



Invitation Letter and Scope of Services
**Request for Statements of Qualifications for Providing
Professional Engineering Services for Floodplain Modeling and
Mapping Engineering Services Rotation List – Solicitation Number
CLMP031**

CONTRACT AND LAND MANAGEMENT DEPARTMENT

Contract Procurement Division

P. O. Box 1088, Austin, TX 78767-8839 Telephone: (512) 974-7181 Fax: (512) 974-7297

October 30, 2009

SUBJECT: Request for Statements of Qualifications (RFQ) for Providing Professional Engineering Services for the Floodplain Modeling and Mapping Engineering Services Rotation List
Solicitation Number: CLMP031

The City of Austin, through its Watershed Protection Department and its Contract and Land Management Department, is requesting statements of qualifications for the selection of up to two professional engineering firms for the above-noted rotation list. The Watershed Protection Department has identified and anticipates a number of engineering projects or Capital Improvement Projects (CIP) for floodplain modeling and mapping. The main purpose of this floodplain study is to develop digital geo-referenced hydrologic and hydraulic models and floodplain maps for selected watersheds for both existing and fully-developed land-use conditions. The total estimated cost for these services is \$2,000,000.

All prime firms and subconsultants must be registered to do business with the Owner prior to the RFQ response due date. Prime firms are responsible for ensuring that their subconsultants are registered as vendors with the City of Austin. You may register through the Owner's on-line Vendor Registration system. Log on to <https://www.ci.austin.tx.us/vss/Advantage> and follow the directions.

A Request for Statements of Qualifications (RFQ) for these services is available which provides project background and requirements for submittal. For a copy of the RFQ, please contact me at the City of Austin, Contract and Land Management Department at carolynd.williams@ci.austin.tx.us or 512-974-7049. Copies may also be obtained at the Contract and Land Management Department, Professional Services Procurement, 505 Barton Springs Road, Suite 1045. The authorized contact persons for this solicitation are Fang Yu, P.E., Ph.D., Project Manager, 512-974-3580 and Carolyn Williams, Contract Compliance Specialist Sr. Please contact Fang Yu for all project related questions and contact me for questions regarding the RFQ procurement process.

A pre-response meeting will be held beginning at 1:30 p.m., November 9, 2009, in the 3rd Floor Conference Room, One Texas Center 505 Barton Springs Road, Austin, Texas. The purpose of the meeting will be to respond to consultants' questions about the project and the procurement process. Attendance at the meeting is not a requirement for selection; however, meeting minutes will not be issued.

Should your firm have an interest in providing these professional services, we ask that you obtain a copy of the RFQ and **return nine (9) copies of your statement of qualifications to Attn: Carolyn Williams, Contract and Land Management Department, Professional Services Procurement, 505 Barton Springs Road, Suite 1045, Austin, Texas 78704, PRIOR to 5:00 p.m., Tuesday, December 1, 2009.** The selection process for this project is anticipated to be completed for City Council action in January 2010. Please provide all the information requested in the RFQ in your submittal.

For information about other professional services procurement actions of this office, please visit us at http://www.ci.austin.tx.us/aeservices_ads/getcurrentads.cfm.

Sincerely,

Carolyn Williams

Carolyn Williams, Contract Compliance Specialist Sr.
Contract and Land Management Department
Professional Services Procurement

**CITY OF AUSTIN
REQUEST FOR
STATEMENTS OF QUALIFICATIONS
RELATIVE TO THE SELECTION OF
PROFESSIONAL ENGINEERING SERVICES**

SCOPE OF SERVICES

PROJECT FOR:

CITY OF AUSTIN, WATERSHED PROTECTION DEPARTMENT, THROUGH ITS
CONTRACT AND LAND MANAGEMENT DEPARTMENT

PROJECT TITLE:

FLOODPLAIN MODELING AND MAPPING ENGINEERING SERVICES ROTATION LIST

OBJECTIVES OF FLOODPLAIN MODELING AND MAPPING PROJECTS:

The mission of the Watershed Protection Department (WPD) is to reduce the impact of flooding, erosion, and water pollution on our community in order to protect lives, property and the environment. The WPD has identified and anticipates a number of engineering projects or Capital Improvement Projects (CIP) for floodplain modeling and mapping.

