



**Professional Services Amendment
CITY OF AUSTIN
RECOMMENDATION FOR COUNCIL ACTION**

**AGENDA ITEM NO.: 17
AGENDA DATE: Thu 05/26/2005
PAGE: 1 of 3**

SUBJECT: Authorize negotiation and execution of an amendment to the professional services agreement with HDR ENGINEERING, INC., Austin, TX to provide additional professional engineering services for Phase B: Design and Bidding phase services for the Lower Fort Branch Creek Watershed Management Area, Reach 1 – Manor Road to Confluence with West Tributary as identified in the preliminary study in the amount of \$400,000 for a total contract amount not to exceed \$800,000.

AMOUNT & SOURCE OF FUNDING: Funding in the amount of \$400,000 is available in the Fiscal Year 2004-2005 Amended Capital Budget of the Watershed Protection and Development Review Department.

FISCAL NOTE: A fiscal note is attached.

REQUESTING Watershed Protection and Development
DEPARTMEN Review
T:

**DIRECTOR'S
AUTHORIZATION:** Joe Pantalion

FOR MORE INFORMATION CONTACT: John Routh, P.E. 974-3380; Morgan Byars, P.E. 974-3381; Jacqueline Ramos, 974-3371

PRIOR COUNCIL ACTION: Council approval of professional service agreement on December 31, 2001.

BOARD AND COMMISSION ACTION: N/A

PURCHASING: N/A

MBE / WBE: 12.68% MBE and 19.47% WBE subconsultant participation to date.

The City of Austin Watershed Protection and Development Review Department (WPDR) has completed the watershed specific preliminary phase of the project to address flooding, stream erosion and water quality problems in the Lower Fort Branch Creek Watershed Management Area. The preliminary phase identified the highest priority projects having the most severe flooding, erosion and water quality problems.

The emphasis of this phase of the project will be Design and Bidding Phase services for Reach 1 – Manor Road to Confluence with West Tributary as identified in the preliminary study using solutions that optimize benefits for each individual mission (flood, erosion, and water quality) while minimizing adverse impacts. The project solution will consider both instream (channel improvements) and upland (ponds, structure buyouts, etc.) techniques. The Fort Branch 1 Watershed Management Area (FOR-1 WMA) comprises approximately 4 linear miles of channel and 2 square miles of watershed. The total drainage area of the Fort Branch watershed is 3.8 square miles. A location map is attached.

This phase includes a 20% contingency to address potential impacts to the design due to the location of the project and the complexity of the soil conditions in the area.

The Fort Branch watershed is classified as "urban" by the City of Austin's water quality regulations. The watershed is atypical, however, for an urban watershed because of its relatively low level of development.



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PAGE: 2 of 3**

The WMA has an impervious cover of about 25% and still has about 30% of the land area classified as "undeveloped". The watershed area that contributes to the WMA has 50% impervious cover and is over 95% built out. The low level of development in the WMA has several implications for this project. One is that this reach can be expected to experience significant additional development, which will impact water quality (because water quality ponds may not be required in urban watersheds), channel erosion and possibly flooding. The second implication is that the remaining undeveloped land offers opportunities for the City of Austin to offset future impacts, especially if incorporated into an overall control strategy that includes all three missions.

AGREEMENT HISTORY

| ACTION | DESCRIPTION | AMOUNT |
|-----------------------------------|--|-------------------|
| 12/13/01 | Council authorization to negotiate and execute Professional Services Agreements for Preliminary Engineering Phase Services | |
| | Fort Branch Creek Water Management Area | \$ 400,000 |
| Proposed | Reach 1 - Manor Road to Confluence with the West Tributary | |
| Design and Bidding Phase Services | | \$ 333,119 |
| Contingency | | \$ 66,881 |
| | TOTAL: | \$ 800,000 |

Participation goals stated in the solicitation were 1.10% African American, 5.90% Hispanic, 1.70% Native/Asian American and 18.20% WBE. Participation for this amendment:

| | | |
|---|------------------|---------------|
| NON M/WBE TOTAL - PRIME | \$268,930 | 80.73% |
| HDR Engineering, Inc., Austin, TX | \$268,930 | 80.73% |
| MBE TOTAL - SUBCONSULTANTS | \$29,758 | 8.93% |
| MB SUBTOTAL | \$29,758 | 8.93% |
| HVJ Associates, Inc., Austin, TX (geotechnical services) | \$29,758 | 8.93% |



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PAGE: 3 of 3**

WBE TOTAL – SUBCONSULTANTS \$34,431 10.34%

(FR) Landmark Surveying, Inc., Austin, TX (land surveying & mapping) \$28,371 8.52%

(FR) Glenrose Engineering, Austin, TX (environmental engineering & planning) \$6,060 1.82%

NON M/WBE TOTAL – SUBCONSULTANTS \$0.00 0.0%

**Overall subconsultant participation in this project including the subject proposed additional services is:
4.63% African American, 4.74% Hispanic, 3.31% Native American, 19.47% WBE and .29% Non
M/WBE subconsultant participation.**

CIP BUDGET FISCAL NOTE

DATE OF COUNCIL CONSIDERATION:

19-May-05

WHERE ON AGENDA:

DEPARTMENT:

Watershed Protection & Development Review

Description: Authorize negotiation and execution of an amendment to the professional services agreement with HDR Engineering Inc., 4401 West Gate Blvd., Suite 400, Austin, TX 78745, to provide additional professional engineering services for Phase B: Design and Bidding phase services for the Lower Fort Branch Creek Watershed Management Area: Reach 1 – Manor Road to Confluence with West Tributary as identified in the preliminary study in the amount of for a total contract amount not to exceed \$400,000.

FINANCIAL INFORMATION:

| | |
|------------------------|-------------------------------------|
| Project Name: | Fort Branch Design & Implementation |
| Project Authorization: | 2004-2005 Amended Capital Budget |
| Funding Source: | Drainage Utility Fund |
| Fund/Agency/Orgn: | 4850-617-2015 |

| | |
|-----------------------------|--------------------------|
| Total Current Appropriation | \$406,262.00 |
| Unencumbered Balance | \$406,262.00 |
| Amount of this Action | <u>(\$400,000.00)</u> |
| Remaining Balance | <u><u>\$6,262.00</u></u> |

Financial Approval: [Signature] Date: 05/16/05

PROFESSIONAL SERVICES AGREEMENT

STATE OF TEXAS §
 §
 §
COUNTY OF TRAVIS §

THIS AGREEMENT, is made and entered into this day by and between the CITY OF AUSTIN, a Municipal Corporation, organized and existing under the laws of the State of Texas, acting by and through its City Manager, hereunto duly authorized, and hereinafter referred to as the OWNER, and HDR ENGINEERING, INC. of Austin, Texas and other locations and hereinafter referred to as the ENGINEER.

WITNESSETH: that whereas the OWNER, through its Watershed Protection & Development Review Department, has completed a Master Plan to address flooding, stream erosion and water quality problems in seventeen central Austin watersheds; and

WHEREAS, the lower portion of the Fort Branch watershed was identified as having some of the most severe flooding, erosion and water quality problems in the OWNER'S urban core while being among the least developed urban watersheds and was selected by the OWNER as the first Watershed Management Area for which integrated solutions are to be developed (integrated solutions being those optimizing benefits for each of the OWNER'S individual missions (flood, erosion, and water quality) while minimizing adverse impacts); and

WHEREAS, as a result of such studies and determination the OWNER has developed the LOWER FORT BRANCH CREEK WATERSHED MANAGEMENT AREA PROJECT, C.I.P. Project No. 4850-617-2006, hereinafter referred to as the PROJECT, encompassing the area shown in Attachment 1, and

WHEREAS, the OWNER requires the development of a PROJECT plan to consider the existing and projected flooding, water quality and erosion

problems of the study area, to evaluate alternate integrated solutions, and to develop and recommend PROJECT improvements; and

WHEREAS, the OWNER requires professional engineering and associated services to conduct the PROJECT studies, evaluations, recommendations, and design; and

WHEREAS, the OWNER has not fully determined the activities necessary to implement and conduct the PROJECT, but believes the necessary services and activities may include: collection and review of data pertinent to the PROJECT; review and documentation of existing or suspected areas of water quality concern, flooding, streambank erosion, general drainage problems, etc; review and evaluation of currently proposed improvements; identification of feasible PROJECT alternatives, preparation of cost estimates for PROJECT alternatives, development of PROJECT recommendations, development of PROJECT construction documents, associated coordination and management of the production of PROJECT deliverables; and PROJECT construction management services to the OWNER; and

WHEREAS, the ENGINEER, having professional and technical employees versed in fields of endeavor appropriate for the conduct of the PROJECT including employees duly licensed and registered to practice engineering in the State of Texas, has the professional abilities and expertise to undertake studies, evaluations, determinations, and analyses to counsel the OWNER in the selection and analysis of PROJECT alternatives; to provide cost estimates, technical opinions and recommendations; and upon conclusion of the ENGINEER'S studies and analyses to develop a final PROJECT report; and upon further authorizations to design PROJECT improvements and provide construction management services to the OWNER for the implementation of the PROJECT improvements; and

WHEREAS, the ENGINEER is willing to provide professional engineering and related services for the PROJECT in accord with the provisions and terms of the AGREEMENT; and

NOW THEREFORE, the OWNER and the ENGINEER, in consideration of their mutual covenants herein, agree in respect to the performance of the professional services to be furnished or rendered by the ENGINEER and to the payment for these services by the OWNER, as set forth above and hereinafter.

SECTION I
EMPLOYMENT OF THE ENGINEER
AND PERFORMANCE OF SERVICES

A. GENERAL

The OWNER agrees to employ the ENGINEER and the ENGINEER agrees to perform the professional engineering, management, cost estimating, environmental planning, and associated services as stated in the Sections to follow; and, in rendering such services, the OWNER agrees to compensate the ENGINEER as stated in the Sections to follow. ENGINEER shall report to OWNER'S designated PROJECT Manager (see Section IV also).

B. PERFORMANCE OF SERVICES

The ENGINEER'S employees and the ENGINEER'S associated subconsultants to be utilized in the performance of the PROJECT professional services (as described in Section II following) are identified in Attachment 2. The persons identified as PROJECT Manager and the subconsultants shown in Attachment 2 shall not be changed except with the OWNER'S prior written acknowledgment and concurrence, which shall not be unreasonably withheld. In the event that the ENGINEER proposes the termination of an identified "Minority Business Enterprise" (MBE) or a "Women Business Enterprise" (WBE) certified subconsultant firm from its employ on this PROJECT, the ENGINEER shall substitute a subconsultant firm of like certification. If the ENGINEER is unable to substitute a subconsultant firm of like certification, the ENGINEER shall provide OWNER with documentation of their efforts to acquire the services of a MBE/WBE replacement firm. The OWNER'S MBE/WBE certifications shall solely apply to this AGREEMENT.

C. GEOTECHNICAL LABORATORY SERVICES

If geotechnical laboratory services are provided for the PROJECT through this AGREEMENT, either by the ENGINEER or its subconsultant(s), these services shall be performed by a laboratory accredited, in soils or geotechnical testing as appropriate, by the American Association of Laboratory Accreditation or by the American Association of State Highway and Transportation Officials. The ENGINEER agrees to provide evidence to the OWNER of such accreditation on an annual basis for the duration of this AGREEMENT.

SECTION II

BASIC PROJECT SERVICES OF THE ENGINEER

The ENGINEER shall serve as the OWNER'S professional consultant in those phases of the PROJECT to which this AGREEMENT applies; and, will give consultation and advice to the OWNER during the performance of their services.

The ENGINEER shall perform and provide the PROJECT preliminary engineering phase services as described in Attachments 3, 4 and 5 and as generally described in Paragraph A below. The ENGINEER shall provide services only following receipt of OWNER'S written authorization to begin.

A. Phase A: Preliminary Engineering

The ENGINEER shall:

1. Attend preliminary conferences with OWNER and other interested or involved agencies regarding the alternatives for the PROJECT. Report progress of this phase to the OWNER relative to approved schedule at intervals not exceeding fourteen days.
2. Review existing plans, maps, records and maintenance reports, and other available information pertinent to the development of the PROJECT. Advise OWNER of additional investigations or any tests, which, in the opinion of the ENGINEER, may be required for the proper execution of Phase A of the PROJECT.
3. Prepare, conduct and document studies, analyses and reports of the PROJECT alternatives in sufficient detail to clearly indicate the problems involved and reasonable solutions available to the OWNER. Such studies, analyses and reports may include but, are not necessarily limited to: preliminary layouts; maps; exhibits; sketches; construction materials and methods evaluations; schedules; utility coordination plans; design criteria; environmental reviews; land-use studies; analysis of costs; hydrologic and hydraulic modeling to identify 500, 100, 50, 25, 10, and 2-year recurrence water surface profiles; identification of required permits and approvals; and other investigations pertinent to the evaluation of the PROJECT alternatives.

