

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

May Session of the April Adjourned

Term. 20 11

10th May 11

In the County Commission of said county, on the day of 20

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the request by the Prosecuting Attorney's Office to apply for the Victims of Crime Act (VOCA) Grant funds for the Victim Response Team through the Department of Public Safety in the amount of \$66,900.62.

Done this 10th day of May, 2011.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

Edward H. Robb

Edward H. Robb
Presiding Commissioner

Karen M. Miller

Karen M. Miller
District I Commissioner

Skip Elkin

Skip Elkin
District II Commissioner



Office of the Boone County Prosecuting Attorney

DANIEL K. KNIGHT, Prosecutor

705 E. Walnut Street – Courthouse
Columbia, Missouri 65201-4485

573-886-4100
FAX: 573-886-4148

DATE: May 10, 2011

TO: Commissioner Robb
Commissioner Miller
Commissioner Elkin

FROM: Bonnie Adkins
Boone County Prosecuting Attorney's Office

RE: VOCA Grant Award Application

I respectfully request your approval to apply for VOCA (Victims of Crime Act) grant funds for our Victim Response Team through the Department of Public Safety in the amount of \$66,900.62. The local match of \$16,901.25 is derived from the existing salary of the Victim Assistant, making the grant total \$83,801.87. We have been receiving funds for the Victim Response Team since 1993. The grant funds will be used for the salary of our Victim Specialist and a part time Case Specialist who will focus on felony case victims.

We anticipate serving over 3000 victims in the next grant cycle.

Thank you for your consideration of this request.

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In the County Commission of said county, on the

day of

20

the following, among other proceedings, were had, viz:

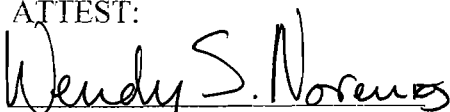
Now on this day the County Commission of the County of Boone does hereby approve the following consultant agreements:

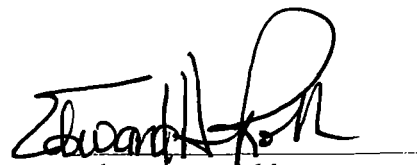
- a. Hanson Professional Services, Inc.
- b. Simon and Associates

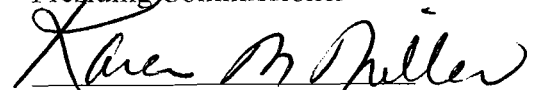
It is further ordered the Presiding Commissioner is hereby authorized to sign said agreements.

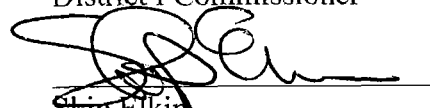
Done this 10th day of May, 2011.

ATTEST:


 Wendy S. Noren
 Clerk of the County Commission


 Edward H. Robb
 Presiding Commissioner


 Karen M. Miller
 District I Commissioner


 Skip Elkin
 District II Commissioner



Boone County Resource Management
801 E. Walnut, Room 315, Columbia, MO 65201 Phone (573) 886-4330 Fax (573) 886-4340

Contract/Consultant Routing Sheet

Initiated by: Paula Evans/Resource Management:

Date: 5/2/2011

The following agreement(s) are attached to this form:

Quantity	Description:
2	Consultant Agreements: Hanson Professional Services, Inc. Simon and Associates

Please process as indicated in the order shown below, and initial space next to your name as the requested item has been completed. Please forward to the next person indicated on this form.

- Three original contracts created
- Send originals to consultant for signature/rates
- Send Kristina e-mail to add to Commission Agenda:
First Reading of Contract set for: May 5, 2011
- Derin Campbell - Review, approve, and execute attached agreement(s)
- Paula - Verify second reading placed on agenda
- CJ Dykhouse - Review, approve, and execute attached agreement(s)
- Auditor - Review, approve, and execute attached agreement(s)
- Kristina - Clerk's office for Commission Approval
- Kristina - Keep one original for Clerk's office.
- Paula - Planning - Two original contracts received.
- Paula - Copy contract for FM consultant file (if required).
- Paula - Mail original contract to consultant.

RECEIVED

MAY - 5 2011

BOONE COUNTY AUDITOR

GENERAL CONSULTANT SERVICES AGREEMENT

THIS AGREEMENT dated this 10 day of May, 2011, by and between Boone County, Missouri, a first class county and political subdivision of the state of Missouri through its County Commission, (herein "Owner") and Hanson Professional Services, Inc. (herein "Consultant").

IN CONSIDERATION OF the performance of the services rendered under this Agreement and payment for such services, the parties agree to the following:

1. **Services** - As authorized by the Owner in writing, the Consultant shall provide the Owner all engineering, surveying, and other professional services for the benefit of the Owner as prescribed by the Owner based upon requests for proposals for projects assigned during the term of this agreement and the Consultant shall provide the Owner, as applicable, with the services, reports, studies, surveys, plans, specifications, and other work required by the Owner's request for proposal. Consultant agrees to provide all such services in a timely manner as established by the Owner in writing for each assigned project, or in the absence of the designation, within a reasonable time after receipt of Owner directives. Consultant agrees to provide services by and through qualified personnel under standards and conditions generally accepted by professionals in the field or occupations for which services are provided. Services shall be provided based only upon requests for proposals provided to the Consultant by the Owner or Owner's representative and to which the Consultant prepares and submits a written proposal for services which is approved by the Owner in writing. No work shall be performed nor shall compensation be paid for Consultant work performed without an Owner approved written proposal for professional services. Proposals for services shall be in written form, as required by the request for proposal, and shall be specifically responsive to the criteria provided by the Owner in its request for proposal. All work performed by the Consultant, based upon Owner approved proposals submitted by the Consultant, shall be subject to the terms and conditions of this agreement unless otherwise specifically agreed upon by the Owner and Consultant in writing. All proposals for work submitted by the Consultant to the Owner for work shall at a minimum contain the following:

1.1 **Scope of Services** - Each proposal for services shall contain a detailed description of work to be performed by the Consultant. When the Owner provides the Consultant with a written and/or graphic request for proposal, the Consultant's proposal shall be responsive to the request with the same or greater level of specificity required by the request for proposal. The Consultant shall specifically identify services which are included as basic services and those services which are excluded from basic services in the proposal. Services which the Consultant does not identify as excluded from basic services under the proposal and which are necessary for successful completion of the work in the judgment of the Owner shall be presumed to be a part of basic services under the proposal. If a request for proposal requires the Consultant to provide optional services, the Consultant's proposal shall respond to the options requested, or provide reasons why the Consultant cannot provide or respond to the request for optional services.

1.2 **Time for Completion** - Each proposal for services shall contain a detailed description of the estimated time to complete each task or item of work to be performed by the Consultant under the proposal. When the Owner provides the Consultant with a written and/or graphic request for proposal, the Consultant's proposal shall be responsive to any request for estimated or maximum completion times for work with the same or greater level of specificity required by the request for proposal.

1.3 **Compensation** - Each proposal for services shall state the basis of compensation on either: (1) an hourly fee plus expense basis with a statement of a maximum compensation to be charged, or, (2) a lump sum payment of compensation for all work to be performed, or, (3) a payment based upon unit prices. Proposals for compensation for an hourly fee plus expense basis shall provide detailed time and expense estimates to support a maximum contract amount to be charged and shall be consistent with the hourly rates, unit prices and reimbursement rates made a part of this agreement by reference in paragraph two (2) below. When the Owner or Owner's representative requests the Consultant to provide work on an hourly fee plus expense basis, the Consultant's proposal shall be responsive to the request and shall not propose payment on another basis unless otherwise authorized. Unit price proposals shall identify and estimate the quantity of units as a part of the proposal when they can be identified and estimated, or as necessary in response to a particular request for proposal requesting such information. Each proposal for services shall also state a proposed payment schedule at a frequency no greater than monthly in such amounts as are consistent with amount of work to be performed and billed. Reimbursable expenses proposed shall be specifically identified and estimated as a part of the proposal with a statement of the maximum amount to be charged unless the Owner's request for proposal specifies otherwise.

1.4 **Signatures** - Consultant proposals for services under this agreement shall be signed and dated by the Consultant or an authorized representative of the Consultant (as applicable), and shall be considered binding offers to contract open for acceptance by the Owner for an indefinite duration unless limited in the proposal or withdrawn prior to acceptance by the Owner. All proposals for services under this agreement shall be on forms approved by the Owner; use of the signature block shown in this agreement on a proposal for services shall be considered an adequate signature block. In the absence of an Owner provided form, the signature block shall contain a signature line for Boone County, Missouri by its Presiding Commissioner, a signature line for attestation by the County Clerk, a signature line approving the proposal by the Director of Public Works, and a signature line for the County Attorney approving the proposal as to legal form. In addition, the signature block shall contain a line for insertion of the date the proposal is approved by the Owner.

2. **Compensation** - In consideration for the Consultant's provision of services under this agreement, the Owner agrees to compensate the Consultant for services rendered in accordance with the hourly rates, unit prices and reimbursement rates for expenses set forth in the schedule for hourly rates and expense charges to be in effect for the calendar year of this agreement which is either attached to this agreement or maintained on file with the Boone County Public Works Department and is hereby incorporated by reference. No increases in the rates and charges set forth in the attached schedule shall be permitted for this calendar year without the written authorization of the Owner. Payments shall be made within thirty (30) days

of receipt of invoice by the Owner. Invoices shall be submitted periodically as mutually agreed upon by the Owner and Consultant, or in the absence of such agreement, upon completion of the work constituting the task or project for which services are provided. Invoices for services on an hourly fee plus expense basis shall individually describe the task or project by name, show hours expended by classes of personnel in increments of not less than one-half hour and rates applied, as well as describe work performed during the invoice period; reimbursable expenses shall be itemized. Invoices for services performed on a unit price basis shall identify the task or project by name, identify and quantify units charged for services during the invoice period. Invoices for services on a lump sum basis shall identify the task or project by name and the invoiced amount. Periodic invoices shall not exceed the amounts permitted in the Consultant's proposal approved by the Owner. The Owner reserves the right to withhold payment for inadequately documented invoices until documented as required herein. The Owner further reserves the right to withhold payments for unperformed work or work not performed on a timely basis in accordance with the Consultant's proposal when delays in performance of services are not attributable to the Owner, or as a result of a billing dispute between the Owner and Consultant. However, Owner agrees to pay interest at a rate of nine percent (9%) annum on any disputed billed amounts for which payments are withheld beyond thirty (30) days of invoice if and to the extent that those disputed amounts are resolved in favor of the Consultant.

3. **Owner Responsibilities** - Owner agrees to furnish Consultant with all current and available information for each task or project assigned to Consultant, along any information necessitated by changes in work or services initiated by the Owner which may affect services rendered thereunder.

4. **Coordination of Work and Work Product** - Consultant shall coordinate all work with the Owner's designated representative for each task or project assigned to Consultant and submit to the Owner's representative all work product in written or graphic form (and in electronic form if requested) as applicable or required. All reports, surveys, test data, memoranda, samples, plans, specifications, and other documents or materials submitted by or to the Owner shall be considered the property of the Owner. When available and requested by the Owner, work product shall be provided in electronic form at actual cost in media compatible for use with Owner software and equipment.

5. **Insurance** - Consultant shall procure and maintain professional liability insurance in such amounts as are deemed mutually agreeable to the parties and approved by the Owner or the Owner's representative in writing within thirty (30) days of this Agreement. Consultant shall also maintain general public liability insurance with coverage's no less than \$2,000,000.00 per occurrence, and worker's compensation insurance as required by state law. Failure of Consultant to obtain or maintain such insurance during this contract, or to provide proper proofs thereof upon request of the Owner, shall not diminish, waive or otherwise reduce the Consultant's obligations to maintain such insurance coverage and Consultant shall indemnify and hold the Owner and all its personnel harmless from and against any and all claims, damages, losses and expenses, including reasonable attorney's fees and litigation costs, arising out of or resulting from the performance of services, provided that any such claim, damage, loss or expenses, is caused in whole or in part by the negligent act, omission and or liability of the Consultant, its agents or employees. The Consultant shall provide the Owner with certificates of insurance exhibiting the coverage as specified above within thirty (30) days of execution of this agreement

and thereafter within five (5) working days after request by the Owner. All certificates of insurance shall contain provision that insurance provided shall not be canceled or altered except upon ten (10) days written notice to the Owner.

6. **Delegation and Subcontracting** - Unless otherwise proposed and approved in the Consultant's proposal for services, the Consultant shall not delegate or subcontract any work to be performed by the Consultant under this agreement to any other person, business or entity without the express advance written approval of the Owner for such delegation or subcontract work.