The professional firms are expected to have the personnel, technical knowledge and experience to provide modeling and mapping services as described below. The professional firms are also encouraged to team with sub-consultants so that the combined professional service team has the ability to offer the broad range of water resource engineering expertise which may be required.

The objectives of Floodplain Mapping and Modeling Projects include, but are not limited to:

- Developing new geo-referenced hydrologic models (HEC-HMS) for selected watersheds for both existing and fully-developed land-use conditions for selected storm frequencies.
- Developing new geo-referenced hydraulic models (HEC-RAS) for selected watershed for both existing and fully-developed land-use conditions for selected storm frequencies.
- Mapping the 100-yr and 500-yr floodplains for existing land-use conditions and the 25-yr and 100-yr floodplains for fully-developed land-use conditions.
- Preparation and submittal of a Letter of Map Revision (LOMR) to the Federal Emergency Management Agency (FEMA) and responding to FEMA and City review comments until both FEMA and the City accept the study results.

SOFTWARE COMPETENCY

The professional firms shall have competency in the following software:

- Operating System: Microsoft Windows XP Professional SP2 (32-bit), Vista, or later version
- Office Productivity: Microsoft Office 2003 or later
- Document Imaging: Adobe Acrobat 8.0 or later

- GIS Packages: ESRI ArcGIS 9.3 or later
- GIS Extensions: Spatial Analyst 9.3 and 3D Analyst 9.3 or later version
- AutoCAD Civil 3D
- Hydrologic Model GIS Preprocessor: HEC-GeoHMS 4.1 or later
- Hydraulic Model GIS Preprocessor: HEC-GeoRAS 4.2 or later
- Hydrologic Model: HEC-HMS 3.3 or later
- Hydraulic Model: HEC-RAS 4.0 or later
- FEMA Preparation Software: CHECK-RAS 1.4, RASLOT 2.5 or later

BACKGROUND:

In the past decade or so, the City of Austin experienced rapid land development and urbanization on many urban and suburban watersheds. Some creeks experienced repetitive major flooding and property damages, severe creek erosion, and deteriorating water quality. Although detailed floodplain models and maps have been developed for the majority of City-maintained watersheds, a number of those watersheds still do not have the updated floodplain models and maps to reflect major changes since last floodplain study, including (1) the cumulative changes due to land developments, (2) the availability of more accurate rainfall data, (3) the availability of more accurate topographic data and surveyed cross section data, and (4) the up-to-date new technology for more accurate floodplain modeling and mapping. The selected watersheds to be studied may include Shoal Creek, Cottonmouth Creek, Rattan Creek, Lake Creek, Bull Creek and West Bull Creek.

Due to the complexity and severity of flooding, erosion and water pollution conditions at these creeks, the City of Austin is seeking engineering firms who at least possess the following minimum qualifications:

- 1) The firm shall have the experience serving as the primary firm to perform a watershed-wide floodplain modeling, mapping and LOMR application after FEMA Region VI started its Map Modernization Project in 2004. The results of such watershed-wide study should have been approved by FEMA and the local government who sponsored it; and
- 2) The firm must have the experience in creating a watershed-wide terrain, DEM and TIN models and successfully used them in completing a project as described in (1) above.

ANTICIPATED SERVICES:

The main purpose of a floodplain study is to develop digital geo-referenced hydrologic and hydraulic models and floodplain maps for selected watersheds for both existing and fully-developed land-use conditions. The engineering firms shall conduct this floodplain modeling and mapping project in accordance to the following standards:

- 1) FEMA's Guidelines and Specifications for Flood Hazard Mapping Partners.
- 2) City of Austin Drainage Criteria Manual (DCM)
- 3) User Manuals and Engineering Reference Manuals associated with the hydraulic modeling software being used.

- 4) Additional requirements and special specifications provided by the City for a specific watershed.

The engineering services may consist of data collection, cross-section surveys, hydrologic model development, hydraulic model development, floodplain mapping, and FEMA LOMR application. The hydrologic and hydraulic modeling and floodplain mapping will cover the entire watershed area. All existing AE zones must be restudied and remapped by detailed method. All Zone A floodplains, shown on FEMA's effective floodplain map that are not included in the City-proposed Zone AE study streams (to be provided in GIS shapefile for a specific watershed), shall be remapped using the best data available.

Task 1: Project Management

The engineering firms shall include task leadership and direction, bi-monthly project update meetings, project status reports, telephone and written communication, project schedule and updates, personnel and data management among other general project management activities.