4. Prepare preliminary PROJECT schedules and cost estimates of the probable PROJECT construction costs including the consideration of opportunities for and cost-effectiveness of phasing of construction for all alternative solutions. The ENGINEER'S opinion of construction costs (referred to as the Maximum Approved PROJECT Construction Cost after OWNER'S approval of the Phase A Report) shall be based on materials, equipment, and labor costs prevailing at the time of the preparation of the preliminary report without consideration of inflationary increases in costs, and shall be indexed to the *Engineering News Record* (ENR) Construction Cost Index prevailing at the time of the preparation of the preliminary report. The ENGINEER shall apply reasonable consideration and knowledge to the preliminary cost estimate development.
5. Conduct preliminary field surveys and determine site constraints and special permitting requirements.
6. Prepare an environmental report for the recommended PROJECT alternatives with consideration given to air, noise, and water quality, historical features, vegetation (including trees protected under City ordinance), and endangered species.
7. Prepare a geotechnical report for the recommended PROJECT alternatives which includes but may not be limited to: delineating geological sensitive areas, soils formation, and information necessary to estimate cost of contractor's trench safety provisions.
8. Evaluate PROJECT easement requirements, both permanent and temporary construction.
9. Evaluate alternative materials and construction methods
10. Prepare recommendations for the number of PROJECT construction contracts to be bid.
11. The ENGINEER shall, upon conclusion of their reviews, investigations, and preliminary evaluations, prepare, present and publish details and summarization of their findings, cost estimates, alternate considered, recommendations for construction and a design and construction schedule for the recommended PROJECT in a Preliminary Engineering and Environmental Investigations Report. The ENGINEER shall provide 15

copies of the draft report and 20 copies of the final report addressing the OWNER'S comments

Phase B: Design and Bidding Documents Preparation

If authorized, the ENGINEER shall:

1. Obtain written authorization from OWNER prior to proceeding with this next (Design) phase of work.
2. Attend and/or arrange for conferences, at periodic intervals not to exceed fourteen (14) days, with the OWNER for the purposes of explaining completed design activities and review of schedule for completing of remaining activities.
3. Conduct or otherwise acquire, upon receipt of OWNER'S written authorization, the necessary field surveys, soils, additional analysis and peripheral investigations that, in the opinion of the ENGINEER, may be required for the proper execution of the design of the PROJECT
4. Provide for geotechnical testing and interpretation as may be required. Locate and provide for geotechnical test boring sites, if such borings are required, and review the results of such tests.
5. Provide for field surveys, which may include photogrammetry, and perform related office computations and drafting for the purpose of collecting information required for design. Such surveys shall include horizontal and vertical control adequately documented on the final plans. Field surveys shall also include the staking and referencing of PT's, PC's, PT's, POT's and BM's necessary to establish the PROJECT construction in the field. Horizontal control for facilities shall be on the Texas State Grid Coordinate System carried to second-order accuracy to permit actual construction staking to third order accuracy. The vertical control shall be based on National Geodetic Survey or established using GPS technology. BM's shall be established not more than 1000 feet apart at an accuracy of 0.01 feet. Visible topographic features shall be tied to the PROJECT centerlines(s) and shall include, but not necessarily to limited to, existing property or lease lines, property or lease corners, utilities and appurtenance, roadways, structure, railroad structures, trees over eight inches in diameter, and other features within the limits of construction and 25 feet beyond. PROJECT control must be complete and staked in the field at the time of

advertisement for bid so that construction staking can be accomplished immediately thereafter.

- 6 Design PROJECT and prepare detailed specifications (utilizing the OWNER'S standards) and prepare PROJECT construction contract drawings, at approved horizontal and vertical scales in electronic format and in ink on mylar 24" x 36" drafting film for construction authorized by the OWNER. The ENGINEER shall incorporate into the design, as appropriate, the standards and guidelines of the Federal and State of Texas government for the construction of barrier-free facilities. The drawings shall, at minimum, conform to examples available from the OWNER and shall include plan views, sections and details clearly defining and describing the intent of the improvements, limits of work and storage areas, sequencing requirements, access routes, environmental-protection requirements, and contractor staging and storage areas.
7. Prepare cost estimates of authorized PROJECT construction. If such estimated cost exceeds the Maximum Approved PROJECT Construction Cost as established herein as adjusted and/or as approved by the OWNER during or subsequent to PROJECT Phase A (as adjusted to reflect the then current ENR construction cost index) the ENGINEER shall consult with the OWNER so that revision can be made to the PROJECT scope to reduce the PROJECT cost as required to stay within approved or authorized cost limitations. The ENGINEER shall then make such revision to the PROJECT construction documents at no additional cost to the OWNER; provided however that such revisions are the result of information, which was reasonably available to the ENGINEER at the time of preparation of the Maximum Approved PROJECT Construction Cost.
- 8 Provide OWNER ten copies of draft Bidding Documents (consisting of plans, details and the PROJECT Manual), one set of final design criteria and calculations of principal elements of final design, and electronic copy of hydrologic and hydraulic PROJECT models. The copies of the draft PROJECT plans provided to the OWNER shall be one-half size.
9. Assist OWNER in obtaining any required Site Development Permit, Building Permit, and other required regulating agency permits/approvals.

10. Obtain OWNER'S approval of the PROJECT bidding documents and provide for duplication of thirty-five (35) sets of final PROJECT bidding documents for distribution to contractors. ENGINEER shall also provide five (5) half size sets, and one electronic version in AutoCAD 12 DWG format, or other format acceptable to OWNER, of the PROJECT Construction drawings.
11. For PROJECTS that include improvements or modifications to facilities or resources owned by the OWNER'S Water and Wastewater Utility: The ENGINEER shall complete the appropriate OWNER'S Asset Retirement Request Form(s) to document all OWNER'S Water and Wastewater Utility assets (including equipment, computers, pipeline and pipeline appurtenances, etc.) that will be removed, abandoned or retired from service as part of implementation of the PROJECT and to provide certain information regarding the replacement assets put into service as a result of the PROJECT. If applicable, ENGINEER shall also provide a list of all new taggable assets to be installed or delivered as part of the PROJECT. These form(s) and information shall be provided to OWNER prior to the bidding of the construction contract. A taggable asset is defined as a single asset costing at least \$1,000 which can operate independently (i.e., is not an in-line component) and which could be removed for use at another location with relative ease.
12. Assist the OWNER in the advertisement of the PROJECT for construction bids and receive bidding-document deposits (reflective of actual reproduction costs per set) and distribute bidding documents. Bidding document deposit check shall be payable to the OWNER and those deposits not returned to bidders shall be given to the OWNER.
13. Attend and conduct pre-bid conference to provide clarification and interpretation of the PROJECT bid documents to bidders.
14. Prepare and issue all addenda required to clarify the PROJECT bid documents.
15. Maintain a record of bidding document issuance and receipt of same.
16. Attend the OWNER'S opening of PROJECT bids, review bids and furnish to the OWNER a recommendation regarding the award of the contract(s), within five (5) working days following bid opening. Should the as-bid

not to award the PROJECT (or component thereof) construction contract, the ENGINEER shall consult with the OWNER to determine revisions to the PROJECT to reduce the PROJECT cost as required to stay within approved or authorized cost limitations. The ENGINEER shall then make such revision to the PROJECT construction documents at no additional cost to the OWNER.

C. Phase C: Construction Management

If authorized, the ENGINEER shall:

1. Make periodic visits to the PROJECT site to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the PROJECT Manual and drawings. It is the intent of the ENGINEER and the OWNER that these services are to be provided by the ENGINEER'S design professionals.
2. Consult with and advise the OWNER; issue/transmit instructions to the contractor and answer contractor's questions in order to implement the PROJECT Manual and drawings and prepare routine change orders as required.
3. Review: samples, catalog data, schedules, shop drawings, laboratory, quarry, shop and mill tests of material and equipment; and other data which the contractor is required to submit for conformance with the design concept of the PROJECT and compliance with the PROJECT Manual and drawings and assemble written guarantees which are required by the PROJECT Manual and drawings. Submit copies of all equipment and machinery drawings and other contractor submittals to OWNER.
4. Review monthly estimates for payments to contractor and furnish the OWNER with recommendations regarding payment.
5. Submit (in a series of hardback binders) four (4) complete sets of operational and maintenance manuals, as prepared by the various manufacturers and submitted by the contractor, including part diagrams, part drawings and part lists together with recommended spare parts lists.

for each unit of equipment or machinery which may be included in the PROJECT.

6. Upon receipt of notification by the contractor that the work has been completed, the ENGINEER shall conduct an inspection, performed by appropriate members of the ENGINEER'S staff. As a result of this inspection, the ENGINEER shall prepare a list of the items needing correction. After the contractor has performed the required corrections, the ENGINEER shall notify the OWNER in writing that the contract has been substantially performed according to the PROJECT Manual and drawings and is ready for final inspection by the OWNER and ENGINEER. The ENGINEER shall accompany the OWNER on the final inspection to assure that the total work has been completed in substantial accordance with the PROJECT Manual and drawings. ENGINEER shall review and tabulate all warranties, guarantees, bonds, equipment-operating instructions and similar required materials and documents to make sure that all such materials and documents are received and that they substantially meet the requirements of the PROJECT Manual and drawings, after which they shall be transmitted to the OWNER or his designed representative(s). After determining that all requirements of the PROJECT Manual and drawings have been substantially met, the ENGINEER shall so certify and shall recommend approval of the contractor's final application for payment.
7. Receive from the contractor(s) as-built documents reflecting field changes to the bid documents. The ENGINEER will review documents to ascertain to the best of his knowledge and belief that the reflected field changes are complete and correct.
8. Compile contractors', Resident PROJECT Representative's, and ENGINEER'S records and submit such compilation to the OWNER.
9. Prepare PROJECT record drawings of construction, incorporating all compiled change orders and field changes from the bid documents. A professional engineer's seal shall be affixed and signed on each document, signifying the recorded changes have been transferred.
 - a. Drawings shall be prepared in electronic format and on 24" x 36" mylar drafting film.

- b. Drawings shall be accurate in scale and dimensions and shall reflect the final, as-constructed condition of the PROJECT.
 - c. For PROJECTS that include improvements or modifications to OWNER'S water and/or wastewater systems or facilities, drawings shall include all dimensions and calculations in English units.
10. Submit electronic file on CD-ROM, or 1.4-MB computer diskettes with OWNER'S approval, one (1) set of mylar and two (2) sets of one-half size print PROJECT record drawings to OWNER. Copies of PROJECT record drawings that may be relied upon by the OWNER are limited to the printed copies ("hard" copies) that are signed and sealed by the ENGINEER. Record drawings on electronic files that are furnished by the ENGINEER to the OWNER are only for the convenience of the OWNER.
 11. For PROJECTS that include improvements or modifications to facilities or resources owned by the OWNER'S Water and Wastewater Utility: The ENGINEER shall provide to OWNER updated OWNER'S Asset Retirement Request Form(s) based on PROJECT as-built drawings. For PROJECTS involving new taggable assets, the ENGINEER shall also provide to OWNER an updated list of new assets installed or delivered as part of the PROJECT. These form(s) and information shall be provided to OWNER at the time of the as-built submittal.
 12. Assist the OWNER in obtaining revision of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps by updating and finalizing the hydrologic and/or hydraulic models to reflect changes to the subject PROJECT floodplain resulting from the PROJECT improvements and mapping the resulting floodplain limits for the 500, 100, 50, 25, 10 and 2-year recurrence water surface profiles. Prepare FEMA Letter of Map Revision and supporting information.

SECTION III ADDITIONAL SERVICES OF THE ENGINEER

If authorized in writing by the OWNER, the ENGINEER will furnish or obtain from others Additional Services of the following types, which are not considered normal or customary Basic Services under this AGREEMENT; these will be paid for by the OWNER as indicated in Section V.

