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STATE OF TEXAS §
 §
COUNTY OF FORT BEND §

AGREEMENT FOR ENGINEERING SERVICES FOR JONES CREEK WATERSHED STUDY BETWEEN FORT BEND COUNTY DRAINAGE DISTRICT AND COSTELLO, INC.

THIS AGREEMENT is made and entered into by and between Fort Bend County DRAINAGE DISTRICT, (hereinafter "County"), a body corporate and politic under the laws of the State of Texas, and Costello, Inc. (hereinafter "Contractor"), a company authorized to conduct business in the State of Texas.

WITNESSETH

WHEREAS, County has determined that this Agreement is for personal or professional services and therefore exempt from competitive bidding under Chapter 262 of the Texas Local Government Code; and

WHEREAS, County desires that Contractor provide Engineering Services to perform a comprehensive hydrologic and hydraulic analysis of the current existing conditions along Jones Creek and Flewellen Creek within the Fort Bend County Drainage District (hereinafter "District"); and

WHEREAS, Contractor represents that it is qualified and desires to perform such services.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth below, the parties agree as follows:

AGREEMENT

Section 1. Scope of Services

Contractor shall render Services to County as defined in the Scope of Services which is attached as Exhibit A and includes pricing structure, as identified.

Section 2. Personnel

A. Contractor represents that it presently has, or is able to obtain, adequate qualified personnel in its employment for the timely performance of the Scope of Services required under this Agreement and that Contractor shall furnish and maintain, at its own expense, adequate and sufficient personnel, in the opinion of County, to perform the Scope of Services when and as required and without delays.

B. All employees of Contractor shall have such knowledge and experience as will enable them to perform the duties assigned to them. Any employee of Contractor who, in the opinion of County, is incompetent or by his conduct becomes detrimental to the project shall, upon request of County, immediately be removed from association with the project.

Section 3. Compensation and Payment

A. Contractor's fees shall be calculated based on performance of services as set forth in the attached Scope of Services (Exhibit A). The Maximum Compensation for the performance of services shall be divided into two "one year" periods, as outlined in Exhibit A, and described in Section 5. The Maximum Compensation for the performance of services for FY 2015 "Year 1" is set at two hundred thousand dollars and 00/100 (\$200,000.00); the Maximum Compensation for FY 2016 "Year 2" is set at two hundred and twenty-five thousand dollars and 00/100, (\$225,000.00) for a total Maximum Compensation for this Agreement in total for the two year period set at four hundred and twenty-five thousand dollars and 00/100 (\$425,000.00).

B. All performance of the Scope of Services by Contractor including any changes in the Scope of Services and revision of work satisfactorily performed will be performed only when approved in advance and authorized by County. In no case shall the amount paid by County under this Agreement exceed the Maximum Compensation without an approved change order.

C. The County agrees to pay Consultant a monthly fee based on the percentage of services performed as described in Section 1 of this Agreement, and to begin on the date of full execution of this agreement as witnessed with the signature of the last party hereto and to end on September 30, 2016. The first payment shall be due and payable October 30, 2014 from the submittal of the first invoice, and shall continue monthly with the last payment being due October 30, 2016. Consultant shall be solely responsible for expenses incurred in the pursuit of the tasks and activities described in this proposal. Consultant shall be reimbursed for actual expenses supported by properly submitted expense records.

D. County will pay Contractor based on the following procedures: Upon completion of the tasks identified in the Scope of Services, Contractor shall submit to County two (2) original copies of invoices showing the amounts due for services performed in a form acceptable to County. County shall review such invoices and approve them within 30 calendar days with such modifications as are consistent with this Agreement and forward same to the Auditor for processing. County shall pay each such approved invoice within thirty (30) calendar days. County reserves the right to withhold payment pending verification of satisfactory work performed.