7. **Records and Samples** - To the extent not otherwise transferred to the Owner's possession, Consultant agrees to retain and provide the Owner with reasonable access to all work product, records, papers and other documents involving transactions and work related to or performed under this agreement for a period of three (3) years after this agreement expires. When services involve testing or sampling, Consultant agrees to either retain all test products or samples collected by or submitted to Consultant, or return same to the Owner as mutually agreed upon. In absence of agreement, Consultant shall not dispose of test samples or products without notice to or consent by the Owner or the Owner's representative.

8. **Additional Services** - No compensation shall be paid for any service rendered by the Consultant considered an additional service beyond the scope of services approved by the Owner unless rendition of that service and expense thereof has been authorized in writing by the Owner in advance of performance of such service. Any additional services performed by the Consultant prior to such authorization by the Owner shall be deemed a part of basic services for work performed under an Owner approved proposal for services governed by this agreement, whether enumerated in this agreement or not, for which the Consultant shall be entitled to no additional compensation.

9. **Owner Authorization** -When the term Owner is used in this agreement, it shall mean the government of Boone County, Missouri or the Boone County Commission, as the context requires. Authorization by the Owner shall mean authorization obtained by recorded majority vote of the Boone County Commission. It is further understood and agreed that no person or party is authorized to bind the Owner to any proposed agreement for services under the auspices of this agreement without having obtained the prior approval of the Boone County Commission by recorded majority vote for such authorization. In this regard, it is understood and agreed that the Consultant shall not be entitled to rely upon verbal or written representations by any agent or employee of the Owner in deviation to the terms and conditions of this agreement, or as authorization for compensation for services except as may be approved by recorded vote of the Boone County Commission. When the term Owner's representative is used, it shall mean the Director of the Boone County Public Works Department or his designee as specified in writing. It shall be presumed that such representative shall have all necessary decision making authority with respect to services provided under this agreement and Owner approved proposals for services except such representative shall have no authority to make decisions concerning changes to the Consultant's compensation or reimbursement, or with respect to services to be performed under this agreement or Owner approved proposal for services which involve or affect cost, expense or budgetary allowances.

10. **Termination** - The Owner may and reserves the right to terminate this agreement at any time with or without cause by giving the Consultant written notice of termination. Upon receipt of such notice, Consultant shall discontinue all services in connection with the performance of services authorized under this agreement or Owner approved proposal for services and Owner shall upon invoice remit payment for all authorized services completed up to the date of termination notice. Upon payment of this invoice, the Consultant shall deliver any and all work product including drawings, plans, and specifications, or other documents, prepared as instruments of service, whether complete or in progress. It is further agreed that if services are terminated the Consultant shall be compensated for all services rendered through the date of termination not to exceed the amount authorized for services through the date of termination. If the Owner questions the extent of work on a final invoice, the Consultant shall give the Owner the opportunity to review and evaluate all work upon which the invoice is based in the offices of the Consultant prior to payment. This agreement or work performed under the provisions of this agreement may also be terminated by the Consultant upon not less than seven days written notice in the event the Owner shall substantially fail to perform in accordance with the terms and conditions of this agreement, through no fault of the Consultant. In the event of termination by the Consultant, the other provisions concerning termination contained in this paragraph shall be applicable.

11. **Governing Law** - This agreement shall be governed by the laws of the state of Missouri and it is agreed that this agreement is made in Boone County, Missouri and that Boone County, Missouri is proper venue for any action pertaining to the interpretation or enforcement of any provision within or services performed under this agreement.

12. **Certification of Lawful Presence / Work Authorization** - Consultant shall complete and return the Work Authorization Certification attached hereto, and if applicable, the other required lawful presence documents for an individual Consultant.

13. **Miscellaneous** - This agreement constitutes the entire agreement of the parties superseding all prior negotiations, written or verbal, and may only be amended by signed writing executed by the parties through their authorized representatives hereunder.

14. **Duration of Agreement** - This agreement shall be in effect for the calendar year for which it is made and may be terminated in accordance with the terms and conditions set forth in this agreement.

IN WITNESS WHEREOF, the parties have executed this agreement by their duly authorized signatories effective the date and year first-above written.

HANSON PROFESSIONAL SERVICES, INC. BOONE COUNTY, MISSOURI

By Rod Sackell

By Edward H. Rom

Presiding Commissioner

Title Vice President

Dated: 3/18/11

Dated: 5-11-2011

APPROVED AS TO FORM:

ATTEST:

[Signature]
County Attorney

Wendy S. Naranjo
County Clerk

APPROVED:

[Signature]
Director, Boone County Public Works

CERTIFICATION:

I certify that this contract is within the purpose of the appropriation to which it is to be charged and there is an unencumbered balance of such appropriation sufficient to pay the costs arising from this contract.

June E. Richford 5/5/11 No Encumbrance
Auditor by Date Required

BASIS OF PAYMENT CONSULTING SERVICES

The following schedule is for normal design and consulting services provided on an hourly basis.

1. ENGINEER/ARCHITECT/SCIENTIST POSITIONS:

ENGINEER/ARCHITECT/SCIENTIST I	\$93.00
ENGINEER/ARCHITECT/SCIENTIST II	\$101.00
ENGINEER/ARCHITECT/SCIENTIST III	\$115.00
ENGINEER/ARCHITECT/SCIENTIST IV	\$125.00
ENGINEER/ARCHITECT/SCIENTIST V	\$138.00
ENGINEER/ARCHITECT/SCIENTIST VI	\$153.00
ENGINEER/ARCHITECT/SCIENTIST VII	\$182.00
ENGINEER/ARCHITECT/SCIENTIST VIII	\$213.00
PRINCIPAL	\$273.00

2. TECHNICAL POSITIONS:

AIDE	\$47.00
TECHNICIAN I	\$62.00
TECHNICIAN II	\$66.00
TECHNICIAN III	\$76.00
TECHNICIAN IV	\$86.00
TECHNICIAN V	\$96.00
TECHNICIAN VI	\$110.00
TECHNICIAN VII	\$116.00
MANAGER/DESIGNER	\$133.00

3. ADMINISTRATIVE:

ADMINISTRATIVE I	\$37.00
ADMINISTRATIVE II	\$51.00
ADMINISTRATIVE III	\$65.00
ADMINISTRATIVE IV	\$86.00
ADMINISTRATIVE V	\$104.00
ADMINISTRATIVE VI	\$116.00
ADMINISTRATIVE VII	\$153.00

4. Charges for special services, expert testimony, etc., will be negotiated.
5. The above rates cover straight time only. Overtime directed by the client will be surcharged by 25 percent.
6. Charges for outside consultants and contractors will be at invoice cost plus 10 percent.
7. Use of computer-aided design, drafting, GIS stations and technical software will be charged at \$15.00 per hour.
8. All direct job expenses and materials other than normal office supplies will be charged at cost plus 10 percent.
9. Mileage charges for automobile = 51 cents per mile. Mileage charges for mobile lab or truck = 65 cents per mile.

Charges for vehicles that will remain assigned to a specific job will be \$60.00 per day or \$825.00 per month for automobiles, and \$65.00 per day or \$975.00 per month for mobile labs or trucks, plus the cost of fuel in lieu of mileage charges.
10. Services will be billed monthly and at the completion of the project. There will be an additional charge of 1 1/2 percent per month compounded monthly on amounts outstanding more than 30 days.
11. Rates are subject to change and may be superseded by a new schedule on or about January 1, 2012.

11 Rev. 0



GENERAL CONSULTANT SERVICES AGREEMENT

THIS AGREEMENT dated this ^{10th} ~~26th~~ day of ^{May} ~~April~~, 2011, by and between Boone County, Missouri, a first class county and political subdivision of the state of Missouri through its County Commission, (herein "Owner") and Simon and Associates (herein "Consultant").

IN CONSIDERATION OF the performance of the services rendered under this Agreement and payment for such services, the parties agree to the following:

1. **Services** - As authorized by the Owner in writing, the Consultant shall provide the Owner all engineering, surveying, and other professional services for the benefit of the Owner as prescribed by the Owner based upon requests for proposals for projects assigned during the term of this agreement and the Consultant shall provide the Owner, as applicable, with the services, reports, studies, surveys, plans, specifications, and other work required by the Owner's request for proposal. Consultant agrees to provide all such services in a timely manner as established by the Owner in writing for each assigned project, or in the absence of the designation, within a reasonable time after receipt of Owner directives. Consultant agrees to provide services by and through qualified personnel under standards and conditions generally accepted by professionals in the field or occupations for which services are provided. Services shall be provided based only upon requests for proposals provided to the Consultant by the Owner or Owner's representative and to which the Consultant prepares and submits a written proposal for services which is approved by the Owner in writing. No work shall be performed nor shall compensation be paid for Consultant work performed without an Owner approved written proposal for professional services. Proposals for services shall be in written form, as required by the request for proposal, and shall be specifically responsive to the criteria provided by the Owner in its request for proposal. All work performed by the Consultant, based upon Owner approved proposals submitted by the Consultant, shall be subject to the terms and conditions of this agreement unless otherwise specifically agreed upon by the Owner and Consultant in writing. All proposals for work submitted by the Consultant to the Owner for work shall at a minimum contain the following:

1.1 **Scope of Services** - Each proposal for services shall contain a detailed description of work to be performed by the Consultant. When the Owner provides the Consultant with a written and/or graphic request for proposal, the Consultant's proposal shall be responsive to the request with the same or greater level of specificity required by the request for proposal. The Consultant shall specifically identify services which are included as basic services and those services which are excluded from basic services in the proposal. Services which the Consultant does not identify as excluded from basic services under the proposal and which are necessary for successful completion of the work in the judgment of the Owner shall be presumed to be a part of basic services under the proposal. If a request for proposal requires the Consultant to provide optional services, the Consultant's proposal shall respond to the options requested, or provide reasons why the Consultant cannot provide or respond to the request for optional services.

1.2 **Time for Completion** - Each proposal for services shall contain a detailed description of the estimated time to complete each task or item of work to be performed by the Consultant under the proposal. When the Owner provides the Consultant with a written and/or graphic request for proposal, the Consultant's proposal shall be responsive to any request for estimated or maximum completion times for work with the same or greater level of specificity required by the request for proposal.

1.3 **Compensation** - Each proposal for services shall state the basis of compensation on either: (1) an hourly fee plus expense basis with a statement of a maximum compensation to be charged, or, (2) a lump sum payment of compensation for all work to be performed, or, (3) a payment based upon unit prices. Proposals for compensation for an hourly fee plus expense basis shall provide detailed time and expense estimates to support a maximum contract amount to be charged and shall be consistent with the hourly rates, unit prices and reimbursement rates made a part of this agreement by reference in paragraph two (2) below. When the Owner or Owner's representative requests the Consultant to provide work on an hourly fee plus expense basis, the Consultant's proposal shall be responsive to the request and shall not propose payment on another basis unless otherwise authorized. Unit price proposals shall identify and estimate the quantity of units as a part of the proposal when they can be identified and estimated, or as necessary in response to a particular request for proposal requesting such information. Each proposal for services shall also state a proposed payment schedule at a frequency no greater than monthly in such amounts as are consistent with amount of work to be performed and billed. Reimbursable expenses proposed shall be specifically identified and estimated as a part of the proposal with a statement of the maximum amount to be charged unless the Owner's request for proposal specifies otherwise.

1.4 **Signatures** - Consultant proposals for services under this agreement shall be signed and dated by the Consultant or an authorized representative of the Consultant (as applicable), and shall be considered binding offers to contract open for acceptance by the Owner for an indefinite duration unless limited in the proposal or withdrawn prior to acceptance by the Owner. All proposals for services under this agreement shall be on forms approved by the Owner; use of the signature block shown in this agreement on a proposal for services shall be considered an adequate signature block. In the absence of an Owner provided form, the signature block shall contain a signature line for Boone County, Missouri by its Presiding Commissioner, a signature line for attestation by the County Clerk, a signature line approving the proposal by the Director of Public Works, and a signature line for the County Attorney approving the proposal as to legal form. In addition, the signature block shall contain a line for insertion of the date the proposal is approved by the Owner.

