CITY COUNCIL

AGENDA REQUEST

AGENDA OF:	10-19-10	AGENDA REQUEST NO:	VIII-C
INITIATED BY:	SHASHI KUMAR, P.E., CFM SENIOR ENGINEER	RESPONSIBLE DEPARTMENT:	ENGINEERING
PRESENTED BY:	SHASHI KUMAR, P.E., CFM SENIOR ENGINEER	DEPARTMENT HEAD:	CHRISTOPHER L. STEUBING, P.E., CFM, CITY ENGINEER CLS
		ADDITIONAL DEPARTMENT. HEAD (S):	N/A
SUBJECT / PROCEEDING:	INTEGRATED STORM WATER MANAGEMENT MODEL (ISWMM) – PHASE II AWARD OF ENGINEERING SERVICES CONTRACT		
EXHIBITS:	CONTRACT, SCOPE		

CLEARANCES		APPROVAL	
LEGAL:	JOE MORRIS, CITY ATTORNEY JCD for JDM	EXECUTIVE DIRECTOR:	N/A
PURCHASING:	TODD REED, PURCHASING MANAGER	ASST. CITY MANAGER:	KAREN DALY kd
BUDGET:	JENNIFER BROWN BUDGET & RESEARCH DIRECTOR	CITY MANAGER:	ALLEN BOGARD kd FOR AB

BUDGET

EXPENDITURE REQUIRED: $	350,000
AMOUNT BUDGETED/REALLOCATION: $	350,000
ADDITIONAL APPROPRIATION: $	N/A

RECOMMENDED ACTION

Award engineering contract for developing an Integrated Storm Water Management Model (ISWMM) – Phase II to Halff Associates, Inc., for an amount not to exceed $350,000.

EXECUTIVE SUMMARY

Funding has been appropriated in the FY11 CIP for the development of an Integrated Storm Water Management Model. ISWMM is a planning tool that can be used to predict drainage system performance citywide and also serves as a valuable tool in preparing for emergency response, such as hurricane preparedness. Such a tool will provide City staff with a system-wide analysis indicating how all components operate under potential flooding scenarios. The development of ISWMM is planned in two phases.

Phase I was completed in FY10. During a workshop with the City Council in April 2010, the Engineering staff presented the salient features of the ISWMM Phase I project and also discussed proposed plans for Phase II. Some of the key tasks completed under Phase I included:

- Integration of hydrologic and hydraulic models from previous studies within GIS
- A city-wide ponding map that identified potential ponding depths during extreme rain events
- Delineation of floodplain limits to identify flood hazard areas

Phase II will be an enhancement to Phase I and will build upon the framework already developed as part of the first phase. Some of the key tasks included under the scope for Phase II are to:

- Continue to integrate hydrologic and hydraulic models from previous studies within GIS which includes FBC LID 2
- Update ponding map to include various storm frequencies
- Analyze "what-if" scenarios such as during the occurrence of a coincidental rainfall event (local rainfall when Brazos is at high stage)
- A pilot study to simulate levee breach and operation of levee outlets that will assist in the emergency preparedness for such an occurrence
- Detailed 2D modeling of Covington Woods

The consultant team of Halff Associates, Inc. and Dannenbaum Engineering Corporation were selected by the Engineering staff for developing Phase I. The same consultant team has been retained for Phase II. Halff Associates will be the lead consultant on this project while Dannenbaum Engineering will be a sub-consultant to Halff Associates. The breakdown of consultant fees for this project are as follows:

- Halff Associates, Inc. (Lead Consultant): $274,960
- Dannenbaum Engineering Corporation (Sub Consultant): $75,040

Funding in the amount of $350,000 for Phase II of this project is budgeted in the City's approved CIP (DR0804). The Engineering Department recommends that the City Council award this engineering services contract to Halff Associates, Inc. for an amount not to exceed $350,000.

EXHIBITS

CITY OF SUGAR LAND STANDARD CONTRACT FOR PROFESSIONAL ENGINEERING DESIGN SERVICES FOR CITY FACILITIES

Over $50K - Form Revised 3/1/10

I. General Information and Terms.

Engineer's Name and Address:	Halff Associates, Inc. 3701 Kirby Drive, Suite 860 Houston, TX 77098
Project Description:	Integrated Stormwater Management Model Phase II Project
Maximum Contract Amount:	$350,000

Effective Date: On the latest date of the dates executed by both parties.