- A. Appearances before regulatory agencies or other public meetings other than those provided as a Basic PROJECT Service.
- B. Resident PROJECT representative services
- C. Assistance to the OWNER in litigation arising from or associated with the planning, design, or implementation of the PROJECT.
- D. Special investigations, including Environmental Impact Studies, involving detailed consideration of operation, maintenance and overhead expenses; preparation of rate schedules; earnings and expense statements; special feasibility studies; appraisals; evaluations; and material audits or inventories required for certifications of force account construction performed by the OWNER
- E. Detailed mill, shop and/or laboratory inspection of materials and/or equipment.
- F. Revision of PROJECT deliverables requested by OWNER after OWNER'S written approval of same unless such revision is required for the correction of ENGINEER'S work products containing errors/omissions or other faults.
- G. Copies of PROJECT documents in excess of number provided as a Basic PROJECT service.

SECTION IV THE OWNER'S RESPONSIBILITIES

The OWNER will:

- A. Provide full information as to their requirements for the PROJECT
- B. Designate the OWNER'S PROJECT Manager.
- C. Assist ENGINEER by placing at their disposal available reports and other data relevant to the development of the PROJECT, all of which information the

ENGINEER may reasonably rely upon in the performance of their services under this AGREEMENT.

- D. Furnish ENGINEER with available property, boundary, easement, right-of-way, topographic and utility surveys; zoning and deed restrictions; and other special data or conditions not addressed in Section II; all of which information the ENGINEER may reasonably rely upon in the performance of their services under this AGREEMENT
- E. Assist ENGINEER in gaining entry to public and private property as may be required by the ENGINEER in the performance of their services under this AGREEMENT.
- F. Examine all studies, reports, sketches, estimates, drawings, proposals and other documents presented by the ENGINEER and render decisions pertaining thereto within a reasonable time so as not to unreasonably delay the services of the ENGINEER.
- G. Provide such legal, accounting and insurance counseling services as may be required for the PROJECT, such auditing services as the OWNER may require to ascertain how or for what purpose any contractor has used the monies paid to the contractor under a construction contract.
- H. Give prompt written notice to the ENGINEER whenever the OWNER observes or otherwise becomes aware of any defect in the PROJECT.
- I. Furnish, or direct ENGINEER (by way of written Supplemental Amendment to this AGREEMENT (see Section V) to provide necessary Additional Services as stipulated in Section III of this AGREEMENT or other services as may be required by the OWNER.
- J. Bear all costs incident to compliance with the requirements of this Section.

SECTION V PAYMENTS TO THE ENGINEER

OWNER agrees to pay the ENGINEER as full compensation for the professional engineering and associated services herein contracted for as follows:

A. Phase A: Preliminary Engineering

For and in consideration of the PROJECT Phase A: Preliminary Engineering services to be provided as described in Section II.A., the ENGINEER shall receive

compensation on a cost-plus-fixed fee basis with a maximum not-to-exceed contract amount. For and in consideration of the PROJECT Phase A: Preliminary Engineering services to be provided, the ENGINEER shall be paid a maximum not-to-exceed contract amount of Three Hundred Ninety-Six Thousand Eighty-Two and no hundredths Dollars (\$396,082.00) which consists of a fixed fee of Twenty-Seven Thousand Six Hundred and Forty One and no hundredths Dollars (\$27,641.00) and a maximum cost of Three Hundred Sixty Eight Thousand Four Hundred Forty One and no hundredths Dollars (\$368,441.00) as more fully described in Attachment 4. Costs are as defined in Paragraph D below and are subject to the audit provisions of Section XI.

B. PROJECT Phase B: Design and Bidding Documents Preparation and Phase C: Construction Management

For and in consideration of authorized PROJECT Phases B and C services as described in Section II, and as may be required, the ENGINEER shall receive compensation on a cost-plus-fixed-fee with maximum contract amount basis as shall be determined when and if such services are required by the OWNER. The maximum allowable compensation for these services or portions thereof, if required by the OWNER, shall be determined subsequent to the conclusion of the PROJECT Phase A, and made part of this AGREEMENT as Supplemental Amendment(s) hereto

C. ADDITIONAL SERVICES

1. Additional services as provided under Section III of this AGREEMENT may be provided or performed by the ENGINEER as determined to be required and when authorized in writing by the OWNER.
2. Additional services shall be performed on a cost-plus-fixed-fee with maximum contract amount or lump sum basis.
3. Upon request by the OWNER for such additional services, the ENGINEER shall prepare and submit to the OWNER, for approval and authorization, a cost-plus-fixed-fee with maximum contract amount proposal (as appropriate) for the Additional Services requested. The ENGINEER shall proceed with such authorized Additional Services only upon receipt of written authorization

D. REIMBURSABLE COSTS:

administrative overhead. Actual Direct Salaries shall be defined as the actual wages paid to the PROJECT manager, planners, engineers, technicians, other professionals, clerks, etc., for the time directly chargeable to the PROJECT. Representative "Actual Direct Salaries" for the anticipated categories of employees is as indicated in Attachment 4. The direct employee benefits and general and administrative rate as described above and in Attachment 5 shall be provisional, intended for interim billing purposes pending ENGINEER'S submission of and OWNER'S and ENGINEER'S agreement on final audited and approved fiscal year multipliers for the periods of this AGREEMENT. ENGINEER agrees to and shall submit to OWNER the results of audits of their firm's direct employee and general and administrative rate, which may be conducted by auditors internal or external to the firm during the periods of this AGREEMENT. Notwithstanding the above, the maximum amount(s) established under this AGREEMENT and any Supplemental Amendments thereto shall not be exceeded regardless of audit results which may indicate a direct employee benefit and general and administrative rate greater than that shown above.

2. Direct Non-Salary Expenses: "Direct Non-Salary Expenses" shall be paid at the actual invoice cost and shall include but not necessarily be limited to, the following:
 - a. Reasonable living and traveling expenses of professional and technical personnel when away from the cities in which they are permanently assigned and when conducting authorized business directly connected with the PROJECT. OWNER shall not reimburse the cost of first-class airline fares in excess of coach fares.
 - b. Identifiable communication expenses such as long-distance telephone, facsimile, express charges and postage.
 - c. Identifiable reproduction costs applicable to the PROJECT such as photocopying, printing, etc.
 - d. Disbursements made by the ENGINEER under approved subcontracts.

- e. Rental or fair charges for the use of special equipment, tools and electronic data processing equipment required in connection with ENGINEER'S services for the PROJECT

FIXED FEE (PROFIT)

For the purposes of costing Additional Services, fixed fee (profit) shall be calculated as:

$$\text{Fixed Fee} = 0.15 (\text{Direct Labor Cost}) + 0.09 (\text{Direct Employee Benefits and General/Administrative Costs}) + 0.05 (\text{Subconsultant Costs})$$

Fixed fee shall be calculated prior to the OWNER'S authorization of Additional PROJECT Services and shall not be reconsidered.

METHOD OF PAYMENT

1. Payments on account of the ENGINEER'S basic services shall be made monthly, in proportion to services performed, so that compensation at the completion of certain tasks of each PROJECT assignment shall not exceed the following percentages of the total maximum not-to-exceed contract amount for PROJECT assignment preliminary engineering, design and construction phase services.

| <u>Event</u> | <u>Maximum Payment</u> |
|---|---|
| a. Submittal of Draft PROJECT Preliminary Report | 80% of the maximum contract amount for PROJECT Phase A: Preliminary Engineering Services. |
| b. Submittal and Approval of Final PROJECT Preliminary Report | 100% of the maximum contract amount for PROJECT Phase A: Preliminary Engineering Services |
| c. Design Phase B: Submittal of draft PROJECT Construction Documents to OWNER | 85% of the maximum contract amount for Phase B: Design Services |
| d. Design Phase B: Submittal and OWNER'S approval of PROJECT Construction Documents | 95% of the maximum contract amount for Phase B: Design Services |
| e. Design Phase B: Award of Construction Contract | 100% of the maximum contract amount for Phase B: Design Services |

2. If the OWNER does not award a contract within one year of OWNER'S approval of completed plans and specifications, the ENGINEER shall be

paid an amount not-to-exceed 100% of the maximum not-to-exceed contract amount established for Design Phase B services.

3. For OWNER authorized PROJECT Construction Phase services and for Additional Services as described above or for extra work required, approved and contracted for by the OWNER, shall be made monthly as the work is performed and billed such that the maximum contract amount(s) are not exceeded
4. For all services rendered, payment is due within thirty (30) days after receipt of billing. Billing shall include documentation of cost of services rendered during the previous month. If payment of the amounts due, or any portion thereof, is not made as described above, interest on the unpaid balance thereof will accrue at the lesser rate of 6 percent per annum (0.5 percent per month) or the maximum lawful rate under Section 271.005 (c) of the Texas Local Government Code until such payment is made, unless delay in payment is due to improper, contested or inadequate billing procedures followed by the ENGINEER.
5. Notice is hereby given of Article VIII, Section 9 of the Austin City Charter, which prohibits the payment of any money to any person, firm, or corporation who is in arrears to the City of Austin for taxes.
6. Invoice amounts in excess of approved maximum not-to-exceed contract amount(s) incurred prior to OWNER'S written consent shall be at ENGINEER'S risk and OWNER is not obligated to pay such billings or expenses. ENGINEER shall closely monitor the amount of their work and notify OWNER within five (5) working days of when expenditures for such work reach eighty (80) percent of approved maximum not-to-exceed contract amount(s). Nothing herein shall be construed to require the OWNER to increase the approved maximum not-to-exceed contract amount(s) established under this AGREEMENT
7. For all services rendered, ENGINEER'S payment to subconsultants is due within ten calendar days after receipt of payment from the OWNER and, when appropriate, OWNER shall issue joint checks to the ENGINEER and subconsultants
8. Cost of services furnished by subcontractors or subconsultants on Federally-funded projects shall be reimbursed at invoice amount

SECTION VI TERMINATION

A. FOR CONVENIENCE

The OWNER shall have the right to terminate this AGREEMENT, in whole or part, at the OWNER'S convenience at any time after ten days written notice to the ENGINEER. Upon receipt of a notice of termination, ENGINEER shall promptly cease all further work on the PROJECT or on any PROJECT assignment, with such exceptions, if any, specified in the notice of termination. OWNER shall pay the ENGINEER for services rendered and obligations incurred to the effective date and time of termination. At or prior to submitting its final invoice, the ENGINEER shall deliver to the OWNER all designs, drawings, specifications, reports, documents, computer models, and other work products and documents prepared to that point. Fixed-fee payment to the ENGINEER shall be proportional to services performed to the date of termination.

B. FOR CAUSE

In the event the ENGINEER should fail to faithfully, fully and timely perform its services under this AGREEMENT, then, in addition to any other rights and privileges of OWNER hereunder or at law in equity, OWNER may immediately terminate this AGREEMENT upon written notice to the ENGINEER. Upon receipt of a notice of termination for cause, ENGINEER shall promptly cease all further work on the PROJECT. OWNER shall pay the ENGINEER for all services satisfactorily rendered and obligations properly incurred prior to the date and time of termination in accordance with the terms hereof and for any items ordered prior to termination which are not subject to cancellation with supplier, less any amounts necessary to compensate OWNER for damages incurred as a result of ENGINEER'S breach; provided ENGINEER shall first deliver to OWNER all designs, drawings, specifications, reports, documents, computer models, and work prepared up to the date of termination.

SECTION VII SUCCESSOR AND ASSIGNS

OWNER and ENGINEER each binds itself, its partners, successors, executors, administrators, and assigns to the other party of the AGREEMENT in respect to all covenants of this AGREEMENT. Neither OWNER nor ENGINEER shall assign, sublet or transfer its interest in this AGREEMENT without the written consent of the other.

SECTION VIII OWNERSHIP AND USE OF DOCUMENTS

The ENGINEER agrees that items such as plans, drawings, photos, designs, studies, specifications, data, computer programs, schedules, technical reports, or other work products which is/are specified to be delivered under this AGREEMENT, and which is/are to be paid for by the OWNER, is/are subject to the rights of the OWNER in effect on the date of execution of this AGREEMENT. These rights include the right to use, duplicate and disclose such items, in whole or in part, in any manner and for whatever purpose; and, to have others do so. If an item produced by the ENGINEER is copyrightable, the ENGINEER may copyright it, subject to the rights of the OWNER. The OWNER reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish, modify and use such items and to authorize others to do so. The ENGINEER shall include in its subconsultant contracts appropriate provisions to achieve the purpose of this Section VIII.

All such items furnished by the ENGINEER pursuant to this AGREEMENT are considered instruments of its services in respect to the PROJECT. It is understood that the ENGINEER does not represent such items to be suitable for reuse on any other project or for any other purpose(s). If the OWNER reuses such items without the ENGINEER'S specific written verification or adaptation, such reuse will be at the risk of the OWNER, without liability to the ENGINEER. Any such verification or adaptation requested by the OWNER may entitle the ENGINEER to further compensation at an amount agreed upon between the OWNER and the ENGINEER.