2. **Compensation** - In consideration for the Consultant's provision of services under this agreement, the Owner agrees to compensate the Consultant for services rendered in accordance with the hourly rates, unit prices and reimbursement rates for expenses set forth in the schedule for hourly rates and expense charges to be in effect for the calendar year of this agreement which is either attached to this agreement or maintained on file with the Boone County Public Works Department and is hereby incorporated by reference. No increases in the rates and charges set forth in the attached schedule shall be permitted for this calendar year without the written authorization of the Owner. Payments shall be made within thirty (30) days

of receipt of invoice by the Owner. Invoices shall be submitted periodically as mutually agreed upon by the Owner and Consultant, or in the absence of such agreement, upon completion of the work constituting the task or project for which services are provided. Invoices for services on an hourly fee plus expense basis shall individually describe the task or project by name, show hours expended by classes of personnel in increments of not less than one-half hour and rates applied, as well as describe work performed during the invoice period; reimbursable expenses shall be itemized. Invoices for services performed on a unit price basis shall identify the task or project by name, identify and quantify units charged for services during the invoice period. Invoices for services on a lump sum basis shall identify the task or project by name and the invoiced amount. Periodic invoices shall not exceed the amounts permitted in the Consultant's proposal approved by the Owner. The Owner reserves the right to withhold payment for inadequately documented invoices until documented as required herein. The Owner further reserves the right to withhold payments for unperformed work or work not performed on a timely basis in accordance with the Consultant's proposal when delays in performance of services are not attributable to the Owner, or as a result of a billing dispute between the Owner and Consultant. However, Owner agrees to pay interest at a rate of nine percent (9%) annum on any disputed billed amounts for which payments are withheld beyond thirty (30) days of invoice if and to the extent that those disputed amounts are resolved in favor of the Consultant.

3. **Owner Responsibilities** - Owner agrees to furnish Consultant with all current and available information for each task or project assigned to Consultant, along any information necessitated by changes in work or services initiated by the Owner which may affect services rendered thereunder.

4. **Coordination of Work and Work Product** - Consultant shall coordinate all work with the Owner's designated representative for each task or project assigned to Consultant and submit to the Owner's representative all work product in written or graphic form (and in electronic form if requested) as applicable or required. All reports, surveys, test data, memoranda, samples, plans, specifications, and other documents or materials submitted by or to the Owner shall be considered the property of the Owner. When available and requested by the Owner, work product shall be provided in electronic form at actual cost in media compatible for use with Owner software and equipment.

5. **Insurance** - Consultant shall procure and maintain professional liability insurance in such amounts as are deemed mutually agreeable to the parties and approved by the Owner or the Owner's representative in writing within thirty (30) days of this Agreement. Consultant shall also maintain general public liability insurance with coverage's no less than \$2,000,000.00 per occurrence, and worker's compensation insurance as required by state law. Failure of Consultant to obtain or maintain such insurance during this contract, or to provide proper proofs thereof upon request of the Owner, shall not diminish, waive or otherwise reduce the Consultant's obligations to maintain such insurance coverage and Consultant shall indemnify and hold the Owner and all its personnel harmless from and against any and all claims, damages, losses and expenses, including reasonable attorney's fees and litigation costs, arising out of or resulting from the performance of services, provided that any such claim, damage, loss or expenses, is caused in whole or in part by the negligent act, omission and or liability of the Consultant, its agents or employees. The Consultant shall provide the Owner with certificates of insurance exhibiting the coverage as specified above within thirty (30) days of execution of this agreement

and thereafter within five (5) working days after request by the Owner. All certificates of insurance shall contain provision that insurance provided shall not be canceled or altered except upon ten (10) days written notice to the Owner.

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7. **Records and Samples** - To the extent not otherwise transferred to the Owner's possession, Consultant agrees to retain and provide the Owner with reasonable access to all work product, records, papers and other documents involving transactions and work related to or performed under this agreement for a period of three (3) years after this agreement expires. When services involve testing or sampling, Consultant agrees to either retain all test products or samples collected by or submitted to Consultant, or return same to the Owner as mutually agreed upon. In absence of agreement, Consultant shall not dispose of test samples or products without notice to or consent by the Owner or the Owner's representative.

8. **Additional Services** - No compensation shall be paid for any service rendered by the Consultant considered an additional service beyond the scope of services approved by the Owner unless rendition of that service and expense thereof has been authorized in writing by the Owner in advance of performance of such service. Any additional services performed by the Consultant prior to such authorization by the Owner shall be deemed a part of basic services for work performed under an Owner approved proposal for services governed by this agreement, whether enumerated in this agreement or not, for which the Consultant shall be entitled to no additional compensation.

9. **Owner Authorization** -When the term Owner is used in this agreement, it shall mean the government of Boone County, Missouri or the Boone County Commission, as the context requires. Authorization by the Owner shall mean authorization obtained by recorded majority vote of the Boone County Commission. It is further understood and agreed that no person or party is authorized to bind the Owner to any proposed agreement for services under the auspices of this agreement without having obtained the prior approval of the Boone County Commission by recorded majority vote for such authorization. In this regard, it is understood and agreed that the Consultant shall not be entitled to rely upon verbal or written representations by any agent or employee of the Owner in deviation to the terms and conditions of this agreement, or as authorization for compensation for services except as may be approved by recorded vote of the Boone County Commission. When the term Owner's representative is used, it shall mean the Director of the Boone County Public Works Department or his designee as specified in writing. It shall be presumed that such representative shall have all necessary decision making authority with respect to services provided under this agreement and Owner approved proposals for services except such representative shall have no authority to make decisions concerning changes to the Consultant's compensation or reimbursement, or with respect to services to be performed under this agreement or Owner approved proposal for services which involve or affect cost, expense or budgetary allowances.

10. **Termination** - The Owner may and reserves the right to terminate this agreement at any time with or without cause by giving the Consultant written notice of termination. Upon receipt of such notice, Consultant shall discontinue all services in connection with the performance of services authorized under this agreement or Owner approved proposal for services and Owner shall upon invoice remit payment for all authorized services completed up to the date of termination notice. Upon payment of this invoice, the Consultant shall deliver any and all work product including drawings, plans, and specifications, or other documents, prepared as instruments of service, whether complete or in progress. It is further agreed that if services are terminated the Consultant shall be compensated for all services rendered through the date of termination not to exceed the amount authorized for services through the date of termination. If the Owner questions the extent of work on a final invoice, the Consultant shall give the Owner the opportunity to review and evaluate all work upon which the invoice is based in the offices of the Consultant prior to payment. This agreement or work performed under the provisions of this agreement may also be terminated by the Consultant upon not less than seven days written notice in the event the Owner shall substantially fail to perform in accordance with the terms and conditions of this agreement, through no fault of the Consultant. In the event of termination by the Consultant, the other provisions concerning termination contained in this paragraph shall be applicable.

11. **Governing Law** - This agreement shall be governed by the laws of the state of Missouri and it is agreed that this agreement is made in Boone County, Missouri and that Boone County, Missouri is proper venue for any action pertaining to the interpretation or enforcement of any provision within or services performed under this agreement.

12. **Certification of Lawful Presence / Work Authorization** - Consultant shall complete and return the Work Authorization Certification attached hereto, and if applicable, the other required lawful presence documents for an individual Consultant.

13. **Miscellaneous** - This agreement constitutes the entire agreement of the parties superseding all prior negotiations, written or verbal, and may only be amended by signed writing executed by the parties through their authorized representatives hereunder.

14. **Duration of Agreement** - This agreement shall be in effect for the calendar year for which it is made and may be terminated in accordance with the terms and conditions set forth in this agreement.

IN WITNESS WHEREOF, the parties have executed this agreement by their duly authorized signatories effective the date and year first-above written.

SIMON AND ASSOCIATES

By John Gunn

Title President

Dated: 5/26/11

BOONE COUNTY, MISSOURI

By Edward H. [Signature]

Presiding Commissioner

Dated: 5-11-2011

APPROVED AS TO FORM:

[Signature]
County Attorney

ATTEST:

Wendy S. Woran
County Clerk

APPROVED:

[Signature]
Director, Boone County Public Works

CERTIFICATION:

I certify that this contract is within the purpose of the appropriation to which it is to be charged and there is an unencumbered balance of such appropriation sufficient to pay the costs arising from this contract.

Jane E. [Signature] 5/5/11 No Encumbrance
Auditor by Date Required

SIMON ASSOCIATES, INC.
■■■■■■■■■■ ARCHITECTURE ■■■■■■■■■■

April 22, 2011

Schedule of hourly rates:

Architect / Engineer	\$120.00 / hour
Architect / Engineer Intern	\$ 85.00 / hour
Drafting	\$ 65.00 / hour
Clerical	\$ 45.00 / hour

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

May Session of the April Adjourned

Term. 20 11

10th

May

11

In the County Commission of said county, on the

day of

20

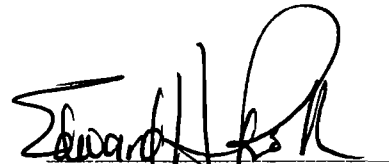
the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the request by Resource Management to pay Geosyntec for additional work completed regarding the Hinkson Creek TMDL in the amount of \$362.00.

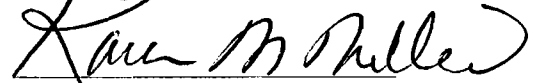
Done this 10th day of May, 2011.

ATTEST:

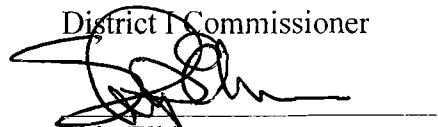
Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission



Edward H. Robb
Presiding Commissioner



Karen M. Miller
District I Commissioner



Skip Elkin
District II Commissioner



Boone County Resource Management

ROGER B. WILSON BOONE COUNTY GOVERNMENT CENTER
801 E. WALNUT ROOM 315 COLUMBIA, MO 65201-7730
(573) 886-4480 FAX (573) 886-4340

STAN SHAWVER, DIRECTOR

PLANNING – INSPECTIONS – ENGINEERING

DERIN CAMPBELL, PE; CHIEF ENGINEER

To: Boone County Commission

From: Georganne Bowman, Stormwater Coordinator

Date: Tuesday, May 03, 2011

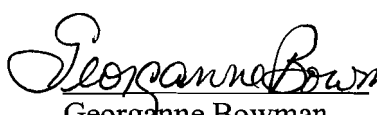
Re: Work on the Hinkson Creek TMDL regulations

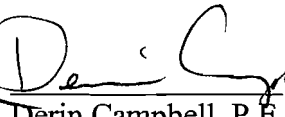
Please approve payment of the attached bill from GeoSyntec for additional work completed regarding the Hinkson Creek TMDL. We originally had a contract, based on the annual consultant agreement, for GeoSyntec to provide a technical evaluation of the Draft Hinkson Creek Total Maximum Daily Load prepared by MDNR and the U.S. Environmental Protection Agency. After completion of the original comment letter in April 2010, payment was made and P.O. number 2010-114 was closed.


Boone County did not receive a rebuttal to our first opposition of the Hinkson Creek TMDL from MDNR/USEPA until October 2010; at which time we were given a 30 day time period to respond with additional comments. Provided the short turn around time allotted for completion of our second comment letter, assistance was requested from GeoSyntec, via Lathrop & Gage, as they were familiar with the project and would be able to provide the technical review in a timely manner.

The expectation was that the 2nd comment letter would be an independent piece of work, and billed as such. The invoice recently received for the 2nd letter makes it seem to be part of the original contract, which had a not to exceed amount of \$9692.00.

We respectfully request your authorization to pay invoice # 18112027 in the amount of \$362.00 for the second comment letter.


Georganne Bowman
Stormwater Coordinator


Derin Campbell, P.E.
Interim Director, PW


Stan Shawver
Director, Res. Mang.

Technical and Regulatory Review of the Hinkson Creek Total Maximum Daily Load Evaluation For Boone County, Missouri

Project Scope of Services

In 2004, Hinkson Creek, located near Columbia, Missouri was included on Missouri's 303(d) list because the Missouri Department of Natural Resources ('Department') determined aquatic life beneficial uses were not being attained. However, subsequent stream evaluations by the Department failed to identify a specific cause of the impairment. In 2009, the Department completed a draft Total Maximum Daily Load (TMDL) report concluding significant reductions in storm water runoff volume were needed to restore aquatic life uses in Hinkson Creek. The Department solicited public comments regarding the draft and subsequently revised their TMDL recommendations. The revised TMDL was recently released for public comment and, like the first report, concludes that reductions in storm water runoff volume will be needed to achieve aquatic life uses in Hinkson Creek. These conclusions may have significant ramifications on provisions in the Municipal Separate Storm Water (MS4) permit jointly held by Boone County, the City of Columbia, and the University of Missouri.

