ITEM NO. 5

STAFF REPORT

CITY OF OCEANSIDE

DATE: April 4, 2012

TO: Honorable Mayor and City Councilmembers

FROM: Development Services Department

SUBJECT: **APPROVAL OF AN AMENDMENT TO A PROFESSIONAL SERVICES AGREEMENT TO UPDATE THE MASTER PLAN OF DRAINAGE**

SYNOPSIS

Staff recommends that the City Council approve Amendment 1 in the amount of $175,000 to the professional services agreement with Tory R. Walker Engineering, Inc., for an update to the City's Master Plan of Drainage for additional compilation of Geographic Information System (GIS) database records, detailed analysis of local historic precipitation, and establishment of precipitation time series for continuous simulation analysis; and authorize the City Manager to execute the Amendment; and approve budget appropriations totaling $175,000 from the Unassigned Fund Balances of Drainage Funds 510, 514, 515, 522, 530, and 531 to the project accounts.

BACKGROUND

On April 6, 2011, the City Council approved a professional services agreement (PSA) with Tory R. Walker Engineering, Inc., to update the City's Master Plan of Drainage (MPD). A key function of the MPD update is to enable both City staff and the development community to clearly understand the City's long-term objectives and direction toward drainage infrastructure. Hence, the comprehensive evaluation of the City's current stormwater drainage conveyance system and an assessment of the interaction and impacts of recently adopted stormwater regulations are an important focus of this effort.

ANALYSIS

One of the key tasks of this update is the incorporation of an existing GIS database and the expansion of that database. The data within that database is approximate, two-dimensional and generally suitable just for a master plan of drainage level analysis, not useful for other purposes. However, recent advances in technology, coupled with more stringent State-mandated stormwater regulations, provides justification for building a more detailed database (three-dimensional digital model) of MPD facilities; one that is geospatially referenced (identified by coordinates and vertical datum) and therefore useful for other municipal programs. The programs and projects that will benefit from a geospatially referenced database include the City's Capital Improvement Program, the Water Utilities Department, and the Clean Water Program, as well as future private development projects within the City.

More detailed geospatially referenced data allows for an enhanced hydrologic and hydraulic analysis of existing drainage systems, which in turn provides better information needed to assess and prioritize CIPs. This data will also be more reliable for identifying potential conflicts with other utilities, such as water and sewer, which are also mapped throughout the City. Finally, if a geospatially referenced database is used in the MPD, the hydrologic and hydraulic model may be used in the Clean Water Program to help meet forthcoming Federal and State stormwater requirements, such as the Total Maximum Daily Load (TMDL) Implementation Plan. All of these benefits should ultimately result in cost savings to the City over the upcoming years. The draft MPD is anticipated to be completed the first quarter of 2013.

At the November 9, 2011 City Council meeting, the South Morro Hills Association (SMHA) expressed specific interest regarding the direction of the future water and sewer master plan update and the in progress master plan of drainage update. It is anticipated that the MPD update will remain consistent with previously adopted MPD's, current City zoning requirements, and current land use policies. Existing MPD documents specify that proposed facilities within the SMHA area will primarily be constructed by developers, as development occurs within the drainage basin. Undeveloped areas with environmental concerns will most likely continue to contain natural unimproved channels. Future improvements to natural channels may potentially be limited to channel enhancements at select locations, rather than completely lining or reconstruction the channel. The MPD may be amended in the future to accommodate zoning or land use policy changes, as necessary.

FISCAL IMPACT

Funding for this project is through drainage impact fees paid by developers. City Ordinance 85-23 indicates drainage impact fees can only be used for administration of the master plan program, construction of facilities, and the reimbursement of the cost of construction of authorized MPD facilities. See Attachment 1 for additional details regarding the benefits of the proposed amendment.

Staff requests $175,000 in budget appropriations from the Unassigned Fund Balances (xxx.3100.0001) of Drainage Funds 510, 514, 515, 522, 530, and 531 to the existing CIP projects as noted in the chart below. These appropriations will bring the total project financing to $775,000, therefore, sufficient funds are available.

Master Plan of Drainage Capital Accounts	Allocated Funding	Budget Appropriations Requested	Total Funding Amount
905116700510	$50,000	$30,000	$80,000
905543700512	$100,000		$100,000
905112900513	$25,000		$25,000
905573100514	$90,000	$10,000	$100,000
905117100515	$35,000	$65,000	$100,000
905117200522	$75,000	$25,000	$100,000
905117400530	$65,000	$35,000	$100,000

905117500531	$90,000	$10,000	$100,000
905117700540	$25,000		$25,000
905117800550	$45,000		$45,000
Totals	$600,000	$175,000	$775,000

INSURANCE REQUIREMENTS

The City's standard insurance requirements will be met.

COMMISSION OR COMMITTEE REPORT

Does not apply.

CITY ATTORNEY'S ANALYSIS

The referenced documents have been reviewed by the City Attorney and approved to form.

RECOMMENDATION

Staff recommends that the City Council approve Amendment 1 in the amount of $175,000 to the professional services agreement with Tory R. Walker Engineering, Inc., for an update to the City's Master Plan of Drainage for additional compilation of Geographic Information System (GIS) database records, detailed analysis of local historic precipitation, and establishment of precipitation time series for continuous simulation analysis; and authorize the City Manager to execute the Amendment; and approve budget appropriations totaling $175,000 from the Unassigned Fund Balances of Drainage Funds 510, 514, 515, 522, 530, and 531 to the project accounts.

PREPARED BY:

Scott O. Smith
City Engineer

SUBMITTED BY:

Peter A. Weiss
City Manager

REVIEWED BY:

Michelle Skaggs Lawrence, Deputy City Manager
George Buell, Development Services Director
Teri Ferro, Financial Services Director

Attachments:

1. Oceanside Master Plan of Drainage - Benefits of Proposed Amendment
2. PSA with Tory R. Walker Engineering, Inc. - dated April 6, 2011
   Exhibit A. Scope of Work - dated December 3, 2010
3. Amendment 1 to PSA with Tory R. Walker Engineering, Inc.
   Exhibit A. Scope of Work for Amendment 1

Oceanside Master Plan of Drainage
Benefits of Proposed Amendment

The purpose of this amendment is to build the master plan storm drain network using a more accurate GIS database, similar to that currently being done for other utilities in the City, and which have additional benefits for reasons stated below.

The Scope of Work in the Request for Proposals, and in the December 3, 2010, proposal submitted by Tory R. Walker Engineering, Inc. (TRWE) included incorporating the existing GIS database and mapping, which represents an approximation of data that is generally suitable for a master plan level, but not accurate enough for other purposes.

