June 17, 2002

Mr. Karl Wetherholt, P.E., City Engineer
City of Gahanna
200 South Hamilton
Gahanna, Ohio 43230

Re: Proposal for Professional Consulting Services – Storm System Model Data Development

Dear Mr. Wetherholt:

Evans, Mechwart, Hambleton & Tilton, Inc. (EMH&T) is pleased to submit this proposal to provide professional consulting services in conjunction with the City's implementation of its Stormwater Program, namely the development of data suitable for model execution and the configuration of that data within Haestad Methods' StormCAD® software.

Project Approach

EMH&T proposes to undertake our efforts in a phased approach to assure the efficient and effective completion of our tasks.

Phase I: Storm System Infrastructure Data Development
Prepare Model Infrastructure Information

1. **Acquire Existing Information**

EMH&T will compile and collect existing relevant hardcopy and electronic products as source material for subsequent steps. The primary resource is assumed to be the digital storm system atlases prepared by EMH&T in 1996 and updated by EMH&T in 1999. This resource is in AutoCAD format as polylines, lines, blocks and annotation blocks with attributes.

2. **Acquire Update Information**

Storm System facilities built since the 1999 AutoCAD update will be added with source material provided by the City. The City will identify update materials and provide them to EMH&T. EMH&T will prepare the source material in a manner consistent with existing City products and the ultimate delivery format within this scope of services.

3. **Import Information into Production Environment**

The updated digital storm system atlases will need to be imported and reformatted to accomplish the production steps necessary in model data development. They are currently in AutoCAD format. First they will be put through various routines that enforce the following graphic conventions:
   - Main lines are distinct AutoCAD entities (specifically polylines)
   - Nodes are present only at the endpoints of mains
   - Nodes are present at the endpoints of all mains

EXHIBIT A

- The coordinates of endpoints of connected main lines match exactly
- The coordinates of main line ends and related nodes match exactly
- Nodes and mains are populated on specific layers

Each storm system feature will then be assigned an object data record within AutoCAD containing the following fields to be populated:
- Identifier
- Map Reference

The object data for identifier will then be populated for each storm system feature to relate the graphic item with non-graphic information to be developed.

A Model Attribute Database (MAD) will be created using Microsoft Access®. The MAD will be created with the fields necessary for the model development. The features and fields requested by the City are as follows:

Manholes & Inlets: Identifier, size, type of casting, top of casting elevation, invert elevation, improvement number, year built.

Pipes: Identifier, size, material, year built, improvement number, node to node elevations.

Basins: Identifier, type, improvement number, year built.

Weirs: Identifier, size, improvement number, year built.

Dams: Identifier, size, improvement number, year built.

EMH&T recommends the following additional data attributes:

Manholes & Inlets: Manhole type, Inlet type.

Pipes: shape, second dimension (if applicable), length.

The MAD will be loaded with records for all of the storm system features in the reformatted AutoCAD product for model attribute enhancement.

4. Model Attribute Enhancement

Existing plans and records drawings will be used to populate the fields in the MAD. EMH&T assumes that those plans will be the only resource for feature information as there is no field work component proposed as part of this work. Additional information provided by the City can be incorporated as long as it is provided in an efficient and convenient format.

The process will consist of interpreting plans and compiling attribute information for entry into the MAD. The process will be entirely electronic (i.e. paperless) using scanned image files as the source material. Notes relevant to interpretations, computations and determinations made as part of the process will be captured in a markup/redline environment using the AutoVue® software. Inclusion of these notes is helpful in EMH&T's overall workflow including, especially, the quality control measures employed.

Graphic alignment and placement is assumed adequate and correct in the existing AutoCAD product. Changes to the graphical placement will only occur when a discrepancy is detected or on a case-by-case basis when specifically instructed by the City.

Phase II: Storm System Tributary Data Development
Prepare Subwatershed Information

1. Delineate and Digitize Subwatersheds

EMH&T will identify each discharge from the City of Gahanna stormwater system to open outfalls, or systems owned and operated by others. The tributary area of each discharge point will be defined, both through the structural components of the system (pipe, ditches, man-made swales) and topographical tributary area. The conveyance of stormwater from one subwatershed to another through man-made means (such as pump stations) is not anticipated. This subwatershed mapping product will serve as the City's initial response to Minimum Control Measure Number 3 of the NPDES Phase II stormwater program.