On behalf of Boone County ('County'), Geosyntec Consultants, Inc. ('Geosyntec') will evaluate the technical and regulatory defensibility of the draft TMDL developed for Hinkson Creek. In performing this evaluation, Geosyntec will complete the following tasks:

Task 1. Review Existing Data and Background Information.

Geosyntec will review available data and background information to further project objectives. Available information may include ambient data collected by the Department, discharge monitoring reports, or data from previous stream evaluations or permitting efforts. Task 1 includes one project kick-off meeting to discuss project objectives and approach.

Task 2. Prepare Technical Comment Letter

Geosyntec will review the merit and defensibility of the draft TMDL and summarize technical concerns within a comment letter that may be submitted by the County during the comment period. Task 2 includes one meeting to discuss Geosyntec's findings with the County prior to submittal of public notice comments.

Deliverable Summary

Geosyntec proposes to conduct a technical review of the draft TMDL with respect to commonly accepted scientific methods and Clean Water Act requirements. A summary of Geosyntec's findings will be provided in a format amenable for use within a public notice comment letter. In addition, Geosyntec will prepare for, and attend, a maximum of two meetings with the County to facilitate development of the review letter and communicate identified concerns to the Department.

**ATTACHMENT A
GEOSYNTEC CONSULTANTS, INC.**

2010 Rate Schedule

Principal	190 \$/hr
Associate	180 \$/hr
Sr. Professional	162 \$/hr
Project Professional	145 \$/hr
Professional	125 \$/hr
Sr. Staff Professional	108 \$/hr
Staff Professional	96 \$/hr
Field Professional	84 \$/hr
Admin Assistant/Tech Word Processor	52 \$/hr
Direct Expense	Cost + 10%
Subcontracted Services	Cost + 12%
Communications Fee	3% of Professional Fees
Per Diem	46 \$/day
Photo Copies	.08 \$/per copy
Mileage	Current IRS Rate
Field Vehicle	85 \$/day
Expert Witness	250 \$/hr

Rates are provided on a confidential basis and are client and project specific.

Rates will be adjusted annually based on the US Department of Labor, Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers.

COOPERATIVE AGREEMENT

THIS AGREEMENT, made and entered into this 21ST day of APRIL, 2010, by and between Boone County Missouri, a political subdivision of the State of Missouri, hereinafter "County;" and the Curators of the University of Missouri, a public corporation of the State of Missouri, hereinafter "University".

WITNESSETH:

WHEREAS, County and University are interested in procuring a technical and regulatory review of the Hinkson Creek Total Maximum Daily Load Evaluation; and

WHEREAS, the parties desire to cooperate in the procurement of said review; and

WHEREAS, both parties have the authority to enter into this Cooperative Agreement under the provisions of RSMo §70.220.

NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

- 1) County will procure the technical and regulatory review contemplated in the proposal from Geosyntec Consultants, attached hereto and incorporated herein by reference, for a total cost to County in the amount of Nine Thousand Six Hundred and Ninety-Two Dollars (\$9,692.00).
- 2) University will reimburse County the sum of Four Thousand Eight Hundred and Forty Six Dollars (\$4,846.00) for said regulatory review within Sixty (60) days of the date of this agreement.

IN WITNESS WHEREOF, the parties have caused this agreement to be executed by the duly-authorized representative as of the date and year stated above.

COUNTY OF BOONE:

By: _____
Kenneth M. Pearson, Presiding Commissioner
Boone County, Missouri

Dated: _____

ATTEST:

Wendy Noren, Clerk of the County Commission

ENCUMBRANCE - PURCHASE ORDER
 BOONE COUNTY, MISSOURI
 GOVERNMENT CENTER
 801 E. WALNUT

20100000114

DATE: 5/24/2010

VENDOR NUMBER:
 13925

COLUMBIA MO 65201
 GEOSYNTECT CONSULTANTS INC
 5901 BROKEN SOUND PKWY NW #
 BOCA RATON, FL 33487-0000

DELIVER TO:
 2046

STORMWATER ADMINISTRATION
 MARY SCHOOLEY
 5551 HWY 63 S
 COLUMBIA, MO 65201-0000
 573-449-8515

SPECIAL INSTRUCTIONS:

RECEIVED

JUN 04 2010

BOONE COUNTY AUDITOR

BILL TO:
 2046

STORMWATER ADMINISTRATION
 MARY SCHOOLEY
 5551 HWY 63 S
 COLUMBIA, MO 65201-0000
 573-449-8515

QTY	DESCRIPTION	LOT	UNIT PRICE	AMOUNT
1	TECHNICAL REVIEW OF TOTAL MAXIMUM DAILY LOAD EVALUATION	NOT TO EXCEED	\$9,692.00	\$ 9,692.00
	2046 STORMWATER ADMINISTRATION 71101 PROFESSIONAL SERVICES			
<u>TOTAL AMOUNT:</u>				\$ 9,692.00

16 - 3273

6/4/2010	Please pay and CLOSE Invoice 1810469	\$	9,692.00
----------	--------------------------------------	----	---------------------

9686.75 per Georganne
 06/08/10 MK



Spent	Remaining
\$9,692.00	\$ -

**PAYMENT AUTHORIZED BY:  **

** DEPARTMENT COPY - ATTACH INVOICE(S) AND RETURN TO AUDITOR'S OFFICE FOR PAYMENT **
 AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY INSTITUTION

MK

Final Memorandum

Date: 21 April 2010
To: Georganne Bowman, Boone County Public Works
Tom Wellman, Public Works Department, City of Columbia, MO
Todd Houts, University of Missouri
Copies to: Eric Strecker, P.E., Geosyntec Portland, OR
From: Trent Stober, P.E., Geosyntec Columbia, MO
Subject: Technical Evaluation of Draft Hinkson Creek Total Maximum Daily Load (TMDL)

1. BACKGROUND

Hinkson Creek is a perennial Ozark-border stream draining a 90 mi² catchment in Boone County, Missouri. In 2004, Hinkson Creek was placed on Missouri's list of impaired waters ('303(d) list') as some monitored reaches did not fully attain applicable biocriteria metrics at frequencies specified by regulatory guidance. The pollutant initially listed as causing the aquatic life impairment was 'unknown'. Bioassessment and ecotoxicology evaluations performed by the Missouri Department of Natural Resources (MDNR) through 2006 did not conclusively identify a causative agent. A draft Total Maximum Daily Load (TMDL) document for Hinkson Creek included for Public Notice on March 8th, 2010 targets reductions in stormwater runoff as a surrogate for a cumulative, but unidentified mixture, of pollutants that may occur in urban and agricultural environments.

A Municipal Separate Storm Sewer System (MS4) permit is jointly held by the City of Columbia, MO, Boone County, and the University of Missouri. At the request of MS4 co-permittees ('permittees'), Geosyntec conducted a third-party technical review of the methods and approaches used in developing the TMDL. This memorandum conveys conclusions and specific comments identified during our review. Where possible, we have suggested approaches that may improve the usefulness or defensibility of TMDL elements. Section 2 summarizes the major findings of our review. Specific technical comments related to hydrologic, landuse, and biologic data interpretations are included in Section 3.

We believe that additional stressor-response data and a more refined hydrologic analysis approach are necessary to assure that compliance with TMDL targets will yield consistent attainment of Hinkson Creek aquatic life uses. In addition, we suggest that attainment of biocriteria at frequencies prescribed by Missouri's 303(d) listing methodology and biocriteria documents serve as the primary TMDL target as (1) bioassessment scores served as the rationale for listing Hinkson Creek as impaired and (2) site-specific causal relationships between runoff and ecological health have not been established in the TMDL.

3. SPECIFIC COMMENTS

3.A. HYDROLOGIC ANALYSIS AND INTERPRETATION

Comment 3.A.1. Periods of record for comparative analyses appear to be inconsistent.

Comparison of landuses from 1993 and 2005 are presented to support the claim of increased imperviousness. However, the flow-duration curves presented in Section 5.1 are compared for 1967 and 2007. Because the time periods of comparative analysis differ, potential changes to *the flow-duration curve are not clearly the result of unquantified changes in urbanization*. Is it possible that changes in farming practices or climatic patterns have influenced hydrograph and flow-duration characteristics?

We also request explanation of the following period-of-record related comments and observations:

- In Table 8, precipitation and flow statistics for 1967 and 2007 are compared for the April 1 – July 31 period. Why are only 4 out of 12 months of available data being used to describe precipitation and runoff? Should MDNR believe that conclusions drawn from fall biological surveys are relevant in assessing use attainment in Hinkson Creek, it would seem appropriate that flow data collected in the late summer/ fall season also be incorporated into hydrologic analyses and comparisons. How do we know that antecedent precipitation regimes did not influence the results a 4-month comparison? Furthermore, as precipitation and streamflow data generally do not follow a normal statistical distribution, we question the use of the arithmetic means to describe central tendencies. If the period of record is expanded to all available and comparable months for 1967 and 2007 (March 11 – December 31, n=296), we note that the median, geometric mean, and cumulative Period of Record (POR) streamflow values for 1967 (median=5.75 cfs) are greater than values for 2007 (median= 3.05 cfs). Side-by-side boxplots of the two data sets (Exhibit 1) indicate both years have very skewed daily average flows, *which suggests that the arithmetic mean is a biased estimator* and the median is a more appropriate metric of the central tendency of data. More importantly, the medians are not

- Flow duration curves inherently require long-term continuous flow records to adequately capture the large variation in rainfall and runoff characteristics. *The selection of only four months (April 1 – July 31) for only two individual years (1967 and 2007, Figure 4) is not adequate for identifying differences in precipitation-runoff responses.* Presumed differences in the flow-duration curves could be attributed to differences in precipitation characteristics alone. A comparison of the intensity-duration curves should supplement the flow-duration curve analysis to ensure differences in precipitation characteristics are not the cause of the presumed differences in the flow-duration relationship. Also, the trend analysis uses precipitation data from two different rainfall gages without evaluating whether the observed trends are simply due to differences in rainfall characteristics at the two gages. The Columbia Regional Airport weather station (COOP ID 231791) includes hourly data from 1970 through 2010. *A single gage should be used or the differences between the gages should be quantified and accounted for in the analysis.*

Comment 3.A.2. Runoff volume trend analysis appears to be incomplete and may be inconclusive.

Long-term flow data from the USGS gauge in Hinkson Creek was used with rainfall records from two separate weather stations to develop a multivariate regression stormwater runoff model for the watershed. In addition to rainfall, the other independent variables included the year and month. There are several technical shortcomings present in this analysis. These concerns are discussed below.

- Figure 5 is a linear regression of rainfall versus storm event runoff volume, but there is no discussion of how rainfall events were defined (e.g., 24-hour totals, 6-hour hour minimum inter-event times etc.) or how storm event runoff volumes were computed (i.e., baseflow separation methods). Methods, models, or algorithms used to calculate runoff and baseflow volumes (Appendix C) from USGS streamflow records are not documented or described in the TMDL. A fundamental premise of the TMDL is that runoff volume has increased over time, yet there is no means of being able to determine how runoff volume was calculated or derived in the TMDL. MDNR should provide additional documentation that describes the methods and assumptions used in developing runoff and baseflow volumes, listed in TMDL appendices. All runoff calculations should be based on streamflow data averaged over the same time period. Runoff volumes computed from daily average flows are not comparable to volumes derived from hourly average flow values.

- It is not clear what rationale supports purposeful selection of unequal sample sizes in the t-test included as Table 9. *The period for 1974-1991 (n=87) has nearly twice the number of samples compared to 2007-2009 (n=45).* Furthermore, why was the period of 1974-1991 selected? We note that Figure 4 and Table 8 use 1967 as a reference for a less-impacted hydrograph.

Comment 3.A.3. Rationale for modeling approach and TMDL attainment stream analyses are unclear.

Four streams within the same ecoregion of Hinkson Creek that are achieving their biological metrics were selected for flow-duration comparisons. Flow-duration curves for these watersheds were adjusted based on watershed size and annual precipitation. However, the rationale for, and the details of, these adjustments are not provided. All of the attainment streams have larger watersheds with different landuse areas compared to Hinkson Creek. Dividing each flow rate by the watershed size and annual precipitation does not adequately account for differences in runoff volumes, flow rates, or rainfall characteristics (e.g. intensity, timing etc.). Many other watershed factors must be considered including imperviousness, soil types, and time-of-concentration. Time-of-concentration can have a significant impact on the flow duration curve and is affected by slope, degree of channelization, stream order, surface roughness, etc. *Because of these many factors, rainfall-runoff relationships are very non-linear and very watershed specific.* As such, the validity of the simple linear adjustment that was made to flow duration curves is highly questionable. Also, the selection of the 1-year return flow for the target flow appears arbitrary and is not supported by monitoring data or analysis that would suggest this return period is biologically or geomorphologically significant. The selection of a slightly different return period, such as 2 times per year or $2/365=0.5\%$ instead of the 0.3% value, the target flow rate reductions would be nearly 50% less (i.e., target reductions would be approximately 25% instead of 50%).