Section 4. Limit of Appropriation

A. Contractor clearly understands and agrees, such understanding and agreement being of the absolute essence of this Agreement, that County shall have available in FY 2015

“Year 1”, a total sum of two hundred thousand dollars and 00/100 (\$200,000.00), and shall have available in FY 2016 “Year 2”, a total sum of two hundred and twenty-five thousand dollars and 00/100 (\$225,000.00) with a total maximum sum over the two year period to be four hundred and twenty-five thousand dollars and 00/100 (\$425,000.00), to perform a comprehensive hydrologic and hydraulic analysis of the current existing conditions along Jones Creek and Flewellen Creek specifically allocated to fully discharge any and all liabilities County may incur.

B. Contractor does further understand and agree, said understanding and agreement also being of the absolute essence of this Agreement, that the total maximum compensation that Contractor may become entitled to and the total maximum sum that County may become liable to pay to Contractor shall not under any conditions, circumstances, or interpretations thereof exceed four hundred and twenty-five thousand dollars and 00/100 (\$425,000.00).

Section 5. Term

A. The term shall begin immediately from the date of full execution of this agreement as witnessed with the signature of the last party hereto and will end on September 30, 2016.

B. The performance of services shall be divided into two “one year” periods, as outlined in Exhibit A and described hereto. FY 2015 or “Year 1” of the two year period shall begin immediately from the date of full execution of this agreement as witnessed with the signature of the last party hereto and will end on September 30, 2015. FY 2016 or “Year 2” of the two year period shall begin October 1, 2015 and end on September 30, 2016.

Section 6. Modifications and Waivers

A. The parties may not amend or waive this Agreement, except by a written agreement executed by both parties.

B. No failure or delay in exercising any right or remedy or requiring the satisfaction of any condition under this Agreement, and no course of dealing between the parties, operates as a waiver or estoppel of any right, remedy, or condition.

C. The rights and remedies of the parties set forth in this Agreement are not exclusive of, but are cumulative to, any rights or remedies now or subsequently existing at law, in equity, or by statute.

Section 7. Termination

A. Termination for Convenience: County may terminate this Agreement at any time upon thirty (30) days written notice.

B. Termination for Default

1. County may terminate the whole or any part of this Agreement for cause in the following circumstances:

- a. If Contractor fails to perform services within the time specified in the Scope of Services or any extension thereof granted by the County in writing;
- b. If Contractor materially breaches any of the covenants or terms and conditions set forth in this Agreement or fails to perform any of the other provisions of this Agreement or so fails to make progress as to endanger performance of this Agreement in accordance with its terms, and in any of these circumstances does not cure such breach or failure to County's reasonable satisfaction within a period of ten (10) calendar days after receipt of notice from County specifying such breach or failure.

2. If, after termination, it is determined for any reason whatsoever that Contractor was not in default, or that the default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the County in accordance with Section 7.B above.

C. Upon termination of this Agreement, County shall compensate Contractor in accordance with Section 3, above, for those services which were provided under this Agreement prior to its termination and which have not been previously invoiced to County. Contractor's final invoice for said services will be presented to and paid by County in the same manner set forth in Section 3 above.

D. If County terminates this Agreement as provided in this Section, no fees of any type, other than fees due and payable at the Termination Date, shall thereafter be paid to Contractor.

Section 8. Ownership and Reuse of Documents

All documents, data, reports, research, graphic presentation materials, etc., developed by Contractor as a part of its work under this Agreement, shall become the property of County upon completion of this Agreement, or in the event of termination or cancellation thereof, at the time of payment under Section 3 for work performed. Contractor shall promptly furnish all such data and material to County on request.

Section 9. Inspection of Books and Records

Contractor will permit County, or any duly authorized agent of County, to inspect and examine the books and records of Contractor for the purpose of verifying the amount of work performed under the Scope of Services. County's right to inspect survives the termination of this Agreement for a period of four years.