The current effort at the City (with existing staff and interns) to compile the more detailed GIS database will not be completed in time for use by the Master Plan of Drainage. It is therefore proposed that TRWE be authorized to amend their contract to build a GIS data base containing Master Plan storm drain facilities and General Plan land use designations. This would be in a format that is consistent with protocols established by the City.

Additional benefits for incorporating the more detailed GIS database into the Master Plan of Drainage include:

1) ***Storm Water Quality*** – An inventory of the City's storm water facilities is required under the City's storm water municipal permit, including facilities that are not master plan facilities, but tie into master plan facilities. Vertical data that are obtained for master plan analyses will be required in the coming years (to support TMDL studies and watershed studies). The City's existing storm water program will also benefit from the more detailed GIS data by organizing and simplifying monitoring and tracking tasks.

   For example, sediment TMDLs are anticipated in some watersheds in the near future. Sediment transport within drainage systems will be easier to track with GIS data that identifies elevations of key points, such as tops of channels, cleanout and inlet rim elevations. These "control points" will allow field measurements of sediment buildup, if invert and flow line elevations are known.

2) ***Detailed Analyses*** - The detailed (more accurate) GIS data will provide a skeletal framework for more detailed analyses and/or design of the City's storm drain systems.

   a) XPSWMM, the hydrologic/hydraulic model the City has chosen at TRWE's recommendation, gives modelers the ability to analyze overland flow (e.g., streets) and underground storm drains concurrently. This will allow the City to perform very detailed analyses of any system, giving greater accuracy of system deficiencies. The combination of soil type and land use will give a reliable rainfall runoff coefficient for each watershed.

   b) This will also aid in the prioritization of CIPs. For example, areas of likely flooding can be identified on the basis of whether the combined conveyance capacity of the subsurface storm drain and the overland street section can convey design flows while still maintaining a computed hydraulic grade line or water surface elevation less than a standard gutter section depth. Storm drains that result in flow depths greater than the street section can be categorized as potential problem areas, and CIPs can

be developed with greater confidence. Detailed elevation information in GIS is essential for modeling these dual drainage systems.

c) Traditional hydraulic modeling software is limited, in that it cannot also model hydrology, and in that dual drainage systems cannot be easily modeled. Since these older/traditional models do not adequately represent surface drainage patterns (such as at street intersections), complex analyses have almost never been attempted, which results in much guesswork, but with the surface topography in GIS and accurate storm drain data in GIS, such modeling can be done with much greater ease and accuracy.

d) Accurate storm drain information will allow detailed analyses of storm drain systems where downstream tail water conditions have an impact on the hydraulics of the system.

e) Actual storms and continuous simulations can be modeled and analyzed with a more accurate GIS database. Actual storm events with precipitation and stream gage data (or documented data) can provide accurate data and valuable information for calibration of models. Continuous simulation with accurate vertical data will allow analysis and/or design of BMPs and IMPs.

3) ***Utility Conflicts*** - More accurate GIS datum will be more reliable for identifying potential conflicts with other utilities. As Subsurface Utility Engineering (SUE) is quickly becoming a standard of care (as opposed to the traditional "potholing" approach), accurate GIS information is essential for the cost savings that are expected with SUE.

CITY OF OCEANSIDE

PROFESSIONAL SERVICES AGREEMENT

PROJECT: City of Oceanside Master Plan of Drainage (MPD)

THIS AGREEMENT, dated April 6, 2011, for identification purposes, is made and entered into by and between the CITY OF OCEANSIDE, a municipal corporation, hereinafter designated as "CITY", and Tory Walker Engineering, Inc., hereinafter designated as "CONSULTANT."

NOW THEREFORE, THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. **SCOPE OF WORK. Amendment of the City of Oceanside Master Plan of Drainage (MPD) to reflect revisions, additions and other changes in facilities.** A more detailed Scope of Service for the project, as defined by the CONSULTANT (dated December 3, 2010), is attached hereto as **Exhibit "A"** which includes Tasks 1 through 10, Task 12 and 14. Tasks 11 and 13 are NOT included in the scope of services.

2. **INDEPENDENT CONTRACTOR.** CONSULTANT'S relationship to the CITY shall be that of an independent contractor. CONSULTANT shall have no authority, express or implied, to act on behalf of the CITY as an agent, or to bind the CITY to any obligation whatsoever, unless specifically authorized in writing by the City Engineer. The CONSULTANT shall not be authorized to communicate directly with, nor in any way direct the actions of, any bidder or the construction contractor for this project without the prior written authorization by the City Engineer. CONSULTANT shall be solely responsible for the performance of any of its employees, agents, or subcontractors under this Agreement. CONSULTANT shall report to the CITY any and all employees, agents, and consultants performing work in connection with this project, and all shall be subject to the approval of the CITY.

3. **WORKERS' COMPENSATION.** Pursuant to Labor Code section 1861, the CONSULTANT hereby certifies that the CONSULTANT is aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and the CONSULTANT will comply with such provisions, and provide certification of such compliance as a part of this Agreement.

4. **LIABILITY INSURANCE.**

4.1. CONSULTANT shall, throughout the duration of this Agreement maintain comprehensive general liability and property damage insurance, or commercial general liability insurance, covering all operations of CONSULTANT, its agents and employees, performed in connection with this Agreement including but not limited to premises and automobile.

4.2 CONSULTANT shall maintain liability insurance in the following minimum limits:

Comprehensive General Liability Insurance	
(bodily injury and property damage)	
Combined Single Limit Per Occurrence	$ 1,000,000
General Aggregate	$ 2,000,000*
Commercial General Liability Insurance	
(bodily injury and property damage)	
General limit per occurrence	$ 1,000,000
General limit project specific aggregate	$ 2,000,000
Automobile Liability Insurance	$ 1,000,000

*General aggregate per year, or part thereof, with respect to losses or other acts or omissions of CONSULTANT under this Agreement.

4.3 If coverage is provided through a Commercial General Liability Insurance policy, a minimum of 50% of each of the aggregate limits shall remain available at all times. If over 50% of any aggregate limit has been paid or reserved, the CITY may require additional coverage to be purchased by the CONSULTANT to restore the required limits. The CONSULTANT shall also notify the CITY'S Project Manager promptly of all losses or claims over $25,000 resulting from work performed under this contract, or any loss or claim against the CONSULTANT resulting from any of the CONSULTANT'S work.

4.4 All insurance companies affording coverage to the CONSULTANT for the purposes of this Section shall add the City of Oceanside as "additional insured" under the designated insurance policy for all work performed under this agreement. Insurance coverage provided to the City as additional insured shall be primary insurance and other insurance maintained by the City of Oceanside, its officers, agents, and employees shall be excess only and not contributing with insurance provided pursuant to this Section.

