contracted information products. That minimal staff requirement is probably four persons. This would include two full time analysts who are highly experienced in the use, implementation, and support of GIS, databases, mapping, analysis software, specialty software as used in planning applications, and data manipulation, and two staff members focused on data input, compilation, and presentation. Having such a staff and organizing them as a team, vastly increases the kinds of things the Division can do and the flexibility it has to meet requirements of the everyday unpredictable needs that occur. A team approach, rather than having responsibilities spread across individuals in the various sections as is now the case, may also allow for cross training and backup, and would be more conducive to employee skills development and opportunities for more varied work and advancement.

2.2 Contracting Information and Analysis Services

There is a concern that for some studies contracted by the Division of Planning there may be inefficiencies, duplication of effort, and loss of valuable information. A worst case scenario would be a case where Division of Planning staff repeatedly spends a great deal of time putting similar information together for consultants and educating them in its features and uses, and then getting much of the same information back as the product of the work and any new information is not easily referenced, or used again. It seems that in projects where there is new data resulting, it is often not captured or is lost after it is used for the primary purpose for which it was generated. It is suspected that for some projects, the information prepared is often the same or similar information and yet there is no savings resulting from having already prepared data previously. At the moment there is not a clear idea of how often such a situation might occur, but it seems that at least one could say that contracted projects are not well coordinated with respect to each other and products from work that has been done are not well documented, captured, discovered, or reused.

A good example is with traffic counts. For various projects or concerns a traffic count may be desired, and either DelDOT or the private sector will pay to have a traffic count done. But currently it is not easy to determine if traffic counts have been done recently in an area, so it happens that sometimes one area could be counted twice during about the same time period for different projects. Once the counts are completed, they are used in the project and then filed away in a hard copy format where they are not easily found or usable in the next project. Large

amounts of money are spent each year in traffic studies and getting traffic counts, but none of the counts data seems to be easily available.

It is imaginable that in a small state, an agency such as the Division of Planning, who works with information about the state year after year in numerous ways, could establish a comprehensive information base to build on and develop methods to more efficiently compile, transmit, and use the information on each project. Also, where projects involve components where planning data and facility data are compiled, there may be cases where it is more cost effective for the work to be done in house, leaving the more specialized work to be done by consultants.

One of the tasks in this project was to determine for contracted work what guidelines or requirements for documentation and data archiving should be determined and included in contracts to insure that information products are available for future needs. There are already some guidelines used in state of Delaware contracts, and there are standards for documentation of information products particularly for GIS products. The main thing that should be done is that when contracts are prepared, DeIDOT includes requirements for delivery of products into the contracts. Perhaps a bigger problem is that if requirements are made to deliver information products there may not be a place to put them.

2.3 Finding Storing and Accessing Information

The Division of Planning works with a very wide range of information in a variety of formats, including those from software that work with text, graphics, databases, GIS layers, presentations, drawings, maps, spreadsheets, and others. Information is constantly being produced by the Division and its consultants. In any one application area the amount of information is very large. Planners are in a day to day push to find information, analyze it, and present it. There needs to be a mechanism to catalog and archive the large amounts of data with which the Division of Planning works. Year after year this is a continued need. With staff changes it is even more urgent. No such data library or reference tool is currently available to Planning staff or other groups in DeIDOT, and information is usually found by asking around.

2.4 INFORM

Considerable investments have been made in the development of INFORM at DelDOT by OIT. It is a customized ARCIMS based web application that provides an attractive user interface to view and relate transportation data and make maps. Users across DelDOT with a wide range of skills can use INFORM to view data. As a customized programmed interface there is an unlimited number of interfaces or applications that could be created. Additional features programmed into INFORM might assist Planning with some reporting and data query. Whether or not the programming would be practical or cost effective for a particular need could be investigated. INFORM would not replace the need for ARCGIS for the analysts at the Division of Planning, and some applications may be better handled with ARCGIS projects. Perhaps a survey should be done to see where INFORM is being used at DelDOT. The largest potential user and beneficiary of INFORM would probably be the general public, though it is currently only available on the DelDOT Intranet.