Section 10. Insurance

A. Prior to commencement of the Services, Contractor shall furnish County with properly executed certificates of insurance which shall evidence all insurance required and provide that such insurance shall not be canceled, except on 30 days' prior written notice to County. Contractor shall provide certified copies of insurance endorsements and/or policies if requested by County. Contractor shall maintain such insurance coverage from the time Services commence until Services are completed and provide replacement certificates, policies and/or endorsements for any such insurance expiring prior to completion of Services. Contractor shall obtain such insurance written on an Occurrence form from such companies having Bests rating of A/VII or better, licensed or approved to transact business in the State of Texas, and shall obtain such insurance of the following types and minimum limits:

1. Workers Compensation in accordance with the laws of the State of Texas. Substitutes to genuine Workers' Compensation Insurance will not be allowed.
2. Employers' Liability insurance with limits of not less than \$1,000,000 per injury by accident, \$1,000,000 per injury by disease, and \$1,000,000 per bodily injury by disease.
3. Commercial general liability insurance with a limit of not less than \$1,000,000 each occurrence and \$2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policyholder.
4. Business Automobile Liability coverage applying to owned, non-owned and hired automobiles with limits not less than \$1,000,000 each occurrence combined single limit for Bodily Injury and Property Damage combined.

B. County and the members of Commissioners Court shall be named as additional insured to all required coverage except for Workers' Compensation and Professional Liability (if required). All Liability policies written on behalf of Contractor shall contain waiver of subrogation in favor of County and members of Commissioners Court.

C. If required coverage is written on a claims-made basis, Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of the Contract and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of 2 years beginning from the time the work under this Contract is completed.

D. Consultant shall not commence any portion of the work under this Contract until it has obtained the insurance required herein and certificates of such insurance have been filed with and approved by Fort Bend County.

E. No cancellation of or changes to the certificates, or the policies, may be made without sixty (60) days prior, written notification to Fort Bend County.

F. Approval of the insurance by Fort Bend County shall not relieve or decrease the liability of the Consultant.

Section 11. Indemnity

CONSULTANT SHALL INDEMNIFY AND DEFEND COUNTY AGAINST ALL LOSSES, LIABILITIES, CLAIMS, CAUSES OF ACTION, AND OTHER EXPENSES, INCLUDING REASONABLE ATTORNEYS FEES, ARISING FROM ACTIVITIES OF CONTRACTOR, ITS AGENTS, SERVANTS OR EMPLOYEES, PERFORMED UNDER THIS AGREEMENT THAT RESULT FROM THE NEGLIGENT ACT, ERROR, OR OMISSION OF CONTRACTOR OR ANY OF CONTRACTOR'S AGENTS, SERVANTS OR EMPLOYEES.

Section 12. Confidential and Proprietary Information

A. Contractor acknowledges that it and its employees or agents may, in the course of performing their responsibilities under this Agreement, be exposed to or acquire information that is confidential to County. Any and all information of any form obtained by Contractor or its employees or agents from County in the performance of this Agreement shall be deemed to be confidential information of County ("Confidential Information"). Any reports or other documents or items (including software) that result from the use of the Confidential Information by Contractor shall be treated with respect to confidentiality in the same manner as the Confidential Information. Confidential Information shall be deemed not to include information that (a) is or becomes (other than by disclosure by Contractor) publicly known or is contained in a publicly available document; (b) is rightfully in Contractor's possession without the obligation of nondisclosure prior to the time of its disclosure under this Agreement; or (c) is independently developed by employees or agents of Contractor who can be shown to have had no access to the Confidential Information.

B. Contractor agrees to hold Confidential Information in strict confidence, using at least the same degree of care that Contractor uses in maintaining the confidentiality of its own confidential information, and not to copy, reproduce, sell, assign, license, market, transfer or otherwise dispose of, give, or disclose Confidential Information to third parties or use Confidential Information for any purposes whatsoever other than the provision of Services to County hereunder, and to advise each of its employees and agents of their obligations to keep Confidential Information confidential. Contractor shall use its best efforts to assist County in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limitation of the foregoing, Contractor shall advise County immediately in the event Contractor learns or has reason to believe that any person who has had access to Confidential Information has violated or intends to violate the terms of this Agreement and Contractor will at its expense cooperate with County in seeking injunctive or other equitable relief in the name of County or Contractor against any such person. Contractor agrees that, except as directed by

County, Contractor will not at any time during or after the term of this Agreement disclose, directly or indirectly, any Confidential Information to any person, and that upon termination of this Agreement or at County's request, Contractor will promptly turn over to County all documents, papers, and other matter in Contractor's possession which embody Confidential Information.