Termination Date: (See III F)

Contract Parts: This Contract consists of the following parts:

I. General Information and Terms
II. Signatures
III. Standard Contractual Provisions
IV. Additional Terms or Conditions
V. Additional Contract Documents

II. Signatures. By signing below, the City and the Engineer agree to the terms of this Contract, which consists of the following parts:

CITY OF SUGAR LAND

_____
City Manager or Assistant City Manager

Date: _____

Reviewed for Legal Compliance:

ENGINEER:

By: Dwayne S. Hamilton
DWAYNE S. HAMILTON, VICE PRESIDENT

Date: 10/6/10

HALFF

September 17, 2010

Shashi Kumar, PE
City of Sugar Land
2700 Town Center Boulevard North
Sugar Land, TX 77479

Re: **Proposal for the Integrated Stormwater Management Model Phase II Project**

Dear Mr. Kumar:

We are pleased to present the City of Sugar Land this proposal for the Integrated Stormwater Management Model Phase II Project. Halff will serve as the Prime Consultant, responsible for all tasks associated with this project. Our scope of services and fee proposal are attached to this letter detailing the individual tasks for this project and associated engineering fees. The Subconsultant on this project is Dannenbaum Engineering Corporation, who will be assisting Halff on various tasks. The Subconsultant's detailed scope of services and fee proposal are also attached to this letter for you information. The total proposed fee for this project is $350,000.00.

We estimate that our services will take approximately 12 months to complete. We have attached a project schedule for your review, which will be updated monthly with our progress reports.

We trust this proposal meets your requirements and we appreciate the opportunity to continue serving you and the City on this project. Please feel free to contact me or Stephen Reiter, if you have any questions or comments concerning this proposal.

Sincerely,
Halff Associates, Inc.

Dwayne S. Hamilton, PE, CFM
Vice President

Attachments
CC: Al Flores – Dannenbaum
Stephen Reiter - Halff
File

HALFF ASSOCIATES, INC.

3701 KIRBY DRIVE, STE 860
HOUSTON, TX 77098

TEL (713) 523-7161
FAX (713) 523-4373

WWW.HALFF.COM

Scope of Services
Integrated Stormwater Management Model Phase II
City of Sugar Land, Texas

The Integrated Stormwater Management Model (ISWMM) Project is a comprehensive geo-database of the City's current drainage infrastructure, including hydrologic and hydraulic models and mapping of flood events. The ISWMM Phase I project consisted of developing the geo-database of the drainage infrastructure and a focus on updating and incorporating the models of the City's open channel network. The open channels were all incorporated in the current version of HEC-RAS, utilizing data from previous models updated to the correct datum, developing new cross sections from the current terrain data, and field investigations.

The ISWMM Phase II Project will consist of continuing to build the geo-database with more of a focus on developing citywide modeling of the open channel network, utilizing consistent hydrologic and hydraulic methodologies. The modeling will consist of evaluating the operation of drainage facilities, within the ETJ, under various storm frequencies and coincidental storm events with the outlets into the Brazos River, Oyster Creek, and Ditch H. In addition, this phase of the project will model areas of interest in more detail using dynamic models to simulate storm events and identify areas needing improvement projects. The detailed summary of the ISWMM Phase II scope of services are as follows:

1.0 Project Coordination

The Consultant will provide the following project coordination tasks:

- 1.1 Project kick-off meeting with the City Staff.
- 1.2 A project schedule will be provided to the City as part of the scope and will be updated as necessary monthly.
- 1.3 Progress Meetings will be held monthly with City Staff (Assume 12 meetings)
- 1.4 Monthly Invoicing and Progress Reports

2.0 Incorporation of LID 2 Data

At the completion of Phase I services, the data from LID 2 was not available. The hydraulic models for channels in these LIDs were developed using current terrain data and field measurements of structures. The existing hydrology was not available, but routing discharges were established. The remaining tasks to complete are the following:

- 2.1 Obtain and evaluate existing hydrology
- 2.2 Incorporate hydrology into Phase I models.
- 2.3 Model and map the channels using the hydrology provided in the original studies. Adjust structure or channel information form As-Builts, as necessary.

3.0 Hydrology

The current hydrologic methodologies for the existing models range from no hydrologic analysis to current methods. This phase will consist of modeling all watersheds in HEC-HMS with a consistent methodology. This task will include:

- 3.1 Develop a seamless drainage basin shapefile. Subbasins will be calculated per storm sewer outfall and set up for unsteady modeling.
- 3.2 Develop citywide landuse file for hydrologic modeling and incorporate into database.
- 3.3 Update each drainage sub-basin with consistent Fort Bend County methodology, using updated landuse files. Input and model parameters for all watersheds in HEC-HMS.
- 3.4 Model the 2, 5, 10, 25, and 100 year storm frequencies and store hydrographs for hydraulic modeling and simulations.