2.5 The Division of Planning, Office of Information Technology, and GIS Responsibilities

The Office of Information Technology (OIT) offers various technical support to the Division of Planning and other DelDOT groups regarding to GIS and information systems in general. It is useful to clarify respective responsibilities as understood by Planning as is summarized on the next page. From the Division of Planning's perspective, the responsibilities of any GIS coordinator or manager is to see that those responsibilities are handled. Other groups at DelDOT may have numerous other GIS related interests and needs. A GIS manager would support various DelDOT groups, and activities often revolve around centralized data holdings. For this reason having this position in the Division of Planning as sometimes suggested is not appropriate.

While most of the data maintained and used by the Division of Planning is GIS data, the Division most needs an individual(s) that is not focused strictly on GIS but has an ongoing comprehensive knowledge of the data and operations and applications in Planning. Personnel are needed that can manage and analyze data, who can support a range of information systems, and who understand and can communicate needs specific to planning. GIS is only one information technology among many used at the Division of Planning. The Division's responsibilities regarding GIS are all focused on specific applications.

It is the Division of Planning's responsibility to provide technical support for any analysis or applications using ARCGIS in their division. Where there is specialized software used in the Division, such as that for the Travel Demand Forecasting Model, the Division of Planning understands that those are Planning's responsibility to support as well.

Figure 1

OIT Information System Responsibilities in Regards to GIS

- * Maintain data file servers and network
- * Maintain and update SDE GIS data libraries
- * Provide facilities to store and archive GIS data
- * Acquire and maintain GIS data obtained from groups outside of DelDOT and assist with information exchange.
- * Optimize performance and access to GIS data libraries
- * Document all GIS data in SDE centralized databases.
- * Maintain all computer hardware
- * Update/maintain and provide the DelDOT Centerline File soon to be replaced with TeleAtlas product.
- * Insure that data used for geocoding addresses is the best available.
- * Insure that Division of Planning personnel have access to the information they need that is managed by OIT.
- * Administer ARCGIS and other ESRI software licenses. Have a knowledge of GIS software products and assist with updates as available.
- * Work with the Division of Planning to allow input and review and comments on specifications for any data contracts initiated by OIT that would involve data the Division of Planning would use.
- * As requested, offer expertise on information system issues and initiatives. Assist the Division of Planning with any appropriate strategies for organizing, storing, and accessing data.
- * Work similarly with other DelDOT groups to support GIS.

Figure 2

The Division of Planning's Responsibilities in Regards to GIS

- * Provide the technical support for GIS applications of all types used in planning
- * Maintain and support the Road Inventory, HPMS, TDFM, HSIP.
- * Direct and manage all aspects of the creation of the official DelDOT Maps
- * Manage Accident data
- * Determine how traffic study and traffic data count data will be collected and managed.
- * Prepare and manage products as needed in planning studies and requests.
- * Prepare and compile products to be used by and generated by outside consultants.

As the cartographic section moves toward the creation of the official maps from a CADD-based environment as the source of the map data to a GIS environment, it is very important that base data that is used in the products including road centerline, municipal boundary, place data, hydrology, and others be kept up to date and available on OIT servers. Having OIT maintain the GIS data on their servers is very important. This is an area where the Division of Planning and OIT could work together to develop more consistent mapping, and perhaps for the first time since GIS has been introduced at DelDOT, build mapping products from the same sources.

Over the years there have been instances where Division of Planning personnel have felt that some data managed by DelDOT has been difficult to access for whatever reason (format, security restrictions, technical difficulties, organizational problems, etc). The Division of Planning needs OIT's assistance to insure that there is full access to information where appropriate. There have been cases where data was unavailable, and staff were encouraged then (if not forced) to create duplicate copies of data and parallel systems. Managing duplicate systems can get the job done and is sometimes practically necessary but is often not cost efficient.