Comment 3.A.4. TMDL requirements are unclear.

Throughout the TMDL, flow is used interchangeably with volume, but these are two distinctly different hydrologic metrics that have very different control strategies. Flow rate reductions may be achieved using detention storage with controlled release to shave peaks, while volume reductions require increased infiltration, evapotranspiration, and/or harvest and use. Because the target reductions are based on a comparison of flow duration curves at the 1-year return period, one may surmise that flow rate reductions are required such that the 1-year peak flow in Hinkson Creek must match the target 1-year peak flow of the attainment streams. The applicability of these reductions for any other flow return period is not supportable because the differences between Hinkson Creek and the attainment streams vary with the frequency of occurrence.

and delivered to the Hinkson Creek channel. *We note that MDNR survey reports suggest that evaluating the effects of sediment should be considered in subsequent investigations.* Where contaminated sediment may represent a significant exposure pathway, the role of sediment budgeting techniques (Walling and Owens 2003, Walling 1999) may be useful during TMDL re-analysis.

Comment 3.A.7. The runoff reduction approach does not adequately consider groundwater delivery processes or alterations in the water balance.

The runoff reduction approach posed by the TMDL does not adequately consider fate and transport of pollutants that may contaminate groundwater in urban areas. For example, if the unidentified pollutant(s) are discharged from groundwater sources during baseflow conditions then reducing runoff volumes could potentially increase overall in-stream concentrations. In addition, increasing infiltration in areas where soils are contaminated, or where known up-gradient plumes occur, could in fact cause an increase in pollutant(s) reaching Hinkson Creek.

Targeting runoff volumes calculated from the 1960s is an incomplete approach and does not consider the water balance as a whole. To achieve streamflow characteristics from the 1960's, we may actually have to infiltrate volumes of water that exceed historic rates due to potential reductions in evapotranspiration (Grimmond and Oke 1999). *The TMDL should consider propagated effects on the urban water balance if a runoff-reduction approach continues to be pursued.*

3.B. LANDUSE ANALYSIS AND INTERPRETATION

Comment 3.B.1. Landuse categories in the draft TMDL do not reflect underlying MORAP datasets.

Based on our analysis of the 1993 and 2005 Missouri Resource Assessment Program (MORAP) datasets, we note that there is no strictly "urban" landuse category as presented in the draft TMDL (Exhibit 2). Additionally, the landuse categories differ between the 1993 and 2005 MORAP data and are therefore not directly comparable.

have used different versions of the Hinkson Creek watershed boundary GIS shapefile to calculate acreage values in the draft TMDL.

Despite dataset differences, MDNR appears to have grouped the following landuse categories into a single “urban” category:

- 1993 MORAP landuse categories grouped as “urban” by MDNR:
 - Urban impervious
 - Urban vegetated
- 2005 MORAP landuse categories grouped as “urban” by MDNR:
 - Impervious
 - High intensity urban
 - Low intensity urban

By grouping 1993 and 2005 data in this manner, the draft TMDL infers that all urban landuses contribute equally to stormwater runoff. However, not all urban uses are equal and their impacts to stormwater runoff differ substantially. We also note that increases to “urban” area referenced in the TMDL are due to the definition of “low intensity urban” landuses. The 2005 MORAP metadata defines “low intensity urban” as “vegetated urban environments with a low density of buildings”. It is highly unlikely that “low intensity urban” landuses contribute to stormwater runoff with the same magnitude as “impervious” landuses.

Comment 3.B.2. The assertion that percent “urban” land cover increased approximately 160% from 1993 to 2005 is not supported by the underlying MORAP datasets.

The 2005 landuse category “low intensity urban” has no “urban” landuse counterpart in the 1993 dataset. We note that comparison of the 2005 MORAP dataset with aerial imagery indicates that “low intensity urban” is primarily residential land. Based on our aerial imagery analysis, we also note that residential land is generally *excluded* from any “urban” landuse category in the 1993 MORAP dataset. As further evidence, we performed a GIS spatial analysis of the MORAP datasets and found that the 2005 “low intensity urban” landuse was identified by any one of 10 different categories in 1993 (Exhibit 3). Of the 7,843 acres categorized as “low intensity urban” in 2005, non-“urban” landuses, as identified by the 1993 dataset, accounted for 6,450 acres (i.e., 82.2%). However, this does not indicate an actual increase in “urban” landuse as suggested in the draft TMDL. *Neighborhoods established well before 1993 are generally categorized as “cool-season grassland” or “deciduous forest” in the 1993 dataset.* Again, as noted above, few

We note that MDNR did not consider 1976 landuse GIS data as part of the TMDL. Landuse data provided by MDNR suggests there were approximately 6,978 urban acres within the Hinkson Creek watershed in 1976, whereas the draft TMDL suggests there were approximately 4,527 urban acres in 1993. There was likely no such decrease in urban landuse, but further underscores the questionable validity of available landuse datasets in establishing meaningful time-trends.

Comment 3.B.4. Inconsistencies between the MORAP datasets suggests inaccuracies and lack of comparability.

We note that Tables 1 and 2 in the draft TMDL suggest that open water acreage within the Hinkson Creek TMDL increased from 422 to 1,439 acres from 1993 to 2005. Closer inspection of the data and associated metadata suggests this does not represent an actual increase in open water acreage, but rather improved techniques for classifying waters between 1993 and 2005. Although the datasets suggest an increase of approximately 240% in open waters, in actuality there was likely no change. *This illustrates that landuse data digitized under different methodologies are not comparable.*

3.C. BIOLOGICAL ANALYSIS AND IMPLEMENTATION

Comment 3.C.1 Historical biological community health is not documented in the TMDL.

Throughout this TMDL document, an assumption has been made that the biological community was attaining the beneficial use prior to increased urbanization and that restoring hydrology to historical levels will restore biological health. There is really not much evidence that this was the case in the 1960-1990 period. The biological health of Hinkson Creek has not been adequately documented for this time period and anecdotal evidence suggests that the water quality and biological health of Hinkson Creek was poor and has improved considerably since the 1960's. MDNR should investigate their own records for water quality and biological data collected during this time period. We note that approximately 53 WWTFs historically discharged within

guidance and the technical literature. Adams (2003) offers several criteria useful in establishing causation between stressors and observed effects.

Comment 3.C.3. Biomonitoring endpoints should serve as the primary TMDL target.

The TMDL document suggests that a 50.5% reduction in stormwater runoff is required to attain acceptable protection of the biological community (Page 27, Table 12). If a linkage between stormwater runoff and the biological community does exist we question whether a 50.5% reduction or some other value would be required to achieve a fully supporting biological community based on macroinvertebrate data collected since 2001. *This further suggests that achieving a fully supporting biological community should be the primary water quality target rather than a reduction of stormwater input, since aquatic life impairment is the driver for placement of Hinkson Creek on the impaired waters list.* On Page 11, Section 2.6, 2nd paragraph of the Hinkson Creek TMDL it says that “Federal regulation also states that TMDLs may be established using a biomonitoring approach as an alternative to the pollutant-by-pollutant approach [40 CFR 130.7 (c)(1)].” Again, it is unclear to us why biomonitoring is not the primary water quality target instead of a technically unsupported runoff reduction.

Comment 3.C.4. The biological community in Hinkson Creek may not be currently impaired.

With the exception of the spring of 2002 assessment, macroinvertebrate samples collected by MDNR have shown the urban portion of Hinkson Creek to be *fully supporting or very nearly so each time the biological community has been evaluated* (MDNR 2002, 2004, and 2006). The last comprehensive investigation of the macroinvertebrate community was conducted by MDNR in the fall of 2001 and spring of 2002. To our knowledge the last macroinvertebrate sampling of any kind was performed by MDNR in the spring of 2006, nearly 4 years ago. We believe that a more methodical investigation into the biological community is warranted to better understand the biological health of Hinkson Creek.

Comment 3.C.5. Several significant differences exist between the Hinkson Creek TMDL and the Potash Brook template.

The Potash Brook TMDL has been cited as an example of a TMDL that has successfully used storm flow as a surrogate for multiple impairments. As such, this approach is being used as a template for the Hinkson Creek TMDL. However, there are several major differences between the two watersheds that must be recognized. Potash Brook is a 7.1 mi² watershed compared to Hinkson Creek which is approximately 90 mi². Potash Brook has a heavily impaired aquatic community as opposed to Hinkson Creek, which regularly is found to be between fully supporting and partially supporting. Are there lessons to be learned in the Potash Brook TMDL? Have the runoff reduction targets been achieved, and if so, has the biological community been restored as a result?

Comment 3.C.7. Biomonitoring scores cited in the TMDL should be corrected

The Missouri Stream Condition Index (MSCI) scores in the TMDL (Page 8, Table 3) contains some errors and inconsistencies with previously published aquatic macroinvertebrate data in addition to those in italics that were recalculated based on more recent reference stream sampling. The largest error is the fall 2001 Rogers Road site (#8) which was changed from an MSCI score of 12 in the original report MDNR (2002) to a 16 in the TMDL report based on the recalculation using more current reference stream data. This analysis appears to be an error. The Rogers Road site remains a 12 even when compared to the new data. It is interesting to note that during the fall of 2001, the Walnut Street site (#6) scored better in 3 of the 4 individual metrics than the Rogers Road site (#8) even though its MSCI score is listed as 12 as opposed to the 16 listed for Rogers Road in this TMDL.

Another example is the Scott Road site (#1) of the fall 2001 survey. The recalculated MSCI score is 14 when it should correctly be scored as a 16 given in the original MDNR report (MDNR 2002). As noted in Table 3 (page 8) some of these changes were made due to rescoring, but at least some of the errors are a result of Metric Value assignment (5, 3, 1) based on the 25th percent quartile value and the bisection value. We therefore recommend that these scores be reevaluated to ensure their correctness.

Comment 3.C.8. Rescoring historic biomonitoring data is not appropriate.

Rescoring of historic data based on more recent sampling of reference streams (TMDL Table 3, italics) is not appropriate in our opinion. It makes it extremely difficult, if not impossible, to make impairment decisions that could change based on data that will be collected in the future. Study streams should be evaluated based upon the scoring criteria that are in effect at the time of sampling. For example, MSCI scores determined in the fall of 2001 should be assessed based on the reference stream criteria that were available and in effect in 2001. Changing or updating scores increases the likelihood of circular use attainment decision. For example, Rogers Road, (site #8) was not impaired in Fall 2001, but could be interpreted as impaired based on re-scoring the information collected in the Spring of 2002. This would clearly make impairment determinations difficult at best, especially of streams that regularly hover near the border between partially and fully supporting (14-16).

We strongly recommend that any given stream be scored based on the reference stream scoring criteria that is available at the time of sampling, and as scoring criteria for reference streams changes as a result of the collection of additional data, then only new data collected on study streams be appropriately compared to the new scoring criteria. Included below as Exhibit 4 is a table containing MSCI scores that we believe to be correct and consistent with previous reported results.

Exhibit 4. Corrected Missouri Stream Condition Indices for Hinkson Creek.

Several times throughout the draft TMDL document (e.g., Section 2.6, Section 4.5, Section 11), MDNR suggests that peak storm flow runoff volume reductions will result in increased baseflows and higher dissolved oxygen concentrations during baseflow periods. On page 11, MDNR states the following:

“water quality studies did reveal, however, that a large percentage of the problems noted above, including increased sediment and low dissolved oxygen at low flows, can be attributed to urban runoff conditions which result in excessive stormwater runoff and lower than normal baseflow conditions.”

MDNR has offered no data to support the claim that “lower than normal” baseflows are directly caused by urban runoff conditions. In fact Schuler (1994, page 2), a paper which is cited in the draft TMDL, states that actual data have demonstrated that this is rarely the case. Furthermore, MDNR’s assumption that low dissolved oxygen concentrations indirectly result from urban runoff conditions is unsubstantiated. As MDNR is aware, recently collected continuous data demonstrated that prolonged periods of low dissolved oxygen (below 5.0 mg/L) occur in several Missouri reference stream reaches during baseflow conditions. As reference stream reaches represent the “best available representatives of ecoregion waters in a natural condition with respect to habitat, water quality, biological integrity and diversity, watershed landuse, and riparian conditions” (10 CSR 20-7.031(1) (U)), *it is unclear why MDNR believes that baseflow dissolved oxygen concentrations in Hinkson Creek can improve to acceptable levels when it has been demonstrated that baseflow dissolved oxygen conditions in reference streams cannot.*

Comment 3.C.11. Physical habitat limitation should be explored as a causal variable.