Task 2: Data Search, Collection and Surveys

The engineering firms shall collect and use the latest most accurate data available from the City and other government agencies. The latest data available includes, but it is not limited to: (1) the 2003 and 2007 LiDAR data, (2) the 2006 aerial photos, (3) the 2006 existing and City-projected fully-developed land use data, (4) the USGS 2001 design storms, (5) the City's latest watershed boundary and stream centerline data (if needed), (6) the effective Flood Insurance Studies (FIS) and approved LOMRs since last study, and (7) the latest Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) data and maps for Travis County. Other pertinent data may include historical or observed rainfall data and flow data, high-water marks, zoning map, new survey data, and available as-built drawings of hydraulic structures, effective hydrologic and hydraulic (H&H) models, reports, GIS and working maps. The engineering firms may use the City-created TINs/Grids developed based on the City's latest LiDAR data and other best topographic data available.

The City shall assist the engineering firms in locating all required data available in the City, but the ultimate responsibility for identifying data needs and for finding, collecting, developing, analyzing, and creating all necessary data shall reside with the engineering firms.

The engineering firms shall perform field reconnaissance to inspect the main stem and all tributaries of the watersheds to be studied, hydraulic and hydrologic structures, land use, vegetative cover conditions of the floodplain, special features and problems within the watershed, and assign preliminary Manning's "n" values for channel and over-bank flow areas. The engineering firms shall document their reconnaissance efforts in a written report including labeled photographs. The engineering firms shall document all physical characteristics of the watershed relevant to modeling, including but not limited to specific features of all major detention ponds and outlet discharge structures, vegetative and as-built structure conditions, types and number of hydraulic structures, apparent maintenance condition of channels and hydraulic structures, as well as locations and descriptions of cross-sections to be surveyed.

All bridges, culverts, and critical creek cross-sections (having substantial change in channel geometry, ground surface characteristics, and/or bed slope in contrast to upstream or downstream cross-sections) shall be surveyed. The maximum distance between any two cross-sections shall not exceed 500 ft; and the maximum distance between any two surveyed cross-sections shall not exceed 2000 feet. Two channel cross-sections, upstream and downstream of each culvert or bridge shall be surveyed unless the upstream and downstream cross-sections are similar in geometry and elevation.

Benchmarks shall be located or established and recorded in and near the floodplains of all streams in the watershed. The engineering firms shall establish primary and secondary control points and elevation reference marks in accordance with FEMA's Guidelines and Specifications for Flood Hazard Mapping Partners.

Task 3: Development of Hydrologic Models for Existing and Fully-developed Land-use Conditions

The engineering firms shall develop HEC-HMS models for both existing and the fully-developed land-use conditions. The engineering firms may use the HEC-GeoHMS as a preprocessor to provide base information for the new hydrologic models. The hydrologic models will be fully geo-referenced for seamless incorporation into the City's GIS projection. A background map should be provided for the HEC-HMS basin model. Note that some watersheds may not need to develop the hydrologic models because reasonable accurate models may already be available.

The engineering firms shall use the latest USGS 24-hour design storm with NRCS type III distribution for the meteorological model setup.

The engineering firms shall use **all** the following return periods listed in Table 1 to develop the hydrologic and hydraulic models, water surface elevation profiles, and floodplain maps.

Table 1: Frequency Requirements for Modeling, Profiling and Floodplain Mapping

(F=required by FEMA) (A=required by Austin)		Land Use Conditions												
		Existing Conditions							Fully Developed Conditions					
Return Period =>		2	5	10	25	50	100	500	2	5	10	25	50	100
Models	Hydrology	A	A	F	A	F	F	F	A	A	A	A	A	A
	Hydraulics	A	A	F	A	F	F	F	A	A	A	A	A	A
Graphics	Profiles			F		F	F	F				A		A
	Maps						F	F				A		A

The engineering firms shall review the current effective hydrologic and hydraulic models, all Letters of Map Revision (LOMRs) approved after the current effective FIS study, as well as all

City approved Floodplain Development Variances. The engineering firms shall incorporate the latest updates and changes in the new study where appropriate.

The City shall provide a list of regional ponds and other selected large ponds to be modeled. All as-built drawings will be provided if available. The stage-storage-discharge (SSD) rating curve for these listed ponds shall be checked for their accuracy and reliability. If no rating curve is available, the latest LiDAR and additional new field surveys shall be used to develop new SSD curves.