Currently Division of Planning staff usually copy the GIS data out of SDE as shapefiles into their own personal or project directories. The data is not used directly, and any data that is produced is not stored in SDE. There are a few reasons for this, the first is that screen displays take significantly longer when data is in SDE, and personnel need better performance. It seems that Division of Planning personnel can't, because of permissions, or are unfamiliar with creating

their own places to store their GIS data in SDE. Frequently the data from SDE central database needs to be changed and cannot be used directly, and new data layers are frequently generated. If there was better performance across the network and a better arrangements and capabilities for how Planning could use the centralized SDE data, there may be advantages.

OIT manages GIS data libraries, and this is a great service if they are comprehensive, current, and accessible with a high degree of performance. This GIS data is predominantly in geodatabases or exists as tabular data in database management systems. There is a great need at Planning to manage huge amounts of information in other formats including ARCGIS mxd, eXcel, powerpoint, word processor and various text formats, pdf, CADD, html, and many, many others. There is a basic library function needed for the huge amount of digital data that the Division of Planning manages, and as this is a matter of the management of data on OIT servers, and as it would certainly seem to be a DelDOT-wide issue, this may be an important area for OIT to address. An example of the type of tool needed for planning was extensively discussed in research by the Delaware Center of Transportation,

<http://www.cadsr.udel.edu/DOWNLOADABLE/DOCUMENTS/transformingdataintoinfo.pdf>

2.6 GIS Software

The GIS software used by the Division of Planning and much of DelDOT is now ARCGIS and other ESRI products. Licenses of ARCGIS need to be available to those analysts in the Division who can use ARCGIS. GIS data libraries managed by OIT are mostly in SDE which works in general, but there are performance issues where users download copies of data onto local machines and networks so that draw time is improved rather than using the data directly.

MapINFO and Geomedia on occasion are used in the Division, but much less than in years past. Personnel in the roadway inventory program are currently using GeoMedia as the sole GIS application for the visual validation of any centerline updates that result from the program, and they are experienced in the use of GeoMedia products but have no experience using ESRI products. Here, as in other sections within the Department, there is a range of user expertise as it relates to the three existing GIS software applications within DelDOT. A realistic appraisal could be undertaken to identify costs and benefits of the conversion to a single GIS software platform for all GIS-based work activities within the Department. In general it would make sense to gradually move toward using ESRI products, though for now in the Division of Planning, if

GeoMedia and MapInfo provide unique features to help Planning personnel with their work and if software and support costs are minimal, then “whatever gets the job done” is the suggested approach.

Section 3: Suggested Steps

This section summarizes recommended work to be done over the next 2 years to address GIS issues and make improvements. A brief outline is shown on this page. Comments about these items follow, and there is more descriptive information in the preceding sections. A timeline was not practical at this time. Activities are recommended to be done “as soon as possible” and “to do next”. The tasks below will be further discussed in this section.

Things to Do As Soon As Possible

- * Real Estate Section mapping needs handled
- * Near term assignment of data input personnel from the accident section
- * Determine methods of storing traffic study and traffic count data for access by GIS
- * Continue upgrade of Cartographic Section operations
- * Mapping of HSIP sites
- * Examine options for management and mapping of development agreements

Things To Do Next

- * Traffic Impact and Traffic Count Investigation
- * Planning decisions concerning analysts on staff and level of in-House capabilities
- * Finding, storing and accessing information
- * Promote guidelines to be included for delivery of digital products for contracted work
- * Implement a method of tracking and mapping development agreements. Perform required data input for past records.

Goals To Be Reached

- * Real Estate Section can without difficulty prepare “DeIDOT owned property” maps, and can perform and list/map basic queries using the REM database.
- * Data input personnel in the Accident Section are transitioned to other data input work to assist the Division.
- * Managers in the HSIP program are able to create and easily view HSIP digital data and documents.
- * All historic and current traffic impact and traffic count data are input as GIS data and it is possible to quickly and easily map and list such data.

Goals To Be Reached (continued)

- * The Cartographic Section pulls layers used in the Official Maps from GIS libraries. Operation is converted from Microstation to ARCGIS software. Mapping is more consistent across DelDOT.
- * Administration of traffic count program is more efficient and data is better and more usable.
- * Planning has identified optimum staff levels, focus, and configuration to support analysis and information systems.
- * The Division of Planning has the capability of quickly identifying development agreements in an area and reference related documents.
- * Methods are established for storing and archiving the vast amount of planning information that is generated in-house and by contractors.