SECTION IX

ENGINEER'S RESPONSIBILITY AND LIABILITY

Acceptance and approval of the final PROJECT Report or other documents or computer programs by the OWNER shall not constitute nor be deemed a release of the responsibilities and liability of the ENGINEER for the accuracy and competency of the ENGINEER'S work products, computer programs, or other documents, and services prepared/performed under this AGREEMENT. No approvals or acceptances by or in behalf of the OWNER shall be deemed to be an assumption of such responsibility by the OWNER for any defect, error or omission in said work products, computer programs or other documents and services as prepared/performed by the ENGINEER.

The ENGINEER further agrees to correct programs or documents or re-execute services as may be required due to the ENGINEER'S development of programs or documents which are found to be in error or contain defects or omissions at no additional costs to the OWNER.

Redesigns required or occasioned for the convenience of the OWNER shall be paid for as provided and prescribed hereinbefore under Additional Services of the ENGINEER.

The ENGINEER does not guarantee the performance of the construction contractor. The ENGINEER shall inform the OWNER of the construction contractor's failure to perform their work in accordance with the construction contract and current approved schedule and shall recommend to the OWNER measures to correct such failures.

It is distinctly understood and agreed that no claim for extra work completed or materials furnished by the ENGINEER will be allowed by the OWNER except as provided herein, nor shall the ENGINEER perform any work or furnish any materials unless such work is first requested and authorized in writing by the OWNER. Any such work or materials furnished by the ENGINEER without such written OWNER request and authorization first being given shall be at the ENGINEER'S own risk, cost, and expense and the ENGINEER hereby agrees and covenants that without such written order, ENGINEER will make no claim for compensation for such work or materials furnished.

SECTION X
PERIOD OF SERVICE

- A. ENGINEER contracts and agrees to commence work provided for herein within five calendar days from the date of written authorization to proceed and to provide their PROJECT Phase A services on the schedule shown as Attachment 6
- B. This AGREEMENT shall remain in force for a period required for the completion of the PROJECT including required extensions thereto unless discontinued by any of the several provisions included elsewhere in this AGREEMENT.

SECTION XI
MAINTENANCE OF AND RIGHT OF ACCESS TO RECORDS

The ENGINEER agrees to maintain appropriate accounting records of costs, expenses and payrolls of employees working on the PROJECT together with documentation and evaluations and study results, for a period of five years after final payment for completed services and all other pending matters concerning this AGREEMENT have been closed. The ENGINEER further agrees that the OWNER, or their duly authorized representative(s), shall have access to any and all books, documents, papers and records of the ENGINEER which are directly pertinent to the services to be performed under this AGREEMENT for the purposes of making audit, examination, excerpts and transcriptions.

SECTION XII
VENUE

VENUE AND JURISDICTION OF ANY SUIT, RIGHT OR CAUSE OF ACTION ARISING UNDER OR IN CONNECTION WITH THIS AGREEMENT SHALL LIE EXCLUSIVELY IN TRAVIS COUNTY, TEXAS.

SECTION XIII
INSURANCE REQUIREMENTS

The ENGINEER agrees to carry and maintain insurance in the following types

and amounts for the duration of this AGREEMENT, and furnish certificates of insurance and make available copies of policy declaration pages and policy endorsements as evidence thereof:

1. Workers' Compensation and Employers' Liability coverage with limits consistent with statutory benefits outlined in the Texas Workers' Compensation Act (Art 8308-1.01 et seq Tex. Rev. Civ. Stat.) and minimum policy limits for employers Liability of \$100,000 bodily injury per accident, \$500,000 bodily injury disease policy limit and \$100,000 per disease per employee.
 - a. Waiver of Subrogation in favor of the City of Austin, endorsement WC420304
 - b. Thirty (30) Day Notice of Cancellation in favor of the City of Austin, endorsement WC 420601
2. Commercial General Liability with a combined single limit of \$500,000 per occurrence for coverages A&B including products/completed operations, where appropriate, with a separate aggregate of \$500,000. The policy shall contain the following provisions:
 - a. Blanket contractual liability coverage for liability assumed under the AGREEMENT and all contracts relative to the PROJECT.
 - b. Independent Contractors coverage.
 - c. City of Austin listed as an additional insured, endorsement CG 2010.
 - d. Thirty (30)-day Notice of Cancellation in favor of the City of Austin, endorsement CG 0205.
 - e. Waiver of Transfer of Rights of Recovery Against Others in favor of the City of Austin, endorsement CG 2404.
3. Business Automobile Liability Insurance for all owned, non-owned and hired vehicles with a minimum combined single limit of \$500,000 per occurrence for bodily injury and property damage. Alternate acceptable limits are \$250,000 bodily injury per person, \$500,000 bodily injury per occurrence and \$100,000 property damage liability per accident. The policy shall contain the following endorsements in favor of the OWNER:
 - a. Waiver of Subrogation endorsement TE 2046A.
 - b. Thirty (30)-day Notice of Cancellation, endorsement TE 0202A.
 - c. Additional Insured, endorsement TE 9901B.

4. Engineers' Professional Liability Insurance with a minimum limit \$500,000 per claim and in the aggregate to pay on behalf of the assured all sums which the assured shall become legally obligated to pay as damages by reason of any negligent act, error, or omission committed or alleged to have been committed with respect to plans, maps, drawings, analyses, reports, surveys, change orders, designs, or specifications prepared or alleged to have been prepared by the assured. The policy shall provide for 30-day notice of cancellation in favor of the OWNER.

General Requirements

The ENGINEER shall be responsible for insurance premiums, deductibles and self-insured retentions, if any, stated in policies. All deductibles or self-insured retentions shall be disclosed on the certificates of insurance required above.

Applicable to all insurance policies: If coverage is underwritten on a claims-made basis, the retroactive date shall be coincident with or prior to the date of this AGREEMENT and the certificate of insurance shall state that the coverage is claims made and the retroactive date. The ENGINEER shall maintain continuous coverage for the duration of this AGREEMENT and for not less than twenty-four (24) months following substantial completion of the PROJECT. Coverage, including any renewals, shall have the same retroactive date as the original policy applicable to the PROJECT. The ENGINEER shall, on at least an annual basis, provide the OWNER with a certificate of insurance as evidence of such insurance.

If insurance policies are not written for amounts specified above, the ENGINEER shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of the primary coverage.

The ENGINEER shall not commence work under this AGREEMENT until they have obtained the required insurance and until such insurance has been reviewed by the OWNER. The ENGINEER shall not allow any subconsultants to commence work until the required insurance has been obtained and approved. Approval of insurance by the OWNER shall not relieve or decrease the liability of the ENGINEER hereunder.

Insurance shall be written by a company licensed to do business in the State of Texas at the time the policy is issued and shall be written by a company with an A. M. Best rating of B++ or better.

services in connection with this AGREEMENT by the ENGINEER, its officers, agents, employees and parties with whom it contracts.

SECTION XIV EQUAL OPPORTUNITY IN EMPLOYMENT

During the performance of the services provided by this AGREEMENT, the ENGINEER agrees to comply with the applicable provisions of State and Federal Equal Opportunity in Employment statutes and regulations.

SECTION XV CERTIFICATE OF ENGINEER

The individual(s) signing this AGREEMENT, acting as duly authorized representative(s) of the firm of HDR ENGINEERING, INC. of Austin, Texas and other locations hereby certify that neither they nor any other members of the ENGINEER'S firm, which they represent, have:

- A. Violated Chapter 9-6 of the 1981 Austin City Code (Lobbying regulations).
- B. Violated Article V, of the Austin City Code (Discrimination in Employment).
- C. Violated the 1992 City Code, Chapter 5-7 (Establishment of Minority-Owned and Women-Owned Business Procurement Program).
- D. Agreed, as an expressed or implied condition for obtaining this AGREEMENT, to employ or retain the services of (1) any firm or person in the employ of the OWNER or, (2) an OWNER official, in connection with carrying out the work to be performed under this AGREEMENT.
- E. Paid or agreed to pay as an express or implied condition for obtaining this AGREEMENT (1) any firm or person in the employ of the OWNER or, (2) an OWNER official, any fee, contribution, donation or consideration of any kind for, or in connection with procuring or carrying out the work provided under the AGREEMENT.

The ENGINEER further acknowledges that this certification may be furnished to any Local, State and Federal Governmental Agencies of the United States in connection with this AGREEMENT and for portions of the PROJECT involving participation of

Agency Grant funds and is subject to all applicable State and Federal laws, both criminal and civil.

SECTION XVI MISCELLANEOUS

A. SEVERABILITY

If any word, phrase, clause, sentence or provision of the AGREEMENT, or the application of same to any person or set of circumstances is for any reason held to be unconstitutional, invalid or unenforceable, such finding shall only effect such word, phrase, clause, sentence or provision, and such finding shall not effect the remaining portions of the AGREEMENT, this being the intent of the parties in entering unto this AGREEMENT; and all provisions of this instrument are declared to be severable for this purpose.

B. CONSTRUCTION OF AGREEMENT

Although the AGREEMENT is substantially drafted by one party, it is the intent of the parties that all provisions be construed in a manner to be fair to both parties, reading no provisions more strictly against one party or the other.

C. ENGINEER'S PROJECT PURCHASES

All durable PROJECT equipment, tools, materials, etc. purchased by the ENGINEER and invoiced to the OWNER shall be considered the property of the OWNER and shall be given over to the OWNER at the time of OWNER'S request or at the completion of the PROJECT.

D. PERSONAL LIABILITY OF PUBLIC OFFICIALS/ADMINISTRATORS

In carrying out any provision of the AGREEMENT or in exercising any power or authority granted to an OWNER Public Official/Administrator by this AGREEMENT, there shall be no liability upon the OWNER Public Official/Administrator, their authorized representative(s), or any official of the OWNER either personally or as an official of the OWNER. It is understood that in such matters they act solely as agents and representatives of the OWNER.

E. ENTIRETIES

The AGREEMENT and mutually executed Supplemental Amendments thereto (if any) constitute the entire agreement of the parties concerning the subject matter:

Certificate of Insurance and all endorsements shall read:

Department of Public Works and Transportation, City of Austin
P.O. Box 1088
Austin, Texas 78767

The "other" insurance clause shall not apply to the City where the City of Austin is an additional insured shown on the policy. It is intended that policies required in this AGREEMENT, covering both the OWNER and the ENGINEER, shall be considered primary coverage as applicable.

The OWNER shall be entitled, upon request and without expense, to receive copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification of particular policy terms, conditions, limitations, or exclusions except where policy provisions are established by law or regulations binding upon either of the parties hereto or the underwriter on any such policies and if such request for deletions, revisions, or modifications are commercially available.

The ENGINEER shall not cause any insurance required under this AGREEMENT to be canceled nor permit any insurance to lapse during the term of this AGREEMENT.

The OWNER reserves the right to review the insurance requirements of this section during the effective period of the AGREEMENT and to make reasonable adjustments to insurance coverages and their limits when deemed necessary and prudent by the OWNER based upon changes in statutory law, court decisions or the claims history of the industry as well as the ENGINEER (such adjustments shall be commercially available to the ENGINEER). If the implementation of such revised insurance coverages/limits would result in additional costs to the ENGINEER, the ENGINEER may request additional compensation from the OWNER under the provisions of Section V, Paragraph B herein.

Actual losses not covered by insurance as required by this AGREEMENT shall be paid by the ENGINEER.

The ENGINEER hereby expressly agrees to indemnify and hold harmless the OWNER and the OWNER'S officers, agents and employees, from and against all claims, demands, costs, causes of action, and liability of every kind and nature, including reasonable attorney's fees for the defense of such claims and demands, arising directly from, or in any way connected with, the negligent performance of

hereof and all prior and contemporaneous understandings, whether written or oral, are merged herein.

IN TESTIMONY THEREOF, the parties hereto have executed this AGREEMENT in multiple counterparts at the City of Austin, Travis County, Texas as of this the 10th day of June, 2022

THE CITY OF AUSTIN,
OWNER

By: Jim Conner

Printed

Name: James A. (Jim) Conner

Buyer

Title: Dept. of Public Works & Trans.