4.5 All insurance companies affording coverage to the CONSULTANT pursuant to this agreement shall be insurance organizations admitted by the Insurance Commissioner of the State of California to transact business of insurance in the state or be rated as A-X or higher by A.M. Best.

4.6 All insurance companies affording coverage shall provide thirty (30) days written notice to the CITY should the policy be cancelled before the expiration date. For the purposes of this notice requirement, any material change in the policy prior to the expiration shall be considered a cancellation.

4.7 CONSULTANT shall provide evidence of compliance with the insurance requirements listed above by providing a Certificate of Insurance and applicable endorsements, in a form satisfactory to the City Attorney, concurrently with the submittal of this Agreement.

4.8 CONSULTANT shall provide a substitute Certificate of Insurance no later than thirty (30) days prior to the policy expiration date. Failure by the CONSULTANT to provide such a substitution and extend the policy expiration date shall be considered a default by CONSULTANT and may subject the CONSULTANT to a suspension or termination of work under the Agreement.

4.9 Maintenance of insurance by the CONSULTANT as specified in this Agreement shall in no way be interpreted as relieving the CONSULTANT of any responsibility whatsoever and the CONSULTANT may carry, at its own expense, such additional insurance as it deems necessary.

5. **PROFESSIONAL ERRORS AND OMISSIONS INSURANCE.** Throughout the duration of this Agreement and four (4) years thereafter, the CONSULTANT shall maintain professional errors and omissions insurance for work performed in connection with this Agreement in the minimum amount of One Million Dollars ($1,000,000.00).

CONSULTANT shall provide evidence of compliance with these insurance requirements by providing a Certificate of Insurance.

6. **CONSULTANT'S INDEMNIFICATION OF CITY.** To the greatest extent allowed by law, CONSULTANT shall indemnify and hold harmless the CITY and its officers, agents and employees against all claims for damages to persons or property arising out of CONSULTANT'S work, including the negligent acts, errors or omissions or wrongful acts or conduct of the CONSULTANT, or its employees, agents, subcontractors, or others in connection with the execution of the work covered by this Agreement, except for those claims arising from the willful misconduct, sole negligence or active negligence of the CITY, its officers, agents, or employees. CONSULTANT'S indemnification shall include any and all costs, expenses, attorneys' fees, expert fees and liability assessed against or incurred by the CITY, its officers, agents, or employees in defending against such claims or lawsuits, whether the same proceed to judgment or not. Further, CONSULTANT at its own expense shall, upon written request by the CITY, defend any such suit or action brought against the CITY, its officers, agents, or employees founded upon,

resulting or arising from the conduct, tortious acts or omissions of the CONSULTANT.

CONSULTANT'S indemnification of CITY shall not be limited by any prior or subsequent declaration by the CONSULTANT.

7. **OWNERSHIP OF DOCUMENTS.** All plans and specifications, including details, computations and other documents, prepared or provided by the CONSULTANT under this Agreement shall be the property of the CITY. The CITY agrees to hold the CONSULTANT free and harmless from any claim arising from any use, other than the purpose intended, of the plans and specifications and all preliminary sketches, schematics, preliminary plans, architectural perspective renderings, working drawings, including details, computation and other documents, prepared or provided by the CONSULTANT. CONSULTANT may retain a copy of all material produced under this Agreement for the purpose of documenting their participation in this project.

8. **COMPENSATION.** CONSULTANT'S compensation for all work performed in accordance with this Agreement, shall not exceed the total contract price of $509,790.00. A more detailed fee schedule, as defined by the CONSULTANT, is attached hereto in **Exhibit "B"**.

No work shall be performed by CONSULTANT in excess of the total contract price without prior written approval of the City Engineer. CONSULTANT shall obtain approval by the City Engineer prior to performing any work that results in incidental expenses to CITY.

9. **TIMING REQUIREMENTS.** Timing requirements shall be per **Exhibit "C"**. Anticipated Timeline which shall be updated by the CONSULTANT on a regular basis and as required by the City Engineer.

10. **ENTIRE AGREEMENT.** This Agreement comprises the entire integrated understanding between CITY and CONSULTANT concerning the work to be performed for this project and supersedes all prior negotiations, representations, or agreements.

11. **INTERPRETATION OF THE AGREEMENT.** The interpretation, validity and enforcement of the Agreement shall be governed by and construed under the laws of the State of California. The Agreement does not limit any other rights or remedies available to CITY.

The CONSULTANT shall be responsible for complying with all local, state, and federal laws whether or not said laws are expressly stated or referred to herein.

Should any provision herein be found or deemed to be invalid, the Agreement shall

be construed as not containing such provision, and all other provisions, which are otherwise lawful, shall remain in full force and effect, and to this end the provisions of this Agreement are severable.

12. **AGREEMENT MODIFICATION.** This Agreement may not be modified orally or in any manner other than by an agreement in writing signed by the parties hereto.

13. **SIGNATURES**. The individuals executing this Agreement represent and warrant that they have the right, power, legal capacity and authority to enter into and to execute this Agreement on behalf of the respective legal entities of the CONSULTANT and the CITY.

IN WITNESS WHEREOF, the parties hereto for themselves, their heirs, executors, administrators, successors, and assigns do hereby agree to the full performance of the covenants herein contained and have caused this Professional Services Agreement to be executed by setting hereunto their signatures on the dates set forth below.

Tory Walker Engineering, Inc.
973 Vale Terrace Drive, Suite 202
Vista, CA 92084

By: Tory R Walker
Name/Title TORY R. WALKER, PRES.

Date: _____

By: _____
Name/Title JENNIFER L. WALKER, SEC.

Date: _____

33-0892309
Employer ID No.

CITY OF OCEANSIDE

By: _____
City Manager

Date: 4-7-11

APPROVED AS TO FORM:

_____
City Attorney

NOTARY ACKNOWLEDGMENTS OF CONSULTANT MUST BE ATTACHED.