There are a few things that OIT could help with in the near term.

Things needed from OIT in the near term.

- * Clear up any data access problems that Planning is experiencing.
- * Improve performance of SDE data.
- * Assist as needed in getting to a quick, cost effective solution to Real Estate Mapping Section needs.
- * Assist in identifying and examining options for finding, storing, and accessing information.

The following portions of this section discuss the recommended tasks in more detail.

Real Estate Section requests

The focus here is on determining current problems with creating DelDOT owned property maps and solving them. It seems that an ARCGIS project could be created where a link is established with Oracle data to create the maps and queries needed. There may be some permissions that need to be granted for staff to view the Oracle tables, and data access problems to address. Perhaps there are other solutions available besides using ARCGIS. A price quote on an INFORM solution or other OIT solution could be obtained. This is seen as a difficulty that should be fixed in the near term.

Upgrade of Cartographic Section operations

Delivery of first ESRI Beta Tests on the cartographic maps is due in November. Products need to be evaluated and the progress toward upgrading operations needs to continue.

Determine methods of storing traffic study and traffic count data for access by GIS

A complete review of how traffic study data and traffic count data is managed needs to be conducted. It seems, though, that there may be some easy short-term solutions for capturing this data, and there may be an opportunity where personnel from the accident section can assist. A review of the information and better, computerized methods of managing and receiving the information needs to be considered. A few years ago the traffic count program was evaluated and recommendations were made. Operation of the traffic program as it is now in relation to those recommendations should be examined.

Managing and mapping of development agreements

As new land developments are approved, agreements are established and responsibilities are identified for the developer and public agencies. This task is to determine how these agreements and responsibilities can be better tracked and spatially referenced. How the information can be captured on a continuous basis, how previous information can be compiled, and how the agreements and responsibilities can be spatially queried in GIS needs to be determined and implemented.

Near term assignment of data input personnel from the accident section

This activity seeks to determine what data input or development work can be done in other Planning sections by those formally inputting accident data. There is most likely very similar work that can be done in other sections where opportunities for development and advancement are available. Traffic studies and traffic count data, as well as other system performance information, could benefit from personnel dedicated to reorganizing and compiling the information. Personnel could also be useful in compiling and locating data related to development agreements and responsibilities.

Traffic Impact and Traffic Count Investigation

Included at the end of this report is a draft of a proposal to do a full examination of the ways that traffic impact and traffic count data are contracted, compiled, and accessed. Some of the types of tasks to be addressed are:

- * Develop a short technical paper outlining how the current traffic summary is conducted now.
- * Contact companies supplying traffic data to determine how products could be delivered in a digital format.
- * Investigate how digital traffic data could be stored and used.
- * Examine ways that traffic data can be presented.
- * Examine commercial traffic count database managers available
- * Examine better contracting methods.
- * Features of an effective traffic count data management system
- * Traffic count coverage
- * Examine the types of queries and presentation of GIS data

Promote Guidelines to be included for delivery of digital products for contracted work

In the near term, basic language should be identified and used in agreements for contracted work that results in the production of digital information products. Next, it is important to determine a minimal way data can be stored and referenced for future use.

Planning decisions concerning the organization of analysts on staff and level of in-house capabilities

Each year there are many studies, requests for information, and large amounts of information being produced and brought into the Division of Planning. Each project and request is viewed separately. There is a belief among some planning staff that perhaps things would be more efficient if there was a more coordinated approach that looked at the workload as a whole. The idea of the establishment of a more extensive information support group in planning is worth looking into. Responsibilities would involve data management and preparation and support of Planning's applications. There is also a question as to whether the information and presentation components of projects may be done more cost effectively by in-house staff rather than by contractors. A scope of work to address this question is included at the end of this report. If

there is an advantage to doing more of the type of information work that is now contracted, the Division of Planning may be justified in developing a group that could be a great support to all operations.