Yug M. Kosov

Watershed Engineering

Division

Pat Rehmet

Law Department

(Approved as to Form)

HDR ENGINEERING, INC.,
ENGINEER

By: J. K. Hancy

Printed

Name: James K. Hancy PE

Title: Executive Vice President

Attest: Kelly J. Keatz

Printed

Name: Kelly J. Keatz

Title: Vice President

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

PROJECT FOR:

**CITY OF AUSTIN, WATERSHED PROTECTION AND DEVELOPMENT REVIEW
DEPARTMENT**

PROJECT TITLE:

**LOWER FORT BRANCH CREEK WATERSHED MANAGEMENT AREA:
INTEGRATED SOLUTIONS**

PROJECT SUMMARY:

The City of Austin Watershed Protection and Development Review Department has completed a Master Plan to address flooding, stream erosion and water quality problems in seventeen central Austin watersheds. The Master Plan identified problems on a reach by reach basis and determined preliminary solution types to attain WPDR goals. The lower portion of the Fort Branch watershed was identified as having some of the most severe flooding, erosion and water quality problems, and thus, was chosen as the first Watershed Management Area for which integrated solutions will be developed.

The emphasis of this project will be on **integrated solutions** - solutions that optimize benefits for each individual mission (flood, erosion, and water quality) while minimizing adverse impacts. For example, in reaches where flood hazard reduction is the primary problem to be solved, the solution shall incorporate techniques that address corollary stream erosion problems (and will not increase erosion problems within the reach or adjacent reaches) and that enhance water quality indices, while maximizing the number of structures with reduced flooding potential. The goal of the integrated solutions is to improve the ability of the stream to maintain its form and function while reducing flood hazards and property loss due to erosion. Mission-specific potential projects shall be evaluated simultaneously to identify synergistic solutions between missions.

The project study area will include the Fort Branch watershed from Fort Branch Blvd. (downstream) to Westminster Drive (upstream). Solutions shall consider both instream (channel improvements) and upland (ponds, structure buyouts, etc...) techniques. The Fort Branch 1 Watershed Management Area (FOR-1 WMA) comprises approximately 4 linear miles of channel and 2 square miles of watershed. The total drainage area of the Fort Branch watershed is 3.8 square miles.

The Fort Branch watershed is located in the Blackland Prairie ecoregion of Texas, and is classified as "urban" by the City of Austin's water quality regulations. The watershed is atypical, however, for an urban watershed because of its relatively low level of

development. The WMA has an impervious cover of about 25% and still has about 30% of the land area classified as "undeveloped". The watershed area that contributes to the WMA has 50% impervious cover and is over 95% built out. The low level of development in the WMA has several implications for this project. One is that this reach can be expected to experience significant additional development, which will impact water quality (because water quality ponds may not be required in urban watersheds), channel erosion and possibly flooding. The second implication is that the remaining undeveloped land offers opportunities for the City of Austin to offset future impacts, especially if incorporated into an overall control strategy that includes all three missions.

PROJECT APPROACH

Four distinct missions are represented in the following description: Regulatory Floodplain Hazard Reduction, Localized Flooding, Channel Stability and Water Quality. The engineer shall seek solutions that optimize the number of concurrent cross-mission problems solved within a given stream reach. The engineer shall adopt a reach-based, system-wide perspective in considering solutions, rather than a piece-meal approach that addresses one mission at a time.

The scopes of problems, potential solutions and anticipated tasks for each individual mission are listed below.

Flood Hazard Reduction

Creek Flooding (Regulatory Floodplain)

GENERAL

Creek flooding shall be defined as overbank and roadway flooding that occurs in the main branch and tributaries (including any manmade or altered drainage channels) referred to as the primary drainage system. The engineer is expected to assist the City of Austin in addressing creek flooding problems in a systematic, effective and watershed wide manner for storms having recurrence intervals including the 2, 10, 25, 50 and 100-year storms. The selected firm is expected to review all available information, including HEC-1 and HEC-RAS models, recent survey data, the findings and recommendations of Klotz Associates ("Westminster Area Channel Improvement Analysis for Fort Branch Channel", September, 2000) and the Master Plan Report findings for Fort Branch. This information should be used, as necessary, to evaluate creek flooding problems and alternative flood hazard mitigation solutions. The goal of the Flood Hazard Mitigation mission is to reduce structure (including houses, businesses and roadways) flooding in the 2-100 year creek floodplains.

For the creek flooding aspect of the project, the selected professional engineering firm shall have expertise and experience in the following areas:

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contours, zoning map, and as-built drawings. The Watershed Protection Department will assist the engineer in locating the existing data available in City offices.

- The engineer shall perform a field reconnaissance to become familiar with the main stem and all tributaries of Fort Branch, the condition of the floodplain, and special features and problems within the watershed. The engineer will document the following, but is not limited to: specific features of all major detention ponds and outlet discharge structures; vegetative and built structure conditions along the floodplains; types and number of hydraulic structures involved; apparent maintenance condition of existing hydraulic structures; and locations of cross-sections to be surveyed.
- Benchmarks shall be established and recorded in and near the floodplains of all streams in the watershed. Benchmark density should be approximately two per mile of stream length or four per square mile of floodplain. All elevations must be referenced to either NGVD (National Geodetic Vertical Datum of 1929) or NAVD (North American Vertical Datum of 1988), but not to both. The Drainage Utility Master Plan installed new benchmarks in recent years at stream crossings. Watershed Protection staff will provide locations.
- Each cross section shall, at a minimum, cross the entire 100-year floodplain and extend horizontally to a point that is at least one foot above the estimated 100-year flood elevation. Cross sections shall be representative of average conditions in reaches no more than 200 feet apart, without permitting excessive conveyance change between cross sections. Use the City of Austin's 1997 flyover and field survey data. Otherwise, field surveys may be used to establish cross sections. The use of interpolated cross sections is not permitted.
- Necessary dimensions and elevations of all hydraulic structures and underwater sections along the streams shall be obtained from available sources or by field survey where necessary. Dimensions and elevations of hydraulic structures may not be established by aerial photogrammetric methods.
- The engineer shall submit a letter to FEMA's regional office to request hydrologic/hydraulic data, report, working maps, LOMRs, etc. of the effective FIS.
- The engineer shall perform a field survey for all existing structures that are located inside the current FEMA 100-year floodplain or inside an "A" zone that have not been included in the existing FFE database (Carter & Burgess). The survey information will include lowest adjacent ground point elevation (LAG), finished floor elevation (FFE), address, longitude and latitude of each structure, Travis County Appraisal District (TCAD parcel ID #) information, type of foundation, etc. The field survey results will be delivered to the City of Austin in digital format with respect to elevation, location, and mapping (state plane coordinates (NAD 83), planimetrics of all floodplain structures, HEC-RAS cross section location, and cross-section length

with beginning and ending points tick marked for reference). The selected firm shall verify geometry of all hydraulic structures in the flow path (bridges, culverts, storm drain outlets).

- Updated physical data related to channel and hydraulic structure modifications, detention storage, land-use changes, floodplain revisions, and finished floor elevations shall be recorded into a Microsoft Access database.

Task 2. Development of an Existing-Condition Model

- The City will provide the Engineer with the following Ft. Branch models:
 - Corps of Engineers 1981 Flood Insurance Study HEC 2 model (hardcopy only),
 - FLMA's effective model.
 - City of Austin HEC 1 model (electronic copy).
 - Klotz Associates' HEC 1 and HEC-RAS model (electronic copy).
 - Carter & Burgess' database of structure elevations.
- The HEC-RAS model (to be developed for this study) upstream study limits for the main stem and tributaries will be points along a channel where the contributing drainage area is equal to or less than 64 acres.
- Models should be calibrated to known high water marks within 0.5 foot.

Task 3. Development of an Ultimate-Condition Model

- The engineer shall contact the City's Neighborhood Planning and Zoning Department to acquire the proposed land use classification report in order to assess future impervious cover limits.
- The City of Austin will provide a current and future land use breakdown with impervious cover estimates.
- The City will provide the engineer with the updated Klotz HEC-1 model to be used as a base model.

Task 4. Model Results

- The engineer shall perform a uniform and thorough QA/QC check throughout the project. The hydraulic model will produce the water surface profiles at the same vertical and horizontal scale as the profiles in the effective FIS report for all selected flood frequencies¹. The Engineer will label cross sections, road crossings (including low chord and top of road data), culverts, tributaries, corporate limits, stream-floor elevations, and study limits.

¹ FLMA has developed a computer program, RASPILOT that enables study contractors to generate computer plotted flood profiles that meet FLMA's requirements. The RASPILOT program allows users to create drawing interchange format (*.DXF) files from HEC-RAS input and output files.

- The engineer will prepare and submit the work maps to the city. The Engineer shall follow closely the specifications set forth by FEMA's FIS Guidelines (Chapter 9) regarding map drawing requirements.
- The following minimum information shall be shown in and near the floodplains on the work map: (1) Cultural features, such as railroads, airfields, streets, roads, highways, levees, dikes, dams and other flood-control structures, and other prominent man-made features and landmarks; (2) Hydrographic features, such as rivers, streams, lakes and ponds, and channels (including both banks of a stream when graphically possible); (3) Corporate limits, extraterritorial jurisdiction limits, and boundaries of excluded areas; (4) Elevation reference marks (ERM), and (5) Grid lines (State Plane or UTM) with appropriate values annotated.
- Base Flood Elevations (BFEs) are shown by wavy line contours drawn normal to the direction of the flow of water, perpendicular to the floodplain, but not necessarily perpendicular to the stream. They shall extend completely across the 100-year floodplain. Each BFE notation shall indicate its elevation above NGVD or NAVD, to the nearest whole foot.
- The starting water-surface elevations for existing conditions shall be based on the City's Boggy Creek model. The starting water-surface elevations for ultimate conditions shall be based on normal depth (or slope-area) method.
- The engineer will generate flood profiles and floodplain maps for the return periods of 2, 10, 25, 50, 100, and 500-year floods (existing and ultimate conditions).

Task 5. LOMR Application

- The Engineer will prepare the final study report, the revised FIRM, and the LOMR application forms as required by FEMA guidelines. The Engineer must provide all materials (data, tables, figures, and maps) necessary to produce the study results. It is anticipated that the following forms will be required:

| | |
|--------|--|
| Form 1 | Revision Requestor and Community Official Form |
| Form 3 | Hydrologic Analysis Form |
| Form 4 | Riverine Hydraulic Analysis Form |
| Form 5 | Riverine/Coastal Mapping Form |
| Form 6 | Channelization |
| Form 7 | Bridge/Culvert Form |
- The engineer will draft a LOMR application with complete supporting documentation. After the City's review and approval, the Engineer will provide to the City two copies of the final LOMR application. The City will be responsible for transmitting the application to the FEMA Regional Office. The City will also be responsible for the payment of all permit application and review fees.

Task 6. LOMR Application Support

- The engineer will also provide services associated with FEMA's comments on the LOMR application. The Engineer will respond to comments made by FEMA on the LOMR application package. The Engineer will attend at least one meeting with the City to review FEMA comments. Based on the comments received, the Engineer will make revisions to the LOMR submittal package to facilitate the issuance of the LOMR by FEMA. The Engineer will provide services in response to any public appeals to the LOMR.

DELIVERABLES

1. Digital copy of the floodplain map files for existing and ultimate conditions, including digital base map file(s), digital flood plains for 2, 10, 25, 50, 100 and 500-year floods, map index, data quality report, computer generated profiles, digital data submission checklist.
2. Watershed sub-area delineation including soils classification. Each sub-area should show its time of concentration path, creek channel, shallow concentration flow, and/or sheet flow;
3. Digital database files, including field survey of structures in the 25 or 100-year current FIS floodplains with LAG and FFE; and all other database files supporting all of the GIS map files;
4. Digital photographs of hydrologic and hydraulic structures; and
5. Two hard copies of the draft report, two hard copies of the final report, and two digital copies of the final report. The final report shall include a general description of the watershed, data, maps, design standards/criteria, models, methods, assumptions, formulas used, and study results. Preparation of the final report shall follow closely the specifications in Section C, Chapter 9 of the FIS Guidelines.

The results of the hydraulic restudy will be used to update the depths of flooding for all structures in the updated flooded structures database for the 2, 10, 25, 50 and 100-year storms, for existing and fully developed conditions. Selected firm shall compare revised depths of flooding to the depths determined as part of the 2001 Master Plan for the entire Fort Branch Watershed included in the hydraulic restudy. This comparison should identify any areas that were not previously identified as having flooding problems, and conversely, any areas that were identified as flood prone which the restudy shows to be out of the floodplain. Any new areas of flooding will be analyzed and an alternatives analysis (buyouts, culvert/bridge upgrade, channel improvements, etc...) will be performed. Alternatives analysis shall include accurate cost estimates (both capital and maintenance), environmental assessment, project phasing, implementation schedule, and project life expectancy, and integration with other missions.