C. Contractor acknowledges that a breach of this Section, including disclosure of any Confidential Information, or disclosure of other information that, at law or in equity, ought to remain confidential, will give rise to irreparable injury to County that is inadequately compensable in damages. Accordingly, County may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies that may be available. Contractor acknowledges and agrees that the covenants contained herein are necessary for the protection of the legitimate business interest of County and are reasonable in scope and content.

D. Contractor in providing all services hereunder agrees to abide by the provisions of any applicable Federal or State Data Privacy Act.

E. Contractor expressly acknowledges that County is subject to the Texas Public Information Act, TEX. GOV'T CODE ANN. §§ 552.001 et seq., as amended, and notwithstanding any provision in the Agreement to the contrary, County will make any information related to the Agreement, or otherwise, available to third parties in accordance with the Texas Public Information Act. Any proprietary or confidential information marked as such provided to County by Contractor shall not be disclosed to any third party, except as directed by the Texas Attorney General in response to a request for such under the Texas Public Information Act, which provides for notice to the owner of such marked information and the opportunity for the owner of such information to notify the Attorney General of the reasons why such information should not be disclosed. The terms and conditions of the Agreement are not proprietary or confidential information.

Section 13. Independent Contractor

A. Contractor agrees that in the performance of work or services hereunder, Contractor shall be deemed an independent contractor, and any of its agents, employees, officers, or volunteers performing work required hereunder shall be deemed solely as employees of contractor or, where permitted, of its subcontractors.

B. Contractor and its agents, employees, officers, or volunteers shall not, by performing work pursuant to this Agreement, be deemed to be employees, agents, or servants of County and shall not be entitled to any of the privileges or benefits of County employment.

Section 14. Notices

A. Each party giving any notice or making any request, demand, or other communication (each, a "Notice") pursuant to this Agreement shall do so in writing and shall use one of the following methods of delivery, each of which, for purposes of this Agreement, is a writing: personal delivery, registered or certified mail (in each case, return receipt requested and postage prepaid), or nationally recognized overnight courier (with all fees prepaid).

B. Each party giving a Notice shall address the Notice to the receiving party at the address listed below or to another address designated by a party in a Notice pursuant to this Section:

County: **Board of Directors**
Fort Bend County Drainage District
ATTN: Chief Engineer, Mark Vogler, PE
Fort Bend County Drainage District
P.O. Box 1028
Rosenberg, Texas 77471

With a copy to: **Fort Bend County**
Attn: County Judge
401 Jackson Street
Richmond, Texas 77469

Contractor: **Costello, Inc.**
~~J. Stephen Wilcox, P.E., CFM~~ Gregory P. Frank, P.E. CFM
~~Project Engineer~~ Vice President
Hydrology & Hydraulics Department

C. Notice is effective only if the party giving or making the Notice has complied with subsections 14.A and 14.B and if the addressee has received the Notice. A Notice is deemed received as follows:

1. If the Notice is delivered in person, or sent by registered or certified mail or a nationally recognized overnight courier, upon receipt as indicated by the date on the signed receipt.
2. If the addressee rejects or otherwise refuses to accept the Notice, or if the Notice cannot be delivered because of a change in address for which no Notice was given, then upon the rejection, refusal, or inability to deliver.

Section 15. Compliance with Laws

Contractor shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of this Agreement, including, without limitation, Worker's Compensation laws, minimum and maximum salary and wage statutes and regulations, licensing laws and regulations. When required by County, Contractor shall furnish County with certification of compliance with said laws, statutes, ordinances, rules, regulations, orders, and decrees above specified.

Section 16. Performance Warranty

A. Contractor warrants to County that Contractor has the skill and knowledge ordinarily possessed by well-informed members of its trade or profession practicing in the greater Houston metropolitan area and Contractor will apply that skill and knowledge with care and diligence to ensure that the Services provided hereunder will be performed and delivered in accordance with the highest professional standards.

B. Contractor warrants to County that the Services will be free from material errors and will materially conform to all requirements and specifications contained in the attached Exhibit A.