Finding Storing and Accessing Information

The Division of Planning works with a very wide range of information in a variety of formats, including those from software that works with text, graphics, databases, GIS layers, presentations, drawings, maps, spreadsheets, and others. There needs to be a mechanism to catalog and archive the large amounts of data with which the Division of Planning works. Year after year this is a continued need. With staff changes it is even more urgent. No such data library or reference tool is currently available to Planning staff or other groups in DelDOT. A solution needs to be investigated. A sample project proposal for this type of work is included at the end of this report.

Section 4
SAMPLE PROPOSALS TO ADDRESS
RECOMMENDED ACTIVITIES

NOTE: These are examples of work descriptions to address needs. They are presented as a starting point to suggest a way forward in some areas. Any work scope presented here would need to be further developed.

Proposed Project : A Complete Review of the Traffic Count Program and Investigation of Methods to Store and Present Traffic Count Data.

Problem to be Addressed: Some traffic counts on the yearly traffic summary are 7 to 8 years old and more counts are needed. More truck counts and summer counts are needed. There seems to be large sums of money spent on getting traffic counts for various reasons. Much of this data, once it is obtained, is used once is lost or it is difficult to reference or use again. There are cases where the same facilities are being counted more than once in the same time period. Currently, pointing to a location on a map and getting an answer to the question “What traffic studies have been done in this area?” can be difficult and most traffic study data can only be referenced by searching through hard copy files. Also there are cases where the accuracy of the counts that are obtained is highly suspect. A change is needed in the way the data is gathered, tracked, stored, and made available. The whole manner in which traffic counts are conducted needs to be evaluated from an organizational as well as technical perspective. A few years ago the traffic program was addressed, and recommendations were made for improvements. It is now necessary to look at how any changes were implemented.

Project Description:

Activities in this project include:

- * Estimate completeness and accuracy of current counts.
- * Identify problem areas and prioritize data needs.
- * Examine the traffic program as previously adopted in relation to its current management.
- * Determine an effective manner of storing and referencing traffic count data and traffic studies in GIS systems.
- * Determine organizational and information system solutions to avoid duplication of effort and costs.
- * Determine costs and procedures for extracting data from past traffic studies so that they can be available digitally.
- * Identify opportunities to use available staff to manage traffic count and other information about transportation facility performance.

Proposed Project : Development of HSIP project/data map

Problem to be Addressed: The DelDOT Highway Safety Improvement Program (HSIP) manager and staff need a way to view HSIP data and documents via digital maps.

Background: A Ph.D candidate intern from the University of Delaware was hired by the manager to create digital maps of HSIP locations using GeoMedia/ArcView and the DelDOT INFORM module. Work was suspended, but the need still exists. The intern has since left DelDOT but did leave detailed notes with his supervisor detailing the status of work he had completed. The overall process involved the HSIP manager providing a spreadsheet of project location information, which was then converted into points that contained hyperlinks, which could access PDF files that contained detailed maps, photos, and reports about each site. This would seem to be a simple and adequate solution to meet needs.

Project Description:

Activities in this project include:

- * Examine work done to date and whether the approach is appropriate and can be made operational.
- * Determine other capabilities or features that may be needed.
- * Offer alternative solutions.

Proposed Project: A Comparison of In-House and Contracted Services Approaches For Analysis and Information Work

Background: There are many studies conducted by consultants for DELDOT Division of Planning and these often include substantial amounts of cost and time for analysis of information and information processing. As with most planning, the information involved could be very broad and includes geographical information system data of various types, demographics, transportation facility and performance data, travel demand information, and other data. In most cases the Division of Planning staff also spends considerable amount of time in preparing information for consultants to use and in explaining it's content and use. There is a question as to whether it may be more cost efficient and beneficial for the Division to do more of this analysis work in-house rather than contracting for it. There is also a question as to the extent and organization of staff and resources that the Division of Planning should maintain for information processing work and in-house planning. A section of planning that would operate as an information system center to support Planning applications and studies is envisioned.

Description: Through a study of DelDOT Division of Planning's past projects and through a detailed formulation of estimated in-house costs for analysis and information processing work, a cost and benefit comparison will be conducted to better understand advantages or disadvantages of contracting.