Specific Area Tasks

1. ***Scottsdale and Elmgrove area south of MLK Blvd. between STA 117+55 and 122+66 on Fort Branch. The Master Plan identified 5 houses on Elmgrove and Scottsdale and the culvert at MLK as flooding at the 100-year storm flows.***
 - Perform topographic field survey of channel to obtain current channel geometry for hydraulic model. Significant erosion has occurred and the existing model may not give adequate credit for in-channel conveyance. Verify culvert dimensions and elevations for hydraulic model.
 - Verify depths of flooding.
 - If structure flooding is verified, perform alternatives analysis to remove structures (including roadway) from flooding.
2. ***Area just north of MLK and south of Springdale Rd. along Bundyhill Drive.***
 - Existing flood depth map shows possible structural inundation, but zero depth of flooding. Verify depths of flooding based on updated hydraulic model and FFE database.
 - Perform alternatives analysis if structural flooding exists along Bundyhill.
3. ***Springdale Road to Pecan Springs Road between STA 160+50 and 163+65 on Main stem. The Master Plan identified 3 residences inundated by greater than 6 ft. on Pecan Springs Rd. and recommended the Pecan Springs Bridge be upgraded and channel modified.***
 - Perform topographic field survey of channel upstream and downstream of bridge and verify bridge geometry and elevations for updated hydraulic model.
 - Verify depths of flooding of structures along Pecan Springs Rd.
 - Perform alternatives analysis comparing cost of property buyout vs. upgrade of Pecan Springs bridge.
4. ***Area just north of Pecan Springs Road to Westminster Drive between STA 179+25 to 22+225 on Main Stem. The Master Plan identified 2 inundated structures on Blue Spruce Circle. Klotz 2000 study identified 42 structures in aforementioned reach that are inundated by 100-year flood. Proposed culvert upgrades at Manor Road and Westminster Drive will remove 2 roadways and 22 dwellings from 100 year flood plain.***
 - Verify depths of flooding of structures from STA 179+25 to 22+225.
 - Integrate Klotz 2000 report proposal to reduce flooding and stabilize channel from 179+25 to Manor Road bridge.
 - Examine Klotz proposal or other alternatives to further reduce flooding between Manor Road and Westminster Drive.
5. ***Currently unstudied East Fork of the watershed that joins the main stem upstream of Springdale Road. The Masterplan identified 11 inundated structures on Medford Dr. and one structure on Darlington Cove.***

- Perform topographic field survey of channel as necessary to define hydraulic structures and channel geometry for updated hydraulic model. May use 1997 flyover contours if there is adequate definition of channel and overbanks.
- Verify depth of flooding to structures in Medford Drive area.
- Perform alternatives analysis if flooding problem exists in area.

DELIVERABLES

1. Preliminary engineering report that documents the findings and results of the above tasks, including an electronic version of the report and computer models.
 - Include Cost/Benefit Matrix that shows the following for each of the examined alternatives:
 - a. Capital cost
 - b. Maintenance cost
 - c. Life span of alternatives
 - d. Ability to achieve stable stream system (dynamic equilibrium)
 - e. Cost of riparian zone degradation/ environmental assessment (e.g. tree loss, habitat loss, etc...)
 - f. Integration with other missions
2. Updated depth of flooding maps for the 2, 10, 25, 50 and 100-year storm flows in a COA/GIS format for existing and fully developed conditions.
3. Preliminary environmental assessment of proposed alternatives
4. Project schedule and cost estimates
5. Preliminary plans (50% design) for recommended project improvements
6. QA/QC statements
7. Cost/Benefit Matrix for preferred solution

Preliminary plans at 50% design means that all analysis and feasibility work has been performed. The plans shall include plan/profile as appropriate, typical details and grading.

Localized Flooding

GENERAL

Localized flooding shall be defined as flooding that occurs outside of the 100-year floodplain along creeks. The nature of flooding may include flooding of buildings, yards, streets and other ponding of water, typically caused by inadequate or outdated stormwater drainage systems. The goal of this mission is to reduce localized flooding, to the extent possible, by upgrading the system to meet current COA drainage criteria.

The boundaries of the localized flooding study area shall be generally defined as Martin Luther King, Jr. Blvd. to the north, Tannehill Lane to the east, Delores Avenue to the south and Springdale Road to the west. This area is one of the highest priority areas in

the citywide critical localized flood areas map. Details of the study area boundaries are shown on the localized flooding study area map, which will be transmitted to the selected firm. Depending on funding availability and scope of work, other critical localized flooding areas within the FOR-1 WMA may also be included in this study.

Stormwater drainage systems to be studied may include but are not limited to stormwater drainpipes, inlets, manholes, curbs and gutters, minor channels, roadside ditches, and culverts. Previous creek and major channel hydrologic and hydraulic studies may also be needed to obtain the tailwater conditions.

More than 200 customer flood complaints have been received in the flood complaint database and from the 1996 flood survey in the Fort Branch WMA 1. These complaints have been reviewed and classified into the following five (5) flood codes: building, yard, street, standing water, others and N/A. WPDR has responded to these flood complaints on a case by case basis. Watershed Engineering Division has also performed preliminary analysis of existing stormwater drainage systems and suggested certain stormwater drainage system improvements.

The engineer is expected to assist the City in addressing the localized flooding problems in a systematic, effective and watershed wide approach. The engineer shall provide recommendations on computer analysis tools that integrate the City's existing GIS data with storm drain design software such as StormCAD to assist the City in assessing and responding to future localized flood concerns.

It is preferred that the selected professional engineering firm has expertise and experience in the following areas:

- Applications of Geographic Information System (GIS) in stormwater drainage systems.
- Analyzing stormwater drainage systems utilizing StormCAD by Haestad Methods.
- Experience in identifying, investigating, analyzing and developing solutions for localized flooding problems, including incorporating other missions into solutions.

TASKS

The engineer shall:

1. Review the flood complaint and flood survey database information to understand the extent and complexity of existing localized flooding problems within the project area.
2. Inventory existing stormwater drainage systems (inlet, pipe, manhole, outfall, size, slope, elevation, etc.) from current GIS files (Drainage Infrastructure GIS (DIG)) and engineering drawings made available by the City of Austin.
3. Perform field reconnaissance to ensure completeness of existing stormwater drainage system inventory.

4. Conduct field survey of existing stormwater drainage systems to confirm or correct record information. The survey shall use coordinates and data consistent with COA/GIS (NAD 83, State Plane Coordinates).
5. Perform detailed stormwater drainage system hydraulic analysis, for 2-, 5-, 10-, 25-, 50- and 100-year storm events, using StormCAD by Hecstad Methods to evaluate system capacity and compliance with current Drainage Criteria.
6. Incorporate stormwater drainage system and hydraulic analysis model into the COA/GIS (DIG).
7. Compare identified drainage problems with the customer drainage complaints and flood survey database and analyzing the differences.
8. Conduct neighborhood meetings or interviews to collect customer inputs and confirm flood concerns.
9. Review in-house stormwater drainage system analysis and improvement suggestions provided by Watershed Engineering Division.
10. Perform preliminary environmental assessment for construction feasibility.
11. Develop stormwater drainage system improvement priority based on flood intensity, frequency, density, inundation depth, etc.
12. Review other City departments' proposed infrastructure improvements and identify opportunities for joint infrastructure improvement projects.
13. Recommend system improvements to effectively address drainage problems in the following order: building flooding, yard flooding, street flooding and standing water with building flooding as the highest priority.
14. Provide improvement alternatives, accurate cost estimates, project phasing, and implementation schedule for recommended project improvements.
15. Conduct QA/QC for the study findings, analyses, recommendations and cost estimates.
16. Prepare a list of drainage easement acquisition needs including sizes and locations.

Deliverables:

1. Preliminary engineering report that documents the finding and results of the above tasks.
2. Drainage Infrastructure maps in COA/GIS format.
3. Drainage system computer models and outputs (StormCAD).
4. Recommended approaches for integrated storm drain system analysis tool.
5. Preliminary environmental assessment.
6. Project schedule and cost estimates.
7. Preliminary design plans at 50% completion.
8. QA/QC statements

Stream Channel Stabilization

GENERAL

The Stream Channel Stabilization aspect of the project will consist of two primary objectives:

- Stabilize discrete sections of streambanks where structures or infrastructure are threatened.
- Stabilize channel reaches such that the stream system is returned to dynamic equilibrium (channel has ability to transport incoming sediment without excessive erosion or deposition).

The engineer shall be responsible for reviewing the Masterplan Watershed Erosion Assessment (Raymond Chan & Assoc, 1997) to become familiar with the scope of erosion problems and the recommendations for potential solutions. The Watershed Protection and Development Review Department expects that proposed solutions will focus on biotechnical slope stabilization techniques for site specific erosion problems and natural channel design techniques for reach-based stability problems.

For the Stream Channel Stabilization aspect of the project, the selected professional engineering firm shall exhibit experience and expertise in the following fields:

- Streambank erosion analysis and erosion control alternatives ranging from soil bioengineering solutions to vegetated, mechanically stabilized earth slopes;
- Knowledge of stream mechanics (to include hydrology, hydraulics, and sediment transport) and fluvial geomorphology;
- Ecological functions of streams;
- Natural Channel Design;
- Construction Management

TASKS

FOR-1 WMA or watershed wide

1. Provide preliminary designs for grade control structures to achieve stable channel slope from Heflin Lane to Westminster Drive, assuming that existing/predicted channel cross-section dimensions are known (i.e. WPDR cannot widen channel to achieve equilibrium conditions). Incorporate appropriate features to enhance in-stream habitat at local grade control structures (e.g. riffle/pool formation, appropriate substrate, etc...).
2. Integrate preliminary channel stability/flood control plans from City of Austin design for Fort Branch from Fort Branch Blvd. to Eleanor Drive into a comprehensive watershed model; provide plans (50% design) for bridge/culvert upgrade at Fort Branch Blvd.
3. Where channel improvements are proposed for increased flood conveyance or channel stabilization (e.g. East Fork near Medford & 51st), engineer shall gather the following data for preliminary design of channel that retains or increases the natural form and function of the stream:

- Detailed channel topography (1-ft. contours) that includes delineation of flow line, toe and top of slopes, pool/riffle location, tree survey. All channel survey shall be in NAD 83, State Plane coordinates.
- Verify Watershed Erosion Assessment data regarding active channel dimensions and flows. Where data does not exist (e.g. on tributaries not studied in Erosion Assessment), perform geomorphic assessment to determine current stage of channel evolution/stability and identify effective channel discharge (channel forming discharge) and obtain particle size distribution for sediment supply reaches.
- Determine stable channel slope/profile, planform and cross-sectional geometry for natural channel.

4. Examine opportunities to reduce directly connected impervious cover to reduce future channel enlargement (per Fort Branch Watershed Erosion Assessment). Integrate such opportunities with water quality efforts to implement Low Impact Development treatment options.

Specific Area Tasks

1. Provide construction details and cost estimates to stabilize the undermined embankment at upstream side of the Springdale Road culverts.
2. Gather geotechnical and survey data needed to produce preliminary plans for profile and side slope stabilization measures for the main channel from MLK to 300 ft. upstream of Heflin Lane.
3. Coordinate with City of Austin Water and Wastewater Department on sanitary line upgrade, East Fork from 51st Street to Darlington Cove. If Water/Wastewater project entails significant in-channel work, provide cost-benefit analysis of creating stable, natural channel of East Fork from confluence with main stem to Darlington Cove.

Deliverables:

1. Preliminary engineering report that documents data collected from geomorphic assessment, sediment transport calculations, channel design calculations and alternatives analysis.
2. Preliminary (50% design) construction drawings for watershed wide and specific area solutions.
3. GIS based map showing location of all channel stability projects.

Water Quality Enhancement

GENERAL

The Fort Branch of Boggy Creek has been highly impacted by urbanization, as it suffers from poor water quality and aquatic biology, degraded stream habitat and riparian buffer zone conditions, lack of baseflow, and poor aesthetic conditions. The primary sources for these problems are high impervious cover, frequent accidental spills and sanitary sewer system seepage, dumping and illicit discharges, and encroachment of development into riparian buffer areas. However, some reaches still retain vestiges of good water quality and stream habitat conditions.