Section 17. Assignment and Delegation

A. Neither party may assign any of its rights under this Agreement, except with the prior written consent of the other party. That party shall not unreasonably withhold its consent. All assignments of rights are prohibited under this subsection, whether they are voluntarily or involuntarily, by merger, consolidation, dissolution, operation of law, or any other manner.

B. Neither party may delegate any performance under this Agreement.

C. Any purported assignment of rights or delegation of performance in violation of this Section is void.

Section 18. Applicable Law

The laws of the State of Texas govern all disputes arising out of or relating to this Agreement. The parties hereto acknowledge that venue is proper in Fort Bend County, Texas, for all legal actions or proceedings arising out of or relating to this Agreement and waive the right to sue or be sued elsewhere. Nothing in the Agreement shall be construed to waive the County's sovereign immunity.

Section 19. Successors and Assigns

County and Contractor bind themselves and their successors, executors, administrators and assigns to the other party of this Agreement and to the successors, executors, administrators and assigns of the other party, in respect to all covenants of this Agreement.

Section 20. Third Party Beneficiaries

This Agreement does not confer any enforceable rights or remedies upon any person other than the parties.

Section 21. Severability

If any provision of this Agreement is determined to be invalid, illegal, or unenforceable, the remaining provisions remain in full force, if the essential terms and conditions of this Agreement for each party remain valid, binding, and enforceable.

Section 22. Publicity

Contact with citizens of Fort Bend County, media outlets, or governmental agencies shall be the sole responsibility of County. Under no circumstances whatsoever, shall Contractor release any material or information developed or received in the performance of the Services hereunder without the express written permission of County, except where required to do so by law.

Section 23. Captions

The section captions used in this Agreement are for convenience of reference only and do not affect the interpretation or construction of this Agreement.

Section 24. Conflict

In the event there is a conflict between this Agreement and the attached Exhibits, this Agreement controls.

ATTACHMENT A: SCOPE OF SERVICES

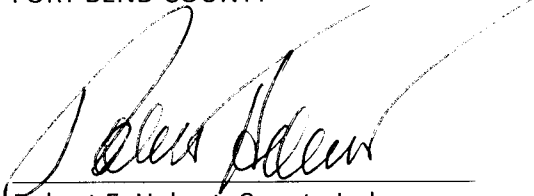
HNA: I/2015 agreements/10.21.2014

Execution page follows

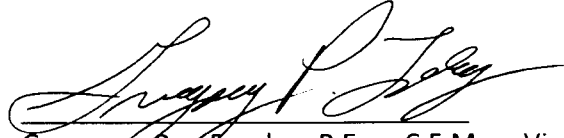
IN WITNESS WHEREOF, the parties hereto have signed or have caused their respective names to be signed to multiple counterparts to be effective on the 4 day of November, 2014.

FORT BEND COUNTY

COSTELLO, INC.



Robert E. Hebert, County Judge



Gregory P. Frank, P.E., C.F.M., Vice President

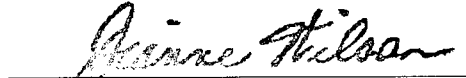
11-4-2014

Date

10/27/2014

Date

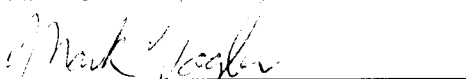
ATTEST:



Dianne Wilson, County Clerk




APPROVED:



Mark Vogler, Chief Engineer, Drainage District

AUDITOR'S CERTIFICATE

I hereby certify that funds are available in the amount of \$20,000⁰⁰ to accomplish and pay the obligation of Fort Bend County under this contract.



Robert Edward Sturdivant, County Auditor

EXHIBIT A



October 6, 2014

Mr. Mark Vogler, P.E., CFM
Chief Engineer
Fort Bend County Drainage District
1004 Blume Road
Rosenberg, Texas 77471

Re: Proposal for Engineering Services for Jones Creek Watershed Study – Existing Conditions
Fort Bend County Drainage District
CI Proposal No. 2014-241

Dear Mr. Vogler:

Pursuant to the request made by the Fort Bend County Drainage District (FBCDD), Costello, Inc. (CI) is pleased to provide you with the following proposal for engineering services related to a watershed study of the Jones Creek Watershed within Fort Bend County (FBC), Texas. This proposal details the scope of work required to perform a comprehensive hydrologic and hydraulic analysis of the current existing conditions along Jones Creek and Flewellen Creek.