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California }
County of San Diego }

On 03-30-2011 (Date) before me, Traci L. Andrews (Here Insert Name and Title of the Officer),
personally appeared Tory Walker + Jennifer Walker (Name(s) of Signer(s)),

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Signature of Notary Public)

TRACI L. ANDREWS
Commission # 1764008
Notary Public - California
San Diego County
MyComm.Expires Aug 27, 2011

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

EXHIBIT A

TORY R. WALKER ENGINEERING, INC.
WATER RESOURCES PLANNING & ENGINEERING

December 3, 2010

Mr. Scott O. Smith
City of Oceanside Engineering Department
300 N. Coast Hwy.
Oceanside, CA 92054

SUBJECT: Proposal to Amend the City of Oceanside Master Plan of Drainage

Dear Mr. Smith:

The Tory R. Walker Engineering, Inc. (TRWE) team is delighted to present our Professional Consulting Services Proposal to you. We appreciate the opportunity to demonstrate our qualifications, experience, and project approach to amend the City of Oceanside Master Plan of Drainage. We previously provided detailed review services to the City for the 2005 Master Plan of Drainage. We have discussed this project with City Engineering staff and thought through the process you are about to undertake. We have prepared our proposal to best help you navigate the way ahead. We are confident that we offer you the best team for working with the City of Oceanside to prepare the most useful Master Plan of Drainage in San Diego County.

TRWE is very familiar with the watersheds and the drainage systems that drain these watersheds through the City of Oceanside. We are also very familiar with most of the contributing drainage systems upstream of the City, primarily in the City of Vista, where we have carefully studied the watersheds and drainage systems in detail. We understand the hydrology of the project area, from both a localized and regional perspective. We have studied many of the creeks, channels and floodplains in and upstream of the City of Oceanside. We have analyzed and designed flood detention systems throughout the area and have prepared sensitivity analyses to optimize networks of detention basins. Since 2004, we have provided valuable review and support services to the City of Oceanside for a number of drainage projects.

Building upon our experience and understanding of the City's drainage systems and the watersheds that drain through the City, we are very well prepared to work with the City of Oceanside to amend the master plan of drainage and complete all of the tasks described in the Request for Proposal. We are the premier North San Diego County water resources firm and are equipped to perform these tasks in-house with the personnel we currently have. We have added to our team Mike Klinefelter, an independent GIS expert, who is also very familiar with watershed, habitat and drainage issues. He will assist our in-house team with GIS tools and provide guidance where needed. An organizational chart is included with our proposal to indicate how the team will work together.

Each member of the team has the specific experience needed to see this project successfully completed. TRWE personnel have studied, analyzed and designed numerous and varied flood conveyance and detention facilities for over 25 years. Also, each member of the team is committed to be available for this project's duration, which we have anticipated to be at least through the end of 2011.

Mr. Scott O. Smith
Proposal to Amend the City of Oceanside Master Plan of Drainage
December 3, 2010

We greatly appreciate this opportunity to present our proposal to you and count it a privilege to offer our professional consulting services to the City of Oceanside. We also welcome the opportunity to discuss any aspect of this proposal with you, and we trust you will allow us to demonstrate how our vision, talent, flexibility, understanding and integrity work together to give you the best value of any team offering these services.

I as the undersigned offer this proposal, having the authority to commit to a Professional Service Agreement (PSA) with the City of Oceanside on behalf of Tory R. Walker Engineering, Inc.

Sincerely,

TORY R. WALKER ENGINEERING, INC.

Tory R. Walker, PE, CFM, LEED GA
President

enclosures

Scope of Services

As described in the Request for Proposals, the scope of services is summarized as follows:

Task 1: Obtain and Compile Hydrologic Information
Task 2: Update Inventory and Database with New Information
Task 3: Research Methodologies and Software Tools
Task 4: Review and Evaluate Existing and Proposed Detention Basins
Task 5: Hydrologic Analysis
Task 6: Revise Recommended Storm Drain Upgrades and Improvements
Task 7: Revise Construction Cost Estimates
Task 8: Capital Improvement Projects (CIP)
Task 9: Drainage Impact Fee Evaluation
Task 10: Meetings, Coordination and Delivered Product

Additional drainage tasks (optional at City discretion)
Task 11: San Luis Rey River - Flood Risk at Major Arterials
Task 12: Loma Alta Creek Watershed Studies
Task 13: Buena Vista Creek Watershed Studies
Task 14: Update City Drainage System Design Criteria

TRWE has spent time considering each task of the proposed scope of services. We have described below in more detail than described in the RFP our tentative approach, which will be further refined in meeting with and communicating with City Engineering Division staff. Our understanding of the tasks and approach to these tasks is as follows:

Task 1: Obtain and Compile Hydrologic Information

TRWE will meet with City Engineering Division staff, Public Works maintenance staff, and Clean Water Program staff to determine what information is available from the City. This will include, at a minimum, previous master plans of drainage (2005 MPD by Bureau Veritas and 1980 MPD by VTN), other hydrologic studies (associated with CIP projects, private developments, and other public agency studies available at the City), storm drain and BMP inventory and design information, detention basin design information, flood insurance studies, and watershed studies.

TRWE will also meet with (and/or coordinate with) other local, state, and federal agencies and any other pertinent sources to obtain pertinent information. Probable sources for additional information, similar to that obtained from the City of Oceanside, include the cities of Vista and Carlsbad, the County of San Diego, California Department of Transportation, the US Army Corps of Engineers, and Camp Pendleton. Pertinent information may also be available from both State and Federal agencies, such as California Department of Water Resources, Department of Conservation (e.g., the California Watershed Portal), State Water Resources Control Board (e.g., watershed studies and/or information), National Weather Service (e.g., precipitation data and/or statistical analysis), and the U. S. Geological Survey (e.g., stream gage data and analysis, geologic mapping). Additionally, pertinent information, including photographs, may also be available from some non-governmental organizations (NGOs), such as Preserve Calavera, the Center for Natural Lands Management, Friends of Loma Alta Creek, Buena Vista Audubon, and The Buena Vista Lagoon Foundation.

Task 2: Update Inventory and Database with New Information

TRWE provided review services to the City of Oceanside for the 2005 MPD prepared by Bureau Veritas. In the process of that detailed review, and because of our involvement with other drainage projects in the City, we became very familiar with many drainage systems and somewhat familiar with all the drainage systems. We will therefore only need to conduct an overview of the 2005 MPD for this task and then meet with the City to discuss the existence of newer or more accurate information that was not previously incorporated into the 2005 MPD.

We will meet with the City's Water Utilities Department to establish the base condition of the City's GIS database and mapping, as well as protocols and procedures for our team to coordinate closely with the City's GIS team. We will then incorporate the MPD and new information into the City's existing GIS database and update or revise data as necessary. Additionally, pertinent information from other sources obtained in Task 1 may be incorporated, but such information would possibly also need to be verified or noted as not yet verified. Field verification is not assumed within any of the tasks, except as specifically noted, so it will be important to make a distinction between sources of data and if the data needs to or has been verified.