Habitat quality limits the biological potential for streams and rivers (Rabeni 2000). Reduced habitat quality within urban stream reaches is well documented in literature (Booth and Jackson 1997, among others). According to MDNR standard operating procedures (SOPs), habitat quality is measured during bioassessments. Furthermore, SOPs stipulate that habitat quality scores for study streams (e.g. Hinkson Creek) must be within a specified percentage of reference stream habitat scores, otherwise application of biocriteria to study streams is unjustified (i.e. habitat limited). Habitat limitation appears to offer a plausible explanation of periodically lowered macroinvertebrate scores in Hinkson Creek. *However available habitat data do not appear to be evaluated to any substantive degree in the TMDL.* Restoration strategies leading to improved habitat quality may differ from the volume reduction approach recommended in the TMDL.

- High groundwater table
- Permeability of soils
- Limited pervious space availability
- Limited areas for evapotranspiration in dense developed areas
- Desirability of dense development vs. sprawl
- Potential for water balance issues and un-natural baseflow impacts
- Lack of non-potable demand for harvested stormwater

For areas that are conducive to achieving volume losses, other site constraints may impact the practicability of implementing infiltration facilities due to the presence of existing infrastructure and location of available space relative to the tributary drainage area. The Mid-America Regional Council Manual of Best Management Practices for Stormwater Quality (MARC, 2009) recommends that infiltration basins have a maximum depth of 2 feet for an infiltration basin and 1 foot for a bioretention area. Therefore, when considering side slopes and pre-treatment requirements, between 2000 and 4000 square feet of land would likely be required per impervious acre. For the purposes of calculation, if we assume that the Hinkson Creek watershed is 20% urban and infiltration is feasible everywhere then 500 to 1000 acres of land would be needed to achieve the required volume reductions. This land would also need to be strategically located such that surface runoff could be routed by gravity; otherwise pump stations would be needed. According to the User's Guide to the BMP and LID Whole Life Cost Models (WERF, 2009), curb-contained bioretention systems without underdrains cost approximately \$13 per square foot. Therefore, the capital costs associated with retrofitting the entire watershed with bioretention facilities could be as high as \$500M. Additional costs could be incurred if pump stations or larger storage facilities are needed or if significant infrastructure conflicts arise.

For agricultural areas, infiltration facilities may be more attractable than bioretention facilities. However, the feasibility of achieving volume reductions in the agricultural areas is even more uncertain than it is for urban areas. Agricultural lands generally have very low imperviousness such that runoff and shallow subsurface interflow typically only occurs when the soils become saturated.

During these conditions infiltration rates would be expected to be reduced and infiltration basins would need to be sized to retain stormwater for longer periods of time in order to reduce volumes.

REFERENCES

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Water Environment Research Foundation (WERF), 2009. *User’s Guide to the BMP and LID Whole Life Cost Models*. WERF Project No. SW2R08.

MAY 14 2010

PLEASE REMIT PAYMENT TO:
5901 Broken Sound Parkway, Suite 300
Boca Raton, Florida 33487-2775 USA
Tel (561) 995-0900 Fax (561)995-0925

BOONE COUNTY PUBLIC WORKS
5551 Highway 63 South
Columbia, MO 65201-9711

Invoice #: 1810469
Project: MOW5240
Project Name: HINKSON CREEK MS4 REVIEW

Attention: DERIN CAMPBELL, P.E.

Invoice Date: 5/11/2010

For Professional Services Rendered through transaction date: 4/25/2010

PROFESSIONAL SERVICES \$9,686.75

TOTAL AMOUNT \$9,686.75

AMOUNT PAYABLE PER CLIENT:

BOONE COUNTY PUBLIC WORKS	\$9,686.75
CITY OF COLUMBIA	\$4,846.00

Statement

Prior Billings	\$0.00	Project Budget	\$14,538.00
Current Invoice	\$14,532.75	Billed to Date	\$14532.75
Billed To Date	\$14,532.75	Contract Balance	\$5.25
Paid To Date	\$0.00	**Amount Due This Invoice	\$14,532.75

*OK to pay & close
Georganne
Bowman
6/4/10*

Phase : 10) REVIEW AVAILABLE DATA

<u>Class / Employee Name</u>	<u>Date</u>	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
ADMINISTRATIVE ASSISTANT				
LYCKE, SUKI	04/05/2010	0.50	52.00 ✓	26.00
PIF, Project assistance				
PROFESSIONAL				
CHRISTIANSEN, JOHN	04/16/2010	0.25	125.00 ✓	31.25
Internal discussions on comment letter.				
PROJECT PROFESSIONAL				
LEISENRING, MARC	04/06/2010	4.00	145.00 ✓	580.00
Reviewed TMDL and background data				
	04/08/2010	4.00	145.00	580.00
Begin drafting comments				
	04/09/2010	8.00	145.00	1,160.00
Drafting comments				
	04/11/2010	2.00	145.00	290.00
Drafting comments				
	04/12/2010	5.00	145.00	725.00
Finalized comments on feasibility				
ZELL, CHRIS	03/31/2010	0.50	145.00	72.50
	04/01/2010	3.50	145.00	507.50
	04/02/2010	7.00	145.00	1,015.00
	04/08/2010	0.75	145.00	108.75
TMDL Review Coordination				
	04/09/2010	0.50	145.00	72.50
Project Coordination w/ DC, RC				
	04/12/2010	2.25	145.00	326.25
TMDL review coordination				
	04/13/2010	5.00	145.00	725.00
TMDL review coordination				
	04/14/2010	6.00	145.00	870.00
comment development				
	04/16/2010	1.50	145.00	217.50
comment coordination				
	04/17/2010	6.25	145.00	906.25
comment memorandum review				
	04/19/2010	0.75	145.00	108.75
project coordination				
	04/21/2010	3.00	145.00	435.00
Finalize Memo				
Total: PROJECT PROFESSIONAL		60.00		8,700.00
SENIOR PROFESSIONAL				
CRAWFORD, RANDY	04/01/2010	2.00	162.00 ✓	324.00
kickoff meeting prep				
	04/02/2010	2.00	162.00	324.00
kickoff meeting				

Phase: 10) REVIEW AVAILABLE DATA

<u>Class / Employee Name</u>	<u>Date</u>	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
SENIOR PROFESSIONAL				
CRAWFORD, RANDY	04/05/2010	3.00	162.00	486.00
review comments				
draft comments	04/06/2010	2.00	162.00	324.00
Hink bug data review	04/07/2010	1.00	162.00	162.00
TMDL reveiw comments	04/08/2010	6.00	162.00	972.00
TMDL review comments	04/09/2010	6.00	162.00	972.00
draft memo review	04/15/2010	0.25	162.00	40.50
review comments	04/16/2010	0.50	162.00	81.00
Total: SENIOR PROFESSIONAL		<u>22.75</u>		<u>3,685.50</u>
PRINCIPAL				
STRECKER, ERIC W	04/16/2010	2.00	190.00	380.00
	04/17/2010	2.00	190.00	380.00
STOBER, TRENT	04/02/2010	2.50	190.00	475.00
Meeting with County, City and UMC				
Comment memo review and edits	04/15/2010	1.50	190.00	285.00
Review and edits to comment letter, call to Strecker	04/16/2010	3.00	190.00	570.00
Total: PRINCIPAL		<u>11.00</u>		<u>2,090.00</u>
Total Phase:	10) REVIEW AVAILABLE DATA		Phase Labor	14,532.75

Total Project Labor 14,532.75

Total Project: MOW5240 -- HINKSON MS4 REVIEW 14,532.75

ACCT. PAYABLE



NO 158342

DATE 6/09/2010

NINE THOUSAND SIX HUNDRED EIGHTY-SIX AND 75/100***** \$ *****9,686.75

VOID AFTER 180 DAYS

PAY TO GEOSYNTEC CONSULTANTS INC
THE ORDER 5901 BROKEN SOUND PKWY NW # 300
OF BOCA RATON, FL 33487-0000



PURCHASE VENDOR 13925 158342

INVOICE ORDER DESCRIPTION AMOUNT

1810469 2010 114 BOONE COUNTY PUBLIC WORKS 9,686.75

TOTAL *****9,686.75

April 8, 2011

Mr. Derin Campbell, P.E.
Boone County Public Works
5551 Highway 63 South
Columbia, MO 65201-9711


Re: Hinkson Creek MS4 Review Invoice

Dear Mr. Campbell,

At the request of Lathrop & Gage, TMDL services for the project Hinkson Creek MS4 Review were provided. Attached is an invoice for services rendered through 12/31/2010. Boone County Public Works is responsible for 1/3 of \$1,086.00.

Please let me know if you need further information. We greatly appreciate the opportunity to assist.

Very Truly Yours,



Trent Stober, P.E.
Principal

Final Memorandum

Date: 30 November 2010
To: Georganne Bowman, Boone County Public Works
Tom Wellman, Public Works Department, City of Columbia, MO
Todd Houts, University of Missouri
From: Trent Stober, P.E., Geosyntec Columbia, MO
Subject: Technical Evaluation of Draft Hinkson Creek Total Maximum Daily Load (TMDL)

A Municipal Separate Storm Sewer System (MS4) permit is jointly held by the City of Columbia, MO, Boone County, and the University of Missouri. At the request of MS4 co-permittees, Geosyntec conducted a third-party technical review of the methods and approaches used in developing the TMDL. This memorandum conveys conclusions and specific comments identified during our review.

1. SUMMARY OF FINDINGS

Aquatic communities inhabiting streams and rivers flowing through urban areas are exposed to a variety of stressors that are either not present in undeveloped landscapes, or occur less frequently. Measures of aquatic community health and biologic integrity have been negatively correlated with impervious area metrics (Miltner et al. 2003, Schuler 1994, Klein 1979). However, as Adams (2003) points out, statistically significant correlation does not establish causation.

In order to meet mandated TMDL development timelines, the U.S. Environmental Protection Agency (USEPA) is required to move forward with establishing a TMDL for Hinkson Creek. The draft TMDL currently on Public Notice prescribes a significant catchment-wide reduction in runoff as a surrogate for a stressor-effect relationship that USEPA has been unable to establish or quantify. In general, our review finds that runoff reduction targets cited in the TMDL are not well supported and are ambitious, given the uncertainty of key technical linkages. Uncertainties identified in our review include but are not limited to:

that changes in farming practices or climatic patterns have influenced hydrograph and flow-duration characteristics?

We also request explanation of the following period-of-record related comments and observations:

- In Table 9, precipitation and flow statistics for 1967 and 2007 are compared for the April 1 – July 31 period. Why are only 4 out of 12 months of available data being used to describe precipitation and runoff? Should USEPA believe that conclusions drawn from fall biological surveys are relevant in assessing use attainment in Hinkson Creek, it would seem appropriate that flow data collected in the late summer/ fall season also be incorporated into hydrologic analyses and comparisons. How do we know that antecedent precipitation regimes did not influence the results of a 4-month comparison? Furthermore, as precipitation and streamflow data often do not follow a normal statistical distribution, we question the use of the arithmetic means to describe central tendencies. If the period of record is expanded to all available and comparable months for 1967 and 2007 (March 11 – December 31, n=296), we note that the median, geometric mean, and cumulative Period of Record (POR) streamflow values for 1967 (median=5.75 cfs) are greater than values for 2007 (median= 3.05 cfs). Side-by-side boxplots of the two data sets (Exhibit 1) indicate both years have very skewed daily average flows, *which suggests that the arithmetic mean is a biased estimator* and the median is a more appropriate metric of the central tendency of data. More importantly, the medians are not statistically different from each other based on the non-parametric Mann-Whitney test ($p=0.95$).

The lack of statistical difference between the median daily average flow for 1967 and 2007 indicates that *the data do not support the claim that the flow regime in the creek has been significantly changed*. It is not clear why a truncated period of record was selected.

Comment 2.A.2. Reductions in runoff may not proportionally reduce unidentified pollutant loading.

Understanding pollutant generation, transport, and delivery processes are necessary in developing effective control and restoration measures. Application of a catchment-wide surrogate for a pollutant is likely to yield unintended consequences. Reducing runoff volume (transport medium) on a basin-wide basis infers that beneficial uses as measured by macroinvertebrate scores respond in a continuous, linear, and negative manner to pollutant load. However, toxicological responses are frequently concentration-driven, often threshold in nature (not continuous), and may be non-linear (sigmoid).