2. Populate Subwatershed Characteristics

For the structural components of the system, EMH&T will identify key characteristics to be used in the modeling of the system. These characteristics will be attributed to point of influent to the City's stormwater system. These factors include:
- C factor (for the Rational Formula $Q=CIA$)
- General slope or area to inlet structure
- General land use type
- General ground cover
- General time of travel to the inlet point
- CN factors
- Factors required for TR-55 calculations

The subwatersheds may be divided into smaller watersheds, should there not be a homogeneous land use across the tributary to each inlet point. These factors will be reviewed with the City for concurrence prior to utilization and definition.

Phase III: Quality Control/Quality Assurance
Ensure Fitness of Project Working Files

EMH&T will implement a quality control program for all deliverables. This program will include both manual and automated checks for completeness and correctness of included graphic features and associated non-graphic information.

Manual checks will include comprehensive checks of all information by a project coordinator to ensure correct interpretation and entry of all information. The scanned image files, markup files and database entries will be used extensively.

Automated checks will cover both graphic features and non-graphic records, whenever applicable. In respect to automated graphic checks, all reasonable methods will be employed to confirm that adjacent features match at mathematically equivalent points and go beyond visually pleasing aspects of graphical placement. Node features must be connected to line features and vice versa and must, when coincident, share a point in space digitized with mathematical equivalence. Any area

boundaries or polygon areas must close and starting points and ending points should match with mathematical equivalence.

Automated checks for non-graphic data will include field checking and ranging whenever possible. This would confirm that values within a field are within a valid range and that combinations of fields would contain consistent information (e.g. no second dimension for pipes that are circular).

EMH&T will verify that graphical features and non-graphic records have a direct correspondence. No unassigned or mis-assigned graphical features or records will be delivered.

An essential aspect of product quality is the acceptance testing by the City. It is our assumption that the City will check a reasonable sample of the data.

Phase IV: Model File Preparation
Prepare Working Files from Data Development Tasks

During this phase, the working files will be formatted to be compatible for import into the Haestad Methods' StormCAD® model platform. This software has been specified as the target platform for data development. The likely data file format will be ESRI Shapefile® format, but information will be maintained and delivered in the production format (i.e. AutoCAD®) as well.

Formatted annotation will be prepared in AutoCAD. EMH&T will not prepare annotation within the StormCAD® software. That can be brought in as a background feature or auto-annotated by routines within that environment.

The StormCAD® software will be reviewed thoroughly to provide a complete mapping of fields to support the City's execution of the model subsequent to completion of this project.

Any pre-processing steps required for comprehensive model import will be documented and solutions designed to support the work under Phase V of this proposal.

Phase V: Model File Import and Delivery
Deliver Updated Information in Requested Format

EMH&T will deliver all work products to the City on CD-ROM disc. The primary product is the installation of the storm system model data in the City's StormCAD® system. EMH&T will perform that installation at City facilities, preferably on the system designed for ultimate model execution.

In summary, the deliverables will include:
*   AutoCAD® Drawing Files (AutoCAD® Map format with attached Object Data)
*   Scanned Image Files (TIFF 6.0 w/ Group IV Compression)
*   AutoVue® Markup Files
*   ESRI Shapefiles
*   Haestad Methods' StormCAD® Model

City's Obligations

For the purpose of this proposal, it is assumed that the City of Gahanna will:

a) support the identification of any related source material (hardcopy or electronic) to be utilized by the consultant;
b) provide for use of Haestad Methods' StormCAD® software capable of the import and preparation of all information;
c) provide timely responses to questions and requests for information; and,
d) work closely with the consultant in the development of the format of work products.

Proposed Fee

We propose to provide the services described herein, and all associated reimbursable costs, on an hourly basis, for a fee not exceed $97,300 (Ninety-Seven Thousand Three Hundred Dollars) without prior written authorization from the City. Invoices will be submitted monthly based on progress of the work and are payable on receipt.

We are prepared to begin the work immediately upon receipt of the Notice to Proceed. We anticipate final delivery of all work products within eight (8) months from notice to proceed. We would recommend project progress meetings on at least a monthly interval.

We appreciate the opportunity to submit this proposal. If you should have any questions or require additional information, please call.

Respectfully submitted,
EVANS, MECHWART, HAMBLETON & TILTON, INC.

Derek M. Mair, Associate
Director GIS/IT Services