Task 3: Research Methodologies and Software Tools

TRWE will research currently available methodologies and software tools for use in preparation of the amended MPD. We will evaluate the methodologies and tools and make recommendations to the City. We will submit proposed criteria for evaluation to the City and discuss the criteria with the City prior to the research. We anticipate this will result in the establishment of a system of weighting criteria that will be organized in a decision matrix. GIS compatibility and conversion of data, hydrologic and hydraulic methodologies and calculations, and updated mapping will be considered as part of the criteria. Recent use of methodologies and software for master planning purposes will also be considered. Additional criteria will be developed with this task, but will at least include considerations specific to the City of Oceanside's existing and future technological systems and capabilities and the ease of use for ongoing updates to the Master Plan.

We anticipate researching and evaluating the following software tools: XPSWMM, XPStorm, MIKE Urban, InfoSWMM and InfoWorks SD, Autodesk SSA, Hydra, and Bentley CivilStorm. We also anticipate using ESRI ArcView with ArcHydro Extension for input data generation. All of the methodologies and software tools will be compared using the weighted criteria decision matrix established by our meeting with the City. TRWE will then prepare a brief report summarizing the decision process and making recommendations. Methodologies and software will ultimately be selected by the City based upon their review of these recommendations.

Task 4: Review and Evaluate Existing and Proposed Detention Basins

The 2005 MPD did not consider the attenuation of flows in storm drain systems due to detention basins, and thus calculated peak discharges in systems downstream of these basins were likely all overestimated. TRWE will review any existing available data and as-built information related to existing detention basins within or upstream of the City. This information will be used to estimate attenuated peak flows upstream of MPD facilities. It is anticipated that 10 to 15 existing basins and up to 5 proposed basins will have to be

analyzed under this project to determine attenuated peak flows. We will use the results of the analyses to make recommendations, as appropriate, regarding possible modifications to basins. Optimization of the City's drainage infrastructure is the primary goal of this task; however, these basins will be analyzed for four discrete storm events, as defined in Task 5. The selection and number of basins to be analyzed shall be at the discretion of the City, and the result of the analysis shall be made part of the amended Master Plan. We have assumed one week of field survey to supplement and/or verify detention basin data, but a better estimate will be prepared once the basins have been identified.

To implement this task, we will meet with the cities of Oceanside and Vista to obtain as-built plans or design drawings and reports, where available. We will review the drawings and reports and follow up with site visits to each detention basin for the purpose of verifying and assessing existing conditions at the basins. The field survey will follow, with more specific information gathered, including outlet works, spillway information and dam crest information. Stage-storage relationships for the basins will be based on the City's 2-foot contour topographic mapping and supplemented as needed by the field survey. We will then use the above information to analyze the detention basins for attenuation of peak flows associated with the 100-year, 25-year, 10-year and 2-year storm events. Finally as already noted, we will make recommendations regarding possible modifications to existing detention basins and regarding proposed basins. After meeting with the City of Oceanside to discuss these recommendations, we will prepare a report incorporating analyses and final recommendations.

Detention basins that are part of the San Luis Rey River Basin Flood Control Project are excluded from this review, as they will not have any bearing on the MPD. Similarly, detention basins in Carlsbad will not be considered, as the only ones that might have relevance would be part of optional Task 13 and would thus be part of that task.

Task 5: Hydrologic Analysis

TRWE will prepare hydrologic models using the methodologies and software selected in Task 3. The geographic extents of this modeling will be approximately the same as previously prepared by Bureau Veritas in the 2005 MPD. We will extract relevant information from the Rational Method calculations prepared for the 2005 MPD. Pertinent information obtained from Tasks 1, 2 and 4 will also be incorporated into the new hydrologic model, generating results for the 100-year, 25-year, 10-year and 2-year storm events. TRWE will also produce an updated map (Appendix A, Figure 4 – 2005 MPD) including an acceptable method of geo-referencing each mapped Master Plan Facility to the appropriate hydrologic calculations.

This task will require the preparation and compilation of GIS layers, including (if available and applicable) soils, precipitation (2, 10, 25, 100-year), land use/cover, City of Oceanside storm sewer database inventory, City of Vista storm sewer, land use/cover database, Pendleton storm sewer, land use/cover database, and topography (Digital Terrain Model).

Once the preparatory work is completed, which will include the preparation and compilation of GIS layers, the extraction of information from the 2005 MPD, and the incorporation of new information into the new model, we will test and troubleshoot the model(s), verifying results for approximately 10 drainage systems, with input from City Engineering and/or maintenance staff. We will then run the model(s) for 2, 10, 25 and 100-year storms. Results for each of these storms will be useful in identifying the extent of deficiencies in different drainage systems and will thus be helpful in tasks 6 through 9.

Task 6: Revise Recommended Storm Drain Upgrades and Improvements

From the results of Tasks 4 and 5 and meetings with Public Works maintenance staff, TRWE will revise and update the 2005 MPD tables summarizing facility upgrades and improvements. Criteria previously used will likely be assumed for determining adequacy of existing facilities and for sizing new facilities. One notable addition to this will be the consideration of multiple-year (100, 25 and 10-year) frequencies.

We will meet with City Engineering staff to discuss results of Task 5 and to select storm frequencies for determining adequacy of existing and new storm drain systems for differing sizes and conditions. We will differentiate between existing and new facilities for various sizes and conditions. We will then incorporate the updated tables summarizing facility upgrades and improvements in the GIS database.

Task 7: Revise Construction Cost Estimates

From the results of Task 6, TRWE will revise and update the 2005 MPD tables summarizing construction cost estimates. Cost estimates will be based upon varying sizing criteria for different sizes and conditions (e.g., sump vs. flow by inlets). In addition to using revised facility sizes, a more current unit price list will be used.

Prior to updating the estimates, we will meet with City staff to discuss the source and desired format of the construction cost estimates. We will then incorporate the updated construction cost estimates tables in the GIS database.

Task 8: Capital Improvement Projects (CIP)

TRWE will assist the City in identifying Capital Improvement Projects under the City's Drainage Program. We will use the completed analyses from previous tasks and the input from Public Works maintenance staff to assist City Engineering staff in preparing documentation for these projects. The following criteria shall generally be used to identify and estimate CIP's:

a) Undersized Master Plan facility sizes (36-inch diameter and greater)
b) Identified chronic flood-prone areas
c) Identifying undersized CIP facilities from 18-inches up to MPD sizes
d) Identifying the need for additional inlets (CBs) and other drainage structures

It is anticipated that considerable engineering judgment, including close coordination with City staff, will be required to develop proposed Capital Improvement Projects. We plan to meet with City Engineering staff to identify probable CIP projects and criteria for selection of projects for CIP. We will prepare schematic plan drawings, using the City's 2-foot contour interval topographic mapping as a base, and cross reference the location of each CIP project on the updated map (Appendix A, Figure 4 – 2005 MPD). We will prepare separate cost estimates for each proposed CIP project using information from previous tasks. Finally, we will prepare a brief description for each CIP project and compile all information into packages. We assume up to 100 locations/projects will be identified.