If periodically lower biological metrics are the result of discrete activities that have been remediated or abated, such as chloride wash-off from road salt storage facilities, how will basin-wide runoff reductions improve ecological health? Furthermore, if impacts were related to chloride or other 'urban' contaminants, how will reducing runoff from agricultural land benefit biological scores?

Many contaminants may be transported by fine sediment in the adsorbed phase. Although not documented, contaminated sediments could be a critical exposure pathway for macroinvertebrate communities in Hinkson Creek. Adsorbed pollutants are subject to sediment transport and delivery phenomena that can operate at timescales much slower than the Hinkson Creek study period (2001 – 2006). It is possible, but uncertain, that biological scores may have been affected by contaminated sediment generated several years ago that is now being released from storage and delivered to the Hinkson Creek channel. *We note that Missouri Department of Natural Resources (MDNR) survey reports suggest that evaluating the effects of sediment should be considered in subsequent investigations.* Where contaminated sediment may represent a significant exposure pathway, the role of sediment budgeting techniques (Walling and Owens 2003, Walling 1999) may be useful during TMDL re-analysis.

Comment 2.A.3. The runoff reduction approach does not adequately consider groundwater delivery processes or alterations in the water balance.

The runoff reduction approach posed by the TMDL does not adequately consider fate and transport of pollutants that may contaminate groundwater in urban areas. For example, if the unidentified pollutant(s) are discharged from groundwater sources during baseflow conditions then reducing runoff volumes could potentially increase overall in-stream concentrations.

In addition, increasing infiltration in areas where soils are contaminated, or where known up-gradient plumes occur, could in fact cause an increase in pollutant(s) reaching Hinkson Creek.

Reducing storm water runoff to achieve historical streamflow patterns from the 1960s is an incomplete approach and does not consider the water balance as a whole. To achieve streamflow characteristics from the 1960's, we may actually have to infiltrate volumes of water that exceed

Despite dataset differences, USEPA appears to have grouped the following landuse categories into a single “urban” category:

- 1993 MORAP landuse categories grouped as “urban” by USEPA:
 - Urban impervious
 - Urban vegetated
- 2005 MORAP landuse categories grouped as “urban” by USEPA:
 - Impervious
 - High intensity urban
 - Low intensity urban

By grouping 1993 and 2005 data in this manner, the draft TMDL infers that all urban landuses contribute equally to stormwater runoff. However, not all urban uses are equal and their impacts to stormwater runoff differ substantially. We also note that increases to “urban” area referenced in the TMDL are due to the definition of “low intensity urban” landuses. The 2005 MORAP metadata defines “low intensity urban” as “vegetated urban environments with a low density of buildings”. It is highly unlikely that “low intensity urban” landuses contribute to stormwater runoff with the same magnitude as “impervious” landuses.

Comment 2.B.2. The assertion that percent “urban” land cover increased approximately 160% from 1993 to 2005 is not supported by the underlying MORAP datasets.

The 2005 landuse category “low intensity urban” has no “urban” landuse counterpart in the 1993 dataset. We note that comparison of the 2005 MORAP dataset with aerial imagery indicates that “low intensity urban” is primarily residential land. Based on our aerial imagery analysis, we also note that residential land is generally *excluded* from any “urban” landuse category in the 1993 MORAP dataset. As further evidence, we performed a GIS spatial analysis of the MORAP datasets and found that the 2005 “low intensity urban” landuse was identified by any one of 10 different categories in 1993 (Exhibit 3). Of the 7,843 acres categorized as “low intensity urban” in 2005, non-“urban” landuses, as identified by the 1993 dataset, accounted for 6,450 acres (i.e., 82.2%). However, this does not indicate an actual increase in “urban” landuse as suggested in the draft TMDL. *Neighborhoods established well before 1993 are generally categorized as “cool-season grassland” or “deciduous forest” in the 1993 dataset.* Again, as noted above, few if any residential neighborhoods are identified under any “urban” category in the 1993 dataset. Therefore, it may not be appropriate to draw any conclusions regarding urban area increases attributed to the 2005 “low intensity urban” landuse category.

Comment 2.B.4. Inconsistencies between the MORAP datasets suggests inaccuracies and lack of comparability.

We note that Tables 1 and 2 in the draft TMDL suggest that open water acreage within the Hinkson Creek TMDL increased from 422 to 1,439 acres from 1993 to 2005. Closer inspection of the data and associated metadata suggests this does not represent an actual increase in open water acreage, but rather improved techniques for classifying waters between 1993 and 2005. Although the datasets suggest an increase of approximately 240% in open waters, in actuality there was likely no change. *This illustrates that landuse data digitized under different methodologies are not comparable.*

2.C. Biological Analysis and Implementation

Comment 2.C.1 Historical biological community health is not documented in the TMDL.

Throughout this TMDL document, an assumption has been made that the biological community was attaining the beneficial use prior to increased urbanization and that restoring hydrology to historical levels will restore biological health. There is really not much evidence that this was the case in the 1960-1990 period. The biological health of Hinkson Creek has not been adequately documented for this time period and anecdotal evidence suggests that the water quality and biological health of Hinkson Creek was poor and has improved considerably since the 1960's. MDNR and USEPA should investigate their own records for water quality and biological data collected during this time period. We note that approximately 53 WWTFs historically discharged within the Hinkson Creek watershed and that agricultural practices may have changed in the past 50 years.

Comment 2.C.2. The return interval targeted by the TMDL does not establish a linkage with the beneficial use.

Although the use of a surrogate measure (reference stream flow duration targets/storm water runoff volume) for "pollutants" has merit in specific and targeted situations where multiple stressors exist, we believe that a TMDL must ultimately be linked to the protection of a beneficial use. For example, in the Potash Brook TMDL (VTDEC 2006) performed by the Vermont Department of Environmental Conservation, such a link was established. A stream geomorphic data assessment of Potash Brook performed in 2005 documented "less than stable" in-stream sediment conditions that provide the link to the impaired biotic community. The Potash Brook TMDL has been cited by USEPA as an example of a TMDL that has successfully used stormflow as a surrogate for multiple impairments. *We note that a link between Missouri attainment stream return intervals and biological endpoints has not been established.*

Comment 2.C.4. The biological community in Hinkson Creek may not be currently impaired.

With the exception of the spring of 2002 assessment, macroinvertebrate samples collected by MDNR have shown the urban portion of Hinkson Creek to be *fully supporting or very nearly so each time the biological community has been evaluated* (MDNR 2002, 2004, and 2006). The last comprehensive investigation of the macroinvertebrate community was conducted by MDNR in the fall of 2001 and spring of 2002. To our knowledge the last macroinvertebrate sampling of any kind was performed by MDNR in the spring of 2006, nearly 4 years ago. We believe that a more methodical investigation into the biological community is warranted to better understand the biological health of Hinkson Creek.

Comment 2.C.5. Several significant differences exist between the Hinkson Creek TMDL and the Potash Brook template.

The Potash Brook TMDL has been cited as an example of a TMDL that has successfully used storm flow as a surrogate for multiple impairments. As such, this approach is being used as a template for the Hinkson Creek TMDL. However, there are several major differences between the two watersheds that must be recognized. Potash Brook is a 7.1 mi² watershed compared to Hinkson Creek which is approximately 90 mi². Potash Brook has a heavily impaired aquatic community as opposed to Hinkson Creek, which regularly is found to be between fully supporting and partially supporting. Are there lessons to be learned in the Potash Brook TMDL? Have the runoff reduction targets been achieved, and if so, has the biological community been restored as a result?

Comment 2.C.6. The attainment stream selection process cited in the TMDL is questionable.

The second paragraph of Section 4.6 in the TMDL ('Setting the Water Quality Targets') states that "The instream water quality target for the TMDL is the high flow category of the FDC developed from the biological reference streams." This approach is similar to that used in the Potash Brook TMDL.

The Potash Brook TMDL states that the use of "attainment" streams as opposed to "reference" streams is used "because reference tends to imply that the ultimate goal for the impaired stream approaches pristine. Instead, the attainment watershed(s), while meeting or exceeding the Vermont water quality standards criteria for aquatic life, should contain some level of development in order to better approximate the true ecological potential of the impaired stream." This use of "attainment streams" gave recognition to the fact that highly developed watersheds would not be expected to attain reference conditions.

A fairly rigorous approach was used for the selection of attainment streams by the Vermont Department of Environmental Conservation using an analysis described in Foley and Dowden

Following are the MSCI scores that we believe to be correct and consistent with previous reported results:

- Fall 2001
 - Site 2 should be 18.
 - Site 1 should be 16.
- Spring 2002
 - Site 8 should be 18.
- Fall 2005
 - Site 6 should be 18.
 - Site 5.5 should be 14.
- Spring 2006
 - Site 2 should be 14.

Based on our interpretation of the biomonitoring results when the correct (see above) MSCI scores are applied, the upstream sites (sites 7 and 8) score as fully supporting 78% (7 of 9) of the time. The lower Hinkson sites (sites 1-6) scored as fully supporting 52 % (13 of 25) of the time. It should be noted, however, that following the spring 2002 sampling event the MSCI scores within the urbanized portion of Hinkson Creek have been fully supporting nearly 70% of the time. This is *quite comparable* to MDNR's TMDL web page¹ which indicates that reference streams in this Ecological Drainage Unit score as fully supporting approximately 75-80% of the time.

Additionally, it is not clear why USEPA is targeting a higher biocriteria attainment frequency (100%, page 36) than what is typically achieved in reference streams. *A 100% attainment frequency for Hinkson Creek is unrealistic and not supported by MDNR biocriteria guidance.*

Comment 2.C.8. The spring 2002 biomonitoring dataset may be an anomaly.

The spring 2002 sampling of macroinvertebrates seems to be the driver for the determination of impairment in the urban portion of Hinkson Creek. When compared to all of the other macroinvertebrate sampling events, the spring 2002 was the only sampling event that consistently showed MSCI scores below 16. It is possible that the 2002 sampling event was an anomaly. We recommend that a comprehensive bioassessment of Hinkson Creek similar to that conducted in 2001-2002 be performed to better assess the current status of the aquatic community.

¹ <http://www.dnr.mo.gov/env/wpp/waterquality/303d.htm>

2.D. IMPLEMENTATION FEASIBILITY

Comment 2.D.1. TMDL implementation feasibility is uncertain.

It is difficult to assess the feasibility and cost implications associated with meeting the TMDL. To attain TMDL flow targets, stormwater volumes will have to be reduced significantly. Currently, the Boone County Stormwater Ordinance requires that the runoff from 10% of the 1.3-inch water quality volume be permanently reduced. However, the Ordinance allows for a waiver of this requirement if there is a risk for groundwater contamination or site constraints make infiltration infeasible. *The TMDL does not provide any consideration for site constraints that may inhibit volume reductions.*

For many parts of the watershed and during many times of year the retention of large runoff volumes may not be feasible due to:

- High groundwater table
- Permeability of soils
- Limited pervious space availability
- Limited areas for evapotranspiration in dense developed areas
- Desirability of dense development vs. sprawl
- Potential for water balance issues and un-natural baseflow impacts
- Lack of non-potable demand for harvested stormwater

For areas that are conducive to achieving volume losses, other site constraints may impact the practicability of implementing infiltration facilities due to the presence of existing infrastructure and location of available space relative to the tributary drainage area. For agricultural areas, infiltration facilities may be more attractive than bioretention facilities. However, the feasibility of achieving volume reductions in the agricultural areas is even more uncertain than it is for urban areas. Agricultural lands generally have very low imperviousness such that runoff and shallow subsurface interflow typically only occurs when the soils become saturated.

During these conditions infiltration rates would be expected to be reduced and infiltration basins would need to be sized to retain stormwater for longer periods of time in order to reduce volumes.

MDNR 2006. Phase III, Hinkson Creek Stream Study, Boone County. Stream Survey Sampling Report, July 2005-June 2006. Missouri Department of Natural Resources, Jefferson City, MO. pp.32

Miltner, R.J., D. White, and C. Yoder. 2003. The biotic integrity of streams in urban and suburbanizing landscapes. *Landuse and Urban Planning*. 69. pp. 87-100.

Rabeni, C. 2000. Evaluating physical habitat integrity in relation to the biological potential of streams. *Hydrobiologia* 422/423: 245–256

Rabeni, Charles F., R.J. Sarver N. Wang, G. Wallace, M. “Weiland, and J. T. Peterson, 1997. *Biological Criteria for Streams of Missouri, A Final Report to the Missouri Department of Natural Resources from the Missouri Cooperative Fish and Wildlife Research Unit, 112 Stephens Hall, University of Missouri, Columbia, Missouri 65211.*

Schuler, T.R. 1994. The importance of imperviousness. *Watershed Protection Techniques*. 1. pp. 100- 111.