Discussion: Research shows that most governments, especially state governments have little or no knowledge of how much services cost since most do not use accounting systems that capture "real" costs. Traditional accounting methods give only costs in broad categories such as "personnel" or "supplies and equipment" summed over large groups of workers and responsibilities. Activity based costing (ABC) is the generally acknowledged approach to pin down the full costs of services –direct and indirect or overhead- associated with delivering public service. ABC defines a unit of work, its inputs(resources) and outputs(outcomes or results), and all related costs, usually expressed as "cost per unit data". An activity identifies a specific problem that needs addressing and explains how it is addressed by an agency function or operation. An activity is something an organization does to accomplish its goals or objectives.

To make knowledgeable decisions as whether to use in-house services or to contract out, it is necessary to make valid cost comparisons which is often complex and problematic. A common problem is underestimation of costs. Often indirect and overhead costs are not fully considered. Common costs in determining full costs of in-house services include 1)cross subsidizing, 2) disregarding the allocation of overhead, 3)failing to capture capital depreciation or replacement costs, 4) discounting the cost of debt or interest, 5) excluding or underestimating costs. The total cost of in-house provision of a state governmental service or activity comprises all direct costs and indirect costs. There are various methods of allocating indirect costs to an activity such by the percentage of employee time involved or by the total dollars budgeted for each activity.

Contractor costs are the cost a contractor pays to provide a service or activity and are fairly straightforward and identified in an RFP. Contract administration costs though can be difficult to calculate precisely and include all actions taken by the contractor from the beginning to the end of a contract, such as preparation of the RFP, procurement, negotiations, change orders and amendments, invoicing, and monitoring and oversight. There are also one time conversion costs to consider when first taking an activity done in-house to contracting or vice versa.

Approach: Previous DelDOT studies and contracted information products will be examined using an activity based approach to determine full costs and compare in-house and contracting alternatives. The focus will be on information analysis, mapping, presentation, and those types of activities with information that could be served by resources in the Division of Planning. Four to six representative activities or projects contracted in the past will be selected as case studies. Contractor costs will be estimated and then an estimate of what an in-house approach would cost will be developed. An attempt will be made to provide estimates by some type of unit costs related to personnel time such as “analyst day” or “analyst hour”. Other considerations involved in the comparison such as the quality of the work, lack of bias, timeliness of products, availability of skills, and other non-cost issues will also be investigated.

To the extent that doing work in-house is warranted by the cost benefit analysis, the organization and responsibilities of an information section within planning will be outlined.

Results: From this project a method of comparing in-house and contracted costs will be demonstrated. The Division of Planning will be able to determine the costs and benefits of contracting versus in-house services in the area of information analysis, mapping, and presentation. This will provide very useful information for the Division to judge the appropriate level and organization of in-house resources they will maintain. The study could provide useful information to respond to criticisms that currently DelDOT hires too many contractors, or perhaps can provide justification for development of staff and in-house resources.

Proposed Project:

**Establishing a Method of Storing and Referencing Planning Data
Phase I, Identifying Options, Approximate Costs, and Request For Proposals**

Background: The Division of Planning works with a very wide range of information in a variety of formats, including those from software that works with text, graphics, databases, GIS layers, presentations, drawings, maps, spreadsheets, and others. Information is constantly being produced by the Division and its consultants. In any one application area the amount of information is very large. Planners are in a day to day push to find information, analyze it, and present it. There needs to be a mechanism to catalog and archive the large amounts of data with which the Division of Planning works. Year after year this is a continued need. With staff changes it is even more urgent. No such data library or reference tool is currently available to Planning staff or other groups in DelDOT and information is usually found by asking around. This need and example of the type of tool needed for planning was extensively discussed in research by the Delaware Center of Transportation, <http://www.cadsr.udel.edu/DOWNLOADABLE/DOCUMENTS/transformingdataintoinfo.pdf>.

Description: Current specifications for a suitable utility will be reviewed and further developed through meetings with DelDOT personnel. This phase will identify commercially available software and/or costs for custom programming of a data archiving and retrieval system. Approximate costs of available options will be estimated. Specifications will be developed of a system that will meet Planning's needs.