A. PROJECT DESCRIPTION

Jones Creek is an approximately 32,000 acre (50 square mile) watershed located in north Fort Bend County (FBC), as shown on **Exhibit 1**. The watershed covers portions of the City of Fulshear including the extra-territorial jurisdictions (ETJ) of the Cities of Houston and Richmond. It also is intersected by major transportation facilities: Westpark Tollway, FM 723, and FM 359. The watershed has two major flooding sources, Jones Creek and Flewellen Creek, with a number of smaller tributaries and potential backwater effects from the Brazos River.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels that became effective in April 2014 reflect a Zone A floodplain designation for Jones Creek, Flewellen Creek and tributaries. FEMA defines Zone A as an approximated floodplain without base flood elevations or detailed models of the watershed and creeks. This produces a floodplain within the watershed which is more difficult for the County to regulate proposed projects to ensure all development criteria are met. A cursory review of past analyses indicates that the most recent comprehensive study of the watershed is in the report entitled "*Drainage Study of Jones Creek Watershed (including Flewellen Creek)*," dated September 1993, prepared by A.I. & Associates.

Since this time, a number of master plan communities have developed on the fringes and within the watershed that affect the results of the '93 study. Additionally, improvements to the channel have been constructed that change the hydraulic conditions of the creek. These modifications of the '93 study in

addition to lack of modeling that meets FEMA specifications necessitates a full restudy of the Jones Creek watershed.

B. SCOPE OF WORK

As part of this study, CI will perform a comprehensive hydrologic and hydraulic analysis of the existing conditions of the watershed that will conform to the 2011 Fort Bend County Drainage District Criteria Manual (DCM) and the FEMA Map Modernization Specifications and Guidelines (MapMOD). The analysis will be performed to the standards required by FEMA for detailed hydrologic and hydraulic analysis to facilitate a future Letter of Map Revision (LOMR), which would establish base flood elevations and Zone AE floodplain boundaries along Jones and Flewellen Creek. In the meantime, the study will establish a localized floodplain to regulate development to. The following scope of work will be provided:

1. SURVEYING

Field surveys will be performed to collect field data of all existing bridges, culverts, pipeline crossings, and an adequate number of natural channel cross sections to develop a hydraulic model of Jones Creek, Flewellen Creek, and certain tributaries within the study limits, as shown on **Exhibit 1**. Survey data will be collected in accordance with current FEMA requirements for flood studies. Photographs will be taken of each cross section and bridge location, upstream and downstream, to be provided in anticipation of a future LOMR. Preliminary review of the watershed indicates field survey of approximately 34 stream miles and 65 bridge/culvert crossing will be required. Where possible, existing hydraulic models with survey information that meets FEMA standards will be utilized. All survey will be overseen by a registered professional surveyor. An exhibit depicting the benchmark locations and survey control utilized for the survey will be included with the report along with a digital copy of the field notes. All field surveys will be performed using the 1988 North American Vertical Datum (NAVD), 2001 adjustment to be consistent with the effective Flood Insurance Study (FIS) of Fort Bend County. As needed, datum adjustments will be established for comparisons to previous studies and construction plans.

2. GENERAL DATA COLLECTION

General watershed data, such as aerial photography, existing contour mapping data, existing development drainage studies and models completed since the '93 study, existing construction plans pertinent to Jones Creek, and other similar data will be collected and reviewed. Pertinent data from these studies, such as design water surface elevations and maximum allowable flow rates along Jones Creek, will be compiled for use in the study. Field reconnaissance of the project area and overall watershed will be performed in order to develop accurate hydrologic and hydraulic parameters for the various models to be developed.