US Environmental Protection Agency (EPA). 2000. *Stressor Identification Guidance Document*. EPA/822/B-00/025. Office of Research and Development and the Office of Water, Washington, D.C.

VTDEC. 2006. *Total Maximum Daily Load to Address Biological Impairment in Potash Brook (VT05-11), Chittenden County, Vermont, October 2006*. Vermont Department of Environmental Conservation, pp.29.

Walling, D. and P. Owens. 2003. The role of overbank floodplain sedimentation in catchment contaminant budgets. *Hydrobiologia* 494: 83–91

Walling D., 1999. Linking landuse, erosion and sediment yields in river basins. *Hydrobiologia* 410: 223–240.

BOONE COUNTY PUBLIC WORKS
 5551 Highway 63 South
 Columbia, MO 65201-9711

Invoice #: 18112027
 Project: MOW5240
 Project Name: HINKSON CREEK MS4 REVIEW

Attention: DERIN CAMPBELL, P.E.

Invoice Date: 01/24/2011

For Professional Services Rendered through transaction date: 12/31/2010

PROFESSIONAL SERVICES \$1,086.00

TOTAL AMOUNT \$1,086.00

AMOUNT PAYABLE PER CLIENT:

BOONE COUNTY PUBLIC WORKS	\$362.00
CITY OF COLUMBIA	\$362.00
UNIVERSITY OF MISSOURI	\$362.00

Statement

Prior Billings	\$14,532.75	Project Budget	\$14,538.00
Current Invoice	\$1,086.00	Billed to Date	\$15,618.75
Billed To Date	\$15,618.75	Contract Balance	
Paid To Date	\$14,532.75	**Amount Due This Invoice	\$1,086.00

*OK to pay
 Georganne Bowman
 4/25/11
 2046-71101*

Phase : 20) EPA TMDL COMMENTS

<u>Class / Employee Name</u>	<u>Date</u>	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
SENIOR STAFF PROFESSIONAL				
CARANI, DAVID	11/29/2010	4.00	108.00 ✓	432.00
tmdl comment letter preparation				
	11/30/2010	0.50	108.00 ✓	54.00
tmdl comment letter preparation				
Total: SENIOR STAFF PROFESSIONAL		4.50		486.00
PROJECT PROFESSIONAL				
ZELL, CHRIS	11/29/2010	1.25	145.00 ✓	181.25
discussion with TS, DC: Hinkson TMDL				
	11/30/2010	1.25	145.00 ✓	181.25
Discussion with DC				
Total: PROJECT PROFESSIONAL		2.50		362.50
PRINCIPAL				
STOBER, TRENT	11/29/2010	1.00	190.00 ✓	190.00
Comment letter prep				
	11/30/2010	0.25	190.00 ✓	47.50
Reviewed comment letter				
Total: PRINCIPAL		1.25		237.50
Total Phase : 20) EPA TMDL COMMENTS			Phase Labor	1,086.00
			Total Project Labor	1,086.00
Total Project: MOW5240 -- HINKSON MS4 REVIEW				1,086.00

193 -2011

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

May Session of the April Adjourned

Term. 20 11

10th

May

11

In the County Commission of said county, on the

day of

20

the following, among other proceedings, were had, viz:

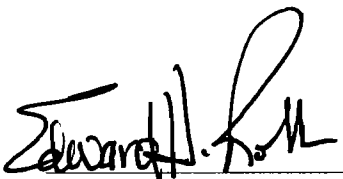
Now on this day the County Commission of the County of Boone does hereby approve the following budget amendment for covering the transfer of the excess tax maintenance fund balance to the general fund per RSMo 52.317:

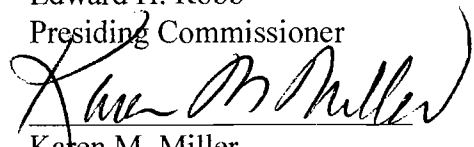
Department	Account	Department Name	Account Name	Decrease \$	Increase \$
2110	83917	Collector Tax Maint	OTO: To General Fund		66,693.00
1190	03917	Non-Departmental	OTI: From Special Rev		66,693.00

Done this 10th day of May, 2011.

ATTEST:


Wendy S. Noren
Clerk of the County Commission


Edward H. Robb
Presiding Commissioner


Karen M. Miller
District I Commissioner


Skip Elkin
District II Commissioner

REQUEST FOR BUDGET AMENDMENT

BOONE COUNTY, MISSOURI

RECEIVED

APR 19 2011

To: County Clerk's Office
Comm Order # 193-2011

Return to Auditor's Office
Please do not remove staple.

4-19-11

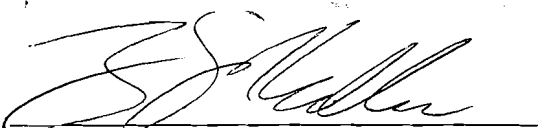
EFFECTIVE DATE

FOR AUDITORS USE

BOONE COUNTY AUDITOR

Department				Account					Department Name		Account Name		(Use whole \$ amounts)	
													Decrease	Increase
2	1	1	0	8	3	9	1	7	Collector Tax Maint	OTO: To General Fund		66,693.00		
1	1	9	0	0	3	9	1	7	Non-Departmental	OTI: From Special Rev		66,693.00		

Describe the circumstances requiring this Budget Amendment. Please address any budgetary impact for the remainder of this year and subsequent years. (Use attachment if necessary): **Covering the transfer of the excess tax maintenance fund balance to the general fund per RSMo 52.317**


Requesting Official

TO BE COMPLETED BY AUDITOR'S OFFICE

- A schedule of previously processed Budget Revisions/Amendments is attached.
- A fund-solvency schedule is attached. *N/A for GF*
- Comments:

Agenda


Auditor's Office


PRESIDING COMMISSIONER


DISTRICT I COMMISSIONER


DISTRICT II COMMISSIONER

BUDGET AMENDMENT PROCEDURES

- County Clerk schedules the Budget Amendment for a first reading on the commission agenda. A copy of the Budget Amendment and all attachments must be made available for public inspection and review for a period of at least 10 days commencing with the first reading of the Budget Amendment.
- At the first reading, the Commission sets the Public Hearing date (at least 10 days hence) and instructs the County Clerk to provide at least 5 days public notice of the Public Hearing. **NOTE: The 10-day period may not be waived.**
- The Budget Amendment may not be approved prior to the Public Hearing.

Tax Maintenance Fund-- Determination of Transfer of Fund Balance to General Fund

	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
Fund Balance Dec 31,	\$ 59,814	118,313	151,645	194,625	216,325	304,093	287,475	303,733	305,509
Maximum Fund Balance	148,438	163,300	171,104	180,758	194,841	220,679	228,293	231,341	238,817
Amount to be Transferred	<u>(88,624)</u>	<u>(44,987)</u>	<u>(19,459)</u>	13,867	21,484	83,414	59,182	72,393	66,693
	None	None	None	Transferred	Transferred	Transferred	Transferred	Transferred	Transferred

	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Approved Budget (with final revisions)	\$ 296,875	326,600	342,207	361,515	389,682	441,358	456,586	462,681	477,633
50% Max Fund Balance (RSMo 52.317)	148,438	163,300	171,104	180,758	194,841	220,679	228,293	231,341	238,817

Year	2010	Opening Balance	303,733.28
Fund	211 COLLECTOR TAX MAINTENANCE FUND	Actual YTD Credits	204,648.24
Object	2913 BEG FUND BAL (UNRESERVED)	Actual YTD Debits	202,872.38
Account Type	Q EQUITY		
Normal Balance	C CREDIT	Current Balance	305,509.14

Period	Debits	Credits	Current Balance
January			303,733.28
February			303,733.28
March			303,733.28
April			303,733.28
May			303,733.28
June			303,733.28
July			303,733.28
August			303,733.28
September			303,733.28
October			303,733.28
November			303,733.28
December			303,733.28
Post Closing	202,872.38	204,648.24	305,509.14

=Key Scr F3=Exit F5=Ledger Transactions F7=Transactions

Fund Statement - Tax Maintenance Fund 211 (Nonmajor)

	2009 Actual	2010 Budget	2010 Projected	2011 Budget
REVENUES:				
Property Taxes	\$ -	\$ -	\$ -	\$ -
Assessments	-	-	-	-
Sales Taxes	-	-	-	-
Franchise Taxes	-	-	-	-
Licenses and Permits	-	-	-	-
Intergovernmental	-	-	-	-
Charges for Services	178,406	190,985	185,542	187,397
Fines and Forfeitures	-	-	-	-
Interest	1,835	1,917	3,745	3,745
Hospital Lease	-	-	-	-
Other	-	-	-	-
Total Revenues	180,241	192,902	189,287	191,142
EXPENDITURES:				
Personal Services	-	39,743	26,250	1,956
Materials & Supplies	246	900	900	900
Dues Travel & Training	3,269	10,850	10,985	11,000
Utilities	-	-	-	-
Vehicle Expense	-	-	-	-
Equip & Bldg Maintenance	972	-	-	-
Contractual Services	75,366	105,750	112,482	143,200
Debt Service (Principal and Interest)	-	-	-	-
Emergency	-	-	-	-
Other	-	72,172	-	34,085
Fixed Asset Additions	24,947	1,272	1,270	-
Total Expenditures	104,800	230,687	151,887	191,141
REVENUES OVER (UNDER) EXPENDITURES	75,441	(37,785)	37,400	1
OTHER FINANCING SOURCES (USES):				
Transfer In	-	-	-	-
Transfer Out	(59,182)	-	(72,393)	(83,917)
Proceeds of Sale of Capital Assets/Insurance Claims/Capital Lease	-	-	-	-
Proceeds of Long-Term Debt	-	-	-	-
Retirement of Long-Term Debt	-	-	-	-
Total Other Financing Sources (Uses)	(59,182)	-	(72,393)	(83,917)
REVENUES AND OTHER SOURCES OVER (UNDER) EXPENDITURES AND OTHER USES (BUDGET BASIS)	16,259	(37,785)	(34,993)	(83,916)
FUND BALANCE (GAAP), beginning of year	287,474	303,733	303,733	268,740
Less encumbrances, beginning of year	-	-	-	-
Add encumbrances, end of year	-	-	-	-
FUND BALANCE (GAAP), end of year	\$ 303,733	\$ 265,948	\$ 268,740	\$ 184,824
FUND BALANCE RESERVES AND DESIGNATIONS, end of year				
Reserved:				
Loan Receivable (Street NIDS/Levy District)	\$ -	\$ -	\$ -	\$ -
Prepaid Items/Security Deposits/Other Reserves	-	-	-	-
Debt Service/Restricted Assets	-	-	-	-
Prior Year Encumbrances	-	-	-	-
Designated:				
Capital Project and Other	-	-	-	-
Total Fund Balance Reserves and Designations, end of year	-	-	-	-
FUND BALANCE, end of year	303,733	265,948	268,740	184,824
FUND BALANCE RESERVES/DESIGNATIONS, end of year	-	-	-	-
UNRESERVED/UNDESIGNATED FUND BALANCE, end of year	\$ 303,733	\$ 265,948	\$ 268,740	\$ 184,824

FY 2011
Budget Amendments/Revisions
Non-Departmental (1190)

Index #	Date Recd	Dept	Account	Dept Name	Account Name	\$Increase	\$Decrease	Reason/Justification	Comments
1	4/19/2011	2110	83917	Tax Maintenance	OTO: To General Fund	66,693		Establish budget for the transfer of excess tax maintenance funds to the General Fund	
		1190	3917	Non-Departmental	OTI: From Special Revenue	66,693			

4/25/2011

FY 2011
Budget Amendments/Revisions
Tax Maintenance (2110)

Index #	Date Recd	Dept	Account	Dept Name	Account Name	\$Increase	\$Decrease	Reason/Justification	Comments
1	1/27/2011	2110	86850	Tax Maintenance	Contingency		1,084	Move funds to cover cost of 2 Microsoft Office Professional Pro software licenses.	
		2110	91302	Tax Maintenance	Computer Software	1,084			
2	4/19/2011	2110	83917	Tax Maintenance	OTO: To General Fund	66,693		Establish budget for the transfer of excess tax	
		1190	3917	Non-Departmental	OTT: From Special Revenue	66,693		maintenance funds to the General Fund	