Task 9: Drainage Impact Fee Evaluation

TRWE will assist the City in evaluating the City's existing Drainage Impact Fee structure based upon the results of Tasks 6, 7, and 8 and make recommendations regarding possible alternative fee structures. To accomplish this task, we will first meet with City Engineering staff to discuss pros and cons of various drainage impact fee structures based on results of

previous tasks. We will then research and evaluate various drainage impact fee structures and prepare a draft report of recommendations regarding drainage impact fee structures. We will meet with City Engineering staff once more to discuss the draft report and then revise the report of recommendations based on review comments and our meeting with the City.

Task 10: Meetings, Coordination and Delivered Product

Ongoing coordination and a number of meetings with the City Engineering staff and operations personnel are expected with the above tasks to identify chronic flood-prone areas and to obtain information. We estimate a total of 174 hours for all meetings; approximately 28 hours of that total would be with neighboring municipalities, and the remaining 146 hours would be with various City of Oceanside personnel. We estimate the total number of meetings with the City to be 32, and we estimate 9 meetings with other municipalities. Coordination for this project, including project management, is estimated to be 214 hours.

Upon completion of the above tasks, TRWE will compile the various reports into a final report and deliver to the City a minimum of 4 hard copies and a digital version of the final report, any project specific software used in the process, and a list of commercially available software required by the City to manage and maintain the amended master plan.

ADDITIONAL DRAINAGE TASKS (OPTIONAL AT CITY DISCRETION)

Task 11: San Luis Rey River - Flood Risk at Major Arterials

While the construction of levees along the San Luis Rey River has reduced some risk of flooding within the City, there still remains some risk. Part of this risk is associated with the lack of an approved Vegetation Management Plan within the river channel. If the levee is overtopped, there is the potential for major arterials, essential for passage of emergency vehicles, to be impassable.

TRWE will determine which roads classified at least as "major arterial" are subject to flooding based on water surface elevations from the FIRMs published prior to the construction of the levees. We will then evaluate the degree of flooding risk on these roads and make recommendations for each road regarding emergency vehicle travel.

For this task, we will review old (without levee) FIS information of the San Luis Rey River through the City, obtain and review the Corps' latest HEC-RAS model of the river through the City, and plot the water surface on top of City 2-foot contour interval topographic mapping. We will coordinate with the City to identify the major arterials of concern, and then review depths of flooding along those arterials with the City. We will also obtain and review road improvement plans for the affected portions of major arterials and conduct a site visit of those affected portions.

TRWE will then determine locations of greatest risk for overtopping of the levee based on the Corps' latest HEC-RAS model and the "No Vegetation Management Plan" scenario. Those locations of greatest risk for overtopping of the levee will be used to further evaluate the degree of flood risk at the affected arterials. We will use approximate (stochastic or probabilistic) means to estimate risk based on relative locations and topography. We will then make recommendations for each road regarding emergency vehicle travel and compile results into a report.

Task 12: Loma Alta Creek Watershed Studies

Based on a recent floodplain analysis of Loma Alta Creek (associated with a LOMR application package), some properties adjacent to the creek are at risk of flood damage in a 100-year storm event. TRWE will restudy the hydrology of the watershed, incorporating any pertinent results of previous tasks. One goal of this study will be to optimize the drainage system to reduce the risk of downstream flood damage from Rancho Del Oro Drive to the Pacific Ocean. This task will include the evaluation of possible new detention and modification of existing and/or planned detention basins. We will also evaluate solutions for reducing the risk of flood damage to properties along Industry Street, at the Cavalier Mobile Estates, and at the Oceanside RV Park.

TRWE is already quite familiar with the LOMR package and HEC-RAS model of Loma Alta Creek, having reviewed and commented on it for the City. We have also obtained a copy of the HEC-1 hydrology study of Loma Alta Creek and will review it in detail so as to determine where system optimization might be possible. We will import the HEC-1 model to HEC-HMS and troubleshoot the model, if necessary. We will then incorporate any pertinent results of previous tasks into the working HEC-HMS model, evaluating land use, vegetative cover, soils, lag, precipitation, and the infiltration/runoff relationship.

We will visit detention basins and possible detention basin locations in the watershed with a view of evaluating modifications of existing basins as appropriate. We will then evaluate the effects of possible new detention and existing detention basin modifications with a sensitivity analysis of the revised HEC-HMS model. The purpose of this analysis is to evaluate where detention is optimized within the watershed such that peak flow reductions are achieved.

With the optimization portion done, we will then evaluate solutions for reducing the risk of flood damage to properties along Industry Street, at the Cavalier Mobile Estates, and at the Oceanside RV Park. We will make recommendations to the City regarding possible solutions and associated constraints, costs and opportunities and then prepare a draft report. Solutions may be influenced by the outcome of the optimization study, which could result in peak reduction as at least part of a solution. Floodplain management, including channel and/or overbank/floodway fringe modifications will also likely be evaluated. We will meet with the City to initiate the study, discuss possible solutions, evaluate progress & direction, and to review the draft report. We will then revise the draft report for a final report.

Task 13: Buena Vista Creek Watershed Studies

TRWE will study the hydrology of the watershed, incorporating any pertinent results of previous tasks. Pertinent information will include, but not be limited to, our recent HEC-HMS study of the Buena Vista Creek Watershed upstream of South Melrose Drive within the City of Vista. That detailed hydrology study, which we completed for the City of Vista and incorporates possible detention basins, will be extended downstream to the Pacific Ocean. The goal of this study will be to optimize the drainage system to reduce the risk of flood damage within the City of Oceanside. This task will include the evaluation of possible new detention and modification of existing and/or planned detention basins. We will also evaluate solutions for reducing the risk of flood damage to properties upstream of Thunder Drive and at College Boulevard. At College Boulevard, we have already evaluated solutions in association with another contract and would thus be prepared to review that analysis with the City and determine if any further analyses would be beneficial.

In performance of this task, we will obtain and review any hydrology studies of Buena Vista

Creek from the cities of Oceanside and Carlsbad. As noted above, we have already completed detailed studies of Buena Vista Creek within Vista. We will extend the most recent hydrology study from Highway 78, where the current study ends, downstream to the ocean, evaluating what from the existing hydrology studies will be incorporated into the new comprehensive hydrology study.