4.0 Hydraulics

The channels developed in Phase I in HEC-RAS will be modeled with the updated hydrology developed in this phase. Due to the significant linear storage, tributary connectivity, backwater affects, and ponds throughout the channel networks, we propose to model the majority of the channels in Unsteady HEC-RAS. This task will include:

- 4.1 Model 27 stream miles in Unsteady HEC-RAS for the 2, 5, 10, 25, and 100 year storm events. (Excludes the Brazos River, Oyster Creek, Ditch H, Sugar Creek, and Ditch A22)
- 4.2 Map the flood delineations for the 2, 5, 10, 25, and 100 year storm events.

5.0 Evaluate Levee Outlets

Each levee outlet will be evaluated to determine how they operate during the various storm events. The condition of the evaluation will be gates closed and pumps at full capacity. The events modeled will be well above the 1% annual chance delineations and are intended for emergency management purposes. Outlets to evaluate are the following:

- 5.1 Evaluate 6 outlets to the Brazos River.
- 5.2 Evaluate 4 outlets to Ditch H.
- 5.3 Map the simulated events for 10 outlets.

6.0 Pilot Levee Simulation and Evaluation

A simulated breach analysis will be performed for LID 14 to determine operation of the internal drainage systems. A meeting with the City Staff will be held to determine the specifics of the breach conditions and the extent of the analysis. It is assumed for the purposes of this scope of services, that the levee will be breached at one critical point near the gates, gates are closed, the pumps will be a full capacity, and the internal storm event will be determined by the City. InfoWorks RS will be utilized for the analysis. The intent of the analysis is to provide basic information for emergency management coordination during a breach scenario. Animation of the final breach and inundation of LID 14 will be provided to the City. The individual tasks include:

6.1 Breach Analysis for LID 14.

7.0 Update Ponding Map

The ponding map in Phase I was not based off of individual storm events. With the new modeling and mapping, the ponding map will be updated to reflect flooding of critical low areas for various storm events, not to exceed the 5, 10, 25, and 100 years storm events. A detailed ponding map will be created for the areas modeled in the Covington Woods InfoWorks Model outlined in "8.0 Detailed Modeling of Covington Woods Area." The remaining areas will be an approximation based on the assumption that the storm sewers will receive the 2 year storm frequency volume.

7.1 Ponding Maps for areas within LIDs
7.2 Ponding Maps for areas not within levee systems

8.0 Detailed Modeling of Covington Woods Area

The Covington Woods area will be modeled in detail using InfoWorks 2D to simulate the existing conditions and determine the areas needing improvements. This study will be performed at the level of a conceptual preliminary engineering study. The tasks will include:

8.1 Obtain and evaluate the existing detailed studies for Ditch A22 and others.
8.2 Develop the hydrology for the watersheds, breaking down the basins to inlet groupings.
8.3 Develop the InfoWorks model
8.4 Simulate the 2, 5, 10, 25, and 100 year storm events.
8.5 Map the 2, 5, 10, 25, and 100 year storm events.
8.6 Develop conceptual alternatives for drainage improvements
8.7 Prepare a preliminary engineering report.

9.0 Report and Presentation Work

The Consultant will assist the City Staff to present the results of the ISWMM Phase II work and the Covington Woods conceptual PER to City Staff and Council, including PowerPoint, GIS demonstrations, and associated exhibits, as necessary.

- 9.1 Report for the ISWMM Phase II Work.
- 9.2 Assist the City Staff in the presentation of the ISWMM Phase II Work to Council.
- 9.3 Presentation of the Covington Woods conceptual PER to Council.

10.0 Quality Assurance and Quality Control

The Consultant will provide internal QA/QC during the development of the database, models, and preliminary engineering. The database will be reviewed for consistency and conformance with the standards set for the project. The hydrologic and hydraulic modeling will be reviewed to ensure compliance with the standards set by the City and developed specifically for this study.