The primary long-term water quality goal for the FOR-I WMA is to achieve an Environmental Integrity Index (EII) score of "Good" or better. The EII is a multi-metric index that measures the biological, chemical, physical, and aesthetic conditions of Austin's creeks. The EII uses an eight-level scoring system to rate conditions as Excellent, Very Good, Good, Marginal, Fair, Poor, Bad, or Very Bad. There are four EII sites in the Fort Branch watershed and monitoring conducted for the Master Plan process documented scores that range from "Fair" to "Good." The EII scoring factors and documentation will be provided to the engineer.

This project will be a key starting point for achieving the long-term goal of a "Good" EII score in Fort Branch. Given the nature of the problem causes and sources, it is appropriate that solutions focus on the following three types:

- Stream corridor restoration and preservation
- Retrofitting controls to provide detention and treatment of stormwater runoff
- Relocation and/or repair of the wastewater infrastructure system

A description of each solution type is provided below but, in general, the purpose of this project is to identify reach-specific and site-specific solutions, and provide design drawings for the highest priority ones. Solutions will need to achieve multiple objectives to the maximum extent possible, i.e., simultaneously solve flooding, erosion, and water quality problems, based on cost-benefit analysis.

The City has recently begun using the EPA's Habitat Assessment Field Data Sheets to characterize stream habitat quality conditions. This index evaluates ten habitat parameters (some with left and right bank scored separately), and rates conditions as Optimal, Suboptimal, Marginal, or Poor; a complete description of this procedure will be provided to the engineer. City staff conducted habitat assessments at the Fort Branch EII sites in February of this year and the results are shown in Table 3. Two sites were rated as Marginal and two were rated as being in Suboptimal condition. A goal of "Suboptimal" for all sites has been proposed.

Interpretation of the habitat assessment data for design of solutions may require considerable professional judgement, and the Consultant should have direct experience in the design, implementation, and monitoring of stream restoration projects. For this project, stream corridor restoration opportunities will be investigated throughout the FOR-I WMA, including the East Branch tributary. Sites should be identified and prioritized based on where both stream habitat deficiencies and land preservation or

acquisition opportunities may exist. The retrofits will be evaluated at both stream corridor restoration sites and localized flood control project sites.

Stream corridor preservation is a companion effort to be conducted in association with the restoration task. Preservation is based on the same information used for assessing stream corridor restoration, but the purpose is to preserve areas where degradation can be prevented. There may be some overlap between the two, e.g., preserve an area that is only slightly degraded and improve its conditions.

When evaluating restoration and preservation solutions, future changes in channel conditions must be accounted for. The watershed erosion assessment of Fort Branch documented that the FOR-1 WMA is mostly an alluvial system that is currently unstable ("in adjustment"), and is predicted to experience future channel enlargement of 8-49%, with the lower two plus miles being most problematic. The current and future condition of the East Branch tributary is not known, as the Watershed Protection Master Plan did not assess it.

Retrofitting controls that detain and treat stormwater runoff can improve the flow regime (i.e., frequency, magnitude, and duration of low-to-high flow events) and improve water chemistry from development that discharges to the creek system. While there are very few opportunities to implement large structural controls in the watershed, there are likely numerous opportunities to install systems that treat small to medium size drainage areas where stream corridor and localized flood control projects are proposed. In addition to conventional treatment systems, such as detention ponds and sand filters, this project will investigate the use of alternative and innovative techniques, such as the following:

- Bioretention or bioretention ("rain garden")
- Disconnection of directly connected impervious cover
- Vegetated Swale
- Vegetated Filter Strip, which can include riparian habitat creation and tree mitigation sites
- Soil restoration and sustainable landscaping practices

The wastewater system, especially in the immediate vicinity of the creek, may be a primary source of elevated bacteria levels. The Watershed Protection & Development Review (WPDR) Department has a database of reported wastewater spills, but this information should be augmented with data from the City's Water and Wastewater Utility Engineering Support Division. In addition to potentially contributing to water quality degradation, the wastewater system may also be causing stream erosion and instability problems where it is located within the creek (e.g., manholes diverting flows into stream banks, thus causing erosion). Solutions to these problems could include relocation of wastewater lines outside the stream banks, removal or repair of manholes, and other measures. While WPDR does not have the responsibility or authority to repair or maintain the wastewater system, the engineer shall develop capital recommendations that could be implemented in conjunction with flood, erosion, or water quality control

projects identified by this project. Such recommendations should be coordinated with the Water and Wastewater Utility, utilizing recent data.

The selected engineering firm shall have experience and expertise in the following areas:

- Stream ecology, including physical habitat, physiochemical parameters and aquatic life parameters (e.g. periphyton, benthic macroinvertebrate and fish)
- Native plant communities- identification, establishment and management
- Regulatory and permitting requirements- federal (EPA, Corps of Engineers), state and City of Austin
- Analysis of spatial and aerial imagery data
- Data and database management

TASKS

1. Identification and Prioritization of Candidate Stream Corridor Restoration and Preservation Project Sites

The purposes of this task are to:

- Based on an assessment of the entire FOR-1 WMA reach (including the East Branch tributary), identify locations within 400' of the creek centerline where in-stream and riparian habitat conditions can either be improved or preserved.
- Propose a design for each site (i.e., implementation of improvements, acquisition of property, or a combination of both)
- Conduct a benefit-cost analysis for each candidate project site in order to prioritize recommendations

Examples of potential projects include:

- Creation of riffles and pools (in conjunction with grade control structures) where none currently exist, as also discussed in stream stabilization task.
- Creation or improvement of riparian buffers that are comprised of native trees, shrubs, and other vegetation.
- Bank and/or bed stabilization using bioengineering and natural channel design techniques instead of "hard" solutions
- Preservation of a riparian area that is currently heavily vegetated through buyout or easement acquisition. The area may be private land, currently undeveloped, but is located in the 100-year floodplain or critical water quality zone.
- Redesign of a storm drain outfall to reduce erosive flows and/or eliminate creation of a scour hole
- Redesign of a storm drain system to provide runoff detention in order to prevent "bypassing" of the riparian buffer zone (also see Task 2 below)

- Relocation or redesign of a wastewater manhole that is diverting flows into a streambank and causing erosion (also see Task 3 below)

Some areas tentatively identified for potential restoration include:

- Fort Branch between Manor Road and 51st Street.
- Fort Branch from Springdale Park to below the Eleanor Street cul-de-sac (existing drainage easement)
- Unnamed tributary that enters Fort Branch from the west between Mason Avenue and Lott Avenue (existing drainage easement)

Some areas tentatively identified for potential preservation include:

- East Branch between Norwood Hill Road and the confluence with Fort Branch
- Fort Branch from 1200' above Pecan Springs Road to Martin Luther King Boulevard
- Fort Branch from Martin Luther King Boulevard to Weberville Road
- Fort Branch between Heflin Road and Weberville Road
- Fort Branch from Weberville Road to confluence with Boggy Creek
- Unnamed tributary entering Fort Branch from east from Fort Branch Boulevard/Eleanor Street intersection to Tunnhill Lane

Development of the restoration and preservation plan may be an iterative process whereby the ability to meet target conditions (e.g., Habitat Assessment score = "Suboptimal") may be limited by the availability of sites, current and future flow and regimes, future channel enlargement, and other factors. Recommended project sites must have a reasonable expectation of remaining in place, e.g., not washed away by high flows, damaged by erosion, covered by sediment, etc. The Consultant shall provide recommendations as to the feasibility of achieving the "Suboptimal" goal so that the City can consider adjusting target conditions.

While the entire WMA reach is to be considered for restoration or preservation, the Consultant shall optimize project benefits by integrating habitat quality design with other potential projects identified by this study, including:

- Flood control projects
- Erosion control projects
- Localized flood control projects
- Stormwater Detention and Treatment retrofit projects (see Task 3 below)
- Wastewater infrastructure improvement projects (see Task 4 below)

2. Identification and Prioritization of Candidate Stormwater Detention and Treatment Retrofit Sites within the Stream Corridor and at Localized Flood Reduction and Erosion Control Sites.

The purpose of this task is to identify retrofit sites that can be designed to improve the flow regime and water quality of runoff prior to it being discharged to the creek system.

drainage area, typically less than 100 acres. All storm drain outfalls to the stream system within the FOR-1 WMA are to be included in the list of candidate sites. For each candidate project, a specific design will be proposed, and a benefit-cost analysis conducted in order to prioritize recommendations.

Examples of potential projects include:

- Creation of a vegetative filter strip within a riparian buffer zone to divert runoff from adjacent development into the BMP for treatment
- Redesign of a storm sewer outfall to incorporate a bioretention BMP upstream of the outfall so that runoff can be captured and released slowly back to the stream system
- "Daylighting" a previously enclosed storm pipe as a vegetative swale, as part of a localized flood control solution.

The design goals for these projects are proposed to be:

- Maximize reduction of annual average pollutant loads, with an optimal goal of providing treatment equivalent to that provided by sedimentation/filtration systems designed per the City's criteria (see Section 1.6.5.C of the Environmental Criteria Manual)
- Maximize reduction of erosive flows, with one or both of the following criteria being the optimal condition:
 - Reduce the peak flow rate for the 2-year design storm to the pre-development level AND capture the runoff from the 1-year, 3-hour rainfall event and release it over 24 hours
 - Provide detention equivalent to that provided by sedimentation/filtration systems, i.e., capture the water quality volume (a function of site impervious cover) and release it over 40 - 64 hours.
- Maintain or improve conveyance of flood flows

3. Identification and Prioritization of Wastewater Infrastructure Improvement

2. Easement or fee simple purchase needs
3. Utility locations in proposed project areas and proposed relocations if necessary

Design and Construction Phase Services

The above defines the anticipated scope of services for the Preliminary Design phase of the project. Several construction projects may result from the preliminary design studies.

- Provide cost estimates for the recommended improvements for which WPDR would be responsible, outside of W/WW utility projects.

Engineer shall schedule meetings with WPDR Project Manager and representatives of City of Austin Water and Wastewater Utility to determine if water/wastewater pipelines and other facilities can be relocated/rebuilt in conjunction with proposed WPDR projects/criteria. W/WW Utility has recently completed Infiltration & Inflow studies of the sanitary system in Fort Branch. The engineer shall use existing information to identify problems, rather than performing additional studies.

Deliverables:

1. Preliminary engineering report that documents findings and results, and describes selected projects in detail, including environmental assessments
2. Display maps and ArcView coverages of all problem area information, stream corridor conditions (current and future), property ownership boundaries, and other relevant information
3. Display maps and ArcView coverages of the candidate project sites -- location, technical description, priority ranking
4. Digital copies of models and model outputs
5. Hard copy and digital copies of design drawings (minimum 50% complete)

City of Austin Transmittals

The selected engineering firm shall be provided data to include:

- Watershed Protection Master Plan Phase 1 Watersheds Report -- ArcView coverages of mission- specific and integrated problem scores, candidate solution sites, reach endpoints, etc.
- Erosion data:
 - Master Plan watershed erosion assessment report -- ArcView coverages of selected information
 - Currently identified erosion control sites
 - Existing particle size distribution, survey and hydraulic models developed for Lower Fort preliminary design
- Creek flooding data
 - Master Plan reports and data
 - Updated flood models (HEC-1, HEC-RAS) -- report, model inputs and outputs, ArcView coverages of floodplain boundaries and flooded structures
 - Currently identified flood control sites - ArcView coverage, project descriptions

Attachment 3 SCOPE OF SERVICES

Preliminary Engineering Services

Lower Fort Branch Creek Watershed Management Area -- Integrated Solutions

Task 1 Project Management

Task 2 Data Collection

Task 3 Hydrologic Analysis

Task 4 Hydraulic Analysis

Task 5 Channel Stability Analysis

Task 6 Water Quality Analysis

Task 7 Alternatives Analysis

FORM AND FORMAT

SCHEDULE

COMPENSATION

This scope of services describes services to be provided by HDR Engineering, Inc. (HDR) to the City of Austin Watershed Protection and Development Review Department (CLIENT). This scope of services defines the tasks required to provide preliminary engineering services for the Lower Fort Branch Creek Watershed Management Area. The following abbreviations for certain entities are used in this scope of services:

CLIENT - City of Austin Watershed Protection and Development Review Department
HDR - HDR Engineering, Inc.
COA - City of Austin
WPDR - Watershed Protection and Development Review Department
GIS - Geographic Information System
DIG - Digital Infrastructure GIS
FEMA - Federal Emergency Management Agency
USACE - United States Army Corps of Engineers

HDR will perform the following tasks:

Task 1 Project Management

Objective

Provide project leadership, coordination and administration for the project. Services for this task will be provided as follows:

...the Project Manager. Coordinate work with subconsultants to control scope, schedule and budget. Anticipate and manage change (scope, schedule, budget and staff assignments). Perform QC reviews

Assumptions

- For the purpose of estimating the budget for this task, duration of 18 months has been assumed for this project
- For kickoff meeting, assume 1-day duration. Assume 36 bi-weekly teleconferences of 0.5-hour duration. Assume 5 Project meetings of 4-hour duration
- Internal project reviews at 0%, 30%, 60%, 90% and 100% completion.

