

Section 3

Geographic Information System Updates

3.1 Introduction and Scope

A Geographical Information System (GIS) is a common means of collecting and organizing geographically based information. The system is essentially a “smart” map, in the sense that an electronic map on a desktop or laptop computer is linked to a database of information. Simply “clicking” on a location on the electronic map will bring up information stored in the database about that location. The GIS software also allows users to perform spatial analysis and queries, and to display maps using the data stored in the GIS.

For example, if drainage manhole information is stored in the GIS a user can select a manhole on the map and view information that has been stored pertaining to the manhole. Attributes like size, material, and date installed are common types of information to be stored within a drainage system GIS. Other types of information such as images and maintenance history can also be related to a feature and stored in the GIS.

The City of Concord currently maintains an extensive GIS database that includes information on parcels, zoning, utilities, aerial mapping, and many other layers. For this project, CDM has developed a GIS data layer consisting of storm water facilities.

This storm water layer is being used to support nearly all other aspects of the storm water master plan.

3.2 Study Area

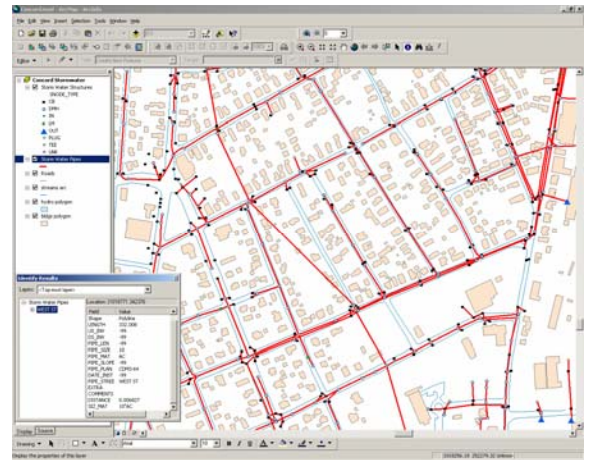
Although other portions of the storm water project have focused on one area of the city at a time, a city-wide storm water layer is currently being developed using a combination of existing hard copy plans and field collection of storm water features using a GPS unit. It is anticipated that all major storm water systems will be mapped as part of this project.

In addition to the storm water GIS layer, a manhole inspection and large culvert applications have been developed. These applications will run on a lap top computer and will allow users to collect information in the field during manhole inspections (see Section 3.4). Information stored in the GIS can be verified and new information can be collected using the application. The application was used to collect detailed information during a manhole inspection project in the Washington Street area (see Section 5). In the future the application can be used by the City to collect information in other areas of the City as city workers perform work in those areas.

3.3 City-Wide Mapping

In an effort to develop an accurate storm water layer for the City of Concord, CDM collected all available source information as well as the city's existing base map. These source documents included record drawings maintained by the City, CDM plans from previous work with the City, sewer sheets, catch basin books, and other reports and studies. Any information related to the storm water system was entered into the GIS. All available attributes were captured from the source drawings and stored in the GIS. The City's existing base map compiled from aerial photography was initially used to spatially place the storm water features. Supplemental field investigations (visual, survey, and television) and GPS data were used to verify the placement of storm water features.

A pilot project was completed in the "Terrible Trapezoid" region of the city to test these methodologies. CDM produced check plots of the area that were submitted to the City for approval. These check plots were reviewed by the City with comments provided back to CDM. CDM incorporated this updated information into the storm water layer and continued to automate the rest of the City's storm water layer.



A storm water GIS data layer is being developed as part of this project

The City now has a comprehensive storm water facility inventory that can be used to manage the storm water system, maintain information related to the maintenance and upkeep of the system, and perform querying and GIS analysis, which is helpful for engineering purposes. All data developed is compatible with the City's existing GIS database.

3.4 Custom Applications for Concord GIS

Once the final GIS for the storm water system is complete, CDM will provide Concord with the GIS mapping and database. CDM will also provide custom applications developed for the City to easily access and analyze the data. These applications include:

- Query of drain line facilities by street, plan, material, or other data – helpful for finding information on given problem structures, etc.;
- Templates for map production;

- Tracing of upstream and downstream pipes (i.e., which lines contribute flow to a given manhole; which lines receive flow from a given source) – helpful in tracking down illicit connections and illegal dumping;
- Integration of scanned plan and profile images with GIS data so that source data can be viewed with the electronic data;
- Transfer of sewer data to AutoCAD DXF files that can be used in the creation of plans for new development, etc.;
- Generation of pipe statistics, including length, diameter, condition, etc.;
- Location of nearest feature (i.e., catch basin to an address) – helpful for use in addressing resident complaints or in managing fieldwork; and
- Linking of GIS to storm water maintenance management software.



The City will be able to access GIS information in the field using hardware, software, and applications provided.

To facilitate entry of additional manhole inspection data into the City’s GIS, CDM created a field application. The application consists of a copy of the GIS mapping linked to a data sheet. Arriving at a manhole to be inspected, the field crew “clicks” on the structure on the computer map. The associated field sheet then requests information on the structure, such as depth of sediment, condition of cover, rim, walls, invert and corbel. The information entered can be added to the GIS database. Queries on the condition, location, photos, etc. can then be made on the entered information. This application is described in more detail in Section 5.

3.5 Recommendations and Next Steps

The City should continue to update their GIS database based on field verifications and new development plans. The City should also continue to clean up the existing pipe network (drain, water, sewer).