11.0 Deliverables

At the conclusion of this phase of work, the deliverables will include:

- 11.1 Updated Geo-Database with established file structure and user manual
- 11.2 Landuse Shapefile for entire City.
- 11.3 Hydrologic and Hydraulic Models
- 11.4 Floodplain Delineations for Channel Network
- 11.5 Mapping of Flood Delineations for Simulated Events at Outlets
- 11.6 Updated Ponding Map for Various Storm Frequencies
- 11.7 Engineering Report for ISWMM Phase II Analysis
- 11.8 Conceptual Preliminary Engineering Report for the Covington Woods Area.
- 11.9 Exhibits and PowerPoint to facilitate Presentations to Council

12.0 Exclusions

The following tasks are excluded and not considered as part of the scope of services for this project:

- 12.1 Environmental Assessments and Permitting
- 12.2 Coordination with FEMA for CLOMRs or LOMRs
- 12.3 Permitting and Coordination with the US Army Corps of Engineers
- 12.4 Survey and Aerial Topography Services
- 12.5 Geotechnical Services
- 12.6 Preliminary Designs of Alternatives
- 12.7 Utility Investigations and Coordination
- 12.8 Preparation of construction plans, specifications, and estimates.

Integrated Stormwater Management Model Phase II
City of Sugar Land, Texas
FEE PROPOSAL

FEE PROPOSAL SUMMARY

PROJECT TASKS		FEE
1. Project Coordination	$	10,531.20
2. Incorporate LID 2 Data	$	1,446.30
3. Hydrology	$	42,102.80
4. Hydraulics	$	52,651.60
5. Evaluate Levee Outlets	$	19,210.40
6. Pilot Levee Evaluation	$	26,432.80
7. Update Ponding Map	$	27,542.80
8. Covington Woods Study	$	67,985.20
9. Report and Presentations	$	17,273.20
10. Quality Assurance and Quality Control	$	6,960.20
TOTAL	$	272,136.50
REIMBURSABLES	$	2,823.50
PRIME CONSULTANT TOTAL FEE (80%)	$	274,960.00
SUBCONSULTANTS (20%)		
Dannenbaum Engineering Corporation	$	75,040.00
TOTAL PROJECT FEE - ISWMM PHASE II	$	350,000.00

DANNENBAUM ENGINEERING CORPORATION
3100 WEST ALABAMA HOUSTON, TEXAS 77098 P.O. BOX 22292 HOUSTON, TEXAS 77227 (713) 520-9570

ENGINEERING EXCELLENCE SINCE 1945

September 17, 2010

Mr. Dwayne Hamilton, P.E.
Halff Associates, Inc.
3701 Kirby Dr., Suite 860
Houston, TX 77098-3926

RE: ISWMM Phase II Sub-Consultant Services

Dear Mr. Hamilton:

Dannenbaum Engineering Corporation is pleased to submit this proposal to Halff Associates, Inc. (Prime Consultant) to perform various tasks to assist on the ISWMM Phase II Project. A summary of the tasks requested of Dannenbaum are as follows:

Incorporation of LID 2 Data

At the completion of Phase I services, the data from LID 2 was not available. The hydraulic models for channels in these LIDs were developed using current terrain data and field measurements of structures. The existing hydrology was not available, but routing discharges were established. The following tasks will be performed by the Sub-Consultant:

- Obtain existing hydrologic and hydraulic models
- Evaluate collected models

Deliverables – The sub-consultant deliverable will include any data collected, a letter describing our evaluation efforts.

Evaluate Levee Outlets

Each levee outlet (10 identified) will be evaluated to determine how they operate during the various storm events. The condition of the evaluation will be gates closed and pumps at full capacity. The events modeled will be well above the 1% annual chance delineations and are intended for emergency management purposes.

The Sub-Consultant will provide data collection for each outlet including:

- The operations and maintenance manual for LID 2
- Outlet design plans, including pump data
- Current Brazos River model from Ft. Bend County Drainage District/ City of Sugar Land
- Critical system elevation for gravity flow

- Coincidental frequency based on current Fort Bend County Criteria Manual dated 1987, revised 1999, Appendix C.

Deliverables – The sub-consultant deliverable will include the operations and maintenance manual and design plans collected and a letter briefly describing information required to complete the analysis.

Update Ponding Map

The ponding map in Phase I was not based off of individual storm events. With the new modeling and mapping, the ponding map will be updated to reflect flooding of critical low areas for various storm events, including the 5-, 10-, 25-, and 100-year storm events. The Sub-Consultant will provide a detailed ponding map for the areas modeled in the Sugar Creek Watershed for the various storm events above. Development of a ponding map will include the following tasks:

- Subdivide drainage areas for the Sugar Creek Watershed. The level of detail will include 1 drainage area per outfall, for a total of 30 systems.
- Develop a peak flow for each basin using Rational Method.
- Create basins in HEC-HMS, use Tc from Rational Method, and vary R-value to match peak
- Establish a runoff volume for the 2-, 5-, 10-, 25-, and 100-year events by taking the excess rainfall depth from HEC-HMS and multiplying by the area. Excess rainfall will be based on total rainfall minus infiltration losses and underground pipe volume.
- Create a storage volume-storage elevation (SV-SE) relationship for each drainage area
- Assign a spill elevation based on flow exiting each drainage area.
- Apply water surface elevations to entire subbasin drainage area, and map against current LiDAR data.
- Produce a ponding map each drainage area for each frequency (5-, 10-, 25-, and 100-year).