We will incorporate any pertinent results of previous tasks into the working HEC-HMS hydrologic model, evaluating land use, vegetative cover, soils, lag, precipitation, and the infiltration/runoff relationship. We will visit Thunder Drive, College Boulevard, and possible new detention basins and existing detention basins with a view of evaluating modifications of existing basins as appropriate. We will then evaluate the effects of possible new detention and existing detention basin modifications with a sensitivity analysis of the revised HEC-HMS model. The purpose of this analysis is to evaluate where detention is optimized within the watershed such that peak flow reductions are achieved.

With the optimization portion done, we will then evaluate solutions for reducing the risk of flood damage to properties at Thunder Drive. We will evaluate channel modifications, both upstream and downstream, and evaluate road/culvert modifications. We are also prepared to further evaluate ways to reduce flooding risk at College Boulevard, if needed. As mentioned, we have completed an evaluation, which we will review with current City staff. Upon completion of this task, we will prepare a draft report. We will meet with the City to initiate the study, evaluate progress & direction, and to review the draft report. We will then revise the draft report for a final report.

Task 14: Update City Drainage System Design Criteria

TRWE will update Chapter II, Section 6 of the manual, the City's Drainage System Design Criteria. This update will incorporate requirements from the Master Plan of Drainage, current drainage design standards, hydrologic methods and regulatory requirements for storm water. We will meet with City Engineering staff on a regular basis and coordinate a public comment review to obtain input from the professional design community and the general public.

For this task, we will review the City's existing Drainage System Design Criteria, the County of San Diego's Drainage Design Manual, and up to three other similar (recent) drainage design manuals that incorporate storm water quality criteria. We will meet with City Engineering staff regularly, coordinate a public comment review, and write a draft updated Drainage System Design Criteria. We will send the draft to select reviewers (up to 10) for comments, coordinate and review City and select reviewers' comments and revise it as a final draft. We will then review final draft comments and prepare the final Drainage System Design Criteria.

ATTACHMENT 3

CITY OF OCEANSIDE
AMENDMENT TO
PROFESSIONAL SERVICES AGREEMENT

PROJECT: AMENDMENT #1 TO THE MASTER PLAN OF DRAINAGE PROFESSIONAL SERVICES AGREEMENT - 425412598 (906404500598)

THIS AMENDMENT TO PROFESSIONAL SERVICES AGREEMENT (hereinafter "Amendment"), dated _____, 2012, for identification purposes, is made and entered into by and between the CITY OF OCEANSIDE, a municipal corporation, hereinafter designated as "CITY", and Tory Walker Engineering, Inc., hereinafter designated as "CONSULTANT."

RECITALS

WHEREAS, City and Consultant are the parties to that certain Professional Services Agreement dated April 6, 2011, hereinafter referred to as the "Agreement", wherein Consultant agreed to provide certain services to the City as set forth therein; and

WHEREAS, the parties desire to amend the Agreement to provide for changes and/or modifications to the scope of work and CONSULTANT's compensation.

AMENDMENT

NOW, THEREFORE, as set forth herein, the parties hereto do mutually agree that the Agreement shall be amended as follows:

1. SECTION 1, **SCOPE OF WORK**, IS HEREBY AMENDED TO INCLUDE THE FOLLOWING ADDITIONAL WORK:

   Amendment #1 expands the scope of the contract to include Additional GIS Services, Precipitation Analysis, and Precipitation Time Series for Continuous Simulation Analysis.

   A detailed description of the additional scope of work, **Exhibit A**, is attached hereto and incorporated herein by this reference.

2. SECTION 8, **COMPENSATION**, IS HEREBY AMENDED BY ADDING A NOT TO EXCEED AMOUNT OF $175,000 FOR THE ADDITIONAL WORK, FOR A TOTAL NOT TO EXCEED CONTRACT AMOUNT OF $684,790.

AMENDMENT #1 TO THE MASTER PLAN OF DRAINAGE PROFESSIONAL SERVICES AGREEMENT - 425412598 (906404500598)

3. EXCEPT AS EXPRESSLY SET FORTH IN THIS AMENDMENT, THE AGREEMENT SHALL REMAIN IN FULL FORCE AND EFFECT AND IS HEREBY RATIFIED AND REAFFIRMED.

SIGNATURES. The individuals executing this Amendment represent and warrant that they have the right, power, legal capacity and authority to enter into and to execute this Amendment on behalf of the respective legal entities of the CONSULTANT and the CITY.

IN WITNESS WHEREOF the parties hereto being duly authorized on behalf of their respective entities to execute this Amendment, do hereby agree to the covenants contained in the Agreement, including this Amendment and have caused this Amendment to be executed by setting hereunto their signatures on the dates set forth below.

Tory Walker Engineering, Inc.
122 Civic Center Drive, Suite 206
Vista, CA 92084

By: _____
Tory R. Walker, President

Date: 3/21/12

By: _____
Jennifer L. Walker, Secretary

Date: 3/21/12

33-0892309
Employer ID No.

CITY OF OCEANSIDE

By: _____
Peter Weiss, City Manager

Date: _____

APPROVED AS TO FORM:

_____
City Attorney

NOTARY ACKNOWLEDGMENTS OF CONSULTANT MUST BE ATTACHED.

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Diego }

On March 21, 2012 (Date) before me, Troy G. Stephens, Notary Public (Here Insert Name and Title of the Officer),

personally appeared Tony R. Walker and Jennifer L. Walker (Name(s) of Signer(s)),

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) ~~is~~/are subscribed to the within instrument and acknowledged to me that ~~he/she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

TROY G. STEPHENS
Commission # 1899980
Notary Public - California
San Diego County
My Comm. Expires Sep 12, 2014

Place Notary Seal Above

Signature _____ (Signature of Notary Public)

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: City of Oceanside: Amendment to Professional Services Agreement

Document Date: March 21, 2012 Number of Pages: 2

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
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Scope of Services - Amendment Number 1

The scope of services for the additional tasks is summarized as follows:

Task 15: Additional GIS Services

Tory R. Walker Engineering (TRWE) will populate the City's existing geoDB (geodatabase) with data required for the XPSWMM model used in the City of Oceanside Storm Drain Master Plan. We will carefully follow the schema of the City's existing geoDB, so that it can be easily merged with the City's existing database. The building of the database will include transferring data from various plan drawings into links and nodes in ArcGIS. TRWE will supplement the plan drawings with field GPS data collected by the City of Oceanside.