Subbasin size for the headwater area and undeveloped lands should be set closely to 64 acres (0.1 sq. mi.). Subbasin size in developed areas or along the main stem of a creek at lower reaches shall not exceed one-third of a square mile without written approval from the City's project manager. Break points (junctions) may be set at certain locations requested by City's project manager. The new watershed boundary should match the updated neighboring watershed boundaries unless there is clear evidence not to do so.

The City recommends the use of SCS unit hydrograph for modeling excess rainfall and runoff transformation. Sheet flow occurs only if the land slope is fairly uniform, land surface cover (grassland, concrete pavement, etc.) is nearly uniform, and land slope value is appreciable. If one or more of these three conditions are not met, consider shorter-distance or no sheet flow in the time of concentration (T_c) estimation. Sheet flow length for natural or undeveloped, and fully-developed land-use conditions shall comply with the Drainage Criteria Manual and be determined by physical conditions.

The SCS curve number method is recommended for modeling rainfall losses. The modeling engineer should consult with the City's project manager if a different method is used. For the purposes of standardizing HEC-HMS hydrologic modeling process and simplifying the floodplain development review process, the City of Austin recommends that Curve Number (CN) (or a composite CN) be determined based on pervious areas of the land surface and hydrologic conditions at the time of a watershed-wide study for existing land use conditions. The CN values will be held constant once a hydrologic model is developed regardless of land use conditions. However, the time of concentration and impervious cover percentage values shall change for fully developed land use conditions.

The estimated impervious cover in percentage (IC%) shall truly represent either the existing land-use conditions for all FEMA studies or the fully-developed land-use conditions for City floodplain studies.

The City recommends that the TR-55 or TR-20 equations/curves be used for estimating the time of concentration for sheet flow, shallow concentrated flow and channel flow.

Areal reductions shall be applied for watersheds with a drainage area of 10 square miles or larger.

All models should be calibrated whenever reliable recorded/historical rainfall-runoff data are available, including historic storm events. Calibration procedure and objective function should be provided in the Technical Support Data Notebooks (TSDN) report. If no reliable recorded/historical rainfall-runoff data are available, the engineering firms should run checks

with other sources of data such as the local/regional regression equations and/or the USGS's frequency-based 100-year peak flow versus watershed drainage area curve for similar watersheds.

Task 4: Development of Hydraulic Models, Floodplain Maps and LOMR application

The engineering firms shall use City specified return periods in Table 1 to develop the hydraulic models, water surface elevation profiles, and floodplain maps.

The engineering firms will use the latest HEC-RAS model software to develop hydraulic models for both existing and fully-developed land-use conditions of the watershed to be studied. The engineering firms may use HEC-GeoRAS as a preprocessor to provide base information for the hydraulic modeling and floodplain mapping. The engineering firms shall fully annotate the model, including descriptive comments in all available fields, and clearly label the flood profiles with respect to return period. The engineering firms shall use FEMA's CHECK-RAS program to do an initial verification of the HEC-RAS models, and address the issues it finds or provide an explanation of why some requested correction is not needed. The hydraulic model will be fully geo-referenced for seamless incorporation into the City's GIS projection.

Peak flows yielded from junctions of a hydrologic model with proper areal reduction shall be properly specified using consistent rules at a HEC-RAS cross section. The peak flow value shall be the same in both HMS and RAS models for an easy checkup.

In HEC-RAS modeling, the engineering firms may use the default critical depth search method (the parabolic search method for a single root solution) during the model development. When a RAS model is essentially complete, the engineering firms should run the model using the secant (multiple roots) search method for a checkup. If the water surface elevation at any location changes dramatically between the two root-search methods, the engineering firms needs to check the cross section geometry and other model data to make sure the water surface profiles are properly modeled.

Ineffective flow areas should be identified and coded in the RAS model. Elevation settings and permanent/non-permanent status must be properly specified. The engineering firms should determine the ineffective flow areas based on physical conditions in an expanded area such as flow pattern, building distribution and shape, bridge/culvert orientation, creek bank location, topography, flow direction, etc. A fixed expansion or contraction ratio is not recommended.