Assumptions:

- Assume that the 2-year event is held in the storm sewer system
- Does not account for flow between drainage areas (overflow areas)

Deliverables – The sub-consultant deliverable will include a ponding map for the Sugar Creek critical areas as defined in the on-going Sugar Creek project, and a brief discussion of the process completed to produce the map for inclusion in the final report.

Detailed Modeling of Covington Woods Area

The Covington Woods area will be modeled in detail using InfoWorks 2D to simulate the existing conditions and determine the areas needing improvements. This study will be performed at the level of a conceptual preliminary engineering study. The following tasks will be performed by the Sub-Consultant:

- Obtain and evaluate the existing detailed studies for Ditch A22 and the Covington Woods Watershed.
- QC of the modeling performed by the Prime Consultant. The model will be reviewed to determine if the results are reasonable considering results from previous models for the project area. The review will include QC to ensure compliance with the standards set by the City specifically for this study.

Deliverables – The sub-consultant deliverable will include the current models for Ditch A-22, Covington Woods, as well as a brief letter including comments on the prime consultants modeling efforts.

Dannenbaum proposes to perform these services for $75,040. The summary of fees is included on the attached Table 1.

Please feel free to contact me at 713-527-6365 if you have any questions.

Sincerely yours,

DANNENBAUM ENGINEERING COMPANY

Alejandro Flores R.

Alejandro C. Flores, P.E., D.WRE, CFM
H&H Division Manager

XC. Elizabeth Parent, P.E.

Table 1
ISWMM Phase II Fee Estimate

	Task	Department Manager	Project Engineer IV	Project Engineer III	CADD	Secretary	Total Hours	Total Cost
		$220.00	$135.00	$105.00	$85.00	$70.00		
1.0	**Coordination/Meetings**	***16***	***16***	***10***	***0***	***0***	***42***	***$6,730.00***
	Client Meetings (3 Meetings @ 2 hrs each) * 2 Consultants	6	6				12	$2,130.00
	Coordination between consultants (4 Meetings @ 1 hrs each)	4	4	4			12	$1,840.00
	Internal Coordination	6	6	6			18	$2,760.00
							0	$0.00
2.0	**Incorporation of LID 2 Data**	***10***	***28***	***32***	***0***	***2***	***72***	***$9,480.00***
	Obtain existing models	4	4	8			16	$2,260.00
	Evaluate Models	4	16	16			36	$4,720.00
	Letter Report	2	8	8		2	20	$2,500.00
3.0	**10 Levee Outlets - Data Collection**	***7***	***18***	***28***	***0***	***2***	***55***	***$7,050.00***
	O&M Manual for LID2	1	2	4			7	$910.00
	Outlet design plans, including pump data	1	2	4			7	$910.00
	Current Brazos River Model	1	2	4			7	$910.00
	Critical System Elevation for Gravity Flow	1	2	4			7	$910.00
	Coincidental Frequency Information	1	2	4			7	$910.00
	Letter Report	2	8	8		2	20	$2,500.00
4.0	**Update Ponding Map - 30 areas**	***22***	***88***	***152***	***56***	***2***	***320***	***$37,580.00***
	Subdivide Drainage Areas (1 per outfall)	8	16	24			48	$6,440.00
	Develop Peak Flows	2	8	16			26	$3,200.00
	Create Basins in HEC-HMS	2	8	16			26	$3,200.00
	Establish Volume	2	8	16			26	$3,200.00
	Create SE-SV relationships for each area	2	16	40	16		74	$8,160.00
	Map Elevation from cuve for 5, 10, 25 and 100-year frequencies	2	16	24	40		82	$8,520.00
	Letter Report	4	16	16		2	38	$4,860.00
5.0	**Covington Woods**	***18***	***40***	***40***	***0***	***2***	***100***	***$13,700.00***
	Obtain and evaluate existing studies for Ditch A22 and Covington Woods Watershed	8	16	16			40	$5,600.00
	QA/QC and Provide Historical Knowledge	8	16	16			40	$5,600.00
	Letter Report	2	8	8		2	20	$2,500.00
	ODCs							***$500.00***
								$500.00
								$0.00
		130	364	514	112	16	1136	$ 75,040.00