The drainage features in the geoDB will include Storm Drain Master Plan level pipes (36-inch and greater diameter), channels and boxes (equivalent flow capacity equal or greater than a 36-inch diameter pipe), and cleanouts (associated with 36-inch and greater pipes); we will also include 30-inch diameter pipe, but not drain inlets. The attributes attached to each drainage feature will include only those necessary to complete the Storm Drainage Master Plan modeling. This may include, but not be limited to:

- Upstream flow elevation
- Downstream flow elevation
- Rim Elevation
- Feature size
- Type & Subtype
- Plan Date
- As-built date
- Editor & Date
- Comments
- Improvement plan/grading plan number

The Land Use geoDB will have the assessor's parcels as the base map with each parcel labeled with the land use per the City's current designation. Roadways will be separate features.

Assumptions:
The City of Oceanside will provide all plans and requested GPS data. Only drainage feature classes and fields required for the Storm Drain Master Plan modeling will be built by TRWE. Because there is no accurate measure of how many drainage features need to be created for the Storm Drain Master Plan modeling, we have estimated 6,500 drainage features, with their respected attributes, will be created as a part of this amendment. This estimate is based on the initial review of previous GIS data and a comparison of recent data creation in the Loma Alta Creek watershed.

Task 16a: Precipitation Analysis

We propose to analyze the existing hourly precipitation data to determine a more realistic intensity-duration frequency curve based upon measurements taken since 1951 in Oceanside. Data for our analysis will come from hourly data used for continuous simulations, obtained from the Project Clean Water (PCW) web site (*http://projectcleanwater.org/html/wg_susmp.html*), as well as average data obtained from the Western Regional Climate Center (WRCC) on its web page (*http://wrcc.dri.edu/summary/Climsmsca.html*), combined with detailed hourly data that can be purchased from WRCC. Also, correlation analysis from the Oceanside data and the best data in the County (San Diego Lindbergh Station, and to a lesser degree the Fallbrook Station) will help to improve the data analysis to fill gaps and to establish better values of intensities valid for Oceanside.

Justification for this detailed analysis is born from the extreme differences found in peak flows obtained from continuous simulations (2-year, 5-year, 10-year, 25-year up to 50-year peak flows) and the peak flows obtained from synthetic storm analysis in the *San Diego County Hydrology Manual* (SDCHM). Such differences can be more than 1 order of magnitude in some cases, and are due to multiple factors, some of which are:

1) Extremely conservative approach to determine intensities for durations of less than 1 hour by adjusting the data to a power law function in the SDCHM. The mathematical equation recommended in the SDCHM ($I = k/tn$) not only does not correspond with the best possible adjustment of the data, but also has the inconvenience of infinite intensity when the time of duration t reduces to zero. The *Handbook of Hydrology* recommends a better approach to avoid this mathematical obstacle: $I = k/(tn + c)$. The additional constant c will force the intensity I to have a finite maximum value even for a duration t=0, which is in line with physical observations. TRWE will obtain a better adjustment of the data that will reduce the exceedingly large intensities associated with short durations, intensities that have not been observed in real data.
2) Single storm analyses are highly dependent on the time of concentration, which most of the time is smaller than 15 minutes, while continuous simulation analysis is associated with hourly data and consequently hourly peak flows. In other words, continuous simulation peak flows are hourly in duration, while single storm event peak flows are instantaneous in duration.
3) Elimination of the artificial disaggregation of the data in Oceanside. Seven percent of the data used for continuous simulation in Oceanside has been improperly disaggregated in the recent HMP effort; this percentage increases to 11% for intensities larger than 0.5 in/hr. TRWE will perform a proper disaggregation of the data that preserves the statistical properties of the original data and does not generate artificial storms with a synthetic distribution that does not occur in nature.
4) Elimination of the aggregation of the data at the 0.1 inch level. This process artificially generates hourly intensities that can only occur in 0.1 in/hr increments and distorts the intensity distribution. TRWE will use an improved statistical analysis that takes into consideration the intensity-duration curve of the time periods where the data was collected with greater precision.

As part of this task, we propose to study in detail the "n,d" largest extreme events, with "n" being the number of years where data was properly obtained, and "d" the duration value selected. Those events will be analyzed at different durations in order to properly extrapolate the intensity

at shorter time intervals, and generate an adequate intensity-duration curve.

Additionally, we will correct many discrepancies between the PCW and the WRCC data sets. Those differences have an effect in the proper determination of the 2-year to 100-year intensities associated with peak flows for design purposes. For example, of the 10 wettest days from 1951 to 2008, 7 have differences in precipitation larger than 20% in both data sets, while such differences are almost non-existent in the San Diego Lindbergh Station data.

Task 16b: Precipitation Time Series for Continuous Simulation Analysis

As most of the time series analysis of precipitation performed for the previous task can be useful for continuous simulation purposes, we recommend adding as a task the improvement of the intensity-duration curve at an hourly level plus the extrapolation analysis that will allow building continuous time series with a time interval of 15-minutes and 30-minutes. Those times series will be generated in such a way that the statistical properties of the rainfall distribution are preserved, and those series can be used for continuous simulation depending on the time of concentration of the potential project. Establishment of time series with shorter time interval will increase the peak flows and generate more realistic values for the range of analysis of hydromodification BMPs, and will significantly reduce differences between continuous analysis and single storm analysis.

Fee Estimate – Amendment Number 1

We have estimated fees for completion of the additional tasks and have indicated totals below.

TASK	ESTIMATED COST
Task 15: Additional GIS Services	$ 160,000
Task 16a: Precipitation Analysis	$ 10,000
Task 16b: Precipitation Time Series for Continuous Simulation Analysis	$ 5,000
ESTIMATED TOTAL OF TASKS 15 AND 16	**$ 175,000**

Project Schedule – Amendment Number 1

We have anticipated time for completion of these additional tasks. Anticipated time for each task is shown below, and a preliminary project schedule is also included. These are preliminary and will likely be refined in discussions with City Engineering staff.

TASK	ANTICIPATED TIME
Task 15: Additional GIS Services	30 weeks
Task 16a: Precipitation Analysis	3 weeks
Task 16b: Precipitation Time Series for Continuous Simulation Analysis	2 weeks

Schedule of Hourly Rates

Below is our current schedule of hourly rates. We anticipate using this schedule through 2011.

TRWE's FEE SCHEDULE
(Effective date: 1/31/2010)

Principal	$185.00/hour
Project Manager	$150.00/hour
GIS Manager	$130.00/hour
Senior Engineer	$125.00/hour
Associate Engineer	$110.00/hour
Junior Engineer	$100.00/hour
Engineering Technician	$80.00/hour
CADD/GIS Technician	$80.00/hour
Clerical	$60.00/hour