Prerequisites

- None

Deliverables

- HDR Work Plan and Project Guide
- Progress reports and budget summaries
- Meeting notes
- Written & verbal communications

Task 2 Data Collection, Development & Management

Objective: Collect and review a variety of data to analyze and design solutions for flooding, channel instability and water quality problems in the Fort Branch WMA. Services for this task will be provided as follows:

- 2.1 *Acquire and Review Existing Data.* Attain reports, models, plans, GIS data and other pertinent information related to the Fort Branch WMA and adjacent watersheds. In addition to data provided by WPDR, we will review other department (i.e. WW, Austin Energy, Southern Union) infrastructure information to identify potential conflicts, impacts and possible cost-sharing opportunities. Acquisition and review of data will include in the following items:

- Erosion assessment and supporting data
- Flood studies and models (COA, FEMA)
- Water Quality Master Plan, assessments and supporting data
- Flood complaint database
- Topographic and bathymetric mapping
- Meteorological information
- Geotechnical information (surface and subsurface grab samples, soil cores)
- Hydraulic structure plans and utility as-built (bridges, culverts, storm drain system)
- Existing and future land use data
- Property Valuation (TCAD)
- Riparian conditions
- GIS and other geospatial data

- 2.2 *Data Management Plan.* Develop a detailed data management plan to effectively acquire, store and transfer the data collected, developed and compiled during this project. The plan will include

for integration with COA databases (i.e. GIS, MS Access). The data management plan will include the following data types: hydrologic data, hydraulic data, floodplain information, flooded structure data, property valuation, Digital Infrastructure GIS (DIG), stream corridor integrity, water quality conditions, erosion and/or deposition sites, and existing and proposed stormwater/channel projects in the Fort Branch WMA.

2.3 Survey and Database Development Perform ground survey of existing conditions and features. Develop GIS databases as noted.

2.3.1 Field Reconnaissance Perform field reconnaissance to verify the existing information, assess existing conditions and to identify additional data and survey needs for the project. We will perform reconnaissance of the Fort Branch channels to locate storm drains outfalls; wastewater and utility crossings; watershed controls; water quality structures; and erosion and sedimentation problem areas within the Fort Branch primary drainage system. Acquire digital photographs of significant features within the stream channel. Compile field data into a GIS database and reproducible format.

2.3.2 Right of Entry Provide initial right of entry services including initial notification and request for permissions for access related to field reconnaissance and surveying. If right of entry is not voluntarily provided by property owner, then any follow-up requirements to obtain right of entry will be provided by the CLIENT.

2.3.3 Ground Control Establish ground control for the initial data collection effort and floodplain mapping. Control benchmark density should be approximately two per mile of stream length or four per square mile of floodplain. Ground control survey requirements:

- 7 additional GPS monuments (based on existing GPS benchmarks which are approximately 1 per mile)

2.3.4 Cross Section Monuments Establish paired cross-section monuments for future monitoring, and operation and maintenance of natural channel sections. These will be implemented in conjunction with establishment of ground control and channel/structure surveys.

- Approximately 10 paired cross section monuments

2.3.5 Fort Branch Channel Survey Perform channel cross-section surveys. The cross section survey will define the channel geometry by the near overbank, top of bank, channel toe, thalweg, and significant grade breaks throughout the channel cross section. Consecutive cross sections no greater than 200 feet apart will be established throughout the Fort Branch primary drainage system where current hydraulic model data is not representative of existing conditions. The channel survey will be limited to areas where the contributing drainage area is greater than 64 acres. Specific reaches where channel survey will be performed are:

2.3.5.1 Tributary 1 from the confluence with Fort Branch near Rogge to Wheelless (~ 15 cross sections over 2800 ft of stream length, average channel width of 40 feet, estimated maximum average bank height of 7 feet)

2.3.5.2 East Fork from the confluence with Fort Branch near Springdale to Rogge on the West Branch and to downstream of Woodbriar on the East Branch (~ 34 cross sections over 6200 ft of stream length, average channel width of 45 feet, estimated maximum average bank height of 8.5 feet)

2.3.5.3 Middle Fort Branch from the end of the concrete channel near Heffin Road to upstream of Pecan Springs Road (~ 33 cross sections over 6700 ft of stream length, average channel width 50 ft feet, average max bank height of 10.5 feet)

2.3.5.4 Lower Fort Branch from Eleanor to the confluence with Boggy Creek (~32 cross sections over 3800 ft of stream length, average channel width 80 ft, average maximum bank height of 12 feet)

2.3.6 Building Elevation Survey and Database Development Perform survey for existing structures that are in the current FEMA 100-year floodplain or Zone "A" that have not been included in the existing FFE database. The survey information will include lowest adjacent ground point elevation (LAG), finished floor elevation (FFE), address, longitude and latitude, and TCAD parcel ID # (Travis County Appraisal District). Incorporate new information and update FFE database.

- Existing COA database of 403 structures does not currently include TCAD ID#, LAG, and HEC-RAS station.
- Approximately 30 structures on the East Fork West Branch in the FEMA Zone A that are not included in the current database.
- Additional structures outside of the current area mapped by FEMA include those on the Upper Fort Branch main stem, East Fork East Branch, and Tributary 1 (not included in fee estimate).

2.3.7 Hydraulic Structure Survey and Database Development Perform survey of hydraulic structures (bridges & culverts) in the flow path of the Fort Branch primary drainage system where the contributing drainage area is greater than 64 acres. Structure information to be obtained includes flow-line, overtopping elevations and structure dimensions.

- Verify/modify structure geometry in current hydraulic models. Develop a hydraulic structure GIS database to include bridges, culverts, storm drain outfalls and utility conflicts.
- Assume 27 bridge/culvert crossings in hydraulic model study area.

2.3.8 Utility Conflict Survey Locate and perform survey of existing utilities that are exposed in the Fort Branch channel and its tributaries for which current survey data is not available.

- Assume 5 conflicts to be surveyed.

2.3.9 Storm Drain System Mapping and Database Development Perform mapping of the existing closed conduit storm drain system within the localized flooding study area to confirm, correct and update COA record information. The storm drain mapping will be limited to the localized flooding study area bound by Martin Luther King to the north, Tannehill Lane to the east, Delores Avenue to the south and Springdale Road to the west. The storm drain mapping will provide information on the configuration and elevation of inlets, manholes, outfalls and junctions; pipe sizes (span and/or rise), length, invert elevation, shape and material type. Develop a preliminary storm drain GIS database to be used in the localized flooding analysis. The current COA storm drain GIS database includes 94 storm drain nodes (inlets, manholes, junctions and outfalls) and incomplete storm drain pipe information within the study area. The subtasks associated with this effort are as follows:

2.3.9.1 Locate and Map Existing Structures Identify approximate locations of storm drain system features within the localized flooding study area. Assume probable pipe alignments. Provide approximate horizontal locations (+/- 10 feet) of storm drain nodes and assumed pipe alignments. Develop preliminary GIS of storm drain system including nodes and lines to represent the connectivity of the system.

2.3.9.2 Size and Dimension Structures Determine dimensions of storm drain features identified in the previous task. This will include inlet sizes; pipe sizes, invert depth, pipe shape and material type. Determine the vertical distance from top of structure to the pipe invert. Verify pipe alignments assumed in the previous task.

2.3.9.3 Top of Structure Elevation Determination Determine the top of structure elevations for inlets and manholes in the localized flooding study area. This will be estimated.

using existing COA topographic mapping and results of the previous analyses. Spot elevations may be required has been included in the fee estimate.

- 2.3.5.4 *Storm Drain GIS* Using data collected in the previous tasks compute pipe invert and soffit elevations. Update the GIS to include the complete storm drain network with appropriate data to perform the hydraulic analysis. This will include horizontal location and alignments of storm drain structures and pipes; inlet dimensions and top elevations; longitudinal and transverse roadway slopes at inlets; pipe sizes and material types; pipe lengths, elevations and slopes.

- 2.4 *Geomorphic Assessment of the East Fork Fort Branch Channel*. Perform a baseline geomorphic assessment of the East Fork of Fort Branch. Develop geomorphic reaches within the East Fork based on similar hydraulic conditions, slope, channel boundary material and vegetation. Identify and characterize visible sources and sinks of sediment in the channel boundary and contributing watershed. Characterize existing and potential channel stability using the rapid geomorphic assessment criteria.

- 2.5 *Riparian Vegetation Database Development*. Compile existing COA riparian vegetation information including Environmental Integrity Index scores to identify and characterize vegetative integrity along the riparian corridor. Summarize information in tabular form and incorporate into a GIS database.

- 2.6 *Sediment Sampling and Sieve Analysis*. Perform sampling of surface and subsurface channel bed and bank material sufficient to characterize sediment transport for each geomorphic reach. Perform particle-size distribution analyses (sieve) for the collected samples for use in sediment transport, the comprehensive sediment budget, hydraulic modeling and streambed monitoring. Assume 10 sample locations with 2 samples per location.

- 2.7 *Channel Instability Database Development*. Review, verify and update locations included in the existing COA watershed erosion assessment GIS. Compile channel instability data from the field measurements (Task 2.2.1). Geomorphic factors associated with channel instability include:

Assumptions:

- **CLIENT** will provide base maps, utility information, existing databases, previous studies, H&H models, design plans, as-built, and other geospatial data. COA contacts for data acquisition:
 - Erosion Assessment - Mike Kelly 974-6951
 - Storm Drain System - Leo Nichols 926-5613
 - Storm Drain Hydraulic Models - Han Tran 974-2582
 - Creek Hydraulic Models - Amy Muscarello 974-3538
 - Riparian Vegetation - Mateo Scoggins 974-1917
 - Water Quality & Land Use - Pat Harrigan 974-1563
 - Wastewater Infrastructure - Gonal Gudikhonda 974-0471
- Channel cross sections to be surveyed only in the areas identified where the current hydraulic model is not representative of existing conditions. This scope does not provide for survey of intermittent sections where current data exists.
- The existing storm drain system data collection effort is budgeted assuming 100 node locations where information will be obtained. If a significant number of additional structures are identified in the location and mapping effort, then additional resources will be required to complete the mapping, GIS development and analyses associated with this task.

Prerequisites

- Right of entry as needed

Deliverables

- Technical Memo to compile information generated from the Data Collection, Development and Management Task. This will include proper documentation, descriptions and associated digital files (survey and GIS databases) of information developed under this task.

Task 3 Hydrologic Analysis

Objective: Estimate hydrology in Fort Branch for evaluation and design related to creek flooding, localized flooding, erosion and water quality. The analysis will include a range of flows from low-frequency flood discharges for floodplain analyses and storm drain capacity to higher frequency flows for evaluation of channel stability. The hydrologic analyses will include the following tasks:

- 3.1 **Verify Existing Conditions Creek Flood Hydrology.** Analyze historical rainfall data, adjacent watershed stream gage data, and urban regional analysis to verify results of previous hydrologic flood studies. Verify existing HEC-1 results for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year storm events. In combination with the hydraulic analysis utilize high water mark information where available to verify hydrologic results.
- 3.2 **Develop Ultimate Conditions Creek Flood Hydrology and Hydrologic Map.** Develop future conditions peak discharges for the 0.5-, 1-, 2-, 5-, 10-, 25-, 50-, 100- and 500-year storm events using HEC-1. The future conditions will be based on projected population and employment data from the City's "Smart Growth" plan and current land use and impervious cover information. Develop GIS-based hydrologic map for existing and ultimate conditions to include runoff coefficients with subbasin delineations.
- 3.3 **Hydrologic Watershed Map.** Develop GIS-based hydrologic watershed maps for the primary drainage system to include sub-area delineations, soils classification, time of concentration flow paths, shallow concentrated flow and/or sheet flow areas, and creek channel.
- 3.4 **Storm Drain Flood Hydrology.** Develop subbasin characteristics and peak discharges for contributing drainage areas to the existing storm drain system within the localized flooding study area. Utilize STORMCAD to perform hydrologic analysis for the 2-, 5-, 10-, 25-, 50-, and 100-year storm events in compliance with COA drainage criteria.