We understand that the FBCDD is in the processing of acquiring topographic Light Detection and Ranging (LiDAR) data for all of Fort Bend County. The LiDAR is anticipated to be issued prior to

the end of 2014 and FBCDD will provide the data for use in the study. The data will be processed to combine the field survey data with the overbank LiDAR data to create a unified digital Triangular Irregular Network (TIN) to replicate the existing ground and aid in hydraulic modeling. The TIN will extend beyond the 500-year water surface elevation with a minimum 1000-foot buffer.

3. EXISTING CONDITION ANALYSIS

The methodologies presented in the FBCDD 2011 DCM hydrology methodologies will be utilized for all analyses. In instances where methodologies are not specified in the FBCDD DCM, the Harris County Flood Control District "*Hydrology & Hydraulics Guidance Manual*" will be utilized in consultation with the FBCDD Engineer.

a. Hydrologic Analysis (HEC-HMS)

A hydrologic model of the Jones Creek Watershed will be developed using the current version of the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS v3.5). The study will determine the overall Jones Creek Watershed boundary and internal drainage divides utilizing the Fort Bend LiDAR information, on-ground observations, previous development drainage analysis boundaries, and aerial data. Generally, the watershed will be divided into sub-areas of approximately 1 to 2-square miles. An existing condition land-use analysis will be included to assist in the computation of percent impervious calculations for each sub-area. A review of current development drainage analyses will be performed and incorporated into the watershed models where possible. If needed, coordination with the existing development's engineers will be included to discuss assumptions and results.

Runoff parameters will be computed for use in determining peak runoff rates and runoff hydrographs at key locations throughout the watershed. In sub-areas generally less than 200 acres, the Rational Method peak flow rate will be computed and the corresponding sub-area parameters adjusted until the HMS peak flow is within 5.0% of the Rational Method peak. Storage-discharge relationships will be established for each routing reach within the model.

Hydrographs for the 24-hour duration 10-, 50-, 100-, and 500-year storm events will be analyzed in this study to meet FEMA requirements. In addition the 25-year storm event will be analyzed to allow for any future development storm sewer analysis in accordance with current FBCDD DCM.

b. Jones Creek Overflow Analysis

The study will identify and evaluate existing overflow connections between the Brazos River and Jones Creek. The '93 report identified two known overflows to the Brazos. The

LiDAR grid, prepared as part of the Brazos River study, will be used to evaluate potential overflow locations. A two-dimensional (2D) analysis of these areas will be performed to evaluate the dynamics of the overflow locations and develop diversion relationships to be included in the hydrologic model. Potential downstream impacts along the receiving stream from the diversions will not be evaluated in this project. Additionally, a review of the GCWA operations of the control pipes at Oyster Creek will be included in this analysis to determine potential flow rates

XP-STORM 2D will be utilized to evaluate each overflow location and the results utilized to develop the diversion relationship. The 2D model will use the project LiDAR to develop the natural ground GIRD surface within the XP-2D model. Where needed, field observations will be completed on downstream restrictions (i.e.: culverts, bridges, etc) to include into the 2D model. The 2D model will extend from the overflow location on Jones Creek to a point downstream along the overflow path to sufficiently simulate the diversion of flows from Jones Creek. The overflow model will utilize approximate methods and will not meet FEMA standards for mapping of a detailed overflow zone.

c. Hydraulic Model (HEC-RAS)

A steady-state hydraulic model of Jones Creek, Flewellen Creek, and the selected tributaries, within the limits shown on **Exhibit 1**, will be developed using the latest version of the USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS v4.2). The channel and structure surveys and other pertinent data collected will be used to develop this model in accordance with current FEMA modeling standards and requirements. The TIN developed from the survey and project LiDAR will be utilized within ARC-GIS HEC-GeoRAS extension to develop the channel cross sections and bridge/culvert hydraulic data. The 10-, 50-, 100-, and 500-year water surface events will be analyzed and a floodway analysis will be completed.

4. FLOODPLAIN MAPPING

Preliminary floodplain mapping will be prepared in accordance with FEMA standards to facilitate a future Letter of Map Revision for Jones Creek and Flewellen Creek and to aid in regulation of development within the watershed. The 100 and 500-year floodplains and floodway delineations will be created based on the results of the hydraulic analysis. Floodplain workmaps will be prepared depicting the resultant floodplains, stream centerlines, contours, cross sections, base flood elevations, roadways, and jurisdictional boundaries.