The engineering firms shall produce water surface elevation profiles at similar (subject to FEMA Guidelines and Specifications) vertical and horizontal scale as the profiles in the effective FIS report for all selected flood frequencies using RAS-PLOT. The engineering firms will label cross sections, road crossings (including low chord and top of road data), culverts, tributaries, corporate limits, stream-floor elevations, and study limits.

If observed rainfall and flow data are available, models shall be calibrated with recorded stage levels, peak flows, and/or checked against known high water marks. If observed data is unavailable or non-usable, the engineering firms will plot the calculated peak flows versus contributing drainage area and compare the plot with other similar Texas watersheds, including

the USGS predicted flows (frequency-based) versus drainage area. Other comparisons are also recommended using regional/local regression flow equations.

Task 5: Quality Assurance and Quality Control Procedures

The engineering firms shall develop a quality control plan meeting or exceeding the requirements of FEMA for FEMA Digital Floodplain Insurance Rate Mapping projects and the City of Austin “Project Quality Assurance Plan”. The quality control plan shall include a multi-level independent review of the models, maps and all supportive data. Quality control review comments and responses shall be created in Word documents or pdf files and submitted to the City as part of the product delivery. All project materials presented to the City as draft or final products must be accompanied by QA/QC certification. Work on a task shall not proceed until the milestone event has been reviewed and all necessary revisions to the data are complete. The checklists shall be signed by the senior task leader, project manager, and the Principal, and are included in the appropriate TSDNs.

The engineering firms shall retain all applicable final work products generated and information gathered and used during the course of the project. This includes, but is not limited to, base data (such as City of Austin’s base terrain data) as well as intermediate work products (e.g. the fill grid used in the hydrologic preprocessor, draft reports, etc.). These items shall be transmitted to the City of Austin project manager by the end of the project.

Task 6: LOMR Application and Support

The engineering firms shall prepare a LOMR application package with complete supportive data as required by FEMA. Following the City of Austin’s staff review and approval, the engineering firms shall represent the City to submit the LOMR application to FEMA and provide the City one hard copy and one digital copy of the final LOMR application package.

The engineering firms shall respond to comments made by FEMA and the City on the LOMR application package. Based on the comments received, the engineering firms shall make necessary revisions to the LOMR package and address all comments and required information to ensure the successful issuance of the LOMR.

ADMINISTRATION OF PROPOSED CONTINUING SERVICES AGREEMENT(S)

Scheduling

The task authorizations of the anticipated agreements shall include schedules of performance by the engineering firms and payment milestones. Timely execution of work is an essential element of the anticipated agreements. Bi-monthly progress meetings will be held and the engineering firms will provide a project status update including, but not limited to, the work completed for the previous month, work anticipated for the next month, and critical issues requiring resolution for the project to remain on schedule. The engineering firms will provide a meeting summary including any action items.

Distribution of Work

The City anticipates contracting with the each of the selected two (2) firms for a period of approximately three (3) years or until the contracting authority is exhausted. Compensation for

individual project assignments will vary depending upon the scope of services required. Funding will come from the individual projects for which the services are provided. The City anticipates developing and executing a professional services agreement with each selected firm.

If an engineering firm ceases operations or is terminated during the contract period, the remaining assignments will be distributed to the remaining firm on the basis of the criteria mentioned above.

TOTAL PROJECT BUDGET:

The total maximum cumulative contract amount available for engineering services under the proposed professional services agreements is \$2,000,000. The City anticipates that this maximum contract amount will be assigned within three years. Assignments will be made under the two professional services agreements until the maximum cumulative contract amount is reached. It is anticipated that the engineering firms will be compensated under contracts for varying amounts depending on the rotating job assignment, with a total maximum funding of \$1,000,000 each.

POTENTIAL SUBCONSULTANT/VENDOR OPPORTUNITIES:

- * GIS Services
- * Surveying Services
- * Hydrologic and Hydraulic Modeling Services
- * Land Surveying
- * Surveying GPS
- Computer Assisted Design
- Printing, Copying/Reproduction
- * Subconsultant experience in these areas will be evaluated under "Subconsultant Firms' Comparable Project Experience".

SUBMITTAL INFORMATION:

Please see Attachments 1 through 4 consisting of:

Attachment 1	City of Austin Protest Procedures
Attachment 2	Affidavit of Responder
Attachment 3	Evaluation Criteria
Attachment 4	MBE/WBE Procurement Program