In addition to the localized floodplain, much of Jones Creek is subject to flooding from high stage events along the Brazos River. A condition with a 100-year flood stage on the Brazos will be

evaluated to determine the impacts from this event on the floodplain delineation along Jones Creek and to establish the limits of the 100-year Brazos River backwater floodplain along Jones and Flewellen Creek. This floodplain delineation will be included on the workmaps.

5. REPORT AND DOCUMENTATION

A report documenting pertinent data, assumptions, analysis, and results will be provided to aid in watershed planning and regulation. In addition, digital GIS shapefiles of resultant subarea boundaries, stream centerlines, floodplains, hydraulic cross sections, and base flood elevations will be provided along with the report. This report and applicable models will be presented to the FBCDD for review and approval.

6. PROJECT COORDINATION

It is anticipated that coordination will be needed both with FBCDD staff and engineering consultants that represent existing developments. This proposal will specify that a total of 6 meetings will be provided as part of this study. The meetings will include an initial project kickoff meeting and interim meetings at significant milestones during the Additional meetings can be accommodated with prior written authorization. Meeting minutes will be documented and provided to FBCDD by CI within one week of the meeting date.

C. COMPENSATION

Compensation for this work is proposed to be on a time and materials expended basis, with estimated budgets not to be exceeded without prior written authorization. The fees below will billed on a monthly basis in accordance with the attached Rate Schedule. FBCDD has notified CI that this project will be funded over a two year period. The proposed scope of work described above represents the total budget for the entire project. To meet the FBCDD funding timeframe, the scope of work will be divided over a two year period, with critical path items being performed in year one. The estimated fees for each major component of the above work are presented below:

	<u>Total</u>	<u>Year 1</u>	<u>Year 2</u>
1 Surveying:	\$ 175,000	\$ 160,000	\$ 15,000
2 General Data Collection :	\$ 35,000	\$ 15,000	\$ 20,000
3 Existing Condition Analysis:	\$ 155,000	\$ 20,000	\$ 135,000
4 Floodplain Mapping:	\$ 13,000		\$ 13,000
5 Report and Documentation:	\$ 35,000		\$ 35,000
6 Project Coordination:	\$ 12,000	\$ 5,000	\$ 7,000
Total Fees :	\$ 425,000	\$ 200,000	\$ 225,000

The total scope of \$425,000 reflects the budget established by FBCDD. Previous man-hour estimates provided to the FBCDD identified a total budget of \$500,000 for this study. That estimate included analyses of the downstream impacts of the overflow areas, research and compilation of existing right-of-way and easements along Jones and Flewellen Creek, and detailed modeling and field survey of all of the major tributaries within the watershed shown on **Exhibit 1**. The proposed scope of work excludes the detailed overflow analysis as described above and uses an approximated method of analyses for tributaries JCT-2 and JCT-3. If a more detailed analysis is desired for the overflow areas or Tributaries JCT-2 or JCT-3, an addendum with a detailed scope of work can be provided for those tasks at a later date.

D. REPRODUCTION/DELIVERIES/MILEAGE

All reproduction of approved construction documents, deliveries, and mileage associated with the project will be invoiced at rates billed to CI plus 10%.

If this proposal is acceptable, we will consider receipt of a signed copy of this letter as approval of our fees and authorization to begin. Please contact me at the above numbers or by e-mail at gfrank@costelloinc.com or Mr. Stephen Wilcox at swilcox@costelloinc.com if you have any questions.

Sincerely,
Costello, Inc.
TBPE Firm No. 280


Gregory P. Frank, P.E., CFM
Vice President


J. Stephen Wilcox, P.E., CFM
Project Manager – H&H

AGREED AND ACCEPTED BY: _____

PRINTED NAME: _____

DATE: _____

Attachments: Exhibit 1, Jones Creek Watershed Study Area
CI Rate Schedule

